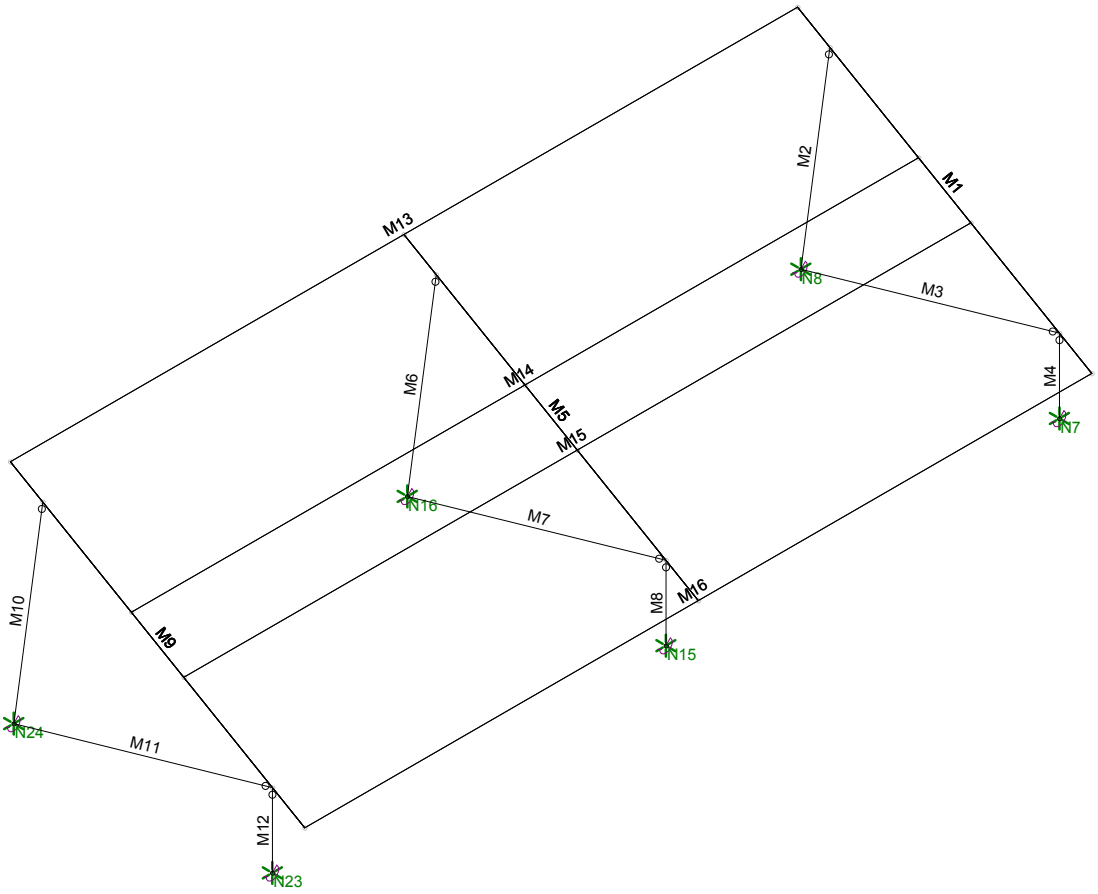


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

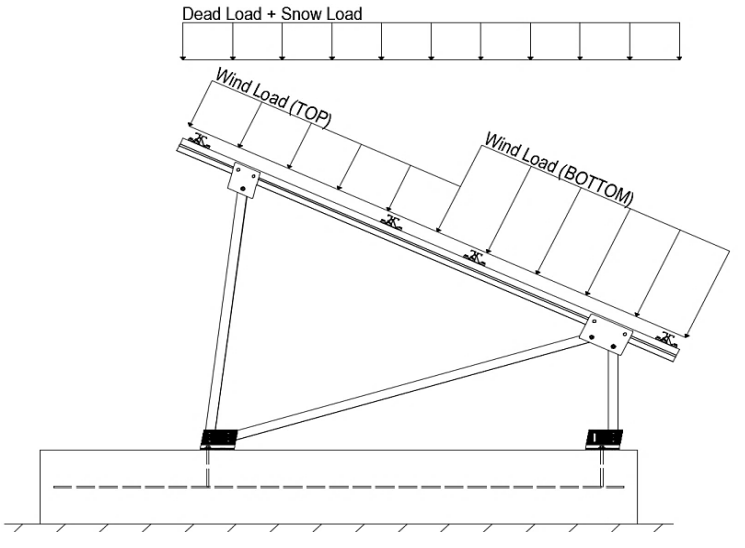
PV modules are required to meet the following specifications:

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

1.3 Technical Codes

- ASCE 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005



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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} =	3.00	psf	*Self-weight of the PV modules.*
g_{MIN} =	1.75	psf	

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	16.49	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.73		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	90	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	12.72	psf	*Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

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 + 0.8W	
1.2D + 1.6W + 0.5S	
0.9D + 1.6W [M]	
1.54D + 1.3E + 0.2S [R]	*(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E [R]	
1.54D + 1.25E + 0.2S [O]	
0.56D + 1.25E [O]	

Allowable Stress Design, ASD

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

1.0D + 1.0S	
1.0D + 1.0W	
1.0D + 0.75L + 0.75W + 0.75S	
0.6D + 1.0W [M]	*(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E [O]	
1.1785D + 0.65625E + 0.75S [O]	
0.362D + 0.875E [O]	

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M14	Mid-Top
M15	Mid-Bottom
M16	Bottom

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

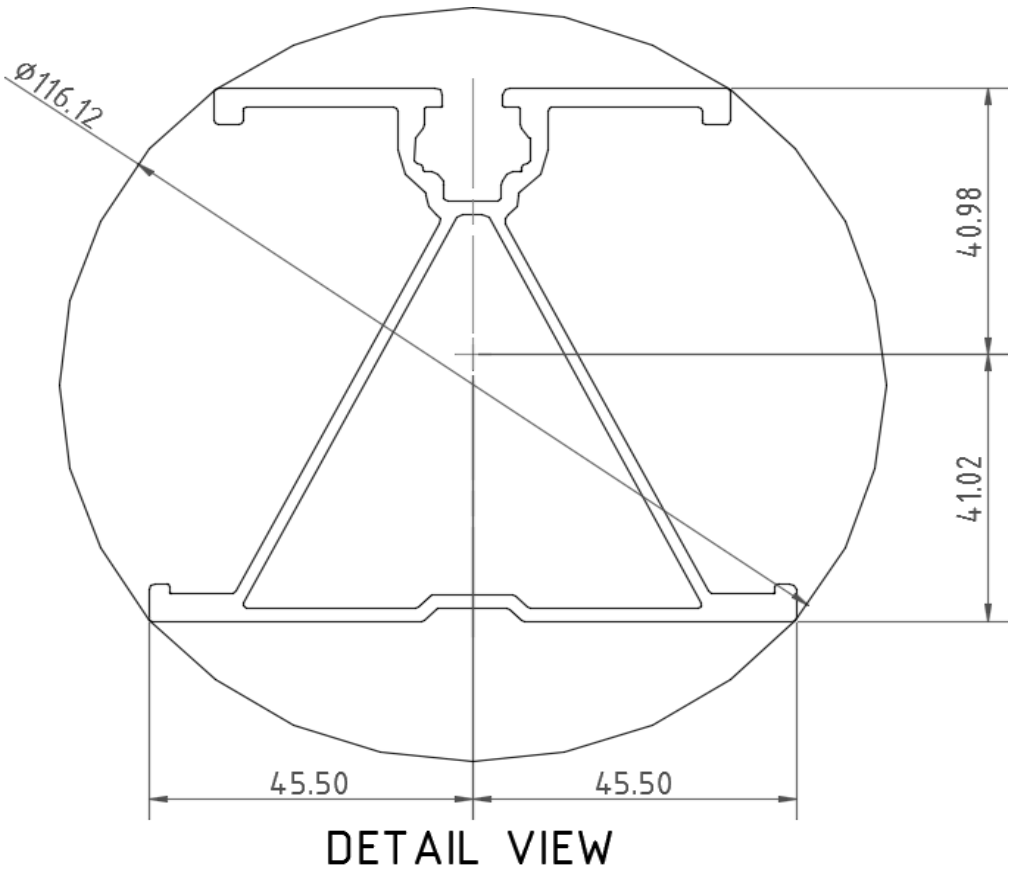
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

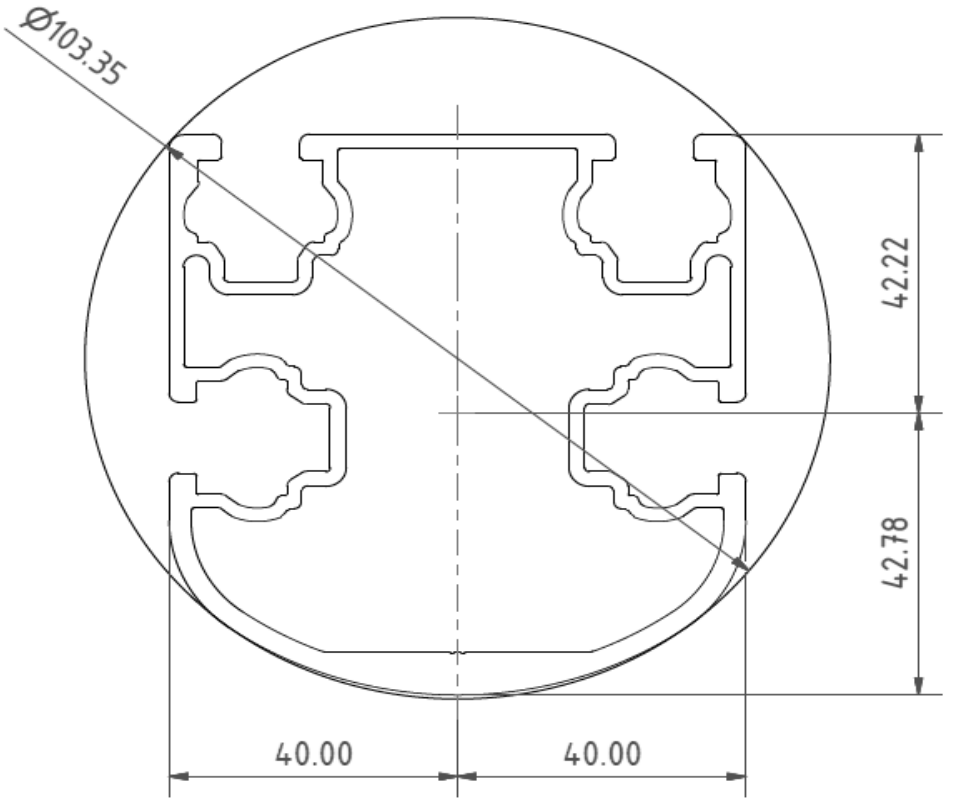
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	129	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.740	k-ft
M_z =	0.390	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	96%	



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).

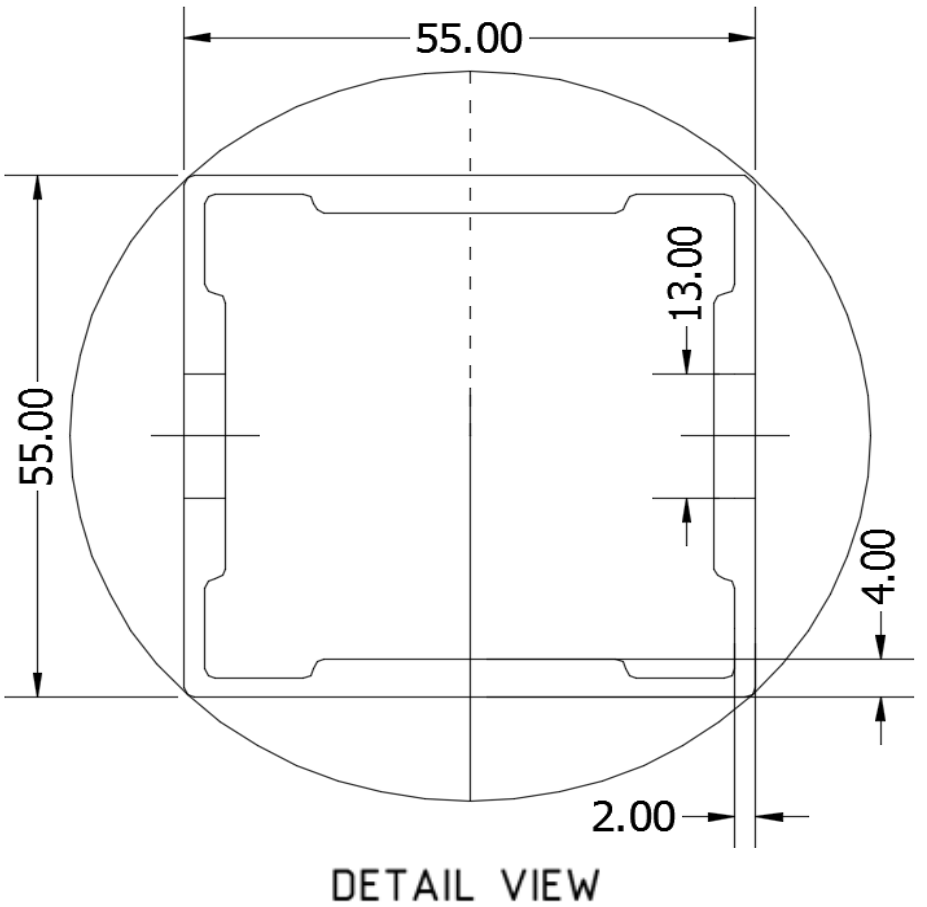
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.651	k-ft
M_z =	0.000	k-ft
P_n =	-0.697	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	78%	



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 =	2.677	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	

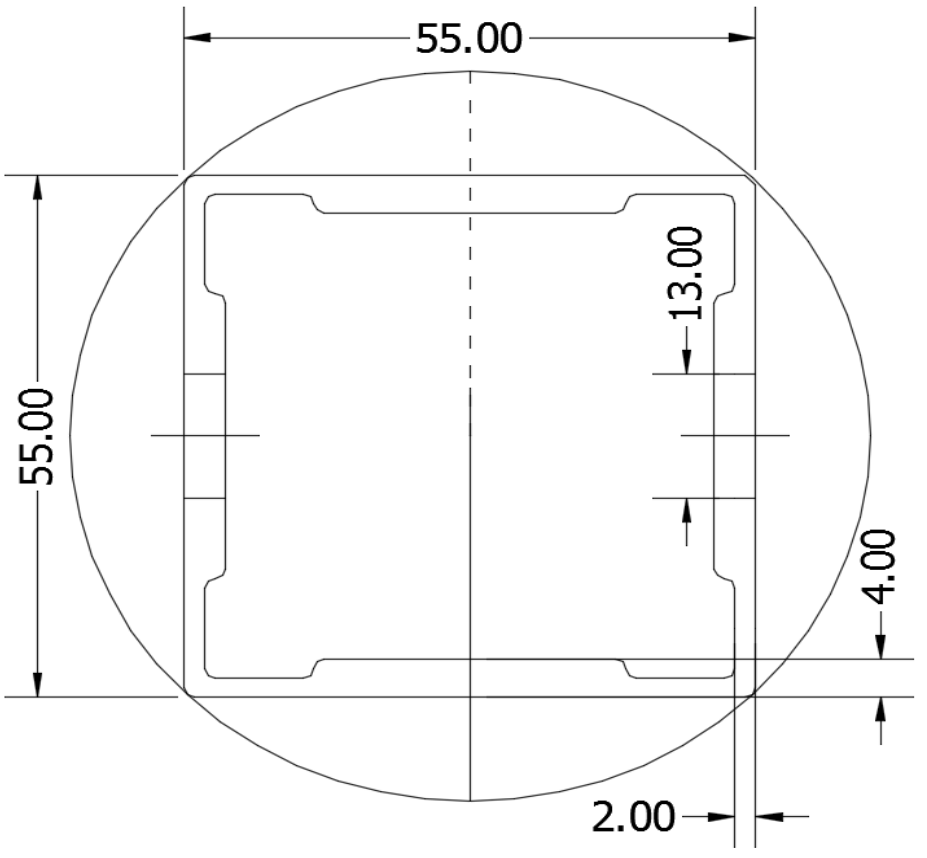


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.085	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	29%	

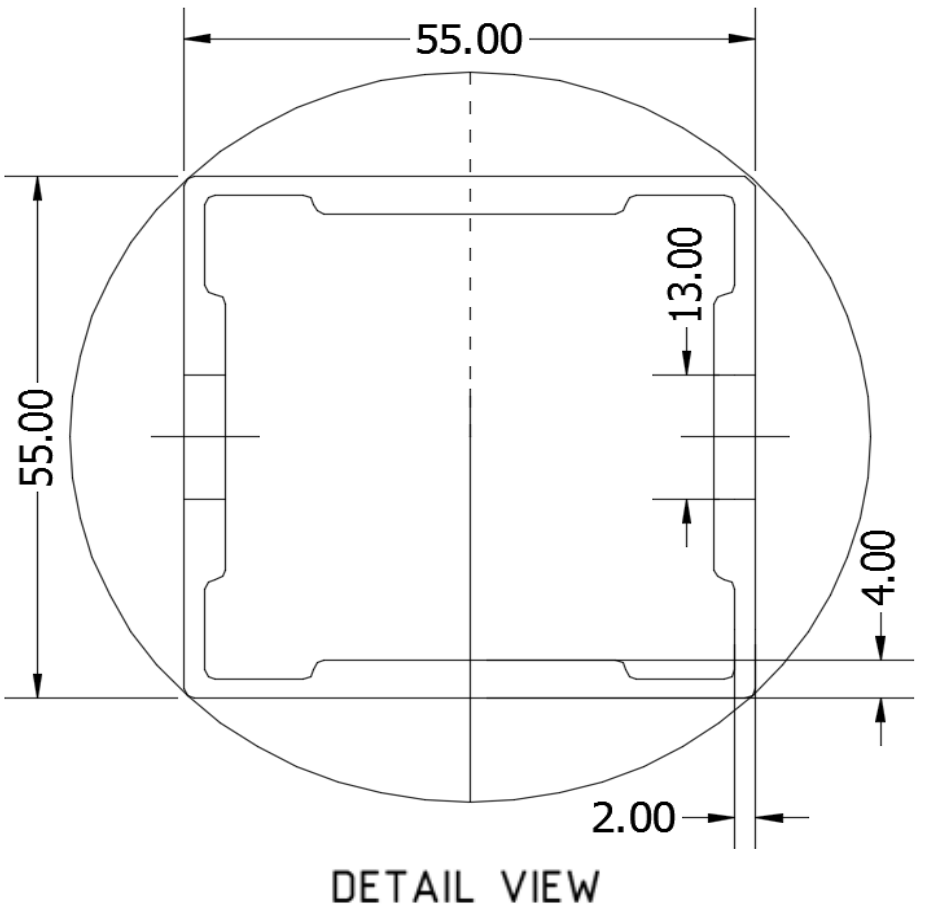


DETAIL VIEW

4.5 Rear Strut Design

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

Strut Type	=	**55x55**	
Aluminum Type	=	6105-T5	
F_{ty}	=	35	ksi
L_b	=	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	=	-0.008	k-ft
M_z	=	0.000	k-ft
P_n	=	2.913	k
$M_{y\ allowable}$	=	1.408	k-ft
$M_{z\ allowable}$	=	1.408	k-ft
$P_{n\ allowable}$	=	10.365	k
Utilization	=	29%	



5. FOUNDATION DESIGN CALCULATIONS

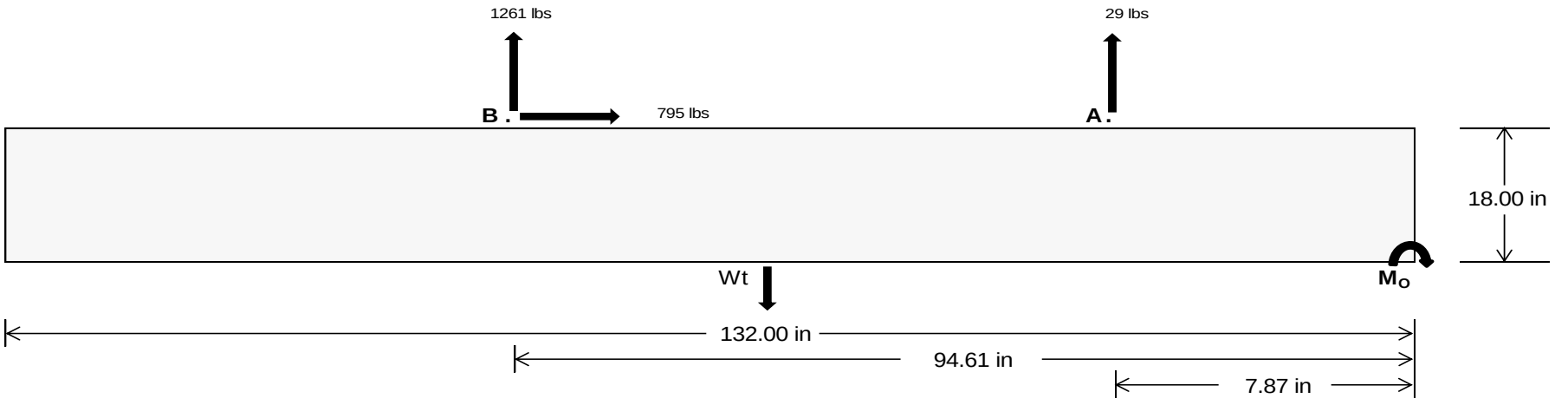
5.1 Helical Pile Foundations

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	=	135.52	5258.31	k
Compressive Load	=	3479.92	4392.69	k
Lateral Load	=	17.34	3308.84	k
Moment (Weak Axis)	=	0.03	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 tables 1804.2 (2003, 2006) & 1806.2 (2009).



Concrete Properties		
Weight of Concrete =	145	pcf
Compressive Strength =	2500	psi
Yield Strength =	60000	psi
Overturning Check		
M_O =	133843.2	in-lbs
Resisting Force Required =	2027.93	lbs
S.F. =	1.67	
Weight Required =	3379.88	lbs
Minimum Width =	27 in	in
Weight Provided =	5383.13	lbs
Sliding		
Force =	795.02	lbs
Friction =	0.4	
Weight Required =	1987.54	lbs
Resisting Weight =	5383.13	lbs
Additional Weight Required =	0	lbs
Cohesion		
Sliding Force =	795.02	lbs
Cohesion =	130	psf
Area =	24.75	ft^2
Resisting =	2691.56	lbs
Additional Weight Required =	0	lbs
Shear Key		
Additional Force =	0	lbs
Lateral Bearing Pressure =	200	psf/ft
Required Depth =	0.00	ft
f'_c =	2500	psi
Length =	8	in

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

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

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

Use a 132in long x 27in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	27 in	28 in	29 in	30 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.25 ft) =	5383 lbs	5583 lbs	5782 lbs	5981 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in
F_A	1317 lbs	1317 lbs	1317 lbs	1317 lbs	1132 lbs	1132 lbs	1132 lbs	1132 lbs	1697 lbs	1697 lbs	1697 lbs	1697 lbs	-58 lbs	-58 lbs	-58 lbs	-58 lbs
F_B	1256 lbs	1256 lbs	1256 lbs	1256 lbs	1868 lbs	1868 lbs	1868 lbs	1868 lbs	2211 lbs	2211 lbs	2211 lbs	2211 lbs	-2522 lbs	-2522 lbs	-2522 lbs	-2522 lbs
F_V	202 lbs	202 lbs	202 lbs	202 lbs	1456 lbs	1456 lbs	1456 lbs	1456 lbs	1223 lbs	1223 lbs	1223 lbs	1223 lbs	-1590 lbs	-1590 lbs	-1590 lbs	-1590 lbs
P_{total}	7956 lbs	8155 lbs	8355 lbs	8554 lbs	8383 lbs	8583 lbs	8782 lbs	8981 lbs	9291 lbs	9491 lbs	9690 lbs	9889 lbs	649 lbs	769 lbs	889 lbs	1008 lbs
M	3687 lbs-ft	3687 lbs-ft	3687 lbs-ft	3687 lbs-ft	3216 lbs-ft	3216 lbs-ft	3216 lbs-ft	3216 lbs-ft	4788 lbs-ft	4788 lbs-ft	4788 lbs-ft	4788 lbs-ft	3344 lbs-ft	3344 lbs-ft	3344 lbs-ft	3344 lbs-ft
e	0.46 ft	0.45 ft	0.44 ft	0.43 ft	0.38 ft	0.37 ft	0.37 ft	0.36 ft	0.52 ft	0.50 ft	0.49 ft	0.48 ft	5.15 ft	4.35 ft	3.76 ft	3.32 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}	240.2 psf	239.4 psf	238.6 psf	237.9 psf	267.9 psf	266.1 psf	264.4 psf	262.8 psf	269.9 psf	268.0 psf	266.3 psf	264.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	402.7 psf	396.1 psf	389.9 psf	384.2 psf	409.6 psf	402.7 psf	396.3 psf	390.4 psf	480.9 psf	471.5 psf	462.7 psf	454.6 psf	549.9 psf	190.9 psf	141.2 psf	123.2 psf

Maximum Bearing Pressure = 550 psf
Allowable Bearing Pressure = 1500 psf

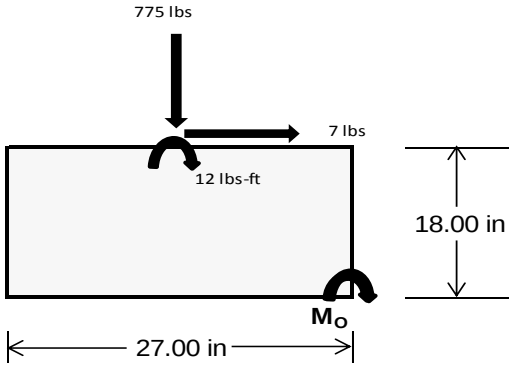
Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	849.8	ft-lbs
Resisting Force Required =	755.36	lbs
S.F. =	1.67	
Weight Required =	1258.93	lbs
Minimum Width =	27 in	in
Weight Provided =	5383.13	lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	27 in			27 in			27 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	264 lbs	673 lbs	264 lbs	775 lbs	2163 lbs	775 lbs	77 lbs	197 lbs	77 lbs
F_V	2 lbs	0 lbs	2 lbs	7 lbs	0 lbs	7 lbs	1 lbs	0 lbs	1 lbs
P_{total}	6929 lbs	5383 lbs	6929 lbs	7119 lbs	5383 lbs	7119 lbs	2026 lbs	5383 lbs	2026 lbs
M	7 lbs-ft	0 lbs-ft	7 lbs-ft	23 lbs-ft	0 lbs-ft	23 lbs-ft	2 lbs-ft	0 lbs-ft	2 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft
f_{min}	279.2 psf	217.5 psf	279.2 psf	285.2 psf	217.5 psf	285.2 psf	81.7 psf	217.5 psf	81.7 psf
f_{max}	280.7 psf	217.5 psf	280.7 psf	290.1 psf	217.5 psf	290.1 psf	82.1 psf	217.5 psf	82.1 psf

Maximum Bearing Pressure = 290 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

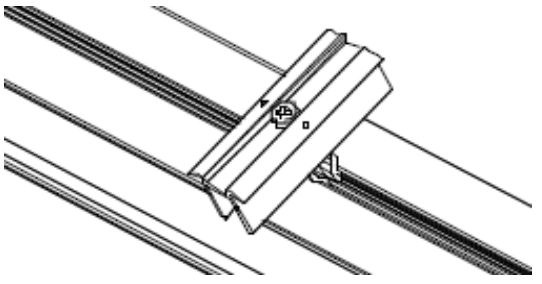
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

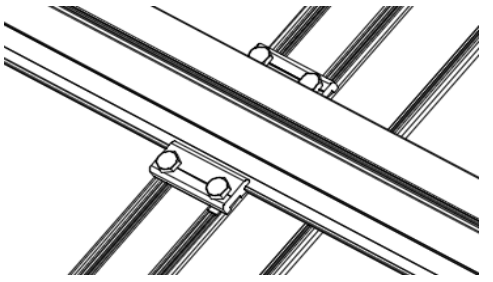
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.493 k
Allowable Uplift	=	1.214 k
Utilization	=	41%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	1.880 k
Allowable Uplift	=	4.357 k
Utilization	=	43%



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	=	2.677 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	36%

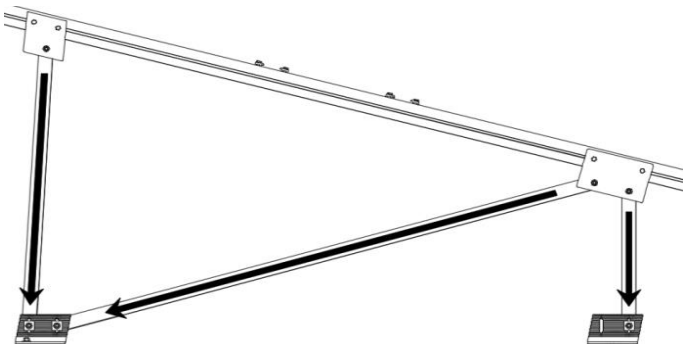
Rear Strut

Maximum Axial Load	=	3.501 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	47%

Diagonal Strut

Maximum Axial Load	=	2.141 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	29%

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)



Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

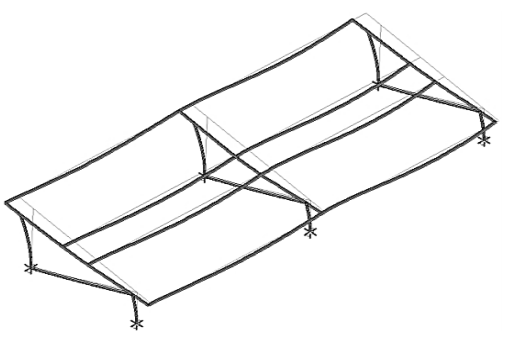
7.1 Seismic Drift - N/A

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx}	=	48.27 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.965 in
Max Drift, Δ_{MAX}	=	0.074 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 = 129 in

J = 0.432

356.874

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.2 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 129

J = 0.432

226.951

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

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= 28.4

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 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

$\varphi F_L St$= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.87952

φF_L = φcc(Bc-Dc*λ)

φF_L = 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 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

$\varphi F_L St$ = 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L Wk$ = 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 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

$\varphi F_L = \varphi y Fcy$

φF_L = 33.25 ksi

φF_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	-40.786	-40.786	0	0
2	M14	y	-40.786	-40.786	0	0
3	M15	y	-65.613	-65.613	0	0
4	M16	y	-65.613	-65.613	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	92.212	92.212	0	0
2	M14	y	70.932	70.932	0	0
3	M15	y	39.013	39.013	0	0
4	M16	y	39.013	39.013	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...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8																
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6																
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6														
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...	B...	Fa...
8																										
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																		
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1																
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75																
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1														
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	633.549	2	1026.387	2	.756	1	.003	1	0	1	0	1
2		min	-801.391	3	-1231.747	3	.041	15	0	15	0	1	0	1
3	N7	max	.041	9	1049.967	1	-.651	15	-.001	15	0	1	0	1
4		min	-.134	2	-.925	3	-13.338	1	-.026	1	0	1	0	1
5	N15	max	.034	9	2676.859	1	0	11	0	11	0	1	0	1
6		min	-1.546	2	-104.248	3	0	14	0	14	0	1	0	1
7	N16	max	2394.843	2	3378.99	2	0	3	0	3	0	1	0	1
8		min	-2545.259	3	-4044.857	3	0	2	0	2	0	1	0	1
9	N23	max	.041	9	1049.967	1	13.338	1	.026	1	0	1	0	1
10		min	-.134	2	-.925	3	.651	15	.001	15	0	1	0	1
11	N24	max	633.549	2	1026.387	2	-.041	15	0	15	0	1	0	1
12		min	-801.391	3	-1231.747	3	-.756	1	-.003	1	0	1	0	1
13	Totals:	max	3660.126	2	9815.673	1	0	11						
14		min	-4148.124	3	-6614.45	3	0	14						

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	130.033	1	391.827	1	-9.265	15	0	3	.311	1	0	1
2			min	6.18	15	-576.175	3	-195.652	1	-.012	2	.015	15	0	3
3		2	max	130.033	1	274.671	1	-7.131	15	0	3	.104	1	.586	3
4			min	6.18	15	-405.491	3	-150.513	1	-.012	2	.005	15	-.398	1
5		3	max	130.033	1	157.516	1	-4.997	15	0	3	0	12	.969	3
6			min	6.18	15	-234.807	3	-105.375	1	-.012	2	-.049	1	-.656	1
7		4	max	130.033	1	40.36	1	-2.863	15	0	3	-.006	12	1.147	3
8			min	6.18	15	-64.123	3	-60.236	1	-.012	2	-.147	1	-.774	1
9		5	max	130.033	1	106.561	3	-.729	15	0	3	-.009	12	1.122	3
10			min	6.18	15	-76.796	1	-15.098	1	-.012	2	-.192	1	-.753	1
11		6	max	130.033	1	277.246	3	30.041	1	0	3	-.009	15	.893	3
12			min	6.18	15	-193.952	1	.876	12	-.012	2	-.183	1	-.591	1
13		7	max	130.033	1	447.93	3	75.18	1	0	3	-.006	15	.46	3
14			min	6.18	15	-311.107	1	3.01	12	-.012	2	-.121	1	-.289	1
15		8	max	130.033	1	618.614	3	120.318	1	0	3	0	10	.152	1
16			min	6.18	15	-428.263	1	5.144	12	-.012	2	-.004	1	-.177	3
17		9	max	130.033	1	789.298	3	165.457	1	0	3	.167	1	.734	1
18			min	6.18	15	-545.419	1	7.277	12	-.012	2	.005	12	-1.018	3
19		10	max	130.033	1	959.983	3	210.596	1	0	3	.391	1	1.455	1
20			min	6.18	15	-662.574	1	9.411	12	-.012	2	.015	12	-2.063	3
21		11	max	130.033	1	545.419	1	-7.277	12	.012	2	.167	1	.734	1
22			min	6.18	15	-789.298	3	-165.457	1	0	3	.005	12	-1.018	3
23		12	max	130.033	1	428.263	1	-5.144	12	.012	2	0	10	.152	1
24			min	6.18	15	-618.614	3	-120.318	1	0	3	-.004	1	-.177	3
25		13	max	130.033	1	311.107	1	-3.01	12	.012	2	-.006	15	.46	3
26			min	6.18	15	-447.93	3	-75.18	1	0	3	-.121	1	-.289	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	130.033	1	193.952	1	-.876	12	.012	2	-.009	15	.893	3
28			min	6.18	15	-277.246	3	-30.041	1	0	3	-.183	1	-.591	1
29		15	max	130.033	1	76.796	1	15.098	1	.012	2	-.009	12	1.122	3
30			min	6.18	15	-106.561	3	.729	15	0	3	-.192	1	-.753	1
31		16	max	130.033	1	64.123	3	60.236	1	.012	2	-.006	12	1.147	3
32			min	6.18	15	-40.36	1	2.863	15	0	3	-.147	1	-.774	1
33		17	max	130.033	1	234.807	3	105.375	1	.012	2	0	12	.969	3
34			min	6.18	15	-157.516	1	4.997	15	0	3	-.049	1	-.656	1
35		18	max	130.033	1	405.491	3	150.513	1	.012	2	.104	1	.586	3
36			min	6.18	15	-274.671	1	7.131	15	0	3	.005	15	-.398	1
37		19	max	130.033	1	576.175	3	195.652	1	.012	2	.311	1	0	1
38			min	6.18	15	-391.827	1	9.265	15	0	3	.015	15	0	3
39	M14	1	max	57.718	1	411.188	1	-9.535	15	.007	3	.352	1	0	1
40			min	2.748	15	-449.762	3	-201.367	1	-.009	2	.017	15	0	3
41		2	max	57.718	1	294.032	1	-7.401	15	.007	3	.138	1	.46	3
42			min	2.748	15	-319.747	3	-156.228	1	-.009	2	.007	15	-.421	1
43		3	max	57.718	1	176.876	1	-5.267	15	.007	3	.001	3	.764	3
44			min	2.748	15	-189.731	3	-111.089	1	-.009	2	-.021	1	-.702	1
45		4	max	57.718	1	59.721	1	-3.133	15	.007	3	-.005	12	.913	3
46			min	2.748	15	-59.715	3	-65.951	1	-.009	2	-.127	1	-.844	1
47		5	max	57.718	1	70.301	3	-.999	15	.007	3	-.008	12	.906	3
48			min	2.748	15	-57.435	1	-20.812	1	-.009	2	-.179	1	-.845	1
49		6	max	57.718	1	200.316	3	24.327	1	.007	3	-.008	15	.745	3
50			min	2.748	15	-174.591	1	.617	12	-.009	2	-.177	1	-.707	1
51		7	max	57.718	1	330.332	3	69.465	1	.007	3	-.006	15	.428	3
52			min	2.748	15	-291.746	1	2.75	12	-.009	2	-.121	1	-.428	1
53		8	max	57.718	1	460.348	3	114.604	1	.007	3	0	10	0	9
54			min	2.748	15	-408.902	1	4.884	12	-.009	2	-.011	1	-.044	3
55		9	max	57.718	1	590.364	3	159.743	1	.007	3	.153	1	.549	1
56			min	2.748	15	-526.058	1	7.018	12	-.009	2	.005	12	-.672	3
57		10	max	57.718	1	720.379	3	204.881	1	.007	3	.371	1	1.247	1
58			min	2.748	15	-643.213	1	9.151	12	-.009	2	.015	12	-1.455	3
59		11	max	57.718	1	526.058	1	-7.018	12	.009	2	.153	1	.549	1
60			min	2.748	15	-590.364	3	-159.743	1	-.007	3	.005	12	-.672	3
61		12	max	57.718	1	408.902	1	-4.884	12	.009	2	0	10	0	9
62			min	2.748	15	-460.348	3	-114.604	1	-.007	3	-.011	1	-.044	3
63		13	max	57.718	1	291.746	1	-2.75	12	.009	2	-.006	15	.428	3
64			min	2.748	15	-330.332	3	-69.465	1	-.007	3	-.121	1	-.428	1
65		14	max	57.718	1	174.591	1	-.617	12	.009	2	-.008	15	.745	3
66			min	2.748	15	-200.316	3	-24.327	1	-.007	3	-.177	1	-.707	1
67		15	max	57.718	1	57.435	1	20.812	1	.009	2	-.008	12	.906	3
68			min	2.748	15	-70.301	3	.999	15	-.007	3	-.179	1	-.845	1
69		16	max	57.718	1	59.715	3	65.951	1	.009	2	-.005	12	.913	3
70			min	2.748	15	-59.721	1	3.133	15	-.007	3	-.127	1	-.844	1
71		17	max	57.718	1	189.731	3	111.089	1	.009	2	.001	3	.764	3
72			min	2.748	15	-176.876	1	5.267	15	-.007	3	-.021	1	-.702	1
73		18	max	57.718	1	319.747	3	156.228	1	.009	2	.138	1	.46	3
74			min	2.748	15	-294.032	1	7.401	15	-.007	3	.007	15	-.421	1
75		19	max	57.718	1	449.762	3	201.367	1	.009	2	.352	1	0	1
76			min	2.748	15	-411.188	1	9.535	15	-.007	3	.017	15	0	3
77	M15	1	max	-2.898	15	550.35	2	-9.532	15	.009	2	.352	1	0	2
78			min	-60.856	1	-244.007	3	-201.333	1	-.006	3	.017	15	0	12
79		2	max	-2.898	15	392.102	2	-7.398	15	.009	2	.138	1	.25	3
80			min	-60.856	1	-174.992	3	-156.194	1	-.006	3	.007	15	-.563	2
81		3	max	-2.898	15	233.853	2	-5.265	15	.009	2	0	3	.418	3
82			min	-60.856	1	-105.976	3	-111.056	1	-.006	3	-.021	1	-.937	2
83		4	max	-2.898	15	75.604	2	-3.131	15	.009	2	-.005	12	.503	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	-60.856	1	-36.961	3	-65.917	1	-.006	3	-.127	1	-1.121	2
85		5	max	-2.898	15	32.054	3	-.997	15	.009	2	-.008	12	.506	3
86			min	-60.856	1	-82.645	2	-20.779	1	-.006	3	-.179	1	-1.117	2
87		6	max	-2.898	15	101.069	3	24.36	1	.009	2	-.008	15	.427	3
88			min	-60.856	1	-240.894	2	.659	12	-.006	3	-.177	1	-.924	2
89		7	max	-2.898	15	170.084	3	69.499	1	.009	2	-.006	15	.265	3
90			min	-60.856	1	-399.143	2	2.793	12	-.006	3	-.121	1	-.542	2
91		8	max	-2.898	15	239.099	3	114.637	1	.009	2	0	10	.029	2
92			min	-60.856	1	-557.392	2	4.927	12	-.006	3	-.011	1	0	15
93		9	max	-2.898	15	308.114	3	159.776	1	.009	2	.153	1	.79	2
94			min	-60.856	1	-715.641	2	7.06	12	-.006	3	.005	12	-.306	3
95		10	max	-2.898	15	377.129	3	204.915	1	.009	2	.371	1	1.739	2
96			min	-60.856	1	-873.889	2	9.194	12	-.006	3	.015	12	-.716	3
97		11	max	-2.898	15	715.641	2	-7.06	12	.006	3	.153	1	.79	2
98			min	-60.856	1	-308.114	3	-159.776	1	-.009	2	.005	12	-.306	3
99		12	max	-2.898	15	557.392	2	-4.927	12	.006	3	0	10	.029	2
100			min	-60.856	1	-239.099	3	-114.637	1	-.009	2	-.011	1	0	15
101		13	max	-2.898	15	399.143	2	-2.793	12	.006	3	-.006	15	.265	3
102			min	-60.856	1	-170.084	3	-69.499	1	-.009	2	-.121	1	-.542	2
103		14	max	-2.898	15	240.894	2	-.659	12	.006	3	-.008	15	.427	3
104			min	-60.856	1	-101.069	3	-24.36	1	-.009	2	-.177	1	-.924	2
105		15	max	-2.898	15	82.645	2	20.779	1	.006	3	-.008	12	.506	3
106			min	-60.856	1	-32.054	3	.997	15	-.009	2	-.179	1	-1.117	2
107		16	max	-2.898	15	36.961	3	65.917	1	.006	3	-.005	12	.503	3
108			min	-60.856	1	-75.604	2	3.131	15	-.009	2	-.127	1	-1.121	2
109		17	max	-2.898	15	105.976	3	111.056	1	.006	3	0	3	.418	3
110			min	-60.856	1	-233.853	2	5.265	15	-.009	2	-.021	1	-.937	2
111		18	max	-2.898	15	174.992	3	156.194	1	.006	3	.138	1	.25	3
112			min	-60.856	1	-392.102	2	7.398	15	-.009	2	.007	15	-.563	2
113		19	max	-2.898	15	244.007	3	201.333	1	.006	3	.352	1	0	2
114			min	-60.856	1	-550.35	2	9.532	15	-.009	2	.017	15	0	12
115	M16	1	max	-6.639	15	530.923	2	-9.273	15	.009	1	.313	1	0	2
116			min	-139.477	1	-229.883	3	-195.888	1	-.009	3	.015	15	0	3
117		2	max	-6.639	15	372.674	2	-7.139	15	.009	1	.106	1	.233	3
118			min	-139.477	1	-160.868	3	-150.75	1	-.009	3	.005	15	-.54	2
119		3	max	-6.639	15	214.425	2	-5.005	15	.009	1	-.001	12	.384	3
120			min	-139.477	1	-91.853	3	-105.611	1	-.009	3	-.048	1	-.89	2
121		4	max	-6.639	15	56.176	2	-2.871	15	.009	1	-.006	12	.453	3
122			min	-139.477	1	-22.838	3	-60.472	1	-.009	3	-.147	1	-1.052	2
123		5	max	-6.639	15	46.177	3	-.737	15	.009	1	-.009	12	.439	3
124			min	-139.477	1	-102.073	2	-15.334	1	-.009	3	-.192	1	-1.024	2
125		6	max	-6.639	15	115.192	3	29.805	1	.009	1	-.009	15	.342	3
126			min	-139.477	1	-260.321	2	1.014	12	-.009	3	-.183	1	-.808	2
127		7	max	-6.639	15	184.207	3	74.943	1	.009	1	-.006	15	.164	3
128			min	-139.477	1	-418.57	2	3.147	12	-.009	3	-.121	1	-.403	2
129		8	max	-6.639	15	253.222	3	120.082	1	.009	1	0	10	.192	2
130			min	-139.477	1	-576.819	2	5.281	12	-.009	3	-.004	1	-.098	3
131		9	max	-6.639	15	322.237	3	165.221	1	.009	1	.166	1	.975	2
132			min	-139.477	1	-735.068	2	7.414	12	-.009	3	.006	12	-.441	3
133		10	max	-6.639	15	391.252	3	210.359	1	.009	1	.39	1	1.948	2
134			min	-139.477	1	-893.317	2	9.548	12	-.009	3	.016	12	-.867	3
135		11	max	-6.639	15	735.068	2	-7.414	12	.009	3	.166	1	.975	2
136			min	-139.477	1	-322.237	3	-165.221	1	-.009	1	.006	12	-.441	3
137		12	max	-6.639	15	576.819	2	-5.281	12	.009	3	0	10	.192	2
138			min	-139.477	1	-253.222	3	-120.082	1	-.009	1	-.004	1	-.098	3
139		13	max	-6.639	15	418.57	2	-3.147	12	.009	3	-.006	15	.164	3
140			min	-139.477	1	-184.207	3	-74.943	1	-.009	1	-.121	1	-.403	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	-6.639	15	260.321	2	-1.014	12	.009	3	-.009	15	.342	3
142			min	-139.477	1	-115.192	3	-29.805	1	-.009	1	-.183	1	-.808	2
143		15	max	-6.639	15	102.073	2	15.334	1	.009	3	-.009	12	.439	3
144			min	-139.477	1	-46.177	3	.737	15	-.009	1	-.192	1	-1.024	2
145		16	max	-6.639	15	22.838	3	60.472	1	.009	3	-.006	12	.453	3
146			min	-139.477	1	-56.176	2	2.871	15	-.009	1	-.147	1	-1.052	2
147		17	max	-6.639	15	91.853	3	105.611	1	.009	3	-.001	12	.384	3
148			min	-139.477	1	-214.425	2	5.005	15	-.009	1	-.048	1	-.89	2
149		18	max	-6.639	15	160.868	3	150.75	1	.009	3	.106	1	.233	3
150			min	-139.477	1	-372.674	2	7.139	15	-.009	1	.005	15	-.54	2
151		19	max	-6.639	15	229.883	3	195.888	1	.009	3	.313	1	0	2
152			min	-139.477	1	-530.923	2	9.273	15	-.009	1	.015	15	0	3
153	M2	1	max	899.693	1	1.928	4	.599	1	0	5	0	3	0	1
154			min	-1065.937	3	.454	15	.028	15	0	1	0	1	0	1
155		2	max	900.169	1	1.843	4	.599	1	0	5	0	1	0	15
156			min	-1065.58	3	.434	15	.028	15	0	1	0	15	0	4
157		3	max	900.645	1	1.757	4	.599	1	0	5	0	1	0	15
158			min	-1065.223	3	.414	15	.028	15	0	1	0	15	-.001	4
159		4	max	901.121	1	1.671	4	.599	1	0	5	0	1	0	15
160			min	-1064.866	3	.393	15	.028	15	0	1	0	15	-.002	4
161		5	max	901.596	1	1.586	4	.599	1	0	5	0	1	0	15
162			min	-1064.51	3	.373	15	.028	15	0	1	0	15	-.002	4
163		6	max	902.072	1	1.5	4	.599	1	0	5	0	1	0	15
164			min	-1064.153	3	.353	15	.028	15	0	1	0	15	-.003	4
165		7	max	902.548	1	1.415	4	.599	1	0	5	.001	1	0	15
166			min	-1063.796	3	.333	15	.028	15	0	1	0	15	-.003	4
167		8	max	903.024	1	1.329	4	.599	1	0	5	.001	1	0	15
168			min	-1063.439	3	.313	15	.028	15	0	1	0	15	-.004	4
169		9	max	903.499	1	1.243	4	.599	1	0	5	.002	1	0	15
170			min	-1063.082	3	.293	15	.028	15	0	1	0	15	-.004	4
171		10	max	903.975	1	1.158	4	.599	1	0	5	.002	1	-.001	15
172			min	-1062.725	3	.273	15	.028	15	0	1	0	15	-.004	4
173		11	max	904.451	1	1.072	4	.599	1	0	5	.002	1	-.001	15
174			min	-1062.369	3	.253	15	.028	15	0	1	0	15	-.005	4
175		12	max	904.927	1	.987	4	.599	1	0	5	.002	1	-.001	15
176			min	-1062.012	3	.233	15	.028	15	0	1	0	15	-.005	4
177		13	max	905.402	1	.901	4	.599	1	0	5	.002	1	-.001	15
178			min	-1061.655	3	.2	12	.028	15	0	1	0	15	-.005	4
179		14	max	905.878	1	.816	4	.599	1	0	5	.003	1	-.001	15
180			min	-1061.298	3	.167	12	.028	15	0	1	0	15	-.006	4
181		15	max	906.354	1	.746	2	.599	1	0	5	.003	1	-.001	15
182			min	-1060.941	3	.133	12	.028	15	0	1	0	15	-.006	4
183		16	max	906.83	1	.679	2	.599	1	0	5	.003	1	-.001	15
184			min	-1060.585	3	.1	12	.028	15	0	1	0	15	-.006	4
185		17	max	907.305	1	.612	2	.599	1	0	5	.003	1	-.002	15
186			min	-1060.228	3	.067	12	.028	15	0	1	0	15	-.006	4
187		18	max	907.781	1	.546	2	.599	1	0	5	.003	1	-.002	15
188			min	-1059.871	3	.033	12	.028	15	0	1	0	15	-.007	4
189		19	max	908.257	1	.479	2	.599	1	0	5	.003	1	-.002	15
190			min	-1059.514	3	-.016	3	.028	15	0	1	0	15	-.007	4
191	M3	1	max	532.878	2	7.778	4	.279	1	0	12	0	1	.007	4
192			min	-679.099	3	1.829	15	.013	15	0	1	0	15	.002	15
193		2	max	532.708	2	7.013	4	.279	1	0	12	0	1	.004	2
194			min	-679.227	3	1.649	15	.013	15	0	1	0	15	0	12
195		3	max	532.537	2	6.249	4	.279	1	0	12	0	1	.002	2
196			min	-679.355	3	1.469	15	.013	15	0	1	0	15	0	3
197		4	max	532.367	2	5.484	4	.279	1	0	12	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	-679.483	3	1.29	15	.013	15	0	1	0	15	-.002	3
199		5	max	532.196	2	4.72	4	.279	1	0	12	0	1	0	15
200			min	-679.61	3	1.11	15	.013	15	0	1	0	15	-.004	4
201		6	max	532.026	2	3.956	4	.279	1	0	12	.001	1	-.001	15
202			min	-679.738	3	.93	15	.013	15	0	1	0	15	-.006	4
203		7	max	531.856	2	3.191	4	.279	1	0	12	.001	1	-.002	15
204			min	-679.866	3	.751	15	.013	15	0	1	0	15	-.007	4
205		8	max	531.685	2	2.427	4	.279	1	0	12	.001	1	-.002	15
206			min	-679.994	3	.571	15	.013	15	0	1	0	15	-.008	4
207		9	max	531.515	2	1.662	4	.279	1	0	12	.001	1	-.002	15
208			min	-680.121	3	.391	15	.013	15	0	1	0	15	-.009	4
209		10	max	531.345	2	.898	4	.279	1	0	12	.002	1	-.002	15
210			min	-680.249	3	.212	15	.013	15	0	1	0	15	-.01	4
211		11	max	531.174	2	.241	2	.279	1	0	12	.002	1	-.002	15
212			min	-680.377	3	-.11	3	.013	15	0	1	0	15	-.01	4
213		12	max	531.004	2	-.148	15	.279	1	0	12	.002	1	-.002	15
214			min	-680.505	3	-.631	4	.013	15	0	1	0	15	-.01	4
215		13	max	530.834	2	-.328	15	.279	1	0	12	.002	1	-.002	15
216			min	-680.632	3	-1.396	4	.013	15	0	1	0	15	-.009	4
217		14	max	530.663	2	-.507	15	.279	1	0	12	.002	1	-.002	15
218			min	-680.76	3	-2.16	4	.013	15	0	1	0	15	-.009	4
219		15	max	530.493	2	-.687	15	.279	1	0	12	.002	1	-.002	15
220			min	-680.888	3	-2.924	4	.013	15	0	1	0	15	-.007	4
221		16	max	530.323	2	-.867	15	.279	1	0	12	.002	1	-.001	15
222			min	-681.016	3	-3.689	4	.013	15	0	1	0	15	-.006	4
223		17	max	530.152	2	-1.046	15	.279	1	0	12	.002	1	-.001	15
224			min	-681.144	3	-4.453	4	.013	15	0	1	0	15	-.004	4
225		18	max	529.982	2	-1.226	15	.279	1	0	12	.002	1	0	15
226			min	-681.271	3	-5.218	4	.013	15	0	1	0	15	-.002	4
227		19	max	529.812	2	-1.406	15	.279	1	0	12	.003	1	0	1
228			min	-681.399	3	-5.982	4	.013	15	0	1	0	15	0	1
229	M4	1	max	1046.9	1	0	1	-.652	15	0	1	.002	1	0	1
230			min	-3.225	3	0	1	-13.741	1	0	1	0	15	0	1
231		2	max	1047.071	1	0	1	-.652	15	0	1	0	1	0	1
232			min	-3.097	3	0	1	-13.741	1	0	1	0	15	0	1
233		3	max	1047.241	1	0	1	-.652	15	0	1	0	12	0	1
234			min	-2.97	3	0	1	-13.741	1	0	1	-.001	1	0	1
235		4	max	1047.411	1	0	1	-.652	15	0	1	0	15	0	1
236			min	-2.842	3	0	1	-13.741	1	0	1	-.003	1	0	1
237		5	max	1047.582	1	0	1	-.652	15	0	1	0	15	0	1
238			min	-2.714	3	0	1	-13.741	1	0	1	-.004	1	0	1
239		6	max	1047.752	1	0	1	-.652	15	0	1	0	15	0	1
240			min	-2.586	3	0	1	-13.741	1	0	1	-.006	1	0	1
241		7	max	1047.922	1	0	1	-.652	15	0	1	0	15	0	1
242			min	-2.459	3	0	1	-13.741	1	0	1	-.007	1	0	1
243		8	max	1048.093	1	0	1	-.652	15	0	1	0	15	0	1
244			min	-2.331	3	0	1	-13.741	1	0	1	-.009	1	0	1
245		9	max	1048.263	1	0	1	-.652	15	0	1	0	15	0	1
246			min	-2.203	3	0	1	-13.741	1	0	1	-.01	1	0	1
247		10	max	1048.433	1	0	1	-.652	15	0	1	0	15	0	1
248			min	-2.075	3	0	1	-13.741	1	0	1	-.012	1	0	1
249		11	max	1048.604	1	0	1	-.652	15	0	1	0	15	0	1
250			min	-1.947	3	0	1	-13.741	1	0	1	-.014	1	0	1
251		12	max	1048.774	1	0	1	-.652	15	0	1	0	15	0	1
252			min	-1.82	3	0	1	-13.741	1	0	1	-.015	1	0	1
253		13	max	1048.944	1	0	1	-.652	15	0	1	0	15	0	1
254			min	-1.692	3	0	1	-13.741	1	0	1	-.017	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	1049.115	1	0	1	-.652	15	0	1	0	15	0	1
256			min	-1.564	3	0	1	-13.741	1	0	1	-.018	1	0	1
257		15	max	1049.285	1	0	1	-.652	15	0	1	0	15	0	1
258			min	-1.436	3	0	1	-13.741	1	0	1	-.02	1	0	1
259		16	max	1049.455	1	0	1	-.652	15	0	1	-.001	15	0	1
260			min	-1.309	3	0	1	-13.741	1	0	1	-.022	1	0	1
261		17	max	1049.626	1	0	1	-.652	15	0	1	-.001	15	0	1
262			min	-1.181	3	0	1	-13.741	1	0	1	-.023	1	0	1
263		18	max	1049.796	1	0	1	-.652	15	0	1	-.001	15	0	1
264			min	-1.053	3	0	1	-13.741	1	0	1	-.025	1	0	1
265		19	max	1049.967	1	0	1	-.652	15	0	1	-.001	15	0	1
266			min	-.925	3	0	1	-13.741	1	0	1	-.026	1	0	1
267	M6	1	max	2904.857	1	2.149	2	0	1	0	1	0	1	0	1
268			min	-3501.162	3	.263	12	0	1	0	1	0	1	0	1
269		2	max	2905.333	1	2.082	2	0	1	0	1	0	1	0	12
270			min	-3500.805	3	.23	12	0	1	0	1	0	1	0	2
271		3	max	2905.809	1	2.016	2	0	1	0	1	0	1	0	12
272			min	-3500.448	3	.196	12	0	1	0	1	0	1	-.001	2
273		4	max	2906.284	1	1.949	2	0	1	0	1	0	1	0	12
274			min	-3500.092	3	.163	12	0	1	0	1	0	1	-.002	2
275		5	max	2906.76	1	1.882	2	0	1	0	1	0	1	0	12
276			min	-3499.735	3	.129	12	0	1	0	1	0	1	-.003	2
277		6	max	2907.236	1	1.816	2	0	1	0	1	0	1	0	12
278			min	-3499.378	3	.095	3	0	1	0	1	0	1	-.003	2
279		7	max	2907.712	1	1.749	2	0	1	0	1	0	1	0	12
280			min	-3499.021	3	.045	3	0	1	0	1	0	1	-.004	2
281		8	max	2908.187	1	1.682	2	0	1	0	1	0	1	0	12
282			min	-3498.664	3	-.005	3	0	1	0	1	0	1	-.004	2
283		9	max	2908.663	1	1.615	2	0	1	0	1	0	1	0	12
284			min	-3498.308	3	-.055	3	0	1	0	1	0	1	-.005	2
285		10	max	2909.139	1	1.549	2	0	1	0	1	0	1	0	12
286			min	-3497.951	3	-.105	3	0	1	0	1	0	1	-.005	2
287		11	max	2909.615	1	1.482	2	0	1	0	1	0	1	0	3
288			min	-3497.594	3	-.155	3	0	1	0	1	0	1	-.006	2
289		12	max	2910.09	1	1.415	2	0	1	0	1	0	1	0	3
290			min	-3497.237	3	-.205	3	0	1	0	1	0	1	-.006	2
291		13	max	2910.566	1	1.349	2	0	1	0	1	0	1	0	3
292			min	-3496.88	3	-.255	3	0	1	0	1	0	1	-.007	2
293		14	max	2911.042	1	1.282	2	0	1	0	1	0	1	0	3
294			min	-3496.523	3	-.305	3	0	1	0	1	0	1	-.007	2
295		15	max	2911.518	1	1.215	2	0	1	0	1	0	1	0	3
296			min	-3496.167	3	-.355	3	0	1	0	1	0	1	-.008	2
297		16	max	2911.993	1	1.149	2	0	1	0	1	0	1	0	3
298			min	-3495.81	3	-.405	3	0	1	0	1	0	1	-.008	2
299		17	max	2912.469	1	1.082	2	0	1	0	1	0	1	0	3
300			min	-3495.453	3	-.455	3	0	1	0	1	0	1	-.008	2
301		18	max	2912.945	1	1.015	2	0	1	0	1	0	1	0	3
302			min	-3495.096	3	-.505	3	0	1	0	1	0	1	-.009	2
303		19	max	2913.421	1	.949	2	0	1	0	1	0	1	0	3
304			min	-3494.739	3	-.555	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2084.589	2	7.813	4	0	1	0	1	0	1	.009	2
306			min	-2139.19	3	1.834	15	0	1	0	1	0	1	0	3
307		2	max	2084.418	2	7.049	4	0	1	0	1	0	1	.006	2
308			min	-2139.318	3	1.654	15	0	1	0	1	0	1	-.002	3
309		3	max	2084.248	2	6.284	4	0	1	0	1	0	1	.004	2
310			min	-2139.446	3	1.475	15	0	1	0	1	0	1	-.004	3
311		4	max	2084.078	2	5.52	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2139.574	3	1.295	15	0	1	0	1	0	1	-.005	3
313		5	max	2083.907	2	4.755	4	0	1	0	1	0	1	0	2
314			min	-2139.702	3	1.115	15	0	1	0	1	0	1	-.006	3
315		6	max	2083.737	2	3.991	4	0	1	0	1	0	1	-.001	15
316			min	-2139.829	3	.936	15	0	1	0	1	0	1	-.007	3
317		7	max	2083.567	2	3.226	4	0	1	0	1	0	1	-.002	15
318			min	-2139.957	3	.756	15	0	1	0	1	0	1	-.007	3
319		8	max	2083.396	2	2.462	4	0	1	0	1	0	1	-.002	15
320			min	-2140.085	3	.567	12	0	1	0	1	0	1	-.008	4
321		9	max	2083.226	2	1.797	2	0	1	0	1	0	1	-.002	15
322			min	-2140.213	3	.269	12	0	1	0	1	0	1	-.009	4
323		10	max	2083.055	2	1.201	2	0	1	0	1	0	1	-.002	15
324			min	-2140.34	3	-.082	3	0	1	0	1	0	1	-.009	4
325		11	max	2082.885	2	.605	2	0	1	0	1	0	1	-.002	15
326			min	-2140.468	3	-.528	3	0	1	0	1	0	1	-.01	4
327		12	max	2082.715	2	.01	2	0	1	0	1	0	1	-.002	15
328			min	-2140.596	3	-.975	3	0	1	0	1	0	1	-.01	4
329		13	max	2082.544	2	-.322	15	0	1	0	1	0	1	-.002	15
330			min	-2140.724	3	-1.422	3	0	1	0	1	0	1	-.009	4
331		14	max	2082.374	2	-.502	15	0	1	0	1	0	1	-.002	15
332			min	-2140.851	3	-2.125	4	0	1	0	1	0	1	-.008	4
333		15	max	2082.204	2	-.682	15	0	1	0	1	0	1	-.002	15
334			min	-2140.979	3	-2.889	4	0	1	0	1	0	1	-.007	4
335		16	max	2082.033	2	-.861	15	0	1	0	1	0	1	-.001	15
336			min	-2141.107	3	-3.654	4	0	1	0	1	0	1	-.006	4
337		17	max	2081.863	2	-1.041	15	0	1	0	1	0	1	-.001	15
338			min	-2141.235	3	-4.418	4	0	1	0	1	0	1	-.004	4
339		18	max	2081.693	2	-1.221	15	0	1	0	1	0	1	0	15
340			min	-2141.362	3	-5.182	4	0	1	0	1	0	1	-.002	4
341		19	max	2081.522	2	-1.4	15	0	1	0	1	0	1	0	1
342			min	-2141.49	3	-5.947	4	0	1	0	1	0	1	0	1
343	M8	1	max	2673.792	1	0	1	0	1	0	1	0	1	0	1
344			min	-106.548	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2673.963	1	0	1	0	1	0	1	0	1	0	1
346			min	-106.42	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2674.133	1	0	1	0	1	0	1	0	1	0	1
348			min	-106.292	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2674.303	1	0	1	0	1	0	1	0	1	0	1
350			min	-106.164	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2674.474	1	0	1	0	1	0	1	0	1	0	1
352			min	-106.037	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2674.644	1	0	1	0	1	0	1	0	1	0	1
354			min	-105.909	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2674.814	1	0	1	0	1	0	1	0	1	0	1
356			min	-105.781	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2674.985	1	0	1	0	1	0	1	0	1	0	1
358			min	-105.653	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2675.155	1	0	1	0	1	0	1	0	1	0	1
360			min	-105.526	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2675.325	1	0	1	0	1	0	1	0	1	0	1
362			min	-105.398	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2675.496	1	0	1	0	1	0	1	0	1	0	1
364			min	-105.27	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2675.666	1	0	1	0	1	0	1	0	1	0	1
366			min	-105.142	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2675.836	1	0	1	0	1	0	1	0	1	0	1
368			min	-105.015	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	2676.007	1	0	1	0	1	0	1	0	1	0	1
370			min	-104.887	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2676.177	1	0	1	0	1	0	1	0	1	0	1
372			min	-104.759	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2676.348	1	0	1	0	1	0	1	0	1	0	1
374			min	-104.631	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2676.518	1	0	1	0	1	0	1	0	1	0	1
376			min	-104.504	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2676.688	1	0	1	0	1	0	1	0	1	0	1
378			min	-104.376	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2676.859	1	0	1	0	1	0	1	0	1	0	1
380			min	-104.248	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	899.693	1	1.928	4	-.028	15	0	1	0	1	0	1
382			min	-1065.937	3	.454	15	-.599	1	0	5	0	3	0	1
383		2	max	900.169	1	1.843	4	-.028	15	0	1	0	15	0	15
384			min	-1065.58	3	.434	15	-.599	1	0	5	0	1	0	4
385		3	max	900.645	1	1.757	4	-.028	15	0	1	0	15	0	15
386			min	-1065.223	3	.414	15	-.599	1	0	5	0	1	-.001	4
387		4	max	901.121	1	1.671	4	-.028	15	0	1	0	15	0	15
388			min	-1064.866	3	.393	15	-.599	1	0	5	0	1	-.002	4
389		5	max	901.596	1	1.586	4	-.028	15	0	1	0	15	0	15
390			min	-1064.51	3	.373	15	-.599	1	0	5	0	1	-.002	4
391		6	max	902.072	1	1.5	4	-.028	15	0	1	0	15	0	15
392			min	-1064.153	3	.353	15	-.599	1	0	5	0	1	-.003	4
393		7	max	902.548	1	1.415	4	-.028	15	0	1	0	15	0	15
394			min	-1063.796	3	.333	15	-.599	1	0	5	-.001	1	-.003	4
395		8	max	903.024	1	1.329	4	-.028	15	0	1	0	15	0	15
396			min	-1063.439	3	.313	15	-.599	1	0	5	-.001	1	-.004	4
397		9	max	903.499	1	1.243	4	-.028	15	0	1	0	15	0	15
398			min	-1063.082	3	.293	15	-.599	1	0	5	-.002	1	-.004	4
399		10	max	903.975	1	1.158	4	-.028	15	0	1	0	15	-.001	15
400			min	-1062.725	3	.273	15	-.599	1	0	5	-.002	1	-.004	4
401		11	max	904.451	1	1.072	4	-.028	15	0	1	0	15	-.001	15
402			min	-1062.369	3	.253	15	-.599	1	0	5	-.002	1	-.005	4
403		12	max	904.927	1	.987	4	-.028	15	0	1	0	15	-.001	15
404			min	-1062.012	3	.233	15	-.599	1	0	5	-.002	1	-.005	4
405		13	max	905.402	1	.901	4	-.028	15	0	1	0	15	-.001	15
406			min	-1061.655	3	.2	12	-.599	1	0	5	-.002	1	-.005	4
407		14	max	905.878	1	.816	4	-.028	15	0	1	0	15	-.001	15
408			min	-1061.298	3	.167	12	-.599	1	0	5	-.003	1	-.006	4
409		15	max	906.354	1	.746	2	-.028	15	0	1	0	15	-.001	15
410			min	-1060.941	3	.133	12	-.599	1	0	5	-.003	1	-.006	4
411		16	max	906.83	1	.679	2	-.028	15	0	1	0	15	-.001	15
412			min	-1060.585	3	.1	12	-.599	1	0	5	-.003	1	-.006	4
413		17	max	907.305	1	.612	2	-.028	15	0	1	0	15	-.002	15
414			min	-1060.228	3	.067	12	-.599	1	0	5	-.003	1	-.006	4
415		18	max	907.781	1	.546	2	-.028	15	0	1	0	15	-.002	15
416			min	-1059.871	3	.033	12	-.599	1	0	5	-.003	1	-.007	4
417		19	max	908.257	1	.479	2	-.028	15	0	1	0	15	-.002	15
418			min	-1059.514	3	-.016	3	-.599	1	0	5	-.003	1	-.007	4
419	M11	1	max	532.878	2	7.778	4	-.013	15	0	1	0	15	.007	4
420			min	-679.099	3	1.829	15	-.279	1	0	12	0	1	.002	15
421		2	max	532.708	2	7.013	4	-.013	15	0	1	0	15	.004	2
422			min	-679.227	3	1.649	15	-.279	1	0	12	0	1	0	12
423		3	max	532.537	2	6.249	4	-.013	15	0	1	0	15	.002	2
424			min	-679.355	3	1.469	15	-.279	1	0	12	0	1	0	3
425		4	max	532.367	2	5.484	4	-.013	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	-679.483	3	1.29	15	-.279	1	0	12	0	1	-.002	3
427		5	max	532.196	2	4.72	4	-.013	15	0	1	0	15	0	15
428			min	-679.61	3	1.11	15	-.279	1	0	12	0	1	-.004	4
429		6	max	532.026	2	3.956	4	-.013	15	0	1	0	15	-.001	15
430			min	-679.738	3	.93	15	-.279	1	0	12	-.001	1	-.006	4
431		7	max	531.856	2	3.191	4	-.013	15	0	1	0	15	-.002	15
432			min	-679.866	3	.751	15	-.279	1	0	12	-.001	1	-.007	4
433		8	max	531.685	2	2.427	4	-.013	15	0	1	0	15	-.002	15
434			min	-679.994	3	.571	15	-.279	1	0	12	-.001	1	-.008	4
435		9	max	531.515	2	1.662	4	-.013	15	0	1	0	15	-.002	15
436			min	-680.121	3	.391	15	-.279	1	0	12	-.001	1	-.009	4
437		10	max	531.345	2	.898	4	-.013	15	0	1	0	15	-.002	15
438			min	-680.249	3	.212	15	-.279	1	0	12	-.002	1	-.01	4
439		11	max	531.174	2	.241	2	-.013	15	0	1	0	15	-.002	15
440			min	-680.377	3	-.11	3	-.279	1	0	12	-.002	1	-.01	4
441		12	max	531.004	2	-.148	15	-.013	15	0	1	0	15	-.002	15
442			min	-680.505	3	-.631	4	-.279	1	0	12	-.002	1	-.01	4
443		13	max	530.834	2	-.328	15	-.013	15	0	1	0	15	-.002	15
444			min	-680.632	3	-1.396	4	-.279	1	0	12	-.002	1	-.009	4
445		14	max	530.663	2	-.507	15	-.013	15	0	1	0	15	-.002	15
446			min	-680.76	3	-2.16	4	-.279	1	0	12	-.002	1	-.009	4
447		15	max	530.493	2	-.687	15	-.013	15	0	1	0	15	-.002	15
448			min	-680.888	3	-2.924	4	-.279	1	0	12	-.002	1	-.007	4
449		16	max	530.323	2	-.867	15	-.013	15	0	1	0	15	-.001	15
450			min	-681.016	3	-3.689	4	-.279	1	0	12	-.002	1	-.006	4
451		17	max	530.152	2	-1.046	15	-.013	15	0	1	0	15	-.001	15
452			min	-681.144	3	-4.453	4	-.279	1	0	12	-.002	1	-.004	4
453		18	max	529.982	2	-1.226	15	-.013	15	0	1	0	15	0	15
454			min	-681.271	3	-5.218	4	-.279	1	0	12	-.002	1	-.002	4
455		19	max	529.812	2	-1.406	15	-.013	15	0	1	0	15	0	1
456			min	-681.399	3	-5.982	4	-.279	1	0	12	-.003	1	0	1
457	M12	1	max	1046.9	1	0	1	13.741	1	0	1	0	15	0	1
458			min	-3.225	3	0	1	.652	15	0	1	-.002	1	0	1
459		2	max	1047.071	1	0	1	13.741	1	0	1	0	15	0	1
460			min	-3.097	3	0	1	.652	15	0	1	0	1	0	1
461		3	max	1047.241	1	0	1	13.741	1	0	1	.001	1	0	1
462			min	-2.97	3	0	1	.652	15	0	1	0	12	0	1
463		4	max	1047.411	1	0	1	13.741	1	0	1	.003	1	0	1
464			min	-2.842	3	0	1	.652	15	0	1	0	15	0	1
465		5	max	1047.582	1	0	1	13.741	1	0	1	.004	1	0	1
466			min	-2.714	3	0	1	.652	15	0	1	0	15	0	1
467		6	max	1047.752	1	0	1	13.741	1	0	1	.006	1	0	1
468			min	-2.586	3	0	1	.652	15	0	1	0	15	0	1
469		7	max	1047.922	1	0	1	13.741	1	0	1	.007	1	0	1
470			min	-2.459	3	0	1	.652	15	0	1	0	15	0	1
471		8	max	1048.093	1	0	1	13.741	1	0	1	.009	1	0	1
472			min	-2.331	3	0	1	.652	15	0	1	0	15	0	1
473		9	max	1048.263	1	0	1	13.741	1	0	1	.01	1	0	1
474			min	-2.203	3	0	1	.652	15	0	1	0	15	0	1
475		10	max	1048.433	1	0	1	13.741	1	0	1	.012	1	0	1
476			min	-2.075	3	0	1	.652	15	0	1	0	15	0	1
477		11	max	1048.604	1	0	1	13.741	1	0	1	.014	1	0	1
478			min	-1.947	3	0	1	.652	15	0	1	0	15	0	1
479		12	max	1048.774	1	0	1	13.741	1	0	1	.015	1	0	1
480			min	-1.82	3	0	1	.652	15	0	1	0	15	0	1
481		13	max	1048.944	1	0	1	13.741	1	0	1	.017	1	0	1
482			min	-1.692	3	0	1	.652	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	1049.115	1	0	1	13.741	1	0	1	.018	1	0	1
484			min	-1.564	3	0	1	.652	15	0	1	0	15	0	1
485		15	max	1049.285	1	0	1	13.741	1	0	1	.02	1	0	1
486			min	-1.436	3	0	1	.652	15	0	1	0	15	0	1
487		16	max	1049.455	1	0	1	13.741	1	0	1	.022	1	0	1
488			min	-1.309	3	0	1	.652	15	0	1	.001	15	0	1
489		17	max	1049.626	1	0	1	13.741	1	0	1	.023	1	0	1
490			min	-1.181	3	0	1	.652	15	0	1	.001	15	0	1
491		18	max	1049.796	1	0	1	13.741	1	0	1	.025	1	0	1
492			min	-1.053	3	0	1	.652	15	0	1	.001	15	0	1
493		19	max	1049.967	1	0	1	13.741	1	0	1	.026	1	0	1
494			min	-.925	3	0	1	.652	15	0	1	.001	15	0	1
495	M1	1	max	195.658	1	576.148	3	-6.179	15	0	1	.311	1	0	3
496			min	9.265	15	-390.504	1	-129.855	1	0	3	.015	15	-.012	2
497		2	max	196.375	1	575.218	3	-6.179	15	0	1	.243	1	.196	1
498			min	9.481	15	-391.744	1	-129.855	1	0	3	.012	15	-.303	3
499		3	max	416.136	3	439.107	1	-6.151	15	0	3	.174	1	.393	1
500			min	-243.038	2	-415.63	3	-129.521	1	0	1	.008	15	-.594	3
501		4	max	416.673	3	437.866	1	-6.151	15	0	3	.106	1	.161	1
502			min	-242.322	2	-416.561	3	-129.521	1	0	1	.005	15	-.375	3
503		5	max	417.21	3	436.626	1	-6.151	15	0	3	.037	1	-.003	15
504			min	-241.606	2	-417.491	3	-129.521	1	0	1	.002	15	-.155	3
505		6	max	417.747	3	435.385	1	-6.151	15	0	3	-.001	15	.066	3
506			min	-240.89	2	-418.422	3	-129.521	1	0	1	-.031	1	-.317	2
507		7	max	418.284	3	434.144	1	-6.151	15	0	3	-.005	15	.287	3
508			min	-240.173	2	-419.352	3	-129.521	1	0	1	-.099	1	-.545	2
509		8	max	418.822	3	432.904	1	-6.151	15	0	3	-.008	15	.508	3
510			min	-239.457	2	-420.282	3	-129.521	1	0	1	-.168	1	-.772	2
511		9	max	434.486	3	40.588	2	-8.9	15	0	9	.098	1	.594	3
512			min	-154.631	2	.379	15	-187.278	1	0	3	.005	15	-.885	2
513		10	max	435.023	3	39.347	2	-8.9	15	0	9	0	15	.578	3
514			min	-153.915	2	.004	15	-187.278	1	0	3	-.001	1	-.906	2
515		11	max	435.56	3	38.107	2	-8.9	15	0	9	-.005	15	.563	3
516			min	-153.199	2	-1.503	4	-187.278	1	0	3	-.1	1	-.926	2
517		12	max	451.158	3	274.156	3	-6.002	15	0	2	.166	1	.49	3
518			min	-92.161	10	-513.026	2	-126.506	1	0	3	.008	15	-.821	2
519		13	max	451.695	3	273.226	3	-6.002	15	0	2	.099	1	.346	3
520			min	-91.564	10	-514.267	2	-126.506	1	0	3	.005	15	-.55	2
521		14	max	452.232	3	272.295	3	-6.002	15	0	2	.032	1	.202	3
522			min	-90.967	10	-515.507	2	-126.506	1	0	3	.002	15	-.28	1
523		15	max	452.769	3	271.365	3	-6.002	15	0	2	-.002	15	.058	3
524			min	-90.37	10	-516.748	2	-126.506	1	0	3	-.035	1	-.027	1
525		16	max	453.306	3	270.434	3	-6.002	15	0	2	-.005	15	.267	2
526			min	-89.774	10	-517.988	2	-126.506	1	0	3	-.101	1	-.085	3
527		17	max	453.843	3	269.504	3	-6.002	15	0	2	-.008	15	.541	2
528			min	-89.177	10	-519.229	2	-126.506	1	0	3	-.168	1	-.227	3
529		18	max	-9.489	15	532.673	2	-6.64	15	0	3	-.011	15	.272	2
530			min	-196.599	1	-229.017	3	-139.649	1	0	2	-.239	1	-.113	3
531		19	max	-9.273	15	531.433	2	-6.64	15	0	3	-.015	15	.009	3
532			min	-195.883	1	-229.948	3	-139.649	1	0	2	-.313	1	-.009	1
533	M5	1	max	421.179	1	1919.856	3	0	1	0	1	0	1	.023	2
534			min	18.823	12	-1317.137	1	0	1	0	1	0	1	-.002	3
535		2	max	421.895	1	1918.926	3	0	1	0	1	0	1	.717	1
536			min	19.181	12	-1318.378	1	0	1	0	1	0	1	-1.014	3
537		3	max	1340.638	3	1351.062	1	0	1	0	1	0	1	1.38	1
538			min	-876.175	2	-1347.708	3	0	1	0	1	0	1	-1.987	3
539		4	max	1341.175	3	1349.821	1	0	1	0	1	0	1	.668	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-875.459	2	-1348.638	3	0	1	0	1	0	1	-1.276	3
541		5	max	1341.713	3	1348.581	1	0	1	0	1	0	1	.003	9
542			min	-874.742	2	-1349.569	3	0	1	0	1	0	1	-.564	3
543		6	max	1342.25	3	1347.34	1	0	1	0	1	0	1	.148	3
544			min	-874.026	2	-1350.499	3	0	1	0	1	0	1	-.799	2
545		7	max	1342.787	3	1346.1	1	0	1	0	1	0	1	.861	3
546			min	-873.31	2	-1351.43	3	0	1	0	1	0	1	-1.502	2
547		8	max	1343.324	3	1344.859	1	0	1	0	1	0	1	1.574	3
548			min	-872.594	2	-1352.36	3	0	1	0	1	0	1	-2.204	2
549		9	max	1371.213	3	135.038	2	0	1	0	1	0	1	1.812	3
550			min	-698.657	2	.376	15	0	1	0	1	0	1	-2.51	2
551		10	max	1371.751	3	133.797	2	0	1	0	1	0	1	1.756	3
552			min	-697.94	2	.002	15	0	1	0	1	0	1	-2.581	2
553		11	max	1372.288	3	132.557	2	0	1	0	1	0	1	1.701	3
554			min	-697.224	2	-1.335	4	0	1	0	1	0	1	-2.651	2
555		12	max	1400.311	3	880.272	3	0	1	0	1	0	1	1.494	3
556			min	-523.307	2	-1603.986	2	0	1	0	1	0	1	-2.374	2
557		13	max	1400.848	3	879.341	3	0	1	0	1	0	1	1.03	3
558			min	-522.591	2	-1605.226	2	0	1	0	1	0	1	-1.527	2
559		14	max	1401.385	3	878.411	3	0	1	0	1	0	1	.566	3
560			min	-521.875	2	-1606.467	2	0	1	0	1	0	1	-.693	1
561		15	max	1401.922	3	877.481	3	0	1	0	1	0	1	.168	2
562			min	-521.159	2	-1607.708	2	0	1	0	1	0	1	-.004	13
563		16	max	1402.459	3	876.55	3	0	1	0	1	0	1	1.017	2
564			min	-520.442	2	-1608.948	2	0	1	0	1	0	1	-.36	3
565		17	max	1402.996	3	875.62	3	0	1	0	1	0	1	1.866	2
566			min	-519.726	2	-1610.189	2	0	1	0	1	0	1	-.822	3
567		18	max	-19.453	12	1790.864	2	0	1	0	1	0	1	.962	2
568			min	-421.445	1	-781.988	3	0	1	0	1	0	1	-.43	3
569		19	max	-19.095	12	1789.624	2	0	1	0	1	0	1	.019	1
570			min	-420.729	1	-782.918	3	0	1	0	1	0	1	-.017	3
571	M9	1	max	195.658	1	576.148	3	129.855	1	0	3	-.015	15	0	3
572			min	9.265	15	-390.504	1	6.179	15	0	1	-.311	1	-.012	2
573		2	max	196.375	1	575.218	3	129.855	1	0	3	-.012	15	.196	1
574			min	9.481	15	-391.744	1	6.179	15	0	1	-.243	1	-.303	3
575		3	max	416.136	3	439.107	1	129.521	1	0	1	-.008	15	.393	1
576			min	-243.038	2	-415.63	3	6.151	15	0	3	-.174	1	-.594	3
577		4	max	416.673	3	437.866	1	129.521	1	0	1	-.005	15	.161	1
578			min	-242.322	2	-416.561	3	6.151	15	0	3	-.106	1	-.375	3
579		5	max	417.21	3	436.626	1	129.521	1	0	1	-.002	15	-.003	15
580			min	-241.606	2	-417.491	3	6.151	15	0	3	-.037	1	-.155	3
581		6	max	417.747	3	435.385	1	129.521	1	0	1	.031	1	.066	3
582			min	-240.89	2	-418.422	3	6.151	15	0	3	.001	15	-.317	2
583		7	max	418.284	3	434.144	1	129.521	1	0	1	.099	1	.287	3
584			min	-240.173	2	-419.352	3	6.151	15	0	3	.005	15	-.545	2
585		8	max	418.822	3	432.904	1	129.521	1	0	1	.168	1	.508	3
586			min	-239.457	2	-420.282	3	6.151	15	0	3	.008	15	-.772	2
587		9	max	434.486	3	40.588	2	187.278	1	0	3	-.005	15	.594	3
588			min	-154.631	2	.379	15	8.9	15	0	9	-.098	1	-.885	2
589		10	max	435.023	3	39.347	2	187.278	1	0	3	.001	1	.578	3
590			min	-153.915	2	.004	15	8.9	15	0	9	0	15	-.906	2
591		11	max	435.56	3	38.107	2	187.278	1	0	3	.1	1	.563	3
592			min	-153.199	2	-1.503	4	8.9	15	0	9	.005	15	-.926	2
593		12	max	451.158	3	274.156	3	126.506	1	0	3	-.008	15	.49	3
594			min	-92.161	10	-513.026	2	6.002	15	0	2	-.166	1	-.821	2
595		13	max	451.695	3	273.226	3	126.506	1	0	3	-.005	15	.346	3
596			min	-91.564	10	-514.267	2	6.002	15	0	2	-.099	1	-.55	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	452.232	3	272.295	3	126.506	1	0	3	-.002	15	.202	3
598			min	-90.967	10	-515.507	2	6.002	15	0	2	-.032	1	-.28	1
599		15	max	452.769	3	271.365	3	126.506	1	0	3	.035	1	.058	3
600			min	-90.37	10	-516.748	2	6.002	15	0	2	.002	15	-.027	1
601		16	max	453.306	3	270.434	3	126.506	1	0	3	.101	1	.267	2
602			min	-89.774	10	-517.988	2	6.002	15	0	2	.005	15	-.085	3
603		17	max	453.843	3	269.504	3	126.506	1	0	3	.168	1	.541	2
604			min	-89.177	10	-519.229	2	6.002	15	0	2	.008	15	-.227	3
605		18	max	-9.489	15	532.673	2	139.649	1	0	2	.239	1	.272	2
606			min	-196.599	1	-229.017	3	6.64	15	0	3	.011	15	-.113	3
607		19	max	-9.273	15	531.433	2	139.649	1	0	2	.313	1	.009	3
608			min	-195.883	1	-229.948	3	6.64	15	0	3	.015	15	-.009	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	.001	1	.09	2	.007	3	7.536e-3	2	NC	1	NC	1
2			min	0	15	-.011	3	-.003	2	-1.226e-3	3	NC	1	NC	1
3		2	max	.001	1	.327	3	.055	1	8.746e-3	2	NC	5	NC	2
4			min	0	15	-.126	1	.003	15	-1.31e-3	3	762.032	3	4862.342	1
5		3	max	.001	1	.601	3	.133	1	9.956e-3	2	NC	5	NC	3
6			min	0	15	-.295	1	.006	15	-1.394e-3	3	421.096	3	1971.392	1
7		4	max	0	1	.768	3	.2	1	1.117e-2	2	NC	5	NC	3
8			min	0	15	-.391	1	.01	15	-1.479e-3	3	331.168	3	1298.646	1
9		5	max	0	1	.806	3	.236	1	1.238e-2	2	NC	5	NC	3
10			min	0	15	-.4	1	.011	15	-1.563e-3	3	315.604	3	1102.797	1
11		6	max	0	1	.719	3	.228	1	1.359e-2	2	NC	5	NC	5
12			min	0	15	-.326	1	.011	15	-1.647e-3	3	353.031	3	1139.157	1
13		7	max	0	1	.534	3	.18	1	1.48e-2	2	NC	5	NC	3
14			min	0	15	-.186	1	.009	15	-1.731e-3	3	473.384	3	1447.023	1
15		8	max	0	1	.298	3	.105	1	1.601e-2	2	NC	4	NC	3
16			min	0	15	-.015	9	.005	10	-1.815e-3	3	834.663	3	2488.256	1
17		9	max	0	1	.155	2	.031	1	1.722e-2	2	NC	4	NC	2
18			min	0	15	.004	15	-.005	10	-1.9e-3	3	2709.692	3	8831.496	1
19		10	max	0	1	.22	2	.023	3	1.843e-2	2	NC	3	NC	1
20			min	0	1	-.013	3	-.015	2	-1.984e-3	3	1998.721	2	NC	1
21		11	max	0	15	.155	2	.031	1	1.722e-2	2	NC	4	NC	2
22			min	0	1	.004	15	-.005	10	-1.9e-3	3	2709.692	3	8831.496	1
23		12	max	0	15	.298	3	.105	1	1.601e-2	2	NC	4	NC	3
24			min	0	1	-.015	9	.005	10	-1.815e-3	3	834.663	3	2488.256	1
25		13	max	0	15	.534	3	.18	1	1.48e-2	2	NC	5	NC	3
26			min	0	1	-.186	1	.009	15	-1.731e-3	3	473.384	3	1447.023	1
27		14	max	0	15	.719	3	.228	1	1.359e-2	2	NC	5	NC	5
28			min	0	1	-.326	1	.011	15	-1.647e-3	3	353.031	3	1139.157	1
29		15	max	0	15	.806	3	.236	1	1.238e-2	2	NC	5	NC	3
30			min	0	1	-.4	1	.011	15	-1.563e-3	3	315.604	3	1102.797	1
31		16	max	0	15	.768	3	.2	1	1.117e-2	2	NC	5	NC	3
32			min	0	1	-.391	1	.01	15	-1.479e-3	3	331.168	3	1298.646	1
33		17	max	0	15	.601	3	.133	1	9.956e-3	2	NC	5	NC	3
34			min	-.001	1	-.295	1	.006	15	-1.394e-3	3	421.096	3	1971.392	1
35		18	max	0	15	.327	3	.055	1	8.746e-3	2	NC	5	NC	2
36			min	-.001	1	-.126	1	.003	15	-1.31e-3	3	762.032	3	4862.342	1
37		19	max	0	15	.09	2	.007	3	7.536e-3	2	NC	1	NC	1
38			min	-.001	1	-.011	3	-.003	2	-1.226e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.178	3	.007	3	4.474e-3	2	NC	1	NC	1
40			min	0	15	-.296	2	-.003	2	-3.135e-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	.495	3	.039	1	5.391e-3	2	NC	5	NC	2
42			min	0	15	-.604	2	.002	15	-3.842e-3	3	811.024	1	7039.298	1
43		3	max	0	1	.762	3	.108	1	6.309e-3	2	NC	15	NC	3
44			min	0	15	-.875	1	.005	15	-4.548e-3	3	437.385	1	2438.547	1
45		4	max	0	1	.944	3	.173	1	7.227e-3	2	NC	15	NC	3
46			min	0	15	-1.068	1	.008	15	-5.255e-3	3	329.325	1	1507.623	1
47		5	max	0	1	1.023	3	.21	1	8.145e-3	2	9556.326	15	NC	3
48			min	0	15	-1.168	1	.01	15	-5.961e-3	3	292.262	1	1236.889	1
49		6	max	0	1	1.002	3	.208	1	9.063e-3	2	9560.959	15	NC	3
50			min	0	15	-1.173	1	.01	15	-6.668e-3	3	290.617	1	1250.088	1
51		7	max	0	1	.898	3	.167	1	9.98e-3	2	NC	15	NC	3
52			min	0	15	-1.103	2	.008	15	-7.374e-3	3	316.916	1	1563.629	1
53		8	max	0	1	.747	3	.099	1	1.09e-2	2	NC	15	NC	3
54			min	0	15	-.992	2	.005	10	-8.081e-3	3	370.677	2	2654.965	1
55		9	max	0	1	.602	3	.03	1	1.182e-2	2	NC	15	NC	2
56			min	0	15	-.88	2	-.005	10	-8.787e-3	3	441.633	2	9240.711	1
57		10	max	0	1	.535	3	.021	3	1.273e-2	2	NC	5	NC	1
58			min	0	1	-.827	2	-.014	2	-9.494e-3	3	485.915	2	NC	1
59		11	max	0	15	.602	3	.03	1	1.182e-2	2	NC	15	NC	2
60			min	0	1	-.88	2	-.005	10	-8.787e-3	3	441.633	2	9240.711	1
61		12	max	0	15	.747	3	.099	1	1.09e-2	2	NC	15	NC	3
62			min	0	1	-.992	2	.005	10	-8.081e-3	3	370.677	2	2654.965	1
63		13	max	0	15	.898	3	.167	1	9.98e-3	2	NC	15	NC	3
64			min	0	1	-1.103	2	.008	15	-7.374e-3	3	316.916	1	1563.629	1
65		14	max	0	15	1.002	3	.208	1	9.063e-3	2	9560.959	15	NC	3
66			min	0	1	-1.173	1	.01	15	-6.668e-3	3	290.617	1	1250.088	1
67		15	max	0	15	1.023	3	.21	1	8.145e-3	2	9556.326	15	NC	3
68			min	0	1	-1.168	1	.01	15	-5.961e-3	3	292.262	1	1236.889	1
69		16	max	0	15	.944	3	.173	1	7.227e-3	2	NC	15	NC	3
70			min	0	1	-1.068	1	.008	15	-5.255e-3	3	329.325	1	1507.623	1
71		17	max	0	15	.762	3	.108	1	6.309e-3	2	NC	15	NC	3
72			min	0	1	-.875	1	.005	15	-4.548e-3	3	437.385	1	2438.547	1
73		18	max	0	15	.495	3	.039	1	5.391e-3	2	NC	5	NC	2
74			min	0	1	-.604	2	.002	15	-3.842e-3	3	811.024	1	7039.298	1
75		19	max	0	15	.178	3	.007	3	4.474e-3	2	NC	1	NC	1
76			min	0	1	-.296	2	-.003	2	-3.135e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.182	3	.006	3	2.705e-3	3	NC	1	NC	1
78			min	0	1	-.295	2	-.003	2	-4.671e-3	2	NC	1	NC	1
79		2	max	0	15	.379	3	.039	1	3.321e-3	3	NC	5	NC	2
80			min	0	1	-.697	2	.002	15	-5.633e-3	2	641.7	2	7007.155	1
81		3	max	0	15	.548	3	.108	1	3.936e-3	3	NC	15	NC	3
82			min	0	1	-1.037	2	.005	15	-6.595e-3	2	347.627	2	2432.054	1
83		4	max	0	15	.671	3	.173	1	4.552e-3	3	NC	15	NC	3
84			min	0	1	-1.273	2	.008	15	-7.557e-3	2	263.796	2	1504.527	1
85		5	max	0	15	.738	3	.211	1	5.167e-3	3	9571.639	15	NC	3
86			min	0	1	-1.384	2	.01	15	-8.52e-3	2	236.981	2	1234.605	1
87		6	max	0	15	.748	3	.209	1	5.783e-3	3	9579.366	15	NC	3
88			min	0	1	-1.37	2	.01	15	-9.482e-3	2	240.077	2	1247.71	1
89		7	max	0	15	.711	3	.167	1	6.398e-3	3	NC	15	NC	3
90			min	0	1	-1.253	2	.008	15	-1.044e-2	2	269.374	2	1560.005	1
91		8	max	0	15	.645	3	.099	1	7.013e-3	3	NC	15	NC	3
92			min	0	1	-1.077	2	.005	15	-1.141e-2	2	330.203	2	2645.033	1
93		9	max	0	15	.576	3	.03	1	7.629e-3	3	NC	5	NC	2
94			min	0	1	-.905	2	-.004	10	-1.237e-2	2	422.938	2	9127.239	1
95		10	max	0	1	.544	3	.019	3	8.244e-3	3	NC	5	NC	1
96			min	0	1	-.825	2	-.013	2	-1.333e-2	2	486.893	2	NC	1
97		11	max	0	1	.576	3	.03	1	7.629e-3	3	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.905	2	-.004	10	-1.237e-2	2	422.938	2	9127.239	1
99		12	max	0	1	.645	3	.099	1	7.013e-3	3	NC	15	NC	3
100			min	0	15	-1.077	2	.005	15	-1.141e-2	2	330.203	2	2645.033	1
101		13	max	0	1	.711	3	.167	1	6.398e-3	3	NC	15	NC	3
102			min	0	15	-1.253	2	.008	15	-1.044e-2	2	269.374	2	1560.005	1
103		14	max	0	1	.748	3	.209	1	5.783e-3	3	9579.366	15	NC	3
104			min	0	15	-1.37	2	.01	15	-9.482e-3	2	240.077	2	1247.71	1
105		15	max	0	1	.738	3	.211	1	5.167e-3	3	9571.639	15	NC	3
106			min	0	15	-1.384	2	.01	15	-8.52e-3	2	236.981	2	1234.605	1
107		16	max	0	1	.671	3	.173	1	4.552e-3	3	NC	15	NC	3
108			min	0	15	-1.273	2	.008	15	-7.557e-3	2	263.796	2	1504.527	1
109		17	max	0	1	.548	3	.108	1	3.936e-3	3	NC	15	NC	3
110			min	0	15	-1.037	2	.005	15	-6.595e-3	2	347.627	2	2432.054	1
111		18	max	0	1	.379	3	.039	1	3.321e-3	3	NC	5	NC	2
112			min	0	15	-.697	2	.002	15	-5.633e-3	2	641.7	2	7007.155	1
113		19	max	0	1	.182	3	.006	3	2.705e-3	3	NC	1	NC	1
114			min	0	15	-.295	2	-.003	2	-4.671e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.084	1	.005	3	4.706e-3	3	NC	1	NC	1
116			min	-.001	1	-.058	3	-.003	2	-6.428e-3	1	NC	1	NC	1
117		2	max	0	15	.062	3	.054	1	5.606e-3	3	NC	5	NC	2
118			min	-.001	1	-.215	2	.003	15	-7.401e-3	1	871.529	2	4896.814	1
119		3	max	0	15	.156	3	.132	1	6.507e-3	3	NC	5	NC	3
120			min	-.001	1	-.452	2	.006	15	-8.374e-3	1	484.278	2	1978.385	1
121		4	max	0	15	.208	3	.2	1	7.407e-3	3	NC	5	NC	3
122			min	0	1	-.59	2	.01	15	-9.347e-3	1	384.809	2	1300.815	1
123		5	max	0	15	.209	3	.235	1	8.307e-3	3	NC	5	NC	3
124			min	0	1	-.61	2	.011	15	-1.032e-2	1	373.442	2	1103.004	1
125		6	max	0	15	.161	3	.228	1	9.207e-3	3	NC	5	NC	3
126			min	0	1	-.516	2	.011	15	-1.129e-2	1	432.107	2	1137.473	1
127		7	max	0	15	.076	3	.18	1	1.011e-2	3	NC	5	NC	3
128			min	0	1	-.333	2	.009	15	-1.227e-2	1	623.819	2	1441.024	1
129		8	max	0	15	0	15	.106	1	1.101e-2	3	NC	4	NC	3
130			min	0	1	-.105	2	.005	15	-1.324e-2	1	1384.919	2	2461.841	1
131		9	max	0	15	.118	1	.032	1	1.191e-2	3	NC	2	NC	2
132			min	0	1	-.12	3	-.003	10	-1.421e-2	1	4209.482	3	8432.541	1
133		10	max	0	1	.2	1	.017	3	1.281e-2	3	NC	4	NC	1
134			min	0	1	-.16	3	-.012	2	-1.519e-2	1	2210.705	1	NC	1
135		11	max	0	1	.118	1	.032	1	1.191e-2	3	NC	2	NC	2
136			min	0	15	-.12	3	-.003	10	-1.421e-2	1	4209.482	3	8432.541	1
137		12	max	0	1	0	15	.106	1	1.101e-2	3	NC	4	NC	3
138			min	0	15	-.105	2	.005	15	-1.324e-2	1	1384.919	2	2461.841	1
139		13	max	0	1	.076	3	.18	1	1.011e-2	3	NC	5	NC	3
140			min	0	15	-.333	2	.009	15	-1.227e-2	1	623.819	2	1441.024	1
141		14	max	0	1	.161	3	.228	1	9.207e-3	3	NC	5	NC	3
142			min	0	15	-.516	2	.011	15	-1.129e-2	1	432.107	2	1137.473	1
143		15	max	0	1	.209	3	.235	1	8.307e-3	3	NC	5	NC	3
144			min	0	15	-.61	2	.011	15	-1.032e-2	1	373.442	2	1103.004	1
145		16	max	0	1	.208	3	.2	1	7.407e-3	3	NC	5	NC	3
146			min	0	15	-.59	2	.01	15	-9.347e-3	1	384.809	2	1300.815	1
147		17	max	.001	1	.156	3	.132	1	6.507e-3	3	NC	5	NC	3
148			min	0	15	-.452	2	.006	15	-8.374e-3	1	484.278	2	1978.385	1
149		18	max	.001	1	.062	3	.054	1	5.606e-3	3	NC	5	NC	2
150			min	0	15	-.215	2	.003	15	-7.401e-3	1	871.529	2	4896.814	1
151		19	max	.001	1	.084	1	.005	3	4.706e-3	3	NC	1	NC	1
152			min	0	15	-.058	3	-.003	2	-6.428e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.01	1	-1.368e-5	15	NC	1	NC	2
154			min	-.007	3	-.011	3	0	15	-2.883e-4	1	NC	1	6963.229	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.005	2	.009	1	-1.289e-5	15	NC	1	NC	2
156			min	-.007	3	-.011	3	0	15	-2.717e-4	1	NC	1	7593.892	1
157		3	max	.005	1	.004	2	.008	1	-1.211e-5	15	NC	1	NC	2
158			min	-.006	3	-.01	3	0	15	-2.55e-4	1	NC	1	8345.414	1
159		4	max	.005	1	.003	2	.008	1	-1.132e-5	15	NC	1	NC	2
160			min	-.006	3	-.01	3	0	15	-2.384e-4	1	NC	1	9249.809	1
161		5	max	.005	1	.002	2	.007	1	-1.053e-5	15	NC	1	NC	1
162			min	-.006	3	-.01	3	0	15	-2.218e-4	1	NC	1	NC	1
163		6	max	.004	1	.001	2	.006	1	-9.743e-6	15	NC	1	NC	1
164			min	-.005	3	-.009	3	0	15	-2.052e-4	1	NC	1	NC	1
165		7	max	.004	1	0	2	.005	1	-8.955e-6	15	NC	1	NC	1
166			min	-.005	3	-.009	3	0	15	-1.886e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.004	1	-8.167e-6	15	NC	1	NC	1
168			min	-.004	3	-.008	3	0	15	-1.72e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.004	1	-7.379e-6	15	NC	1	NC	1
170			min	-.004	3	-.008	3	0	15	-1.554e-4	1	NC	1	NC	1
171		10	max	.003	1	-.001	2	.003	1	-6.591e-6	15	NC	1	NC	1
172			min	-.004	3	-.007	3	0	15	-1.388e-4	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-5.804e-6	15	NC	1	NC	1
174			min	-.003	3	-.007	3	0	15	-1.222e-4	1	NC	1	NC	1
175		12	max	.002	1	-.001	15	.002	1	-5.016e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-1.056e-4	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.001	1	-4.228e-6	15	NC	1	NC	1
178			min	-.002	3	-.005	3	0	15	-8.899e-5	1	NC	1	NC	1
179		14	max	.002	1	-.001	15	.001	1	-3.44e-6	15	NC	1	NC	1
180			min	-.002	3	-.005	3	0	15	-7.238e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-2.652e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-5.577e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-1.865e-6	15	NC	1	NC	1
184			min	-.001	3	-.003	4	0	15	-3.917e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-1.077e-6	15	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-2.256e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-2.889e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-5.956e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.065e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	4.546e-7	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.008e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.323e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	2.316e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	12	1.098e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	5.063e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	12	2.4e-6	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	7.811e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	3.702e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	1.056e-4	1	NC	1	NC	1
200			min	-.001	2	-.008	4	0	15	5.004e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.331e-4	1	NC	1	NC	1
202			min	-.001	2	-.01	4	0	15	6.305e-6	15	9625.224	4	NC	1
203		7	max	.002	3	-.003	15	0	1	1.605e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	7.607e-6	15	8290.912	4	NC	1
205		8	max	.002	3	-.003	15	.001	1	1.88e-4	1	NC	2	NC	1
206			min	-.002	2	-.012	4	0	15	8.909e-6	15	7468.572	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	2.155e-4	1	NC	3	NC	1
208			min	-.002	2	-.013	4	0	15	1.021e-5	15	6985.398	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.43e-4	1	NC	5	NC	1
210			min	-.002	2	-.014	4	0	15	1.151e-5	15	6757.831	4	NC	1
211		11	max	.003	3	-.003	15	.002	1	2.705e-4	1	NC	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
212			min	-.003	2	-.014	4	0	15	1.281e-5	15	6752.532	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.979e-4	1	NC	3	NC	1
214			min	-.003	2	-.013	4	0	15	1.412e-5	15	6973.607	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	3.254e-4	1	NC	2	NC	1
216			min	-.003	2	-.013	4	0	15	1.542e-5	15	7465.839	4	NC	1
217		14	max	.004	3	-.003	15	.004	1	3.529e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	1.672e-5	15	8337.614	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	3.804e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	1.802e-5	15	9828.082	4	NC	1
221		16	max	.005	3	-.002	15	.006	1	4.079e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	1.932e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.007	1	4.353e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	2.062e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.008	1	4.628e-4	1	NC	1	NC	1
226			min	-.004	2	-.004	1	0	15	2.193e-5	15	NC	1	NC	1
227		19	max	.006	3	0	10	.01	1	4.903e-4	1	NC	1	NC	2
228			min	-.005	2	-.002	1	0	15	2.323e-5	15	NC	1	9455.187	1
229	M4	1	max	.003	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
230			min	0	3	-.006	3	-.01	1	5.373e-6	15	NC	1	2599.72	1
231		2	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
232			min	0	3	-.006	3	-.009	1	5.373e-6	15	NC	1	2823.073	1
233		3	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
234			min	0	3	-.005	3	-.008	1	5.373e-6	15	NC	1	3089.139	1
235		4	max	.002	1	.004	2	0	15	1.131e-4	1	NC	1	NC	3
236			min	0	3	-.005	3	-.007	1	5.373e-6	15	NC	1	3408.97	1
237		5	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	3
238			min	0	3	-.005	3	-.007	1	5.373e-6	15	NC	1	3797.589	1
239		6	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
240			min	0	3	-.004	3	-.006	1	5.373e-6	15	NC	1	4275.832	1
241		7	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
242			min	0	3	-.004	3	-.005	1	5.373e-6	15	NC	1	4873.274	1
243		8	max	.002	1	.003	2	0	15	1.131e-4	1	NC	1	NC	2
244			min	0	3	-.004	3	-.004	1	5.373e-6	15	NC	1	5633.042	1
245		9	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
246			min	0	3	-.003	3	-.004	1	5.373e-6	15	NC	1	6620.055	1
247		10	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	5.373e-6	15	NC	1	7935.779	1
249		11	max	.001	1	.002	2	0	15	1.131e-4	1	NC	1	NC	2
250			min	0	3	-.003	3	-.003	1	5.373e-6	15	NC	1	9746.167	1
251		12	max	0	1	.002	2	0	15	1.131e-4	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	5.373e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	1.131e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	-.002	1	5.373e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.131e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.001	1	5.373e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	5.373e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	5.373e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	5.373e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.131e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	5.373e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.131e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	5.373e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.025	2	0	1	0	1	NC	3	NC	1
268			min	-.024	3	-.034	3	0	1	0	1	2854.669	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.018	1	.022	2	0	1	0	1	NC	3	NC	1
270			min	-.022	3	-.032	3	0	1	0	1	3139.639	2	NC	1
271		3	max	.017	1	.02	2	0	1	0	1	NC	3	NC	1
272			min	-.021	3	-.031	3	0	1	0	1	3484.634	2	NC	1
273		4	max	.016	1	.018	2	0	1	0	1	NC	3	NC	1
274			min	-.02	3	-.029	3	0	1	0	1	3906.92	2	NC	1
275		5	max	.015	1	.016	2	0	1	0	1	NC	3	NC	1
276			min	-.018	3	-.027	3	0	1	0	1	4430.672	2	NC	1
277		6	max	.014	1	.014	2	0	1	0	1	NC	1	NC	1
278			min	-.017	3	-.025	3	0	1	0	1	5090.573	2	NC	1
279		7	max	.013	1	.012	2	0	1	0	1	NC	1	NC	1
280			min	-.016	3	-.023	3	0	1	0	1	5937.825	2	NC	1
281		8	max	.012	1	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.014	3	-.021	3	0	1	0	1	7050.635	2	NC	1
283		9	max	.011	1	.008	2	0	1	0	1	NC	1	NC	1
284			min	-.013	3	-.019	3	0	1	0	1	8553.418	2	NC	1
285		10	max	.01	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.017	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.01	3	-.015	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.01	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	9736.356	3	NC	1
317		7	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.012	3	0	1	0	1	8474.869	4	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7622.656	4	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7120.441	4	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.014	3	0	1	0	1	6881.096	4	NC	1
325		11	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.01	2	-.015	3	0	1	0	1	6869.476	4	NC	1
327		12	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7088.951	4	NC	1
329		13	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.014	3	0	1	0	1	7584.435	4	NC	1
331		14	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.013	3	0	1	0	1	8465.512	4	NC	1
333		15	max	.014	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.012	3	0	1	0	1	9974.467	4	NC	1
335		16	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.01	3	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.016	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.017	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.018	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	15	2.883e-4	1	NC	1	NC	2
382			min	-.007	3	-.011	3	-.01	1	1.368e-5	15	NC	1	6963.229	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.005	2	0	15	2.717e-4	1	NC	1	NC	2
384			min	-.007	3	-.011	3	-.009	1	1.289e-5	15	NC	1	7593.892	1
385		3	max	.005	1	.004	2	0	15	2.55e-4	1	NC	1	NC	2
386			min	-.006	3	-.01	3	-.008	1	1.211e-5	15	NC	1	8345.414	1
387		4	max	.005	1	.003	2	0	15	2.384e-4	1	NC	1	NC	2
388			min	-.006	3	-.01	3	-.008	1	1.132e-5	15	NC	1	9249.809	1
389		5	max	.005	1	.002	2	0	15	2.218e-4	1	NC	1	NC	1
390			min	-.006	3	-.01	3	-.007	1	1.053e-5	15	NC	1	NC	1
391		6	max	.004	1	.001	2	0	15	2.052e-4	1	NC	1	NC	1
392			min	-.005	3	-.009	3	-.006	1	9.743e-6	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	1.886e-4	1	NC	1	NC	1
394			min	-.005	3	-.009	3	-.005	1	8.955e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.72e-4	1	NC	1	NC	1
396			min	-.004	3	-.008	3	-.004	1	8.167e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	1.554e-4	1	NC	1	NC	1
398			min	-.004	3	-.008	3	-.004	1	7.379e-6	15	NC	1	NC	1
399		10	max	.003	1	-.001	2	0	15	1.388e-4	1	NC	1	NC	1
400			min	-.004	3	-.007	3	-.003	1	6.591e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	1.222e-4	1	NC	1	NC	1
402			min	-.003	3	-.007	3	-.003	1	5.804e-6	15	NC	1	NC	1
403		12	max	.002	1	-.001	15	0	15	1.056e-4	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	5.016e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	8.899e-5	1	NC	1	NC	1
406			min	-.002	3	-.005	3	-.001	1	4.228e-6	15	NC	1	NC	1
407		14	max	.002	1	-.001	15	0	15	7.238e-5	1	NC	1	NC	1
408			min	-.002	3	-.005	3	-.001	1	3.44e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	5.577e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	2.652e-6	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	3.917e-5	1	NC	1	NC	1
412			min	-.001	3	-.003	4	0	1	1.865e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.256e-5	1	NC	1	NC	1
414			min	0	3	-.002	4	0	1	1.077e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	5.956e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	2.889e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-4.546e-7	12	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.065e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	4.323e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.008e-7	12	NC	1	NC	1
421		2	max	0	3	0	15	0	12	-1.098e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-2.316e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	12	-2.4e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-5.063e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-3.702e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-7.811e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-5.004e-6	15	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.056e-4	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-6.305e-6	15	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.331e-4	1	9625.224	4	NC	1
431		7	max	.002	3	-.003	15	0	15	-7.607e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-1.605e-4	1	8290.912	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-8.909e-6	15	NC	2	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.88e-4	1	7468.572	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-1.021e-5	15	NC	3	NC	1
436			min	-.002	2	-.013	4	-.002	1	-2.155e-4	1	6985.398	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-1.151e-5	15	NC	5	NC	1
438			min	-.002	2	-.014	4	-.002	1	-2.43e-4	1	6757.831	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-1.281e-5	15	NC	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
440			min	-.003	2	-.014	4	-.002	1	-2.705e-4	1	6752.532	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.412e-5	15	NC	3	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.979e-4	1	6973.607	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.542e-5	15	NC	2	NC	1
444			min	-.003	2	-.013	4	-.004	1	-3.254e-4	1	7465.839	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-1.672e-5	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-3.529e-4	1	8337.614	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-1.802e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-3.804e-4	1	9828.082	4	NC	1
449		16	max	.005	3	-.002	15	0	15	-1.932e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.006	1	-4.079e-4	1	NC	1	NC	1
451		17	max	.005	3	-.001	15	0	15	-2.062e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.007	1	-4.353e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-2.193e-5	15	NC	1	NC	1
454			min	-.004	2	-.004	1	-.008	1	-4.628e-4	1	NC	1	NC	1
455		19	max	.006	3	0	10	0	15	-2.323e-5	15	NC	1	NC	2
456			min	-.005	2	-.002	1	-.01	1	-4.903e-4	1	NC	1	9455.187	1
457	M12	1	max	.003	1	.004	2	.01	1	-5.373e-6	15	NC	1	NC	3
458			min	0	3	-.006	3	0	15	-1.131e-4	1	NC	1	2599.72	1
459		2	max	.002	1	.004	2	.009	1	-5.373e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-1.131e-4	1	NC	1	2823.073	1
461		3	max	.002	1	.004	2	.008	1	-5.373e-6	15	NC	1	NC	3
462			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	3089.139	1
463		4	max	.002	1	.004	2	.007	1	-5.373e-6	15	NC	1	NC	3
464			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	3408.97	1
465		5	max	.002	1	.003	2	.007	1	-5.373e-6	15	NC	1	NC	3
466			min	0	3	-.005	3	0	15	-1.131e-4	1	NC	1	3797.589	1
467		6	max	.002	1	.003	2	.006	1	-5.373e-6	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-1.131e-4	1	NC	1	4275.832	1
469		7	max	.002	1	.003	2	.005	1	-5.373e-6	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-1.131e-4	1	NC	1	4873.274	1
471		8	max	.002	1	.003	2	.004	1	-5.373e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-1.131e-4	1	NC	1	5633.042	1
473		9	max	.001	1	.002	2	.004	1	-5.373e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	6620.055	1
475		10	max	.001	1	.002	2	.003	1	-5.373e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	7935.779	1
477		11	max	.001	1	.002	2	.003	1	-5.373e-6	15	NC	1	NC	2
478			min	0	3	-.003	3	0	15	-1.131e-4	1	NC	1	9746.167	1
479		12	max	0	1	.002	2	.002	1	-5.373e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
481		13	max	0	1	.001	2	.002	1	-5.373e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-5.373e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.131e-4	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.131e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.131e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.131e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-5.373e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.131e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-5.373e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.131e-4	1	NC	1	NC	1
495	M1	1	max	.007	3	.09	2	.001	1	1.542e-2	1	NC	1	NC	1
496			min	-.003	2	-.011	3	0	15	-2.45e-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	.007	3	.043	2	0	15	7.466e-3	1	NC	3	NC	1
498			min	-.003	2	-.003	3	-.007	1	-1.212e-2	3	2404.92	2	NC	1
499		3	max	.007	3	.011	3	0	15	1.22e-5	10	NC	5	NC	1
500			min	-.003	2	-.009	2	-.01	1	-2.099e-4	1	1157.386	2	NC	1
501		4	max	.007	3	.037	3	0	15	4.064e-3	2	NC	5	NC	1
502			min	-.003	2	-.067	2	-.009	1	-4.326e-3	3	729.117	2	NC	1
503		5	max	.007	3	.07	3	0	15	8.321e-3	1	NC	5	NC	1
504			min	-.003	2	-.129	2	-.007	1	-8.53e-3	3	525.31	2	NC	1
505		6	max	.007	3	.106	3	0	15	1.259e-2	1	NC	15	NC	1
506			min	-.003	2	-.188	2	-.003	1	-1.273e-2	3	413.19	2	NC	1
507		7	max	.007	3	.14	3	0	1	1.685e-2	1	NC	15	NC	1
508			min	-.003	2	-.241	2	0	12	-1.694e-2	3	347.085	2	NC	1
509		8	max	.007	3	.169	3	.001	1	2.112e-2	1	9184.871	15	NC	1
510			min	-.003	2	-.283	2	0	15	-2.114e-2	3	308.02	2	NC	1
511		9	max	.007	3	.188	3	0	15	2.346e-2	1	8580.806	15	NC	1
512			min	-.003	2	-.31	2	0	1	-2.118e-2	3	287.699	2	NC	1
513		10	max	.006	3	.195	3	0	1	2.549e-2	2	8396.916	15	NC	1
514			min	-.003	2	-.319	2	0	12	-1.847e-2	3	281.736	2	NC	1
515		11	max	.006	3	.19	3	0	1	2.761e-2	2	8580.504	15	NC	1
516			min	-.003	2	-.31	2	0	15	-1.575e-2	3	288.66	2	NC	1
517		12	max	.006	3	.174	3	0	15	2.678e-2	2	9184.242	15	NC	1
518			min	-.003	2	-.282	2	-.001	1	-1.308e-2	3	310.968	2	NC	1
519		13	max	.006	3	.148	3	0	15	2.149e-2	2	NC	15	NC	1
520			min	-.003	2	-.238	2	0	1	-1.047e-2	3	354.305	2	NC	1
521		14	max	.006	3	.115	3	.002	1	1.62e-2	2	NC	15	NC	1
522			min	-.003	2	-.182	2	0	15	-7.855e-3	3	428.683	2	NC	1
523		15	max	.006	3	.078	3	.006	1	1.091e-2	2	NC	5	NC	1
524			min	-.003	2	-.121	2	0	15	-5.243e-3	3	557.326	2	NC	1
525		16	max	.005	3	.04	3	.009	1	5.626e-3	2	NC	5	NC	1
526			min	-.003	2	-.061	2	0	15	-2.63e-3	3	796.93	2	NC	1
527		17	max	.005	3	.004	3	.01	1	6.342e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	-1.723e-5	3	1307.538	1	NC	1
529		18	max	.005	3	.043	1	.007	1	1.072e-2	2	NC	4	NC	1
530			min	-.003	2	-.028	3	0	15	-4.291e-3	3	2768.594	1	NC	1
531		19	max	.005	3	.084	1	0	15	2.146e-2	2	NC	1	NC	1
532			min	-.003	2	-.058	3	-.001	1	-8.726e-3	3	NC	1	NC	1
533	M5	1	max	.023	3	.22	2	0	1	0	1	NC	1	NC	1
534			min	-.015	2	-.013	3	0	1	0	1	NC	1	NC	1
535		2	max	.023	3	.102	2	0	1	0	1	NC	5	NC	1
536			min	-.016	2	.001	3	0	1	0	1	979.642	2	NC	1
537		3	max	.023	3	.036	3	0	1	0	1	NC	5	NC	1
538			min	-.016	2	-.03	2	0	1	0	1	462.568	2	NC	1
539		4	max	.023	3	.108	3	0	1	0	1	9645.784	15	NC	1
540			min	-.015	2	-.186	2	0	1	0	1	284.475	2	NC	1
541		5	max	.022	3	.205	3	0	1	0	1	6754.799	15	NC	1
542			min	-.015	2	-.354	2	0	1	0	1	200.992	2	NC	1
543		6	max	.022	3	.313	3	0	1	0	1	5203.083	15	NC	1
544			min	-.015	2	-.52	2	0	1	0	1	155.798	2	NC	1
545		7	max	.021	3	.419	3	0	1	0	1	4306.452	15	NC	1
546			min	-.014	2	-.67	2	0	1	0	1	129.505	2	NC	1
547		8	max	.021	3	.507	3	0	1	0	1	3784.883	15	NC	1
548			min	-.014	2	-.791	2	0	1	0	1	114.135	2	NC	1
549		9	max	.02	3	.564	3	0	1	0	1	3517.325	15	NC	1
550			min	-.014	2	-.867	2	0	1	0	1	106.222	2	NC	1
551		10	max	.02	3	.584	3	0	1	0	1	3436.71	15	NC	1
552			min	-.014	2	-.892	2	0	1	0	1	103.905	2	NC	1
553		11	max	.019	3	.569	3	0	1	0	1	3517.427	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	-.013	2	-.866	2	0	1	0	1	106.589	2	NC	1
555		12	max	.019	3	.52	3	0	1	0	1	3785.13	15	NC	1
556			min	-.013	2	-.787	2	0	1	0	1	115.329	2	NC	1
557		13	max	.018	3	.441	3	0	1	0	1	4306.968	15	NC	1
558			min	-.013	2	-.66	2	0	1	0	1	132.585	2	NC	1
559		14	max	.018	3	.342	3	0	1	0	1	5204.11	15	NC	1
560			min	-.013	2	-.502	2	0	1	0	1	162.701	2	NC	1
561		15	max	.017	3	.231	3	0	1	0	1	6756.855	15	NC	1
562			min	-.013	2	-.331	2	0	1	0	1	215.935	2	NC	1
563		16	max	.017	3	.118	3	0	1	0	1	9650.12	15	NC	1
564			min	-.013	2	-.164	2	0	1	0	1	316.648	1	NC	1
565		17	max	.017	3	.012	3	0	1	0	1	NC	5	NC	1
566			min	-.012	2	-.016	2	0	1	0	1	533.673	1	NC	1
567		18	max	.017	3	.103	1	0	1	0	1	NC	5	NC	1
568			min	-.012	2	-.078	3	0	1	0	1	1161.455	1	NC	1
569		19	max	.017	3	.2	1	0	1	0	1	NC	1	NC	1
570			min	-.012	2	-.16	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.007	3	.09	2	0	15	2.45e-2	3	NC	1	NC	1
572			min	-.003	2	-.011	3	-.001	1	-1.542e-2	1	NC	1	NC	1
573		2	max	.007	3	.043	2	.007	1	1.212e-2	3	NC	3	NC	1
574			min	-.003	2	-.003	3	0	15	-7.466e-3	1	2404.92	2	NC	1
575		3	max	.007	3	.011	3	.01	1	2.099e-4	1	NC	5	NC	1
576			min	-.003	2	-.009	2	0	15	-1.22e-5	10	1157.386	2	NC	1
577		4	max	.007	3	.037	3	.009	1	4.326e-3	3	NC	5	NC	1
578			min	-.003	2	-.067	2	0	15	-4.064e-3	2	729.117	2	NC	1
579		5	max	.007	3	.07	3	.007	1	8.53e-3	3	NC	5	NC	1
580			min	-.003	2	-.129	2	0	15	-8.321e-3	1	525.31	2	NC	1
581		6	max	.007	3	.106	3	.003	1	1.273e-2	3	NC	15	NC	1
582			min	-.003	2	-.188	2	0	15	-1.259e-2	1	413.19	2	NC	1
583		7	max	.007	3	.14	3	0	12	1.694e-2	3	NC	15	NC	1
584			min	-.003	2	-.241	2	0	1	-1.685e-2	1	347.085	2	NC	1
585		8	max	.007	3	.169	3	0	15	2.114e-2	3	9184.871	15	NC	1
586			min	-.003	2	-.283	2	-.001	1	-2.112e-2	1	308.02	2	NC	1
587		9	max	.007	3	.188	3	0	1	2.118e-2	3	8580.806	15	NC	1
588			min	-.003	2	-.31	2	0	15	-2.346e-2	1	287.699	2	NC	1
589		10	max	.006	3	.195	3	0	12	1.847e-2	3	8396.916	15	NC	1
590			min	-.003	2	-.319	2	0	1	-2.549e-2	2	281.736	2	NC	1
591		11	max	.006	3	.19	3	0	15	1.575e-2	3	8580.504	15	NC	1
592			min	-.003	2	-.31	2	0	1	-2.761e-2	2	288.66	2	NC	1
593		12	max	.006	3	.174	3	.001	1	1.308e-2	3	9184.242	15	NC	1
594			min	-.003	2	-.282	2	0	15	-2.678e-2	2	310.968	2	NC	1
595		13	max	.006	3	.148	3	0	1	1.047e-2	3	NC	15	NC	1
596			min	-.003	2	-.238	2	0	15	-2.149e-2	2	354.305	2	NC	1
597		14	max	.006	3	.115	3	0	15	7.855e-3	3	NC	15	NC	1
598			min	-.003	2	-.182	2	-.002	1	-1.62e-2	2	428.683	2	NC	1
599		15	max	.006	3	.078	3	0	15	5.243e-3	3	NC	5	NC	1
600			min	-.003	2	-.121	2	-.006	1	-1.091e-2	2	557.326	2	NC	1
601		16	max	.005	3	.04	3	0	15	2.63e-3	3	NC	5	NC	1
602			min	-.003	2	-.061	2	-.009	1	-5.626e-3	2	796.93	2	NC	1
603		17	max	.005	3	.004	3	0	15	1.723e-5	3	NC	5	NC	1
604			min	-.003	2	-.005	2	-.01	1	-6.342e-4	1	1307.538	1	NC	1
605		18	max	.005	3	.043	1	0	15	4.291e-3	3	NC	4	NC	1
606			min	-.003	2	-.028	3	-.007	1	-1.072e-2	2	2768.594	1	NC	1
607		19	max	.005	3	.084	1	.001	1	8.726e-3	3	NC	1	NC	1
608			min	-.003	2	-.058	3	0	15	-2.146e-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

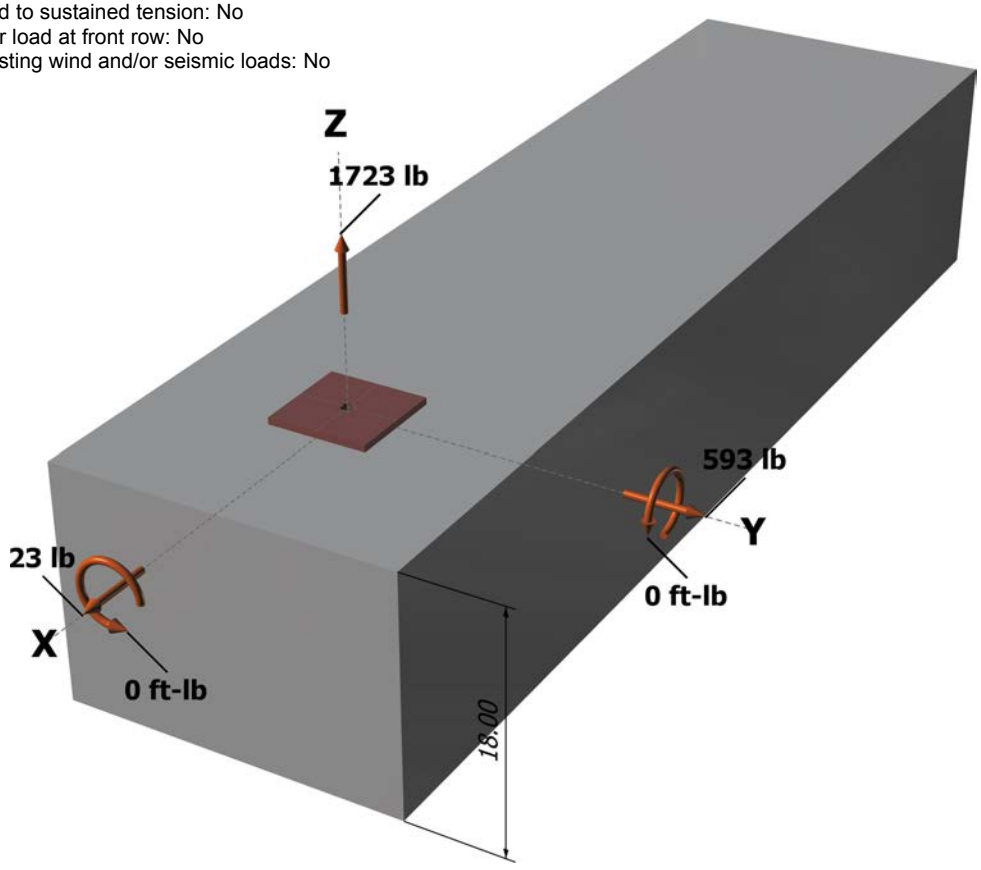
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

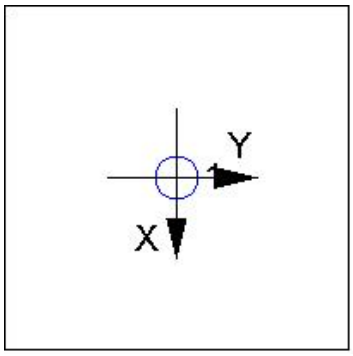
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

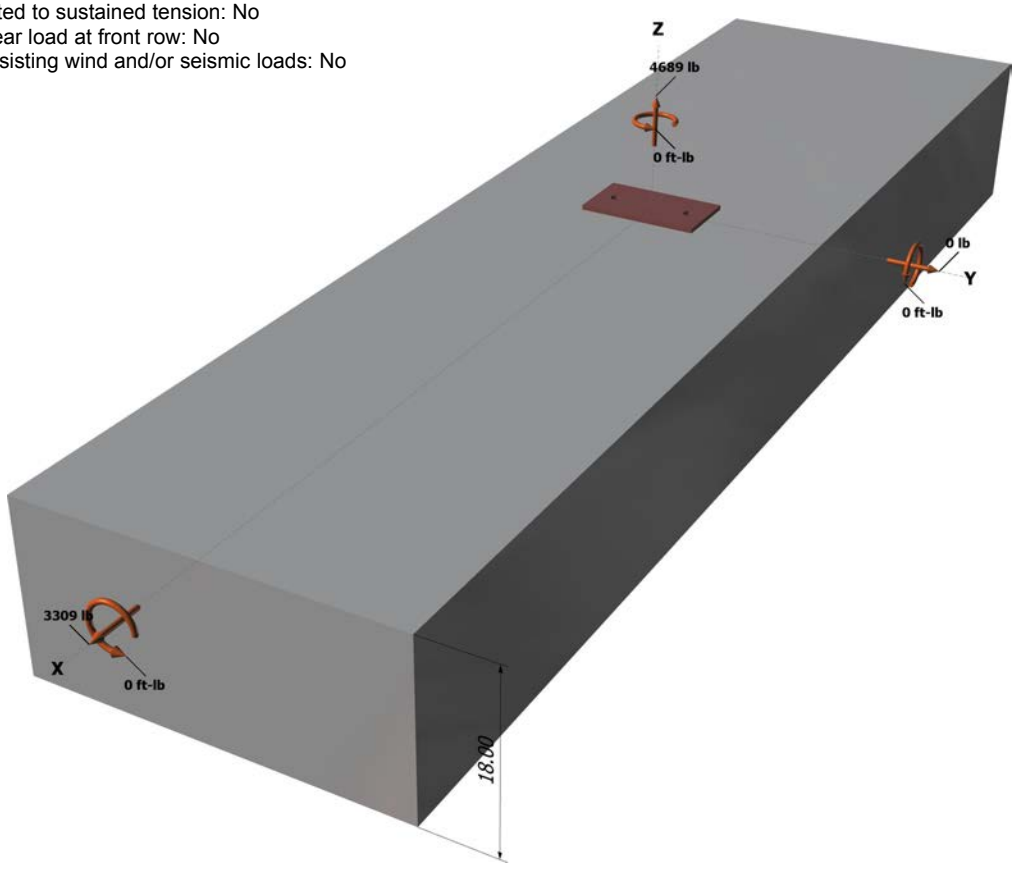
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

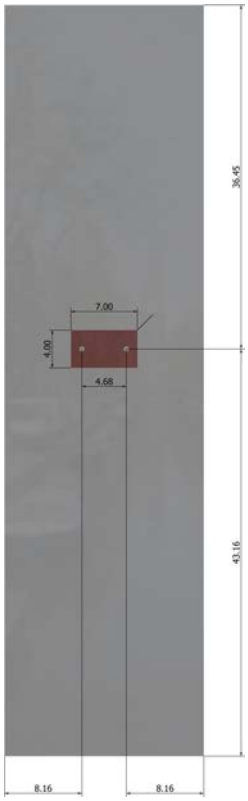
<Figure 1>

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

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



<Figure 2>



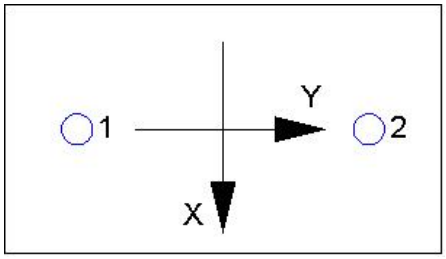
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

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

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

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

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

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

12. Warnings

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

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

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