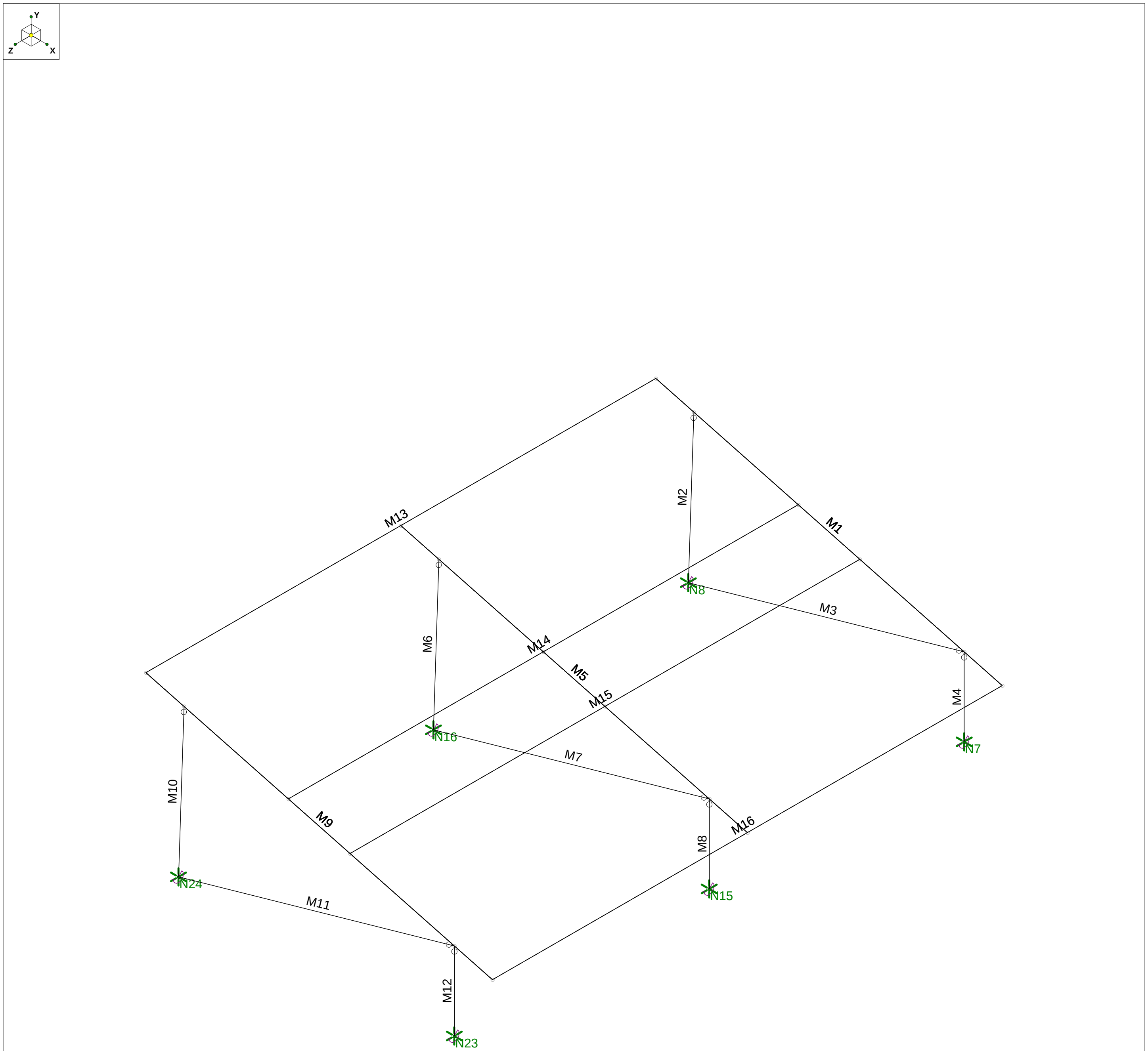


Schletter, Inc.		15ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

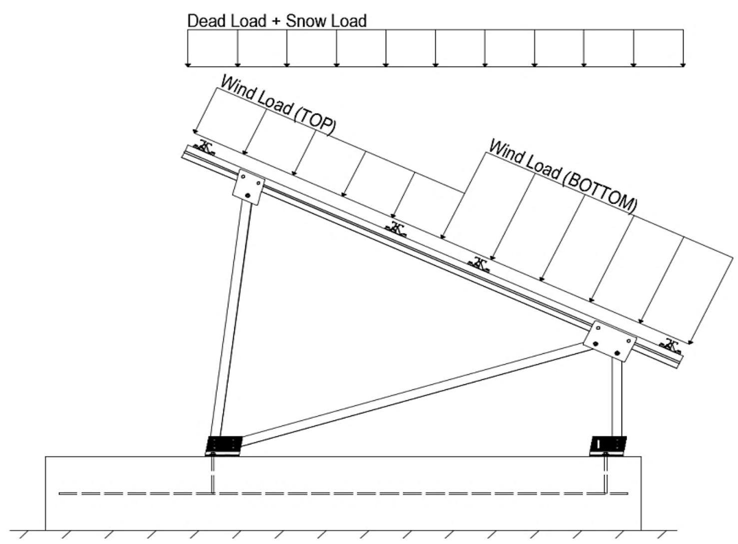
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 15°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 22.68 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 1.00
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.000	(Pressure)
$Cf+_{BOTTOM}$	=	1.600	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.300	
$Cf-_{TOP, INNER PURLIN}$	=	-1.780	(Suction)
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

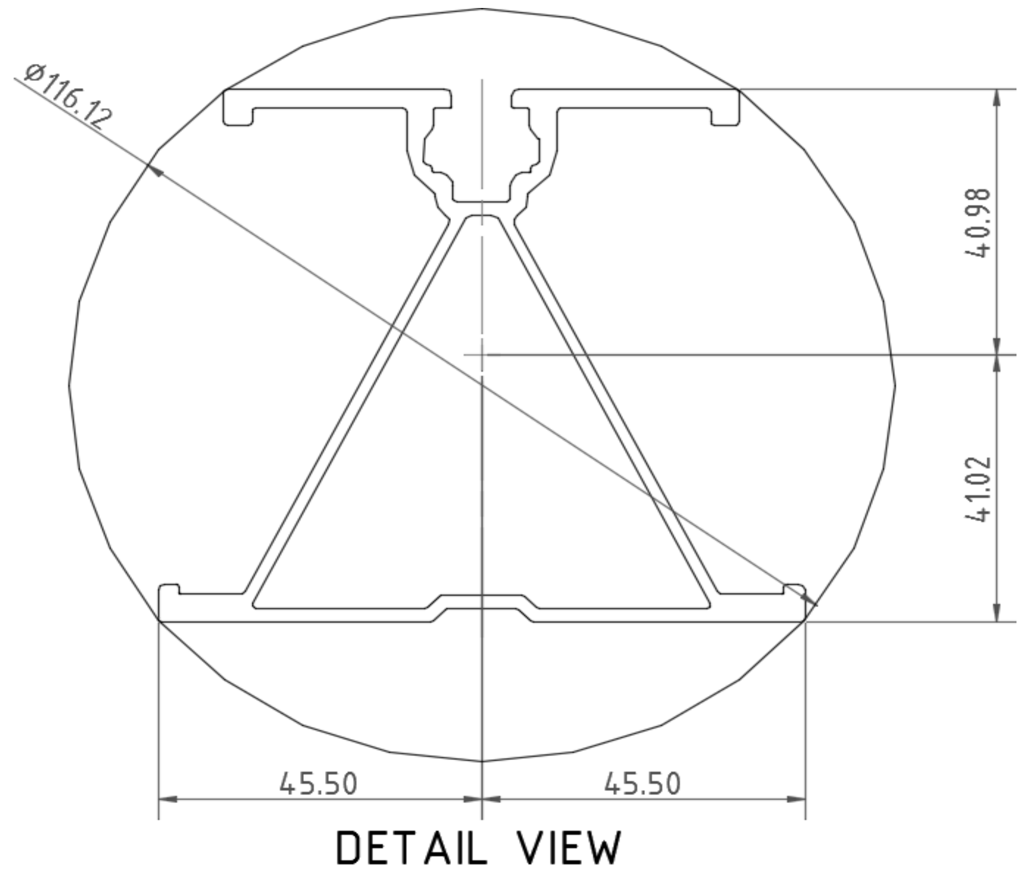
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

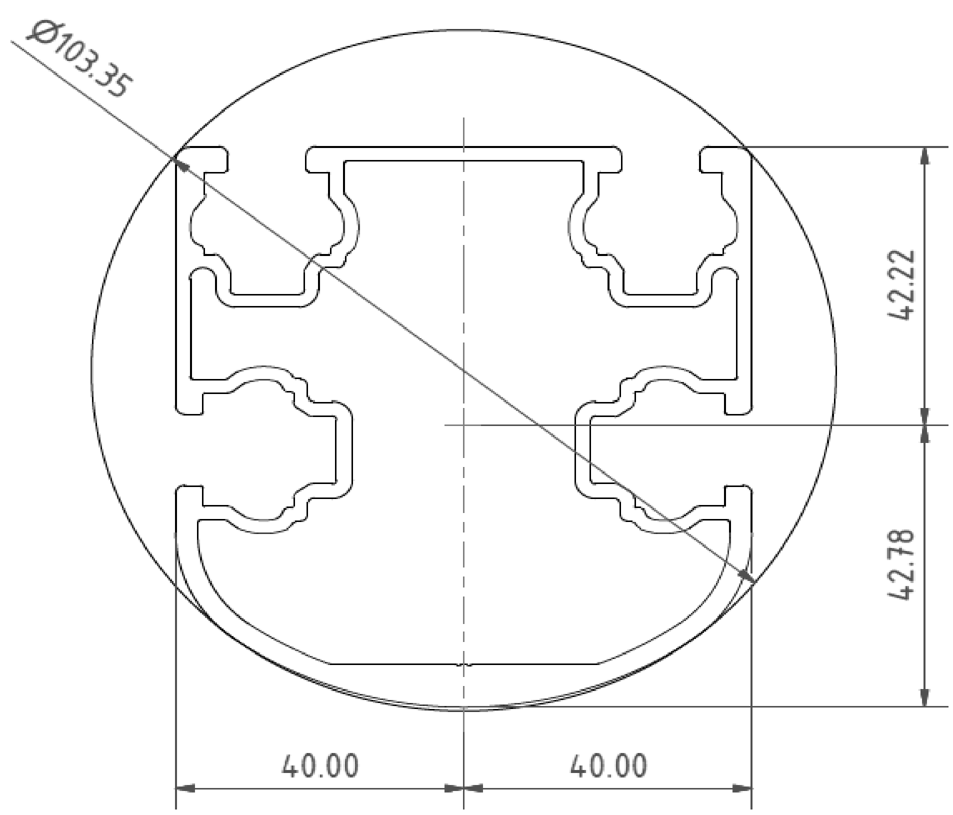
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	126	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	2.093	k-ft
M_z =	0.280	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	100%	



4.2 Girder Design

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

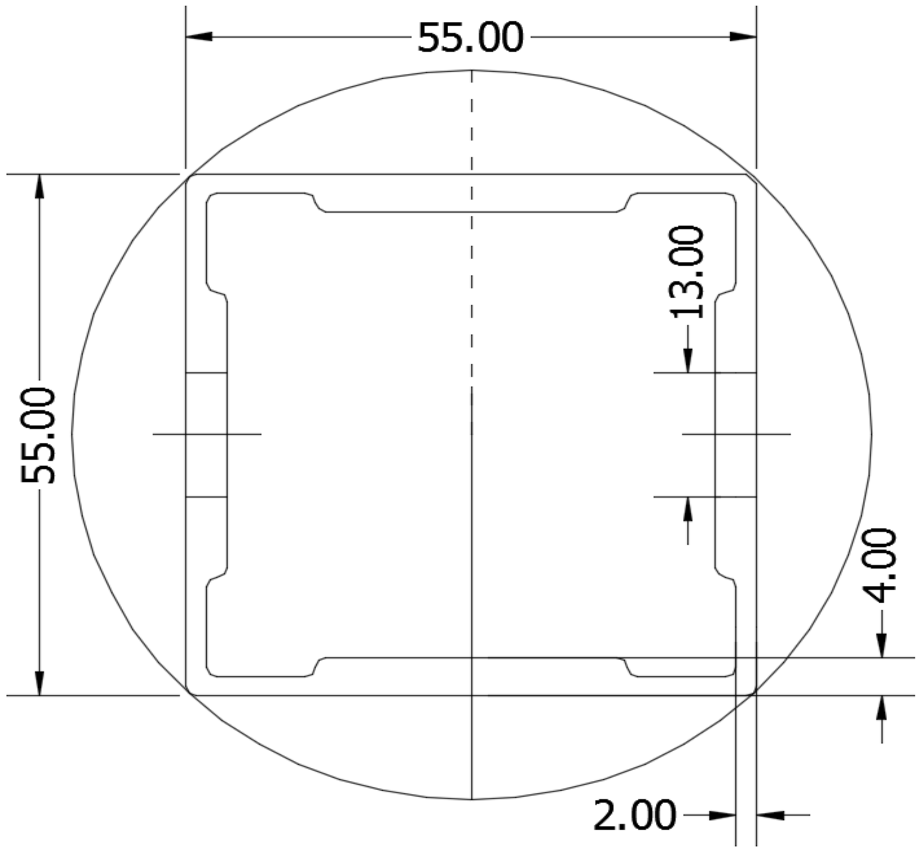
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.198	k-ft
M_z =	0.000	k-ft
P_n =	-0.191	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	93%	



4.3 Front Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.637	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	

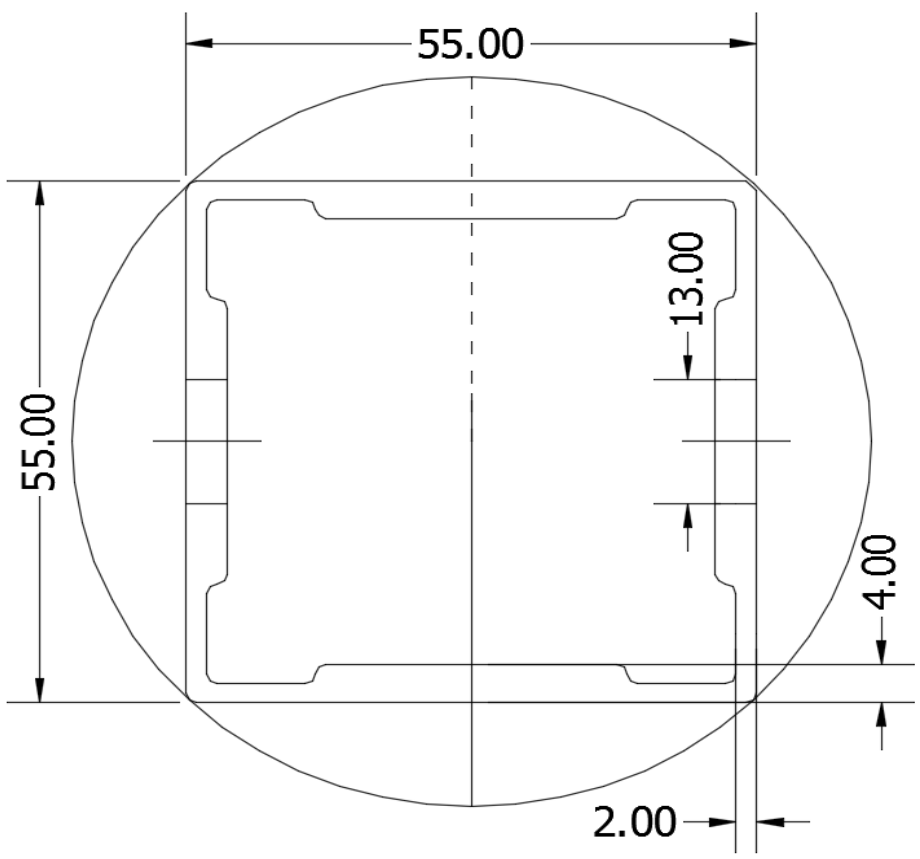


DETAIL VIEW

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 =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	0.964	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	14%	

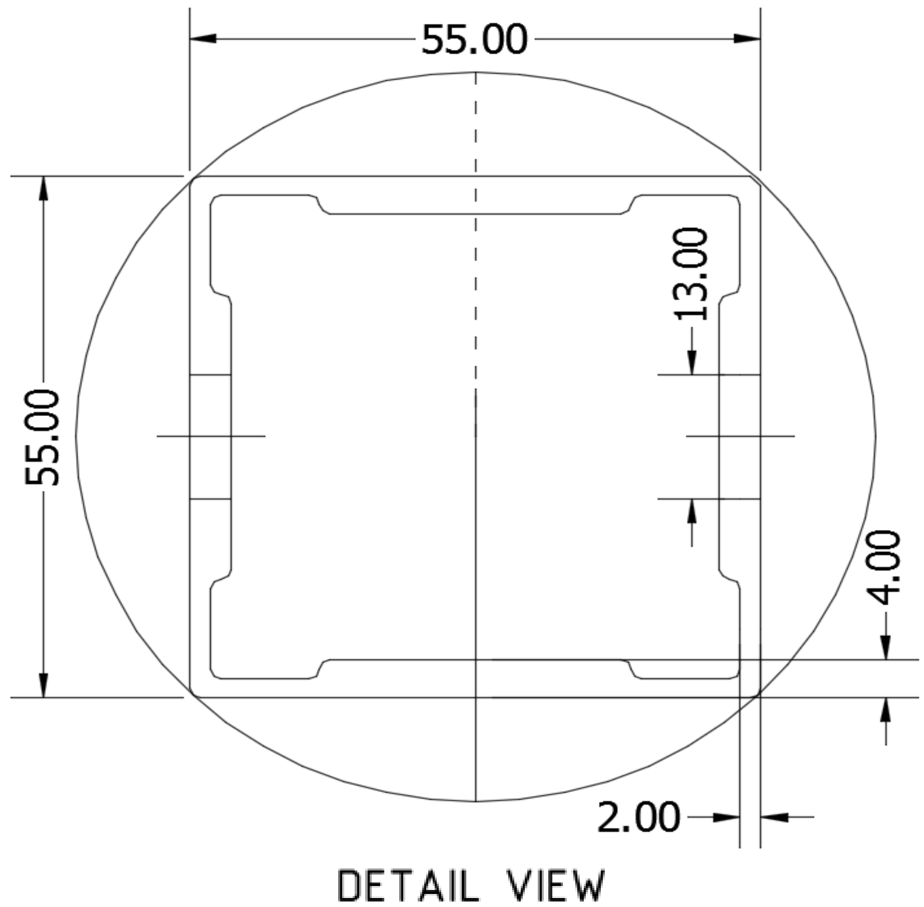


DETAIL VIEW

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 =	48.30	in
$\Phi F_{ty\ AXIAL}$ =	18.93	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 =	3.607	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	18.592	k
Utilization =	20%	



5. FOUNDATION DESIGN CALCULATIONS

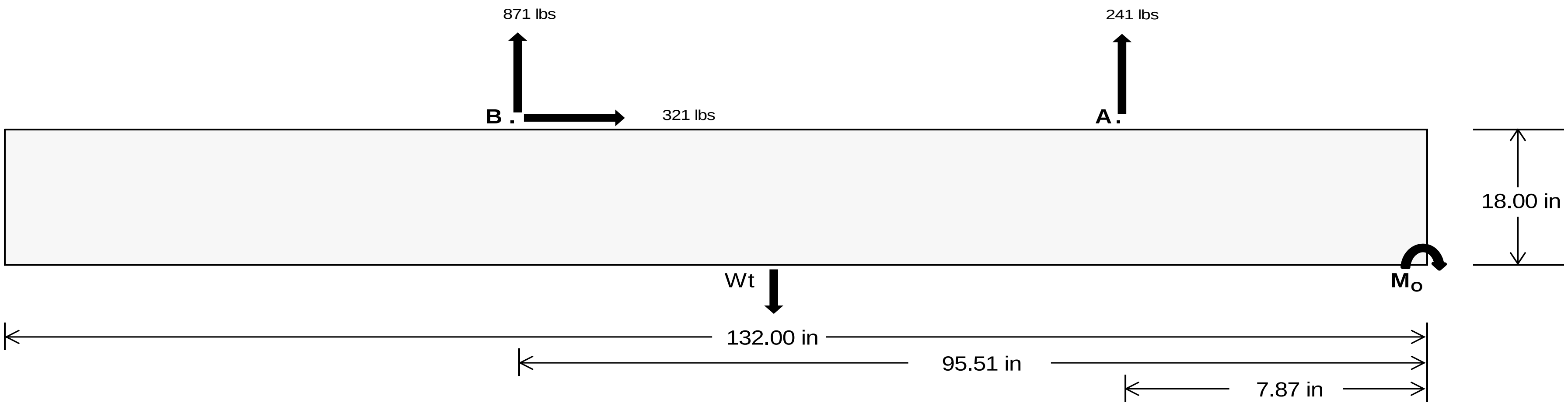
5.1 Helical Pile Foundations

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 =	1066.15	3798.97	k
Compressive Load =	4728.26	4908.66	k
Lateral Load =	11.05	1391.20	k
Moment (Weak Axis) =	0.02	0.01	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>

M_O =	90906.6 in-lbs
Resisting Force Required =	1377.37 lbs
S.F. =	1.67
Weight Required =	2295.62 lbs
Minimum Width =	<u>21 in</u> in
Weight Provided =	4186.88 lbs

A minimum 132in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force =	320.69 lbs
Friction =	0.4
Weight Required =	801.72 lbs
Resisting Weight =	4186.88 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force =	320.69 lbs
Cohesion =	130 psf
Area =	19.25 ft^2
Resisting =	2093.44 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 21in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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

Shear key is not required.

<u>Bearing Pressure</u>

	Ballast Width			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(1.75 ft) =	4187 lbs	4386 lbs	4586 lbs	4785 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	1810 lbs	1810 lbs	1810 lbs	1810 lbs	1287 lbs	1287 lbs	1287 lbs	1287 lbs	2189 lbs	2189 lbs	2189 lbs	2189 lbs	-482 lbs	-482 lbs	-482 lbs	-482 lbs
F_B	1877 lbs	1877 lbs	1877 lbs	1877 lbs	1336 lbs	1336 lbs	1336 lbs	1336 lbs	2271 lbs	2271 lbs	2271 lbs	2271 lbs	-1743 lbs	-1743 lbs	-1743 lbs	-1743 lbs
F_V	162 lbs	162 lbs	162 lbs	162 lbs	578 lbs	578 lbs	578 lbs	578 lbs	544 lbs	544 lbs	544 lbs	544 lbs	-641 lbs	-641 lbs	-641 lbs	-641 lbs
P_{total}	7874 lbs	8074 lbs	8273 lbs	8473 lbs	6810 lbs	7010 lbs	7209 lbs	7408 lbs	8647 lbs	8846 lbs	9046 lbs	9245 lbs	287 lbs	407 lbs	527 lbs	646 lbs
M	4396 lbs-ft	4396 lbs-ft	4396 lbs-ft	4396 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft	5835 lbs-ft	5835 lbs-ft	5835 lbs-ft	5835 lbs-ft	990 lbs-ft	990 lbs-ft	990 lbs-ft	990 lbs-ft
e	0.56 ft	0.54 ft	0.53 ft	0.52 ft	0.56 ft	0.54 ft	0.53 ft	0.52 ft	0.67 ft	0.66 ft	0.65 ft	0.63 ft	3.45 ft	2.43 ft	1.88 ft	1.53 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}	284.5 psf	281.4 psf	278.7 psf	276.1 psf	245.6 psf	244.3 psf	243.2 psf	242.1 psf	283.9 psf	280.8 psf	278.1 psf	275.6 psf	0.0 psf	0.0 psf	0.0 psf	4.8 psf
f_{max}	533.6 psf	519.3 psf	506.1 psf	494.1 psf	461.9 psf	450.8 psf	440.7 psf	431.4 psf	614.5 psf	596.5 psf	580.0 psf	564.9 psf	53.3 psf	48.3 psf	50.6 psf	53.9 psf

Maximum Bearing Pressure = 615 psf
Allowable Bearing Pressure = 1500 psf

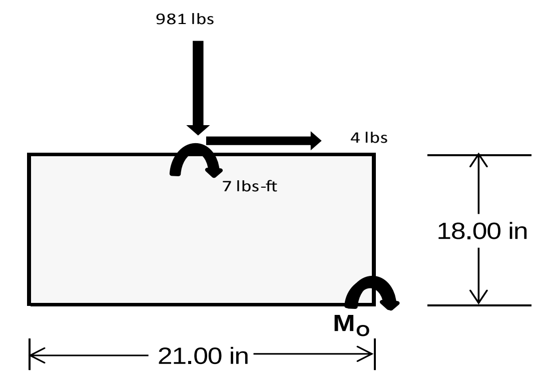
Use a 132in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 845.6 ft-lbs
Resisting Force Required = 966.42 lbs
S.F. = 1.67
Weight Required = 1610.70 lbs
Minimum Width = 21 in in
Weight Provided = 4186.88 lbs

A minimum 132in long x 21in 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	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	247 lbs	676 lbs	247 lbs	981 lbs	3000 lbs	981 lbs	72 lbs	198 lbs	72 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	5430 lbs	4187 lbs	5430 lbs	5915 lbs	4187 lbs	5915 lbs	1588 lbs	4187 lbs	1588 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	13 lbs-ft	0 lbs-ft	13 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft	0.29 ft
f_{min}	281.5 psf	217.5 psf	281.5 psf	305.0 psf	217.5 psf	305.0 psf	82.4 psf	217.5 psf	82.4 psf
f_{max}	282.7 psf	217.5 psf	282.7 psf	309.6 psf	217.5 psf	309.6 psf	82.5 psf	217.5 psf	82.5 psf

Maximum Bearing Pressure = 310 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 21in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

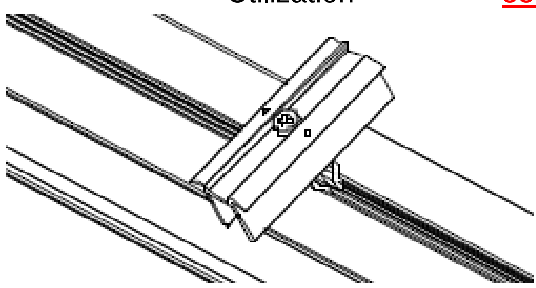
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

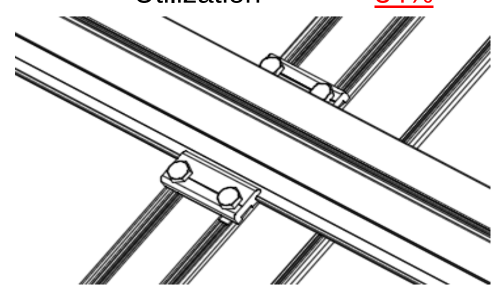
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.405	k
Allowable Uplift =	1.214	k
Utilization =	33%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.488	k
Allowable Uplift =	4.357	k
Utilization =	34%	



6.2 Strut Connections

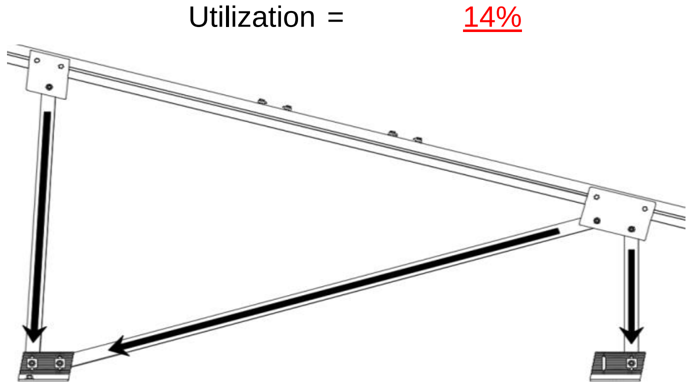
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	3.637	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	49%	

Rear Strut		
Maximum Axial Load =	3.607	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	49%	

Diagonal Strut		
Maximum Axial Load =	1.013	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	14%	

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.

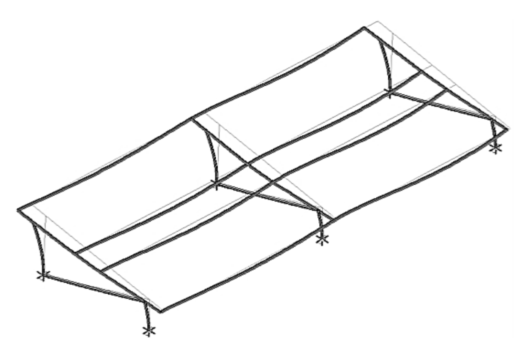
7. SEISMIC DESIGN

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} =	36.30	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.726	in
Max Drift, Δ_{MAX} =	0.041	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 = 126 in

J = 0.432

348.575

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

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

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in³

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

Weak Axis:

3.4.14

L_b = 126

J = 0.432

221.673

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

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= 28.5

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in³

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:
3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:
3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_LSt= 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

φF_LWk= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

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

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 48.30 in
J = 0.942
75.3767

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

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= 30.6 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 = 48.3
J = 0.942
75.3767

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

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= 30.6

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

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.11734

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76536

φF_L= φcc(Bc-Dc*λ)

φF_L= 18.9268 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 18.93 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 19.48 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	-61.093	-61.093	0	0
2	M14	Y	-61.093	-61.093	0	0
3	M15	Y	-61.093	-61.093	0	0
4	M16	Y	-61.093	-61.093	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	-52.98	-52.98	0	0
2	M14	y	-52.98	-52.98	0	0
3	M15	y	-84.769	-84.769	0	0
4	M16	y	-84.769	-84.769	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	121.855	121.855	0	0
2	M14	y	94.305	94.305	0	0
3	M15	y	52.98	52.98	0	0
4	M16	y	52.98	52.98	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	237.631	2	1119.659	1	1.169	1	.005	1	0	1	0	1
2		min	-340.145	3	-885.642	3	.043	15	0	15	0	1	0	1
3	N7	max	.053	1	1242.892	1	-.288	15	0	15	0	1	0	1
4		min	-.049	2	-233.324	3	-8.498	1	-.018	1	0	1	0	1
5	N15	max	.024	9	3637.122	1	0	2	0	2	0	1	0	1
6		min	-.774	2	-820.114	3	0	3	0	3	0	1	0	1
7	N16	max	1022.997	2	3775.89	1	0	1	0	1	0	1	0	1
8		min	-1070.157	3	-2922.287	3	0	3	0	3	0	1	0	1
9	N23	max	.053	1	1242.892	1	8.498	1	.018	1	0	1	0	1
10		min	-.049	2	-233.324	3	.288	15	0	15	0	1	0	1
11	N24	max	237.631	2	1119.659	1	-.043	15	0	15	0	1	0	1
12		min	-340.145	3	-885.642	3	-1.169	1	-.005	1	0	1	0	1
13	Totals:	max	1497.387	2	12138.114	1	0	2						
14		min	-1750.787	3	-5980.335	3	0	3						

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	93.492	1	516.116	1	-4.68	15	0	3	.222	1	0	1
2			min	3.06	15	-459.303	3	-143.394	1	-.013	1	.007	15	0	3
3		2	max	93.492	1	361.708	1	-3.601	15	0	3	.074	1	.456	3
4			min	3.06	15	-323.177	3	-110.302	1	-.013	1	.002	15	-.512	1
5		3	max	93.492	1	207.3	1	-2.522	15	0	3	0	12	.754	3
6			min	3.06	15	-187.052	3	-77.21	1	-.013	1	-.035	1	-.844	1
7		4	max	93.492	1	52.893	1	-1.443	15	0	3	-.003	12	.893	3
8			min	3.06	15	-50.927	3	-44.117	1	-.013	1	-.106	1	-.996	1
9		5	max	93.492	1	85.199	3	-.364	15	0	3	-.004	12	.873	3
10			min	3.06	15	-101.515	1	-11.025	1	-.013	1	-.138	1	-.967	1
11		6	max	93.492	1	221.324	3	22.068	1	0	3	-.004	15	.694	3
12			min	3.06	15	-255.923	1	.459	12	-.013	1	-.132	1	-.759	1
13		7	max	93.492	1	357.45	3	55.16	1	0	3	-.003	15	.356	3
14			min	3.06	15	-410.331	1	1.538	12	-.013	1	-.086	1	-.37	1
15		8	max	93.492	1	493.575	3	88.253	1	0	3	0	10	.199	1
16			min	3.06	15	-564.738	1	2.617	12	-.013	1	-.003	1	-.14	3
17		9	max	93.492	1	629.7	3	121.345	1	0	3	.119	1	.947	1
18			min	3.06	15	-719.146	1	3.696	12	-.013	1	.003	12	-.795	3
19		10	max	93.492	1	765.826	3	154.438	1	0	3	.28	1	1.877	1
20			min	3.06	15	-873.554	1	4.774	12	-.013	1	.008	12	-1.609	3
21		11	max	93.492	1	719.146	1	-3.696	12	.013	1	.119	1	.947	1
22			min	3.06	15	-629.7	3	-121.345	1	0	3	.003	12	-.795	3
23		12	max	93.492	1	564.738	1	-2.617	12	.013	1	0	10	.199	1
24			min	3.06	15	-493.575	3	-88.253	1	0	3	-.003	1	-.14	3
25		13	max	93.492	1	410.331	1	-1.538	12	.013	1	-.003	15	.356	3
26			min	3.06	15	-357.45	3	-55.16	1	0	3	-.086	1	-.37	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	93.492	1	255.923	1	-.459	12	.013	1	-.004	15	.694	3
28			min	3.06	15	-221.324	3	-22.068	1	0	3	-.132	1	-.759	1
29		15	max	93.492	1	101.515	1	11.025	1	.013	1	-.004	12	.873	3
30			min	3.06	15	-85.199	3	.364	15	0	3	-.138	1	-.967	1
31		16	max	93.492	1	50.927	3	44.117	1	.013	1	-.003	12	.893	3
32			min	3.06	15	-52.893	1	1.443	15	0	3	-.106	1	-.996	1
33		17	max	93.492	1	187.052	3	77.21	1	.013	1	0	12	.754	3
34			min	3.06	15	-207.3	1	2.522	15	0	3	-.035	1	-.844	1
35		18	max	93.492	1	323.177	3	110.302	1	.013	1	.074	1	.456	3
36			min	3.06	15	-361.708	1	3.601	15	0	3	.002	15	-.512	1
37		19	max	93.492	1	459.303	3	143.394	1	.013	1	.222	1	0	1
38			min	3.06	15	-516.116	1	4.68	15	0	3	.007	15	0	3
39	M14	1	max	42.33	1	542.314	1	-4.819	15	.005	3	.252	1	0	1
40			min	1.389	15	-359.905	3	-147.654	1	-.011	1	.008	15	0	3
41		2	max	42.33	1	387.906	1	-3.74	15	.005	3	.099	1	.359	3
42			min	1.389	15	-255.921	3	-114.561	1	-.011	1	.003	15	-.543	1
43		3	max	42.33	1	233.498	1	-2.661	15	.005	3	0	3	.597	3
44			min	1.389	15	-151.937	3	-81.469	1	-.011	1	-.015	1	-.905	1
45		4	max	42.33	1	79.091	1	-1.582	15	.005	3	-.003	12	.714	3
46			min	1.389	15	-47.954	3	-48.376	1	-.011	1	-.091	1	-1.087	1
47		5	max	42.33	1	56.03	3	-.503	15	.005	3	-.004	12	.709	3
48			min	1.389	15	-75.317	1	-15.284	1	-.011	1	-.128	1	-1.09	1
49		6	max	42.33	1	160.014	3	17.809	1	.005	3	-.004	15	.583	3
50			min	1.389	15	-229.725	1	.325	12	-.011	1	-.127	1	-.912	1
51		7	max	42.33	1	263.997	3	50.901	1	.005	3	-.003	15	.336	3
52			min	1.389	15	-384.132	1	1.403	12	-.011	1	-.087	1	-.554	1
53		8	max	42.33	1	367.981	3	83.993	1	.005	3	0	10	0	15
54			min	1.389	15	-538.54	1	2.482	12	-.011	1	-.008	1	-.033	3
55		9	max	42.33	1	471.965	3	117.086	1	.005	3	.109	1	.703	1
56			min	1.389	15	-692.948	1	3.561	12	-.011	1	.003	12	-.523	3
57		10	max	42.33	1	575.948	3	150.178	1	.005	3	.265	1	1.601	1
58			min	1.389	15	-847.355	1	4.64	12	-.011	1	.007	12	-1.134	3
59		11	max	42.33	1	692.948	1	-3.561	12	.011	1	.109	1	.703	1
60			min	1.389	15	-471.965	3	-117.086	1	-.005	3	.003	12	-.523	3
61		12	max	42.33	1	538.54	1	-2.482	12	.011	1	0	10	0	15
62			min	1.389	15	-367.981	3	-83.993	1	-.005	3	-.008	1	-.033	3
63		13	max	42.33	1	384.132	1	-1.403	12	.011	1	-.003	15	.336	3
64			min	1.389	15	-263.997	3	-50.901	1	-.005	3	-.087	1	-.554	1
65		14	max	42.33	1	229.725	1	-.325	12	.011	1	-.004	15	.583	3
66			min	1.389	15	-160.014	3	-17.809	1	-.005	3	-.127	1	-.912	1
67		15	max	42.33	1	75.317	1	15.284	1	.011	1	-.004	12	.709	3
68			min	1.389	15	-56.03	3	.503	15	-.005	3	-.128	1	-1.09	1
69		16	max	42.33	1	47.954	3	48.376	1	.011	1	-.003	12	.714	3
70			min	1.389	15	-79.091	1	1.582	15	-.005	3	-.091	1	-1.087	1
71		17	max	42.33	1	151.937	3	81.469	1	.011	1	0	3	.597	3
72			min	1.389	15	-233.498	1	2.661	15	-.005	3	-.015	1	-.905	1
73		18	max	42.33	1	255.921	3	114.561	1	.011	1	.099	1	.359	3
74			min	1.389	15	-387.906	1	3.74	15	-.005	3	.003	15	-.543	1
75		19	max	42.33	1	359.905	3	147.654	1	.011	1	.252	1	0	1
76			min	1.389	15	-542.314	1	4.819	15	-.005	3	.008	15	0	3
77	M15	1	max	-1.461	15	604.888	1	-4.818	15	.011	1	.252	1	0	1
78			min	-44.539	1	-197.335	3	-147.632	1	-.005	3	.008	15	0	3
79		2	max	-1.461	15	431.937	1	-3.739	15	.011	1	.099	1	.198	3
80			min	-44.539	1	-141.564	3	-114.539	1	-.005	3	.003	15	-.605	1
81		3	max	-1.461	15	258.986	1	-2.66	15	.011	1	0	3	.33	3
82			min	-44.539	1	-85.793	3	-81.447	1	-.005	3	-.015	1	-1.008	1
83		4	max	-1.461	15	86.034	1	-1.581	15	.011	1	-.003	12	.398	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	-44.539	1	-30.022	3	-48.354	1	-.005	3	-.091	1	-1.209	1
85		5	max	-1.461	15	25.75	3	-.502	15	.011	1	-.004	12	.4	3
86			min	-44.539	1	-86.917	1	-15.262	1	-.005	3	-.128	1	-1.209	1
87		6	max	-1.461	15	81.521	3	17.831	1	.011	1	-.004	15	.338	3
88			min	-44.539	1	-259.868	1	.345	12	-.005	3	-.127	1	-1.006	1
89		7	max	-1.461	15	137.292	3	50.923	1	.011	1	-.003	15	.21	3
90			min	-44.539	1	-432.819	1	1.423	12	-.005	3	-.087	1	-.602	1
91		8	max	-1.461	15	193.063	3	84.016	1	.011	1	0	10	.017	3
92			min	-44.539	1	-605.771	1	2.502	12	-.005	3	-.008	1	-.003	9
93		9	max	-1.461	15	248.834	3	117.108	1	.011	1	.109	1	.811	1
94			min	-44.539	1	-778.722	1	3.581	12	-.005	3	.003	12	-.24	3
95		10	max	-1.461	15	304.605	3	150.2	1	.011	1	.265	1	1.821	1
96			min	-44.539	1	-951.673	1	4.66	12	-.005	3	.007	12	-.563	3
97		11	max	-1.461	15	778.722	1	-3.581	12	.005	3	.109	1	.811	1
98			min	-44.539	1	-248.834	3	-117.108	1	-.011	1	.003	12	-.24	3
99		12	max	-1.461	15	605.771	1	-2.502	12	.005	3	0	10	.017	3
100			min	-44.539	1	-193.063	3	-84.016	1	-.011	1	-.008	1	-.003	9
101		13	max	-1.461	15	432.819	1	-1.423	12	.005	3	-.003	15	.21	3
102			min	-44.539	1	-137.292	3	-50.923	1	-.011	1	-.087	1	-.602	1
103		14	max	-1.461	15	259.868	1	-.345	12	.005	3	-.004	15	.338	3
104			min	-44.539	1	-81.521	3	-17.831	1	-.011	1	-.127	1	-1.006	1
105		15	max	-1.461	15	86.917	1	15.262	1	.005	3	-.004	12	.4	3
106			min	-44.539	1	-25.75	3	.502	15	-.011	1	-.128	1	-1.209	1
107		16	max	-1.461	15	30.022	3	48.354	1	.005	3	-.003	12	.398	3
108			min	-44.539	1	-86.034	1	1.581	15	-.011	1	-.091	1	-1.209	1
109		17	max	-1.461	15	85.793	3	81.447	1	.005	3	0	3	.33	3
110			min	-44.539	1	-258.986	1	2.66	15	-.011	1	-.015	1	-1.008	1
111		18	max	-1.461	15	141.564	3	114.539	1	.005	3	.099	1	.198	3
112			min	-44.539	1	-431.937	1	3.739	15	-.011	1	.003	15	-.605	1
113		19	max	-1.461	15	197.335	3	147.632	1	.005	3	.252	1	0	1
114			min	-44.539	1	-604.888	1	4.818	15	-.011	1	.008	15	0	3
115	M16	1	max	-3.233	15	578.906	1	-4.684	15	.012	1	.223	1	0	1
116			min	-98.612	1	-185.685	3	-143.561	1	-.007	3	.007	15	0	3
117		2	max	-3.233	15	405.955	1	-3.605	15	.012	1	.075	1	.184	3
118			min	-98.612	1	-129.913	3	-110.469	1	-.007	3	.002	15	-.574	1
119		3	max	-3.233	15	233.003	1	-2.527	15	.012	1	0	12	.303	3
120			min	-98.612	1	-74.142	3	-77.377	1	-.007	3	-.034	1	-.947	1
121		4	max	-3.233	15	60.052	1	-1.448	15	.012	1	-.003	12	.357	3
122			min	-98.612	1	-18.371	3	-44.284	1	-.007	3	-.105	1	-1.118	1
123		5	max	-3.233	15	37.4	3	-.369	15	.012	1	-.004	12	.346	3
124			min	-98.612	1	-112.899	1	-11.192	1	-.007	3	-.138	1	-1.087	1
125		6	max	-3.233	15	93.171	3	21.901	1	.012	1	-.004	15	.27	3
126			min	-98.612	1	-285.851	1	.523	12	-.007	3	-.131	1	-.855	1
127		7	max	-3.233	15	148.942	3	54.993	1	.012	1	-.003	15	.129	3
128			min	-98.612	1	-458.802	1	1.602	12	-.007	3	-.087	1	-.42	1
129		8	max	-3.233	15	204.714	3	88.086	1	.012	1	0	10	.216	1
130			min	-98.612	1	-631.753	1	2.681	12	-.007	3	-.003	1	-.078	3
131		9	max	-3.233	15	260.485	3	121.178	1	.012	1	.119	1	1.054	1
132			min	-98.612	1	-804.704	1	3.76	12	-.007	3	.003	12	-.349	3
133		10	max	-3.233	15	316.256	3	154.271	1	.012	1	.28	1	2.093	1
134			min	-98.612	1	-977.656	1	4.838	12	-.007	3	.008	12	-.686	3
135		11	max	-3.233	15	804.704	1	-3.76	12	.007	3	.119	1	1.054	1
136			min	-98.612	1	-260.485	3	-121.178	1	-.012	1	.003	12	-.349	3
137		12	max	-3.233	15	631.753	1	-2.681	12	.007	3	0	10	.216	1
138			min	-98.612	1	-204.714	3	-88.086	1	-.012	1	-.003	1	-.078	3
139		13	max	-3.233	15	458.802	1	-1.602	12	.007	3	-.003	15	.129	3
140			min	-98.612	1	-148.942	3	-54.993	1	-.012	1	-.087	1	-.42	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
141		14	max	-3.233	15	285.851	1	-.523	12	.007	3	-.004	15	.27	3
142			min	-98.612	1	-93.171	3	-21.901	1	-.012	1	-.131	1	-.855	1
143		15	max	-3.233	15	112.899	1	11.192	1	.007	3	-.004	12	.346	3
144			min	-98.612	1	-37.4	3	.369	15	-.012	1	-.138	1	-1.087	1
145		16	max	-3.233	15	18.371	3	44.284	1	.007	3	-.003	12	.357	3
146			min	-98.612	1	-60.052	1	1.448	15	-.012	1	-.105	1	-1.118	1
147		17	max	-3.233	15	74.142	3	77.377	1	.007	3	0	12	.303	3
148			min	-98.612	1	-233.003	1	2.527	15	-.012	1	-.034	1	-.947	1
149		18	max	-3.233	15	129.913	3	110.469	1	.007	3	.075	1	.184	3
150			min	-98.612	1	-405.955	1	3.605	15	-.012	1	.002	15	-.574	1
151		19	max	-3.233	15	185.685	3	143.561	1	.007	3	.223	1	0	1
152			min	-98.612	1	-578.906	1	4.684	15	-.012	1	.007	15	0	3
153	M2	1	max	1114.847	1	2.279	4	1.327	1	0	3	0	3	0	1
154			min	-807.049	3	.537	15	.043	15	0	1	0	1	0	1
155		2	max	1115.175	1	2.264	4	1.327	1	0	3	0	1	0	15
156			min	-806.802	3	.533	15	.043	15	0	1	0	15	0	4
157		3	max	1115.504	1	2.249	4	1.327	1	0	3	0	1	0	15
158			min	-806.556	3	.53	15	.043	15	0	1	0	15	-.001	4
159		4	max	1115.832	1	2.233	4	1.327	1	0	3	0	1	0	15
160			min	-806.31	3	.526	15	.043	15	0	1	0	15	-.001	4
161		5	max	1116.161	1	2.218	4	1.327	1	0	3	.001	1	0	15
162			min	-806.063	3	.523	15	.043	15	0	1	0	15	-.002	4
163		6	max	1116.489	1	2.203	4	1.327	1	0	3	.001	1	0	15
164			min	-805.817	3	.519	15	.043	15	0	1	0	15	-.002	4
165		7	max	1116.817	1	2.188	4	1.327	1	0	3	.002	1	0	15
166			min	-805.571	3	.516	15	.043	15	0	1	0	15	-.003	4
167		8	max	1117.146	1	2.172	4	1.327	1	0	3	.002	1	0	15
168			min	-805.324	3	.512	15	.043	15	0	1	0	15	-.003	4
169		9	max	1117.474	1	2.157	4	1.327	1	0	3	.002	1	0	15
170			min	-805.078	3	.508	15	.043	15	0	1	0	15	-.004	4
171		10	max	1117.803	1	2.142	4	1.327	1	0	3	.003	1	-.001	15
172			min	-804.832	3	.505	15	.043	15	0	1	0	15	-.004	4
173		11	max	1118.131	1	2.127	4	1.327	1	0	3	.003	1	-.001	15
174			min	-804.585	3	.501	15	.043	15	0	1	0	15	-.005	4
175		12	max	1118.46	1	2.111	4	1.327	1	0	3	.003	1	-.001	15
176			min	-804.339	3	.498	15	.043	15	0	1	0	15	-.005	4
177		13	max	1118.788	1	2.096	4	1.327	1	0	3	.004	1	-.001	15
178			min	-804.093	3	.494	15	.043	15	0	1	0	15	-.006	4
179		14	max	1119.116	1	2.081	4	1.327	1	0	3	.004	1	-.001	15
180			min	-803.846	3	.49	15	.043	15	0	1	0	15	-.006	4
181		15	max	1119.445	1	2.065	4	1.327	1	0	3	.004	1	-.002	15
182			min	-803.6	3	.487	15	.043	15	0	1	0	15	-.007	4
183		16	max	1119.773	1	2.05	4	1.327	1	0	3	.004	1	-.002	15
184			min	-803.354	3	.483	15	.043	15	0	1	0	15	-.007	4
185		17	max	1120.102	1	2.035	4	1.327	1	0	3	.005	1	-.002	15
186			min	-803.107	3	.48	15	.043	15	0	1	0	15	-.008	4
187		18	max	1120.43	1	2.02	4	1.327	1	0	3	.005	1	-.002	15
188			min	-802.861	3	.476	15	.043	15	0	1	0	15	-.008	4
189		19	max	1120.759	1	2.004	4	1.327	1	0	3	.005	1	-.002	15
190			min	-802.615	3	.473	15	.043	15	0	1	0	15	-.009	4
191	M3	1	max	216.109	2	8.077	4	.011	1	0	3	0	1	.009	4
192			min	-322.894	3	1.899	15	0	15	0	1	0	15	.002	15
193		2	max	215.939	2	7.305	4	.011	1	0	3	0	1	.005	4
194			min	-323.021	3	1.718	15	0	15	0	1	0	15	.001	15
195		3	max	215.768	2	6.532	4	.011	1	0	3	0	1	.003	2
196			min	-323.149	3	1.536	15	0	15	0	1	0	15	0	12
197		4	max	215.598	2	5.76	4	.011	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-323.277	3	1.355	15	0	15	0	1	0	15	-.001	3
199		5	max	215.427	2	4.987	4	.011	1	0	3	0	1	0	15
200			min	-323.405	3	1.173	15	0	15	0	1	0	15	-.002	4
201		6	max	215.257	2	4.215	4	.011	1	0	3	0	1	-.001	15
202			min	-323.533	3	.992	15	0	15	0	1	0	15	-.004	4
203		7	max	215.087	2	3.443	4	.011	1	0	3	0	1	-.001	15
204			min	-323.66	3	.81	15	0	15	0	1	0	15	-.006	4
205		8	max	214.916	2	2.67	4	.011	1	0	3	0	1	-.002	15
206			min	-323.788	3	.628	15	0	15	0	1	0	15	-.007	4
207		9	max	214.746	2	1.898	4	.011	1	0	3	0	1	-.002	15
208			min	-323.916	3	.447	15	0	15	0	1	0	15	-.008	4
209		10	max	214.576	2	1.125	4	.011	1	0	3	0	1	-.002	15
210			min	-324.044	3	.265	15	0	15	0	1	0	15	-.009	4
211		11	max	214.405	2	.375	2	.011	1	0	3	0	1	-.002	15
212			min	-324.171	3	.054	12	0	15	0	1	0	15	-.009	4
213		12	max	214.235	2	-.098	15	.011	1	0	3	0	1	-.002	15
214			min	-324.299	3	-.42	4	0	15	0	1	0	15	-.009	4
215		13	max	214.065	2	-.279	15	.011	1	0	3	0	1	-.002	15
216			min	-324.427	3	-1.192	4	0	15	0	1	0	15	-.009	4
217		14	max	213.894	2	-.461	15	.011	1	0	3	0	1	-.002	15
218			min	-324.555	3	-1.964	4	0	15	0	1	0	15	-.008	4
219		15	max	213.724	2	-.643	15	.011	1	0	3	0	1	-.002	15
220			min	-324.682	3	-2.737	4	0	15	0	1	0	15	-.007	4
221		16	max	213.554	2	-.824	15	.011	1	0	3	0	1	-.001	15
222			min	-324.81	3	-3.509	4	0	15	0	1	0	15	-.006	4
223		17	max	213.383	2	-1.006	15	.011	1	0	3	0	1	-.001	15
224			min	-324.938	3	-4.282	4	0	15	0	1	0	15	-.004	4
225		18	max	213.213	2	-1.187	15	.011	1	0	3	0	1	0	15
226			min	-325.066	3	-5.054	4	0	15	0	1	0	15	-.002	4
227		19	max	213.043	2	-1.369	15	.011	1	0	3	0	1	0	1
228			min	-325.193	3	-5.827	4	0	15	0	1	0	15	0	1
229	M4	1	max	1239.825	1	0	1	-.289	15	0	1	0	1	0	1
230			min	-235.624	3	0	1	-8.84	1	0	1	0	10	0	1
231		2	max	1239.996	1	0	1	-.289	15	0	1	0	12	0	1
232			min	-235.496	3	0	1	-8.84	1	0	1	0	1	0	1
233		3	max	1240.166	1	0	1	-.289	15	0	1	0	15	0	1
234			min	-235.369	3	0	1	-8.84	1	0	1	-.002	1	0	1
235		4	max	1240.336	1	0	1	-.289	15	0	1	0	15	0	1
236			min	-235.241	3	0	1	-8.84	1	0	1	-.003	1	0	1
237		5	max	1240.507	1	0	1	-.289	15	0	1	0	15	0	1
238			min	-235.113	3	0	1	-8.84	1	0	1	-.004	1	0	1
239		6	max	1240.677	1	0	1	-.289	15	0	1	0	15	0	1
240			min	-234.985	3	0	1	-8.84	1	0	1	-.005	1	0	1
241		7	max	1240.847	1	0	1	-.289	15	0	1	0	15	0	1
242			min	-234.857	3	0	1	-8.84	1	0	1	-.006	1	0	1
243		8	max	1241.018	1	0	1	-.289	15	0	1	0	15	0	1
244			min	-234.73	3	0	1	-8.84	1	0	1	-.007	1	0	1
245		9	max	1241.188	1	0	1	-.289	15	0	1	0	15	0	1
246			min	-234.602	3	0	1	-8.84	1	0	1	-.008	1	0	1
247		10	max	1241.359	1	0	1	-.289	15	0	1	0	15	0	1
248			min	-234.474	3	0	1	-8.84	1	0	1	-.009	1	0	1
249		11	max	1241.529	1	0	1	-.289	15	0	1	0	15	0	1
250			min	-234.346	3	0	1	-8.84	1	0	1	-.01	1	0	1
251		12	max	1241.699	1	0	1	-.289	15	0	1	0	15	0	1
252			min	-234.219	3	0	1	-8.84	1	0	1	-.011	1	0	1
253		13	max	1241.87	1	0	1	-.289	15	0	1	0	15	0	1
254			min	-234.091	3	0	1	-8.84	1	0	1	-.012	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	1242.04	1	0	1	-.289	15	0	1	0	15	0	1
256			min	-233.963	3	0	1	-8.84	1	0	1	-.013	1	0	1
257		15	max	1242.21	1	0	1	-.289	15	0	1	0	15	0	1
258			min	-233.835	3	0	1	-8.84	1	0	1	-.014	1	0	1
259		16	max	1242.381	1	0	1	-.289	15	0	1	0	15	0	1
260			min	-233.708	3	0	1	-8.84	1	0	1	-.015	1	0	1
261		17	max	1242.551	1	0	1	-.289	15	0	1	0	15	0	1
262			min	-233.58	3	0	1	-8.84	1	0	1	-.016	1	0	1
263		18	max	1242.721	1	0	1	-.289	15	0	1	0	15	0	1
264			min	-233.452	3	0	1	-8.84	1	0	1	-.017	1	0	1
265		19	max	1242.892	1	0	1	-.289	15	0	1	0	15	0	1
266			min	-233.324	3	0	1	-8.84	1	0	1	-.018	1	0	1
267	M6	1	max	3601.141	1	2.543	2	0	1	0	1	0	1	0	1
268			min	-2657.335	3	.373	12	0	1	0	1	0	1	0	1
269		2	max	3601.469	1	2.531	2	0	1	0	1	0	1	0	12
270			min	-2657.088	3	.367	12	0	1	0	1	0	1	0	2
271		3	max	3601.798	1	2.519	2	0	1	0	1	0	1	0	12
272			min	-2656.842	3	.361	12	0	1	0	1	0	1	-.001	2
273		4	max	3602.126	1	2.507	2	0	1	0	1	0	1	0	12
274			min	-2656.596	3	.355	12	0	1	0	1	0	1	-.002	2
275		5	max	3602.455	1	2.495	2	0	1	0	1	0	1	0	12
276			min	-2656.349	3	.349	12	0	1	0	1	0	1	-.002	2
277		6	max	3602.783	1	2.484	2	0	1	0	1	0	1	0	12
278			min	-2656.103	3	.343	12	0	1	0	1	0	1	-.003	2
279		7	max	3603.112	1	2.472	2	0	1	0	1	0	1	0	12
280			min	-2655.857	3	.337	12	0	1	0	1	0	1	-.003	2
281		8	max	3603.44	1	2.46	2	0	1	0	1	0	1	0	12
282			min	-2655.61	3	.332	12	0	1	0	1	0	1	-.004	2
283		9	max	3603.768	1	2.448	2	0	1	0	1	0	1	0	12
284			min	-2655.364	3	.326	12	0	1	0	1	0	1	-.004	2
285		10	max	3604.097	1	2.436	2	0	1	0	1	0	1	0	12
286			min	-2655.118	3	.32	12	0	1	0	1	0	1	-.005	2
287		11	max	3604.425	1	2.424	2	0	1	0	1	0	1	0	12
288			min	-2654.871	3	.314	12	0	1	0	1	0	1	-.006	2
289		12	max	3604.754	1	2.412	2	0	1	0	1	0	1	0	12
290			min	-2654.625	3	.308	12	0	1	0	1	0	1	-.006	2
291		13	max	3605.082	1	2.4	2	0	1	0	1	0	1	0	12
292			min	-2654.379	3	.302	12	0	1	0	1	0	1	-.007	2
293		14	max	3605.411	1	2.388	2	0	1	0	1	0	1	0	12
294			min	-2654.132	3	.296	12	0	1	0	1	0	1	-.007	2
295		15	max	3605.739	1	2.376	2	0	1	0	1	0	1	-.001	12
296			min	-2653.886	3	.29	12	0	1	0	1	0	1	-.008	2
297		16	max	3606.068	1	2.365	2	0	1	0	1	0	1	-.001	12
298			min	-2653.64	3	.284	12	0	1	0	1	0	1	-.008	2
299		17	max	3606.396	1	2.353	2	0	1	0	1	0	1	-.001	12
300			min	-2653.393	3	.278	12	0	1	0	1	0	1	-.009	2
301		18	max	3606.724	1	2.341	2	0	1	0	1	0	1	-.001	12
302			min	-2653.147	3	.272	12	0	1	0	1	0	1	-.009	2
303		19	max	3607.053	1	2.329	2	0	1	0	1	0	1	-.001	12
304			min	-2652.901	3	.266	12	0	1	0	1	0	1	-.01	2
305	M7	1	max	964.307	2	8.12	4	0	1	0	1	0	1	.01	2
306			min	-1010.758	3	1.905	15	0	1	0	1	0	1	.001	12
307		2	max	964.137	2	7.347	4	0	1	0	1	0	1	.007	2
308			min	-1010.886	3	1.723	15	0	1	0	1	0	1	0	3
309		3	max	963.967	2	6.575	4	0	1	0	1	0	1	.005	2
310			min	-1011.014	3	1.542	15	0	1	0	1	0	1	-.002	3
311		4	max	963.796	2	5.802	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	-1011.142	3	1.36	15	0	1	0	1	0	1	-.003	3
313		5	max	963.626	2	5.03	4	0	1	0	1	0	1	0	2
314			min	-1011.269	3	1.179	15	0	1	0	1	0	1	-.004	3
315		6	max	963.456	2	4.258	4	0	1	0	1	0	1	-.001	15
316			min	-1011.397	3	.997	15	0	1	0	1	0	1	-.005	3
317		7	max	963.285	2	3.485	4	0	1	0	1	0	1	-.001	15
318			min	-1011.525	3	.815	15	0	1	0	1	0	1	-.006	4
319		8	max	963.115	2	2.713	4	0	1	0	1	0	1	-.002	15
320			min	-1011.653	3	.634	15	0	1	0	1	0	1	-.007	4
321		9	max	962.945	2	1.94	4	0	1	0	1	0	1	-.002	15
322			min	-1011.78	3	.452	15	0	1	0	1	0	1	-.008	4
323		10	max	962.774	2	1.28	2	0	1	0	1	0	1	-.002	15
324			min	-1011.908	3	.168	12	0	1	0	1	0	1	-.009	4
325		11	max	962.604	2	.678	2	0	1	0	1	0	1	-.002	15
326			min	-1012.036	3	-.246	3	0	1	0	1	0	1	-.009	4
327		12	max	962.434	2	.076	2	0	1	0	1	0	1	-.002	15
328			min	-1012.164	3	-.697	3	0	1	0	1	0	1	-.009	4
329		13	max	962.263	2	-.274	15	0	1	0	1	0	1	-.002	15
330			min	-1012.291	3	-1.149	4	0	1	0	1	0	1	-.009	4
331		14	max	962.093	2	-.456	15	0	1	0	1	0	1	-.002	15
332			min	-1012.419	3	-1.922	4	0	1	0	1	0	1	-.008	4
333		15	max	961.923	2	-.637	15	0	1	0	1	0	1	-.002	15
334			min	-1012.547	3	-2.694	4	0	1	0	1	0	1	-.007	4
335		16	max	961.752	2	-.819	15	0	1	0	1	0	1	-.001	15
336			min	-1012.675	3	-3.467	4	0	1	0	1	0	1	-.006	4
337		17	max	961.582	2	-1	15	0	1	0	1	0	1	0	15
338			min	-1012.802	3	-4.239	4	0	1	0	1	0	1	-.004	4
339		18	max	961.412	2	-1.182	15	0	1	0	1	0	1	0	15
340			min	-1012.93	3	-5.012	4	0	1	0	1	0	1	-.002	4
341		19	max	961.241	2	-1.363	15	0	1	0	1	0	1	0	1
342			min	-1013.058	3	-5.784	4	0	1	0	1	0	1	0	1
343	M8	1	max	3634.056	1	0	1	0	1	0	1	0	1	0	1
344			min	-822.413	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3634.226	1	0	1	0	1	0	1	0	1	0	1
346			min	-822.285	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3634.397	1	0	1	0	1	0	1	0	1	0	1
348			min	-822.158	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3634.567	1	0	1	0	1	0	1	0	1	0	1
350			min	-822.03	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3634.737	1	0	1	0	1	0	1	0	1	0	1
352			min	-821.902	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3634.908	1	0	1	0	1	0	1	0	1	0	1
354			min	-821.774	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3635.078	1	0	1	0	1	0	1	0	1	0	1
356			min	-821.647	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3635.248	1	0	1	0	1	0	1	0	1	0	1
358			min	-821.519	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3635.419	1	0	1	0	1	0	1	0	1	0	1
360			min	-821.391	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3635.589	1	0	1	0	1	0	1	0	1	0	1
362			min	-821.263	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3635.759	1	0	1	0	1	0	1	0	1	0	1
364			min	-821.136	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3635.93	1	0	1	0	1	0	1	0	1	0	1
366			min	-821.008	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3636.1	1	0	1	0	1	0	1	0	1	0	1
368			min	-820.88	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	3636.27	1	0	1	0	1	0	1	0	1	0	1
370			min	-820.752	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3636.441	1	0	1	0	1	0	1	0	1	0	1
372			min	-820.625	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3636.611	1	0	1	0	1	0	1	0	1	0	1
374			min	-820.497	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3636.781	1	0	1	0	1	0	1	0	1	0	1
376			min	-820.369	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3636.952	1	0	1	0	1	0	1	0	1	0	1
378			min	-820.241	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3637.122	1	0	1	0	1	0	1	0	1	0	1
380			min	-820.114	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1114.847	1	2.279	4	-.043	15	0	1	0	1	0	1
382			min	-807.049	3	.537	15	-1.327	1	0	3	0	3	0	1
383		2	max	1115.175	1	2.264	4	-.043	15	0	1	0	15	0	15
384			min	-806.802	3	.533	15	-1.327	1	0	3	0	1	0	4
385		3	max	1115.504	1	2.249	4	-.043	15	0	1	0	15	0	15
386			min	-806.556	3	.53	15	-1.327	1	0	3	0	1	-.001	4
387		4	max	1115.832	1	2.233	4	-.043	15	0	1	0	15	0	15
388			min	-806.31	3	.526	15	-1.327	1	0	3	0	1	-.001	4
389		5	max	1116.161	1	2.218	4	-.043	15	0	1	0	15	0	15
390			min	-806.063	3	.523	15	-1.327	1	0	3	-.001	1	-.002	4
391		6	max	1116.489	1	2.203	4	-.043	15	0	1	0	15	0	15
392			min	-805.817	3	.519	15	-1.327	1	0	3	-.001	1	-.002	4
393		7	max	1116.817	1	2.188	4	-.043	15	0	1	0	15	0	15
394			min	-805.571	3	.516	15	-1.327	1	0	3	-.002	1	-.003	4
395		8	max	1117.146	1	2.172	4	-.043	15	0	1	0	15	0	15
396			min	-805.324	3	.512	15	-1.327	1	0	3	-.002	1	-.003	4
397		9	max	1117.474	1	2.157	4	-.043	15	0	1	0	15	0	15
398			min	-805.078	3	.508	15	-1.327	1	0	3	-.002	1	-.004	4
399		10	max	1117.803	1	2.142	4	-.043	15	0	1	0	15	-.001	15
400			min	-804.832	3	.505	15	-1.327	1	0	3	-.003	1	-.004	4
401		11	max	1118.131	1	2.127	4	-.043	15	0	1	0	15	-.001	15
402			min	-804.585	3	.501	15	-1.327	1	0	3	-.003	1	-.005	4
403		12	max	1118.46	1	2.111	4	-.043	15	0	1	0	15	-.001	15
404			min	-804.339	3	.498	15	-1.327	1	0	3	-.003	1	-.005	4
405		13	max	1118.788	1	2.096	4	-.043	15	0	1	0	15	-.001	15
406			min	-804.093	3	.494	15	-1.327	1	0	3	-.004	1	-.006	4
407		14	max	1119.116	1	2.081	4	-.043	15	0	1	0	15	-.001	15
408			min	-803.846	3	.49	15	-1.327	1	0	3	-.004	1	-.006	4
409		15	max	1119.445	1	2.065	4	-.043	15	0	1	0	15	-.002	15
410			min	-803.6	3	.487	15	-1.327	1	0	3	-.004	1	-.007	4
411		16	max	1119.773	1	2.05	4	-.043	15	0	1	0	15	-.002	15
412			min	-803.354	3	.483	15	-1.327	1	0	3	-.004	1	-.007	4
413		17	max	1120.102	1	2.035	4	-.043	15	0	1	0	15	-.002	15
414			min	-803.107	3	.48	15	-1.327	1	0	3	-.005	1	-.008	4
415		18	max	1120.43	1	2.02	4	-.043	15	0	1	0	15	-.002	15
416			min	-802.861	3	.476	15	-1.327	1	0	3	-.005	1	-.008	4
417		19	max	1120.759	1	2.004	4	-.043	15	0	1	0	15	-.002	15
418			min	-802.615	3	.473	15	-1.327	1	0	3	-.005	1	-.009	4
419	M11	1	max	216.109	2	8.077	4	0	15	0	1	0	15	.009	4
420			min	-322.894	3	1.899	15	-.011	1	0	3	0	1	.002	15
421		2	max	215.939	2	7.305	4	0	15	0	1	0	15	.005	4
422			min	-323.021	3	1.718	15	-.011	1	0	3	0	1	.001	15
423		3	max	215.768	2	6.532	4	0	15	0	1	0	15	.003	2
424			min	-323.149	3	1.536	15	-.011	1	0	3	0	1	0	12
425		4	max	215.598	2	5.76	4	0	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	-323.277	3	1.355	15	-.011	1	0	3	0	1	-.001	3
427		5	max	215.427	2	4.987	4	0	15	0	1	0	15	0	15
428			min	-323.405	3	1.173	15	-.011	1	0	3	0	1	-.002	4
429		6	max	215.257	2	4.215	4	0	15	0	1	0	15	-.001	15
430			min	-323.533	3	.992	15	-.011	1	0	3	0	1	-.004	4
431		7	max	215.087	2	3.443	4	0	15	0	1	0	15	-.001	15
432			min	-323.66	3	.81	15	-.011	1	0	3	0	1	-.006	4
433		8	max	214.916	2	2.67	4	0	15	0	1	0	15	-.002	15
434			min	-323.788	3	.628	15	-.011	1	0	3	0	1	-.007	4
435		9	max	214.746	2	1.898	4	0	15	0	1	0	15	-.002	15
436			min	-323.916	3	.447	15	-.011	1	0	3	0	1	-.008	4
437		10	max	214.576	2	1.125	4	0	15	0	1	0	15	-.002	15
438			min	-324.044	3	.265	15	-.011	1	0	3	0	1	-.009	4
439		11	max	214.405	2	.375	2	0	15	0	1	0	15	-.002	15
440			min	-324.171	3	.054	12	-.011	1	0	3	0	1	-.009	4
441		12	max	214.235	2	-.098	15	0	15	0	1	0	15	-.002	15
442			min	-324.299	3	-.42	4	-.011	1	0	3	0	1	-.009	4
443		13	max	214.065	2	-.279	15	0	15	0	1	0	15	-.002	15
444			min	-324.427	3	-1.192	4	-.011	1	0	3	0	1	-.009	4
445		14	max	213.894	2	-.461	15	0	15	0	1	0	15	-.002	15
446			min	-324.555	3	-1.964	4	-.011	1	0	3	0	1	-.008	4
447		15	max	213.724	2	-.643	15	0	15	0	1	0	15	-.002	15
448			min	-324.682	3	-2.737	4	-.011	1	0	3	0	1	-.007	4
449		16	max	213.554	2	-.824	15	0	15	0	1	0	15	-.001	15
450			min	-324.81	3	-3.509	4	-.011	1	0	3	0	1	-.006	4
451		17	max	213.383	2	-1.006	15	0	15	0	1	0	15	-.001	15
452			min	-324.938	3	-4.282	4	-.011	1	0	3	0	1	-.004	4
453		18	max	213.213	2	-1.187	15	0	15	0	1	0	15	0	15
454			min	-325.066	3	-5.054	4	-.011	1	0	3	0	1	-.002	4
455		19	max	213.043	2	-1.369	15	0	15	0	1	0	15	0	1
456			min	-325.193	3	-5.827	4	-.011	1	0	3	0	1	0	1
457	M12	1	max	1239.825	1	0	1	8.84	1	0	1	0	10	0	1
458			min	-235.624	3	0	1	.289	15	0	1	0	1	0	1
459		2	max	1239.996	1	0	1	8.84	1	0	1	0	1	0	1
460			min	-235.496	3	0	1	.289	15	0	1	0	12	0	1
461		3	max	1240.166	1	0	1	8.84	1	0	1	.002	1	0	1
462			min	-235.369	3	0	1	.289	15	0	1	0	15	0	1
463		4	max	1240.336	1	0	1	8.84	1	0	1	.003	1	0	1
464			min	-235.241	3	0	1	.289	15	0	1	0	15	0	1
465		5	max	1240.507	1	0	1	8.84	1	0	1	.004	1	0	1
466			min	-235.113	3	0	1	.289	15	0	1	0	15	0	1
467		6	max	1240.677	1	0	1	8.84	1	0	1	.005	1	0	1
468			min	-234.985	3	0	1	.289	15	0	1	0	15	0	1
469		7	max	1240.847	1	0	1	8.84	1	0	1	.006	1	0	1
470			min	-234.857	3	0	1	.289	15	0	1	0	15	0	1
471		8	max	1241.018	1	0	1	8.84	1	0	1	.007	1	0	1
472			min	-234.73	3	0	1	.289	15	0	1	0	15	0	1
473		9	max	1241.188	1	0	1	8.84	1	0	1	.008	1	0	1
474			min	-234.602	3	0	1	.289	15	0	1	0	15	0	1
475		10	max	1241.359	1	0	1	8.84	1	0	1	.009	1	0	1
476			min	-234.474	3	0	1	.289	15	0	1	0	15	0	1
477		11	max	1241.529	1	0	1	8.84	1	0	1	.01	1	0	1
478			min	-234.346	3	0	1	.289	15	0	1	0	15	0	1
479		12	max	1241.699	1	0	1	8.84	1	0	1	.011	1	0	1
480			min	-234.219	3	0	1	.289	15	0	1	0	15	0	1
481		13	max	1241.87	1	0	1	8.84	1	0	1	.012	1	0	1
482			min	-234.091	3	0	1	.289	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	1242.04	1	0	1	8.84	1	0	1	.013	1	0	1
484			min	-233.963	3	0	1	.289	15	0	1	0	15	0	1
485		15	max	1242.21	1	0	1	8.84	1	0	1	.014	1	0	1
486			min	-233.835	3	0	1	.289	15	0	1	0	15	0	1
487		16	max	1242.381	1	0	1	8.84	1	0	1	.015	1	0	1
488			min	-233.708	3	0	1	.289	15	0	1	0	15	0	1
489		17	max	1242.551	1	0	1	8.84	1	0	1	.016	1	0	1
490			min	-233.58	3	0	1	.289	15	0	1	0	15	0	1
491		18	max	1242.721	1	0	1	8.84	1	0	1	.017	1	0	1
492			min	-233.452	3	0	1	.289	15	0	1	0	15	0	1
493		19	max	1242.892	1	0	1	8.84	1	0	1	.018	1	0	1
494			min	-233.324	3	0	1	.289	15	0	1	0	15	0	1
495	M1	1	max	143.397	1	459.292	3	-3.06	15	0	1	.222	1	0	3
496			min	4.68	15	-514.904	1	-93.399	1	0	3	.007	15	-.013	1
497		2	max	143.768	1	458.254	3	-3.06	15	0	1	.173	1	.259	1
498			min	4.792	15	-516.288	1	-93.399	1	0	3	.006	15	-.242	3
499		3	max	189.505	3	566.947	1	-3.017	15	0	3	.124	1	.518	1
500			min	-124.537	2	-329.888	3	-92.309	1	0	1	.004	15	-.474	3
501		4	max	189.783	3	565.564	1	-3.017	15	0	3	.075	1	.22	1
502			min	-124.166	2	-330.925	3	-92.309	1	0	1	.002	15	-.299	3
503		5	max	190.061	3	564.18	1	-3.017	15	0	3	.026	1	-.004	15
504			min	-123.795	2	-331.963	3	-92.309	1	0	1	0	15	-.124	3
505		6	max	190.339	3	562.796	1	-3.017	15	0	3	0	15	.051	3
506			min	-123.424	2	-333.001	3	-92.309	1	0	1	-.022	1	-.376	1
507		7	max	190.617	3	561.413	1	-3.017	15	0	3	-.002	15	.227	3
508			min	-123.054	2	-334.039	3	-92.309	1	0	1	-.071	1	-.672	1
509		8	max	190.895	3	560.029	1	-3.017	15	0	3	-.004	15	.404	3
510			min	-122.683	2	-335.076	3	-92.309	1	0	1	-.12	1	-.968	1
511		9	max	198.818	3	32.033	2	-4.406	15	0	9	.07	1	.472	3
512			min	-65.439	2	.42	15	-134.659	1	0	3	.002	15	-1.103	1
513		10	max	199.096	3	30.649	2	-4.406	15	0	9	0	15	.459	3
514			min	-65.068	2	.002	15	-134.659	1	0	3	0	1	-1.112	1
515		11	max	199.374	3	29.265	2	-4.406	15	0	9	-.002	15	.447	3
516			min	-64.698	2	-1.71	4	-134.659	1	0	3	-.072	1	-1.12	1
517		12	max	207.264	3	219.605	3	-2.945	15	0	1	.118	1	.389	3
518			min	-38.501	10	-593.698	1	-90.164	1	0	3	.004	15	-.988	1
519		13	max	207.543	3	218.567	3	-2.945	15	0	1	.071	1	.273	3
520			min	-38.192	10	-595.082	1	-90.164	1	0	3	.002	15	-.675	1
521		14	max	207.821	3	217.53	3	-2.945	15	0	1	.023	1	.158	3
522			min	-37.883	10	-596.465	1	-90.164	1	0	3	0	15	-.36	1
523		15	max	208.099	3	216.492	3	-2.945	15	0	1	0	15	.044	3
524			min	-37.574	10	-597.849	1	-90.164	1	0	3	-.024	1	-.045	1
525		16	max	208.377	3	215.454	3	-2.945	15	0	1	-.002	15	.271	1
526			min	-37.265	10	-599.233	1	-90.164	1	0	3	-.072	1	-.07	3
527		17	max	208.655	3	214.416	3	-2.945	15	0	1	-.004	15	.587	1
528			min	-36.956	10	-600.616	1	-90.164	1	0	3	-.12	1	-.183	3
529		18	max	-4.796	15	581.44	1	-3.233	15	0	3	-.006	15	.294	1
530			min	-143.93	1	-184.672	3	-98.702	1	0	1	-.171	1	-.091	3
531		19	max	-4.684	15	580.056	1	-3.233	15	0	3	-.007	15	.007	3
532			min	-143.56	1	-185.71	3	-98.702	1	0	1	-.223	1	-.012	1
533	M5	1	max	308.87	1	1531.609	3	0	1	0	1	0	1	.027	1
534			min	9.549	12	-1739.795	1	0	1	0	1	0	1	0	3
535		2	max	309.241	1	1530.571	3	0	1	0	1	0	1	.945	1
536			min	9.734	12	-1741.178	1	0	1	0	1	0	1	-.809	3
537		3	max	608.962	3	1746.494	1	0	1	0	1	0	1	1.822	1
538			min	-494.053	1	-1067.491	3	0	1	0	1	0	1	-1.585	3
539		4	max	609.24	3	1745.111	1	0	1	0	1	0	1	.901	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	-493.682	1	-1068.529	3	0	1	0	1	0	1	-1.021	3
541		5	max	609.518	3	1743.727	1	0	1	0	1	0	1	.011	9
542			min	-493.312	1	-1069.567	3	0	1	0	1	0	1	-.457	3
543		6	max	609.796	3	1742.344	1	0	1	0	1	0	1	.107	3
544			min	-492.941	1	-1070.604	3	0	1	0	1	0	1	-.939	1
545		7	max	610.074	3	1740.96	1	0	1	0	1	0	1	.673	3
546			min	-492.57	1	-1071.642	3	0	1	0	1	0	1	-1.858	1
547		8	max	610.352	3	1739.576	1	0	1	0	1	0	1	1.238	3
548			min	-492.199	1	-1072.68	3	0	1	0	1	0	1	-2.776	1
549		9	max	624.466	3	105.768	2	0	1	0	1	0	1	1.426	3
550			min	-345.413	2	.418	15	0	1	0	1	0	1	-3.139	1
551		10	max	624.745	3	104.384	2	0	1	0	1	0	1	1.382	3
552			min	-345.043	2	.001	15	0	1	0	1	0	1	-3.168	1
553		11	max	625.023	3	103	2	0	1	0	1	0	1	1.338	3
554			min	-344.672	2	-1.576	4	0	1	0	1	0	1	-3.198	1
555		12	max	639.202	3	699.017	3	0	1	0	1	0	1	1.174	3
556			min	-227.652	2	-1853.021	1	0	1	0	1	0	1	-2.847	1
557		13	max	639.481	3	697.98	3	0	1	0	1	0	1	.805	3
558			min	-227.282	2	-1854.405	1	0	1	0	1	0	1	-1.869	1
559		14	max	639.759	3	696.942	3	0	1	0	1	0	1	.437	3
560			min	-226.911	2	-1855.788	1	0	1	0	1	0	1	-.89	1
561		15	max	640.037	3	695.904	3	0	1	0	1	0	1	.132	2
562			min	-226.54	2	-1857.172	1	0	1	0	1	0	1	-.004	13
563		16	max	640.315	3	694.866	3	0	1	0	1	0	1	1.07	1
564			min	-226.169	2	-1858.555	1	0	1	0	1	0	1	-.297	3
565		17	max	640.593	3	693.829	3	0	1	0	1	0	1	2.051	1
566			min	-225.799	2	-1859.939	1	0	1	0	1	0	1	-.664	3
567		18	max	-9.862	12	1963.584	1	0	1	0	1	0	1	1.06	1
568			min	-308.916	1	-631.635	3	0	1	0	1	0	1	-.347	3
569		19	max	-9.677	12	1962.2	1	0	1	0	1	0	1	.024	1
570			min	-308.545	1	-632.672	3	0	1	0	1	0	1	-.013	3
571	M9	1	max	143.397	1	459.292	3	93.399	1	0	3	-.007	15	0	3
572			min	4.68	15	-514.904	1	3.06	15	0	1	-.222	1	-.013	1
573		2	max	143.768	1	458.254	3	93.399	1	0	3	-.006	15	.259	1
574			min	4.792	15	-516.288	1	3.06	15	0	1	-.173	1	-.242	3
575		3	max	189.505	3	566.947	1	92.309	1	0	1	-.004	15	.518	1
576			min	-124.537	2	-329.888	3	3.017	15	0	3	-.124	1	-.474	3
577		4	max	189.783	3	565.564	1	92.309	1	0	1	-.002	15	.22	1
578			min	-124.166	2	-330.925	3	3.017	15	0	3	-.075	1	-.299	3
579		5	max	190.061	3	564.18	1	92.309	1	0	1	0	15	-.004	15
580			min	-123.795	2	-331.963	3	3.017	15	0	3	-.026	1	-.124	3
581		6	max	190.339	3	562.796	1	92.309	1	0	1	.022	1	.051	3
582			min	-123.424	2	-333.001	3	3.017	15	0	3	0	15	-.376	1
583		7	max	190.617	3	561.413	1	92.309	1	0	1	.071	1	.227	3
584			min	-123.054	2	-334.039	3	3.017	15	0	3	.002	15	-.672	1
585		8	max	190.895	3	560.029	1	92.309	1	0	1	.12	1	.404	3
586			min	-122.683	2	-335.076	3	3.017	15	0	3	.004	15	-.968	1
587		9	max	198.818	3	32.033	2	134.659	1	0	3	-.002	15	.472	3
588			min	-65.439	2	.42	15	4.406	15	0	9	-.07	1	-1.103	1
589		10	max	199.096	3	30.649	2	134.659	1	0	3	0	1	.459	3
590			min	-65.068	2	.002	15	4.406	15	0	9	0	15	-1.112	1
591		11	max	199.374	3	29.265	2	134.659	1	0	3	.072	1	.447	3
592			min	-64.698	2	-1.71	4	4.406	15	0	9	.002	15	-1.12	1
593		12	max	207.264	3	219.605	3	90.164	1	0	3	-.004	15	.389	3
594			min	-38.501	10	-593.698	1	2.945	15	0	1	-.118	1	-.988	1
595		13	max	207.543	3	218.567	3	90.164	1	0	3	-.002	15	.273	3
596			min	-38.192	10	-595.082	1	2.945	15	0	1	-.071	1	-.675	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
597		14	max	207.821	3	217.53	3	90.164	1	0	3	0	15	.158	3
598			min	-37.883	10	-596.465	1	2.945	15	0	1	-.023	1	-.36	1
599		15	max	208.099	3	216.492	3	90.164	1	0	3	.024	1	.044	3
600			min	-37.574	10	-597.849	1	2.945	15	0	1	0	15	-.045	1
601		16	max	208.377	3	215.454	3	90.164	1	0	3	.072	1	.271	1
602			min	-37.265	10	-599.233	1	2.945	15	0	1	.002	15	-.07	3
603		17	max	208.655	3	214.416	3	90.164	1	0	3	.12	1	.587	1
604			min	-36.956	10	-600.616	1	2.945	15	0	1	.004	15	-.183	3
605		18	max	-4.796	15	581.44	1	98.702	1	0	1	.171	1	.294	1
606			min	-143.93	1	-184.672	3	3.233	15	0	3	.006	15	-.091	3
607		19	max	-4.684	15	580.056	1	98.702	1	0	1	.223	1	.007	3
608			min	-143.56	1	-185.71	3	3.233	15	0	3	.007	15	-.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.111	1	.003	3	8.8e-3	1	NC	1	NC	1
2			min	0	15	-.013	3	-.001	10	-9.774e-4	3	NC	1	NC	1
3		2	max	0	1	.237	3	.039	1	1.017e-2	1	NC	5	NC	2
4			min	0	15	-.148	1	.001	15	-1.026e-3	3	971.583	1	6897.132	1
5		3	max	0	1	.44	3	.092	1	1.155e-2	1	NC	5	NC	3
6			min	0	15	-.354	1	.003	15	-1.075e-3	3	541.871	1	2802.902	1
7		4	max	0	1	.563	3	.138	1	1.292e-2	1	NC	5	NC	3
8			min	0	15	-.47	1	.005	15	-1.124e-3	3	433.583	1	1847.904	1
9		5	max	0	1	.59	3	.163	1	1.429e-2	1	NC	5	NC	3
10			min	0	15	-.48	1	.005	15	-1.172e-3	3	417.648	3	1569.421	1
11		6	max	0	1	.525	3	.158	1	1.567e-2	1	NC	5	NC	3
12			min	0	15	-.388	1	.005	15	-1.221e-3	3	468.284	3	1620.371	1
13		7	max	0	1	.386	3	.125	1	1.704e-2	1	NC	5	NC	3
14			min	0	15	-.215	1	.004	15	-1.27e-3	3	631.025	3	2055.09	1
15		8	max	0	1	.21	3	.074	1	1.841e-2	1	NC	5	NC	2
16			min	0	15	-.012	9	.003	15	-1.319e-3	3	1127.554	3	3516.949	1
17		9	max	0	1	.185	1	.023	1	1.979e-2	1	NC	4	NC	1
18			min	0	15	.005	15	-.002	10	-1.367e-3	3	3410.677	1	NC	1
19		10	max	0	1	.269	1	.011	3	2.116e-2	1	NC	3	NC	1
20			min	0	1	-.021	3	-.006	2	-1.416e-3	3	1592.699	1	NC	1
21		11	max	0	15	.185	1	.023	1	1.979e-2	1	NC	4	NC	1
22			min	0	1	.005	15	-.002	10	-1.367e-3	3	3410.677	1	NC	1
23		12	max	0	15	.21	3	.074	1	1.841e-2	1	NC	5	NC	2
24			min	0	1	-.012	9	.003	15	-1.319e-3	3	1127.554	3	3516.949	1
25		13	max	0	15	.386	3	.125	1	1.704e-2	1	NC	5	NC	3
26			min	0	1	-.215	1	.004	15	-1.27e-3	3	631.025	3	2055.09	1
27		14	max	0	15	.525	3	.158	1	1.567e-2	1	NC	5	NC	3
28			min	0	1	-.388	1	.005	15	-1.221e-3	3	468.284	3	1620.371	1
29		15	max	0	15	.59	3	.163	1	1.429e-2	1	NC	5	NC	3
30			min	0	1	-.48	1	.005	15	-1.172e-3	3	417.648	3	1569.421	1
31		16	max	0	15	.563	3	.138	1	1.292e-2	1	NC	5	NC	3
32			min	0	1	-.47	1	.005	15	-1.124e-3	3	433.583	1	1847.904	1
33		17	max	0	15	.44	3	.092	1	1.155e-2	1	NC	5	NC	3
34			min	0	1	-.354	1	.003	15	-1.075e-3	3	541.871	1	2802.902	1
35		18	max	0	15	.237	3	.039	1	1.017e-2	1	NC	5	NC	2
36			min	0	1	-.148	1	.001	15	-1.026e-3	3	971.583	1	6897.132	1
37		19	max	0	15	.111	1	.003	3	8.8e-3	1	NC	1	NC	1
38			min	0	1	-.013	3	-.001	10	-9.774e-4	3	NC	1	NC	1
39	M14	1	max	0	1	.138	3	.003	3	5.568e-3	1	NC	1	NC	1
40			min	0	15	-.36	1	0	10	-2.52e-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	.376	3	.027	1	6.711e-3	1	NC	5	NC	1
42			min	0	15	-.753	1	0	15	-3.081e-3	3	641.865	1	NC	1
43		3	max	0	1	.575	3	.075	1	7.853e-3	1	NC	15	NC	3
44			min	0	15	-1.089	1	.002	15	-3.642e-3	3	346.047	1	3475.449	1
45		4	max	0	1	.712	3	.119	1	8.995e-3	1	NC	15	NC	3
46			min	0	15	-1.328	1	.004	15	-4.203e-3	3	260.411	1	2148.974	1
47		5	max	0	1	.772	3	.145	1	1.014e-2	1	9016.974	15	NC	3
48			min	0	15	-1.452	1	.005	15	-4.764e-3	3	230.908	1	1762.492	1
49		6	max	0	1	.757	3	.144	1	1.128e-2	1	8986.467	15	NC	3
50			min	0	15	-1.459	1	.005	15	-5.325e-3	3	229.317	1	1779.768	1
51		7	max	0	1	.68	3	.116	1	1.242e-2	1	9832.877	15	NC	3
52			min	0	15	-1.37	1	.004	15	-5.886e-3	3	249.596	1	2221.804	1
53		8	max	0	1	.567	3	.069	1	1.356e-2	1	NC	15	NC	2
54			min	0	15	-1.223	1	.002	15	-6.447e-3	3	292.285	1	3751.812	1
55		9	max	0	1	.46	3	.022	1	1.471e-2	1	NC	15	NC	1
56			min	0	15	-1.075	1	-.002	10	-7.008e-3	3	352.611	1	NC	1
57		10	max	0	1	.41	3	.01	3	1.585e-2	1	NC	5	NC	1
58			min	0	1	-1.005	1	-.006	2	-7.569e-3	3	390.87	1	NC	1
59		11	max	0	15	.46	3	.022	1	1.471e-2	1	NC	15	NC	1
60			min	0	1	-1.075	1	-.002	10	-7.008e-3	3	352.611	1	NC	1
61		12	max	0	15	.567	3	.069	1	1.356e-2	1	NC	15	NC	2
62			min	0	1	-1.223	1	.002	15	-6.447e-3	3	292.285	1	3751.812	1
63		13	max	0	15	.68	3	.116	1	1.242e-2	1	9832.877	15	NC	3
64			min	0	1	-1.37	1	.004	15	-5.886e-3	3	249.596	1	2221.804	1
65		14	max	0	15	.757	3	.144	1	1.128e-2	1	8986.467	15	NC	3
66			min	0	1	-1.459	1	.005	15	-5.325e-3	3	229.317	1	1779.768	1
67		15	max	0	15	.772	3	.145	1	1.014e-2	1	9016.974	15	NC	3
68			min	0	1	-1.452	1	.005	15	-4.764e-3	3	230.908	1	1762.492	1
69		16	max	0	15	.712	3	.119	1	8.995e-3	1	NC	15	NC	3
70			min	0	1	-1.328	1	.004	15	-4.203e-3	3	260.411	1	2148.974	1
71		17	max	0	15	.575	3	.075	1	7.853e-3	1	NC	15	NC	3
72			min	0	1	-1.089	1	.002	15	-3.642e-3	3	346.047	1	3475.449	1
73		18	max	0	15	.376	3	.027	1	6.711e-3	1	NC	5	NC	1
74			min	0	1	-.753	1	0	15	-3.081e-3	3	641.865	1	NC	1
75		19	max	0	15	.138	3	.003	3	5.568e-3	1	NC	1	NC	1
76			min	0	1	-.36	1	0	10	-2.52e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.142	3	.003	3	2.12e-3	3	NC	1	NC	1
78			min	0	1	-.36	1	0	10	-5.659e-3	1	NC	1	NC	1
79		2	max	0	15	.291	3	.027	1	2.594e-3	3	NC	5	NC	2
80			min	0	1	-.787	1	0	15	-6.825e-3	1	590.492	1	9975.962	1
81		3	max	0	15	.419	3	.075	1	3.068e-3	3	NC	15	NC	3
82			min	0	1	-1.15	1	.002	15	-7.99e-3	1	318.981	1	3466.285	1
83		4	max	0	15	.513	3	.12	1	3.543e-3	3	NC	15	NC	3
84			min	0	1	-1.406	1	.004	15	-9.156e-3	1	240.865	1	2144.552	1
85		5	max	0	15	.564	3	.145	1	4.017e-3	3	9024.385	15	NC	3
86			min	0	1	-1.534	1	.005	15	-1.032e-2	1	214.713	1	1759.185	1
87		6	max	0	15	.572	3	.144	1	4.491e-3	3	8995.305	15	NC	3
88			min	0	1	-1.532	1	.005	15	-1.149e-2	1	214.95	1	1776.276	1
89		7	max	0	15	.544	3	.116	1	4.966e-3	3	9844.938	15	NC	3
90			min	0	1	-1.424	1	.004	15	-1.265e-2	1	236.799	1	2216.411	1
91		8	max	0	15	.495	3	.07	1	5.44e-3	3	NC	15	NC	2
92			min	0	1	-1.253	1	.002	15	-1.382e-2	1	282.26	1	3736.939	1
93		9	max	0	15	.444	3	.022	1	5.914e-3	3	NC	15	NC	1
94			min	0	1	-1.084	1	-.001	10	-1.498e-2	1	348.258	1	NC	1
95		10	max	0	1	.419	3	.009	3	6.389e-3	3	NC	5	NC	1
96			min	0	1	-1.004	1	-.005	2	-1.615e-2	1	391.399	1	NC	1
97		11	max	0	1	.444	3	.022	1	5.914e-3	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.084	1	-.001	10	-1.498e-2	1	348.258	1	NC	1
99		12	max	0	1	.495	3	.07	1	5.44e-3	3	NC	15	NC	2
100			min	0	15	-1.253	1	.002	15	-1.382e-2	1	282.26	1	3736.939	1
101		13	max	0	1	.544	3	.116	1	4.966e-3	3	9844.938	15	NC	3
102			min	0	15	-1.424	1	.004	15	-1.265e-2	1	236.799	1	2216.411	1
103		14	max	0	1	.572	3	.144	1	4.491e-3	3	8995.305	15	NC	3
104			min	0	15	-1.532	1	.005	15	-1.149e-2	1	214.95	1	1776.276	1
105		15	max	0	1	.564	3	.145	1	4.017e-3	3	9024.385	15	NC	3
106			min	0	15	-1.534	1	.005	15	-1.032e-2	1	214.713	1	1759.185	1
107		16	max	0	1	.513	3	.12	1	3.543e-3	3	NC	15	NC	3
108			min	0	15	-1.406	1	.004	15	-9.156e-3	1	240.865	1	2144.552	1
109		17	max	0	1	.419	3	.075	1	3.068e-3	3	NC	15	NC	3
110			min	0	15	-1.15	1	.002	15	-7.99e-3	1	318.981	1	3466.285	1
111		18	max	0	1	.291	3	.027	1	2.594e-3	3	NC	5	NC	2
112			min	0	15	-.787	1	0	15	-6.825e-3	1	590.492	1	9975.962	1
113		19	max	0	1	.142	3	.003	3	2.12e-3	3	NC	1	NC	1
114			min	0	15	-.36	1	0	10	-5.659e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.108	1	.003	3	3.667e-3	3	NC	1	NC	1
116			min	0	1	-.047	3	0	10	-8.312e-3	1	NC	1	NC	1
117		2	max	0	15	.043	3	.038	1	4.346e-3	3	NC	5	NC	2
118			min	0	1	-.187	1	.001	15	-9.566e-3	1	855.324	1	6938.545	1
119		3	max	0	15	.114	3	.092	1	5.024e-3	3	NC	5	NC	3
120			min	0	1	-.421	1	.003	15	-1.082e-2	1	476.357	1	2810.782	1
121		4	max	0	15	.153	3	.138	1	5.702e-3	3	NC	5	NC	3
122			min	0	1	-.555	1	.005	15	-1.207e-2	1	380.141	1	1849.861	1
123		5	max	0	15	.153	3	.163	1	6.381e-3	3	NC	5	NC	3
124			min	0	1	-.57	1	.005	15	-1.333e-2	1	371.763	1	1568.805	1
125		6	max	0	15	.117	3	.158	1	7.059e-3	3	NC	5	NC	3
126			min	0	1	-.469	1	.005	15	-1.458e-2	1	436.618	1	1616.965	1
127		7	max	0	15	.052	3	.125	1	7.738e-3	3	NC	5	NC	3
128			min	0	1	-.278	1	.004	15	-1.584e-2	1	652.898	1	2044.968	1
129		8	max	0	15	.001	13	.074	1	8.416e-3	3	NC	3	NC	2
130			min	0	1	-.065	2	.003	15	-1.709e-2	1	1666.744	1	3475.283	1
131		9	max	0	15	.166	1	.024	1	9.094e-3	3	NC	4	NC	1
132			min	0	1	-.095	3	0	10	-1.834e-2	1	4310.645	1	NC	1
133		10	max	0	1	.26	1	.008	3	9.773e-3	3	NC	5	NC	1
134			min	0	1	-.126	3	-.005	2	-1.96e-2	1	1652.66	1	NC	1
135		11	max	0	1	.166	1	.024	1	9.094e-3	3	NC	4	NC	1
136			min	0	15	-.095	3	0	10	-1.834e-2	1	4310.645	1	NC	1
137		12	max	0	1	.001	13	.074	1	8.416e-3	3	NC	3	NC	2
138			min	0	15	-.065	2	.003	15	-1.709e-2	1	1666.744	1	3475.283	1
139		13	max	0	1	.052	3	.125	1	7.738e-3	3	NC	5	NC	3
140			min	0	15	-.278	1	.004	15	-1.584e-2	1	652.898	1	2044.968	1
141		14	max	0	1	.117	3	.158	1	7.059e-3	3	NC	5	NC	3
142			min	0	15	-.469	1	.005	15	-1.458e-2	1	436.618	1	1616.965	1
143		15	max	0	1	.153	3	.163	1	6.381e-3	3	NC	5	NC	3
144			min	0	15	-.57	1	.005	15	-1.333e-2	1	371.763	1	1568.805	1
145		16	max	0	1	.153	3	.138	1	5.702e-3	3	NC	5	NC	3
146			min	0	15	-.555	1	.005	15	-1.207e-2	1	380.141	1	1849.861	1
147		17	max	0	1	.114	3	.092	1	5.024e-3	3	NC	5	NC	3
148			min	0	15	-.421	1	.003	15	-1.082e-2	1	476.357	1	2810.782	1
149		18	max	0	1	.043	3	.038	1	4.346e-3	3	NC	5	NC	2
150			min	0	15	-.187	1	.001	15	-9.566e-3	1	855.324	1	6938.545	1
151		19	max	0	1	.108	1	.003	3	3.667e-3	3	NC	1	NC	1
152			min	0	15	-.047	3	0	10	-8.312e-3	1	NC	1	NC	1
153	M2	1	max	.005	1	.002	2	.007	1	-6.063e-6	15	NC	1	NC	2
154			min	-.004	3	-.004	3	0	15	-1.858e-4	1	NC	1	6692.778	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	.005	1	.002	2	.007	1	-5.618e-6	15	NC	1	NC	2
156			min	-.003	3	-.004	3	0	15	-1.721e-4	1	NC	1	7298.723	1
157		3	max	.005	1	.001	2	.006	1	-5.173e-6	15	NC	1	NC	2
158			min	-.003	3	-.004	3	0	15	-1.585e-4	1	NC	1	8020.672	1
159		4	max	.004	1	0	2	.005	1	-4.728e-6	15	NC	1	NC	2
160			min	-.003	3	-.004	3	0	15	-1.448e-4	1	NC	1	8889.323	1
161		5	max	.004	1	0	2	.005	1	-4.283e-6	15	NC	1	NC	2
162			min	-.003	3	-.004	3	0	15	-1.312e-4	1	NC	1	9946.559	1
163		6	max	.004	1	0	2	.004	1	-3.838e-6	15	NC	1	NC	1
164			min	-.003	3	-.004	3	0	15	-1.176e-4	1	NC	1	NC	1
165		7	max	.003	1	0	2	.004	1	-3.393e-6	15	NC	1	NC	1
166			min	-.002	3	-.004	3	0	15	-1.039e-4	1	NC	1	NC	1
167		8	max	.003	1	0	10	.003	1	-2.948e-6	15	NC	1	NC	1
168			min	-.002	3	-.004	3	0	15	-9.027e-5	1	NC	1	NC	1
169		9	max	.003	1	0	15	.003	1	-2.503e-6	15	NC	1	NC	1
170			min	-.002	3	-.003	3	0	15	-7.662e-5	1	NC	1	NC	1
171		10	max	.003	1	0	15	.002	1	-2.058e-6	15	NC	1	NC	1
172			min	-.002	3	-.003	3	0	15	-6.298e-5	1	NC	1	NC	1
173		11	max	.002	1	0	15	.002	1	-1.613e-6	15	NC	1	NC	1
174			min	-.002	3	-.003	3	0	15	-4.934e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.001	1	-1.168e-6	15	NC	1	NC	1
176			min	-.001	3	-.003	3	0	15	-3.57e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	.001	1	-7.23e-7	15	NC	1	NC	1
178			min	-.001	3	-.002	3	0	15	-2.205e-5	1	NC	1	NC	1
179		14	max	.001	1	0	15	0	1	-2.779e-7	15	NC	1	NC	1
180			min	-.001	3	-.002	4	0	15	-8.411e-6	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	5.231e-6	1	NC	1	NC	1
182			min	0	3	-.002	4	0	15	0	3	NC	1	NC	1
183		16	max	0	1	0	15	0	1	1.887e-5	1	NC	1	NC	1
184			min	0	3	-.002	4	0	15	5.513e-7	12	NC	1	NC	1
185		17	max	0	1	0	15	0	1	3.252e-5	1	NC	1	NC	1
186			min	0	3	-.001	4	0	15	1.057e-6	15	NC	1	NC	1
187		18	max	0	1	0	15	0	1	4.616e-5	1	NC	1	NC	1
188			min	0	3	0	4	0	15	1.502e-6	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	5.98e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.947e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-6.033e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.852e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	4.357e-6	1	NC	1	NC	1
194			min	0	2	-.001	4	0	15	1.427e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.723e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	8.887e-7	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	5.011e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.635e-6	15	NC	1	NC	1
199		5	max	0	3	-.002	15	.001	1	7.299e-5	1	NC	1	NC	1
200			min	0	2	-.007	4	0	15	2.381e-6	15	NC	1	NC	1
201		6	max	0	3	-.002	15	.002	1	9.587e-5	1	NC	1	NC	1
202			min	0	2	-.009	4	0	15	3.127e-6	15	NC	1	NC	1
203		7	max	0	3	-.002	15	.002	1	1.187e-4	1	NC	1	NC	1
204			min	0	2	-.01	4	0	15	3.873e-6	15	9281.999	4	NC	1
205		8	max	.001	3	-.003	15	.002	1	1.416e-4	1	NC	1	NC	1
206			min	0	2	-.011	4	0	15	4.619e-6	15	8274.232	4	NC	1
207		9	max	.001	3	-.003	15	.003	1	1.645e-4	1	NC	1	NC	1
208			min	0	2	-.012	4	0	15	5.365e-6	15	7672.049	4	NC	1
209		10	max	.001	3	-.003	15	.003	1	1.874e-4	1	NC	2	NC	1
210			min	0	2	-.013	4	0	15	6.111e-6	15	7368.451	4	NC	1
211		11	max	.002	3	-.003	15	.003	1	2.103e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.001	2	-.013	4	0	15	6.857e-6	15	7317.921	4	NC	1
213		12	max	.002	3	-.003	15	.004	1	2.331e-4	1	NC	2	NC	1
214			min	-.001	2	-.013	4	0	15	7.603e-6	15	7518.842	4	NC	1
215		13	max	.002	3	-.003	15	.004	1	2.56e-4	1	NC	1	NC	1
216			min	-.001	2	-.012	4	0	15	8.349e-6	15	8015.014	4	NC	1
217		14	max	.002	3	-.002	15	.005	1	2.789e-4	1	NC	1	NC	1
218			min	-.001	2	-.011	4	0	15	9.095e-6	15	8919.004	4	NC	1
219		15	max	.002	3	-.002	15	.005	1	3.018e-4	1	NC	1	NC	1
220			min	-.001	2	-.009	4	0	15	9.841e-6	15	NC	1	NC	1
221		16	max	.002	3	-.002	15	.005	1	3.246e-4	1	NC	1	NC	1
222			min	-.002	2	-.008	1	0	15	1.059e-5	15	NC	1	NC	1
223		17	max	.003	3	-.001	15	.006	1	3.475e-4	1	NC	1	NC	1
224			min	-.002	2	-.006	1	0	15	1.133e-5	15	NC	1	NC	1
225		18	max	.003	3	0	15	.006	1	3.704e-4	1	NC	1	NC	1
226			min	-.002	2	-.005	1	0	15	1.208e-5	15	NC	1	NC	1
227		19	max	.003	3	0	15	.007	1	3.933e-4	1	NC	1	NC	1
228			min	-.002	2	-.003	1	0	15	1.282e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.001	2	0	15	-4.624e-7	12	NC	1	NC	3
230			min	0	3	-.003	3	-.007	1	-1.537e-5	1	NC	1	3629.968	1
231		2	max	.003	1	.001	2	0	15	-4.624e-7	12	NC	1	NC	2
232			min	0	3	-.003	3	-.006	1	-1.537e-5	1	NC	1	3954.006	1
233		3	max	.003	1	.001	2	0	15	-4.624e-7	12	NC	1	NC	2
234			min	0	3	-.002	3	-.006	1	-1.537e-5	1	NC	1	4339.295	1
235		4	max	.002	1	.001	2	0	15	-4.624e-7	12	NC	1	NC	2
236			min	0	3	-.002	3	-.005	1	-1.537e-5	1	NC	1	4801.813	1
237		5	max	.002	1	.001	2	0	15	-4.624e-7	12	NC	1	NC	2
238			min	0	3	-.002	3	-.005	1	-1.537e-5	1	NC	1	5363.272	1
239		6	max	.002	1	0	2	0	15	-4.624e-7	12	NC	1	NC	2
240			min	0	3	-.002	3	-.004	1	-1.537e-5	1	NC	1	6053.783	1
241		7	max	.002	1	0	2	0	15	-4.624e-7	12	NC	1	NC	2
242			min	0	3	-.002	3	-.004	1	-1.537e-5	1	NC	1	6916.09	1
243		8	max	.002	1	0	2	0	15	-4.624e-7	12	NC	1	NC	2
244			min	0	3	-.002	3	-.003	1	-1.537e-5	1	NC	1	8012.542	1
245		9	max	.002	1	0	2	0	15	-4.624e-7	12	NC	1	NC	2
246			min	0	3	-.002	3	-.003	1	-1.537e-5	1	NC	1	9437.019	1
247		10	max	.001	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
248			min	0	3	-.001	3	-.002	1	-1.537e-5	1	NC	1	NC	1
249		11	max	.001	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
250			min	0	3	-.001	3	-.002	1	-1.537e-5	1	NC	1	NC	1
251		12	max	.001	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
252			min	0	3	-.001	3	-.001	1	-1.537e-5	1	NC	1	NC	1
253		13	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
254			min	0	3	0	3	-.001	1	-1.537e-5	1	NC	1	NC	1
255		14	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
256			min	0	3	0	3	0	1	-1.537e-5	1	NC	1	NC	1
257		15	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
258			min	0	3	0	3	0	1	-1.537e-5	1	NC	1	NC	1
259		16	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
260			min	0	3	0	3	0	1	-1.537e-5	1	NC	1	NC	1
261		17	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
262			min	0	3	0	3	0	1	-1.537e-5	1	NC	1	NC	1
263		18	max	0	1	0	2	0	15	-4.624e-7	12	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.537e-5	1	NC	1	NC	1
265		19	max	0	1	0	1	0	1	-4.624e-7	12	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.537e-5	1	NC	1	NC	1
267	M6	1	max	.017	1	.009	2	0	1	0	1	NC	3	NC	1
268			min	-.012	3	-.014	3	0	1	0	1	5044.57	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	.016	1	.009	2	0	1	0	1	NC	3	NC	1
270			min	-.012	3	-.013	3	0	1	0	1	5572.755	2	NC	1
271		3	max	.015	1	.008	2	0	1	0	1	NC	1	NC	1
272			min	-.011	3	-.012	3	0	1	0	1	6218.786	2	NC	1
273		4	max	.014	1	.007	2	0	1	0	1	NC	1	NC	1
274			min	-.01	3	-.012	3	0	1	0	1	7019.742	2	NC	1
275		5	max	.013	1	.006	2	0	1	0	1	NC	1	NC	1
276			min	-.01	3	-.011	3	0	1	0	1	8029.086	2	NC	1
277		6	max	.012	1	.005	2	0	1	0	1	NC	1	NC	1
278			min	-.009	3	-.01	3	0	1	0	1	9326.304	2	NC	1
279		7	max	.011	1	.004	2	0	1	0	1	NC	1	NC	1
280			min	-.008	3	-.01	3	0	1	0	1	NC	1	NC	1
281		8	max	.01	1	.004	2	0	1	0	1	NC	1	NC	1
282			min	-.007	3	-.009	3	0	1	0	1	NC	1	NC	1
283		9	max	.009	1	.003	2	0	1	0	1	NC	1	NC	1
284			min	-.007	3	-.008	3	0	1	0	1	NC	1	NC	1
285		10	max	.008	1	.002	2	0	1	0	1	NC	1	NC	1
286			min	-.006	3	-.007	3	0	1	0	1	NC	1	NC	1
287		11	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
288			min	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
289		12	max	.006	1	.001	2	0	1	0	1	NC	1	NC	1
290			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
291		13	max	.006	1	0	2	0	1	0	1	NC	1	NC	1
292			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	0	2	0	1	0	1	NC	1	NC	1
294			min	-.003	3	-.004	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	-.003	3	-.003	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	-.002	3	-.003	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	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
301		18	max	0	1	0	15	0	1	0	1	NC	1	NC	1
302			min	0	3	0	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	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	0	3	0	15	0	1	0	1	NC	1	NC	1
310			min	0	2	-.003	3	0	1	0	1	NC	1	NC	1
311		4	max	.001	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.001	2	-.005	3	0	1	0	1	NC	1	NC	1
313		5	max	.002	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.002	2	-.007	4	0	1	0	1	NC	1	NC	1
315		6	max	.002	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.002	2	-.009	4	0	1	0	1	NC	1	NC	1
317		7	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.003	2	-.01	4	0	1	0	1	9568.412	4	NC	1
319		8	max	.003	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.003	2	-.011	4	0	1	0	1	8508.952	4	NC	1
321		9	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.004	2	-.012	4	0	1	0	1	7874.079	4	NC	1
323		10	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.004	2	-.013	4	0	1	0	1	7550.1	4	NC	1
325		11	max	.005	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	-.005	2	-.013	4	0	1	0	1	7488.089	4	NC	1
327		12	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.005	2	-.013	4	0	1	0	1	7684.907	4	NC	1
329		13	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.006	2	-.012	4	0	1	0	1	8184.246	4	NC	1
331		14	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.006	2	-.012	1	0	1	0	1	9100.164	4	NC	1
333		15	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.007	2	-.011	1	0	1	0	1	NC	1	NC	1
335		16	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.007	2	-.011	1	0	1	0	1	NC	1	NC	1
337		17	max	.008	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.007	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.008	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.008	2	-.009	1	0	1	0	1	NC	1	NC	1
341		19	max	.009	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.008	2	-.008	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.009	1	.007	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.009	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	1	.007	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.008	3	0	1	0	1	NC	1	NC	1
347		3	max	.008	1	.006	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.008	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.006	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.007	3	0	1	0	1	NC	1	NC	1
351		5	max	.007	1	.005	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.007	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.005	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.006	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	1	.005	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.006	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.004	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.005	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.004	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.005	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.003	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.003	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.003	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.002	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.001	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	0	2	0	1	0	1	NC	1	NC	1
376			min	0	3	0	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	0	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	.005	1	.002	2	0	15	1.858e-4	1	NC	1	NC	2
382			min	-.004	3	-.004	3	-.007	1	6.063e-6	15	NC	1	6692.778	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	.005	1	.002	2	0	15	1.721e-4	1	NC	1	NC	2
384			min	-.003	3	-.004	3	-.007	1	5.618e-6	15	NC	1	7298.723	1
385		3	max	.005	1	.001	2	0	15	1.585e-4	1	NC	1	NC	2
386			min	-.003	3	-.004	3	-.006	1	5.173e-6	15	NC	1	8020.672	1
387		4	max	.004	1	0	2	0	15	1.448e-4	1	NC	1	NC	2
388			min	-.003	3	-.004	3	-.005	1	4.728e-6	15	NC	1	8889.323	1
389		5	max	.004	1	0	2	0	15	1.312e-4	1	NC	1	NC	2
390			min	-.003	3	-.004	3	-.005	1	4.283e-6	15	NC	1	9946.559	1
391		6	max	.004	1	0	2	0	15	1.176e-4	1	NC	1	NC	1
392			min	-.003	3	-.004	3	-.004	1	3.838e-6	15	NC	1	NC	1
393		7	max	.003	1	0	2	0	15	1.039e-4	1	NC	1	NC	1
394			min	-.002	3	-.004	3	-.004	1	3.393e-6	15	NC	1	NC	1
395		8	max	.003	1	0	10	0	15	9.027e-5	1	NC	1	NC	1
396			min	-.002	3	-.004	3	-.003	1	2.948e-6	15	NC	1	NC	1
397		9	max	.003	1	0	15	0	15	7.662e-5	1	NC	1	NC	1
398			min	-.002	3	-.003	3	-.003	1	2.503e-6	15	NC	1	NC	1
399		10	max	.003	1	0	15	0	15	6.298e-5	1	NC	1	NC	1
400			min	-.002	3	-.003	3	-.002	1	2.058e-6	15	NC	1	NC	1
401		11	max	.002	1	0	15	0	15	4.934e-5	1	NC	1	NC	1
402			min	-.002	3	-.003	3	-.002	1	1.613e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	3.57e-5	1	NC	1	NC	1
404			min	-.001	3	-.003	3	-.001	1	1.168e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	2.205e-5	1	NC	1	NC	1
406			min	-.001	3	-.002	3	-.001	1	7.23e-7	15	NC	1	NC	1
407		14	max	.001	1	0	15	0	15	8.411e-6	1	NC	1	NC	1
408			min	-.001	3	-.002	4	0	1	2.779e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	0	3	NC	1	NC	1
410			min	0	3	-.002	4	0	1	-5.231e-6	1	NC	1	NC	1
411		16	max	0	1	0	15	0	15	-5.513e-7	12	NC	1	NC	1
412			min	0	3	-.002	4	0	1	-1.887e-5	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-1.057e-6	15	NC	1	NC	1
414			min	0	3	-.001	4	0	1	-3.252e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-1.502e-6	15	NC	1	NC	1
416			min	0	3	0	4	0	1	-4.616e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.947e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-5.98e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.852e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	6.033e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-1.427e-7	15	NC	1	NC	1
422			min	0	2	-.001	4	0	1	-4.357e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-8.887e-7	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.723e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-1.635e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-5.011e-5	1	NC	1	NC	1
427		5	max	0	3	-.002	15	0	15	-2.381e-6	15	NC	1	NC	1
428			min	0	2	-.007	4	-.001	1	-7.299e-5	1	NC	1	NC	1
429		6	max	0	3	-.002	15	0	15	-3.127e-6	15	NC	1	NC	1
430			min	0	2	-.009	4	-.002	1	-9.587e-5	1	NC	1	NC	1
431		7	max	0	3	-.002	15	0	15	-3.873e-6	15	NC	1	NC	1
432			min	0	2	-.01	4	-.002	1	-1.187e-4	1	9281.999	4	NC	1
433		8	max	.001	3	-.003	15	0	15	-4.619e-6	15	NC	1	NC	1
434			min	0	2	-.011	4	-.002	1	-1.416e-4	1	8274.232	4	NC	1
435		9	max	.001	3	-.003	15	0	15	-5.365e-6	15	NC	1	NC	1
436			min	0	2	-.012	4	-.003	1	-1.645e-4	1	7672.049	4	NC	1
437		10	max	.001	3	-.003	15	0	15	-6.111e-6	15	NC	2	NC	1
438			min	0	2	-.013	4	-.003	1	-1.874e-4	1	7368.451	4	NC	1
439		11	max	.002	3	-.003	15	0	15	-6.857e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.001	2	-.013	4	-.003	1	-2.103e-4	1	7317.921	4	NC	1
441		12	max	.002	3	-.003	15	0	15	-7.603e-6	15	NC	2	NC	1
442			min	-.001	2	-.013	4	-.004	1	-2.331e-4	1	7518.842	4	NC	1
443		13	max	.002	3	-.003	15	0	15	-8.349e-6	15	NC	1	NC	1
444			min	-.001	2	-.012	4	-.004	1	-2.56e-4	1	8015.014	4	NC	1
445		14	max	.002	3	-.002	15	0	15	-9.095e-6	15	NC	1	NC	1
446			min	-.001	2	-.011	4	-.005	1	-2.789e-4	1	8919.004	4	NC	1
447		15	max	.002	3	-.002	15	0	15	-9.841e-6	15	NC	1	NC	1
448			min	-.001	2	-.009	4	-.005	1	-3.018e-4	1	NC	1	NC	1
449		16	max	.002	3	-.002	15	0	15	-1.059e-5	15	NC	1	NC	1
450			min	-.002	2	-.008	1	-.005	1	-3.246e-4	1	NC	1	NC	1
451		17	max	.003	3	-.001	15	0	15	-1.133e-5	15	NC	1	NC	1
452			min	-.002	2	-.006	1	-.006	1	-3.475e-4	1	NC	1	NC	1
453		18	max	.003	3	0	15	0	15	-1.208e-5	15	NC	1	NC	1
454			min	-.002	2	-.005	1	-.006	1	-3.704e-4	1	NC	1	NC	1
455		19	max	.003	3	0	15	0	15	-1.282e-5	15	NC	1	NC	1
456			min	-.002	2	-.003	1	-.007	1	-3.933e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.001	2	.007	1	1.537e-5	1	NC	1	NC	3
458			min	0	3	-.003	3	0	15	4.624e-7	12	NC	1	3629.968	1
459		2	max	.003	1	.001	2	.006	1	1.537e-5	1	NC	1	NC	2
460			min	0	3	-.003	3	0	15	4.624e-7	12	NC	1	3954.006	1
461		3	max	.003	1	.001	2	.006	1	1.537e-5	1	NC	1	NC	2
462			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	4339.295	1
463		4	max	.002	1	.001	2	.005	1	1.537e-5	1	NC	1	NC	2
464			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	4801.813	1
465		5	max	.002	1	.001	2	.005	1	1.537e-5	1	NC	1	NC	2
466			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	5363.272	1
467		6	max	.002	1	0	2	.004	1	1.537e-5	1	NC	1	NC	2
468			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	6053.783	1
469		7	max	.002	1	0	2	.004	1	1.537e-5	1	NC	1	NC	2
470			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	6916.09	1
471		8	max	.002	1	0	2	.003	1	1.537e-5	1	NC	1	NC	2
472			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	8012.542	1
473		9	max	.002	1	0	2	.003	1	1.537e-5	1	NC	1	NC	2
474			min	0	3	-.002	3	0	15	4.624e-7	12	NC	1	9437.019	1
475		10	max	.001	1	0	2	.002	1	1.537e-5	1	NC	1	NC	1
476			min	0	3	-.001	3	0	15	4.624e-7	12	NC	1	NC	1
477		11	max	.001	1	0	2	.002	1	1.537e-5	1	NC	1	NC	1
478			min	0	3	-.001	3	0	15	4.624e-7	12	NC	1	NC	1
479		12	max	.001	1	0	2	.001	1	1.537e-5	1	NC	1	NC	1
480			min	0	3	-.001	3	0	15	4.624e-7	12	NC	1	NC	1
481		13	max	0	1	0	2	.001	1	1.537e-5	1	NC	1	NC	1
482			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
483		14	max	0	1	0	2	0	1	1.537e-5	1	NC	1	NC	1
484			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
485		15	max	0	1	0	2	0	1	1.537e-5	1	NC	1	NC	1
486			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
487		16	max	0	1	0	2	0	1	1.537e-5	1	NC	1	NC	1
488			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
489		17	max	0	1	0	2	0	1	1.537e-5	1	NC	1	NC	1
490			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
491		18	max	0	1	0	2	0	1	1.537e-5	1	NC	1	NC	1
492			min	0	3	0	3	0	15	4.624e-7	12	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.537e-5	1	NC	1	NC	1
494			min	0	1	0	1	0	1	4.624e-7	12	NC	1	NC	1
495	M1	1	max	.003	3	.111	1	0	1	1.928e-2	1	NC	1	NC	1
496			min	-.001	10	-.013	3	0	15	-1.856e-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	.003	3	.055	1	0	15	9.398e-3	1	NC	3	NC	1
498			min	-.001	10	-.006	3	-.005	1	-9.183e-3	3	2040.247	1	NC	1
499		3	max	.003	3	.005	3	0	15	1.738e-5	10	NC	5	NC	1
500			min	-.001	10	-.006	1	-.007	1	-1.367e-4	1	974.809	1	NC	1
501		4	max	.003	3	.025	3	0	15	5.229e-3	1	NC	5	NC	1
502			min	-.001	10	-.077	1	-.007	1	-3.31e-3	3	607.919	1	NC	1
503		5	max	.003	3	.052	3	0	15	1.059e-2	1	NC	15	NC	1
504			min	-.001	10	-.152	1	-.005	1	-6.532e-3	3	434.292	1	NC	1
505		6	max	.003	3	.08	3	0	15	1.596e-2	1	NC	15	NC	1
506			min	0	10	-.226	1	-.002	1	-9.753e-3	3	339.385	1	NC	1
507		7	max	.003	3	.108	3	0	1	2.133e-2	1	9413.062	15	NC	1
508			min	0	10	-.292	1	0	12	-1.297e-2	3	283.723	1	NC	1
509		8	max	.003	3	.131	3	0	1	2.669e-2	1	8359.901	15	NC	1
510			min	0	10	-.344	1	0	15	-1.62e-2	3	250.954	1	NC	1
511		9	max	.003	3	.146	3	0	15	2.931e-2	1	7811.107	15	NC	1
512			min	0	10	-.378	1	0	1	-1.625e-2	3	233.954	1	NC	1
513		10	max	.003	3	.152	3	0	1	3.01e-2	1	7644.054	15	NC	1
514			min	0	10	-.389	1	0	12	-1.421e-2	3	228.855	1	NC	1
515		11	max	.003	3	.148	3	0	1	3.089e-2	1	7810.967	15	NC	1
516			min	0	10	-.377	1	0	15	-1.217e-2	3	234.195	1	NC	1
517		12	max	.003	3	.136	3	0	15	2.908e-2	1	8359.607	15	NC	1
518			min	0	10	-.344	1	0	1	-1.014e-2	3	251.71	1	NC	1
519		13	max	.003	3	.115	3	0	15	2.337e-2	1	9412.545	15	NC	1
520			min	0	10	-.29	1	0	1	-8.115e-3	3	285.597	1	NC	1
521		14	max	.003	3	.089	3	.002	1	1.766e-2	1	NC	15	NC	1
522			min	0	10	-.223	1	0	15	-6.092e-3	3	343.43	1	NC	1
523		15	max	.003	3	.06	3	.004	1	1.194e-2	1	NC	15	NC	1
524			min	0	10	-.149	1	0	15	-4.07e-3	3	442.669	1	NC	1
525		16	max	.003	3	.03	3	.006	1	6.23e-3	1	NC	5	NC	1
526			min	0	10	-.074	1	0	15	-2.047e-3	3	625.655	1	NC	1
527		17	max	.003	3	.002	3	.007	1	5.169e-4	1	NC	5	NC	1
528			min	0	10	-.004	1	0	15	-2.475e-5	3	1015.131	1	NC	1
529		18	max	.003	3	.055	1	.005	1	1.101e-2	1	NC	5	NC	1
530			min	0	10	-.023	3	0	15	-3.299e-3	3	2142.99	1	NC	1
531		19	max	.003	3	.108	1	0	15	2.189e-2	1	NC	1	NC	1
532			min	0	10	-.047	3	0	1	-6.697e-3	3	NC	1	NC	1
533	M5	1	max	.011	3	.269	1	0	1	0	1	NC	1	NC	1
534			min	-.006	2	-.021	3	0	1	0	1	NC	1	NC	1
535		2	max	.011	3	.133	1	0	1	0	1	NC	5	NC	1
536			min	-.007	2	-.011	3	0	1	0	1	842.54	1	NC	1
537		3	max	.011	3	.016	3	0	1	0	1	NC	15	NC	1
538			min	-.007	2	-.021	1	0	1	0	1	393.678	1	NC	1
539		4	max	.011	3	.072	3	0	1	0	1	8874.354	15	NC	1
540			min	-.006	2	-.21	1	0	1	0	1	238.729	1	NC	1
541		5	max	.01	3	.149	3	0	1	0	1	6213.024	15	NC	1
542			min	-.006	2	-.416	1	0	1	0	1	166.789	1	NC	1
543		6	max	.01	3	.234	3	0	1	0	1	4784.93	15	NC	1
544			min	-.006	2	-.622	1	0	1	0	1	128.223	1	NC	1
545		7	max	.01	3	.318	3	0	1	0	1	3959.894	15	NC	1
546			min	-.006	2	-.809	1	0	1	0	1	105.958	1	NC	1
547		8	max	.01	3	.388	3	0	1	0	1	3480.041	15	NC	1
548			min	-.006	2	-.96	1	0	1	0	1	93.016	1	NC	1
549		9	max	.01	3	.433	3	0	1	0	1	3233.906	15	NC	1
550			min	-.006	2	-1.054	1	0	1	0	1	86.385	1	NC	1
551		10	max	.009	3	.45	3	0	1	0	1	3159.735	15	NC	1
552			min	-.006	2	-1.086	1	0	1	0	1	84.408	1	NC	1
553		11	max	.009	3	.439	3	0	1	0	1	3233.955	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	-.005	2	-1.054	1	0	1	0	1	86.481	1	NC	1
555		12	max	.009	3	.401	3	0	1	0	1	3480.159	15	NC	1
556			min	-.005	2	-.957	1	0	1	0	1	93.334	1	NC	1
557		13	max	.009	3	.339	3	0	1	0	1	3960.139	15	NC	1
558			min	-.005	2	-.804	1	0	1	0	1	106.784	1	NC	1
559		14	max	.009	3	.262	3	0	1	0	1	4785.415	15	NC	1
560			min	-.005	2	-.613	1	0	1	0	1	130.08	1	NC	1
561		15	max	.008	3	.175	3	0	1	0	1	6213.994	15	NC	1
562			min	-.005	2	-.405	1	0	1	0	1	170.81	1	NC	1
563		16	max	.008	3	.088	3	0	1	0	1	8876.399	15	NC	1
564			min	-.005	2	-.198	1	0	1	0	1	247.714	1	NC	1
565		17	max	.008	3	.006	3	0	1	0	1	NC	15	NC	1
566			min	-.005	2	-.013	1	0	1	0	1	415.46	1	NC	1
567		18	max	.008	3	.134	1	0	1	0	1	NC	5	NC	1
568			min	-.005	2	-.064	3	0	1	0	1	900.754	1	NC	1
569		19	max	.008	3	.26	1	0	1	0	1	NC	1	NC	1
570			min	-.005	2	-.126	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.003	3	.111	1	0	15	1.856e-2	3	NC	1	NC	1
572			min	-.001	10	-.013	3	0	1	-1.928e-2	1	NC	1	NC	1
573		2	max	.003	3	.055	1	.005	1	9.183e-3	3	NC	3	NC	1
574			min	-.001	10	-.006	3	0	15	-9.398e-3	1	2040.247	1	NC	1
575		3	max	.003	3	.005	3	.007	1	1.367e-4	1	NC	5	NC	1
576			min	-.001	10	-.006	1	0	15	-1.738e-5	10	974.809	1	NC	1
577		4	max	.003	3	.025	3	.007	1	3.31e-3	3	NC	5	NC	1
578			min	-.001	10	-.077	1	0	15	-5.229e-3	1	607.919	1	NC	1
579		5	max	.003	3	.052	3	.005	1	6.532e-3	3	NC	15	NC	1
580			min	-.001	10	-.152	1	0	15	-1.059e-2	1	434.292	1	NC	1
581		6	max	.003	3	.08	3	.002	1	9.753e-3	3	NC	15	NC	1
582			min	0	10	-.226	1	0	15	-1.596e-2	1	339.385	1	NC	1
583		7	max	.003	3	.108	3	0	12	1.297e-2	3	9413.062	15	NC	1
584			min	0	10	-.292	1	0	1	-2.133e-2	1	283.723	1	NC	1
585		8	max	.003	3	.131	3	0	15	1.62e-2	3	8359.901	15	NC	1
586			min	0	10	-.344	1	0	1	-2.669e-2	1	250.954	1	NC	1
587		9	max	.003	3	.146	3	0	1	1.625e-2	3	7811.107	15	NC	1
588			min	0	10	-.378	1	0	15	-2.931e-2	1	233.954	1	NC	1
589		10	max	.003	3	.152	3	0	12	1.421e-2	3	7644.054	15	NC	1
590			min	0	10	-.389	1	0	1	-3.01e-2	1	228.855	1	NC	1
591		11	max	.003	3	.148	3	0	15	1.217e-2	3	7810.967	15	NC	1
592			min	0	10	-.377	1	0	1	-3.089e-2	1	234.195	1	NC	1
593		12	max	.003	3	.136	3	0	1	1.014e-2	3	8359.607	15	NC	1
594			min	0	10	-.344	1	0	15	-2.908e-2	1	251.71	1	NC	1
595		13	max	.003	3	.115	3	0	1	8.115e-3	3	9412.545	15	NC	1
596			min	0	10	-.29	1	0	15	-2.337e-2	1	285.597	1	NC	1
597		14	max	.003	3	.089	3	0	15	6.092e-3	3	NC	15	NC	1
598			min	0	10	-.223	1	-.002	1	-1.766e-2	1	343.43	1	NC	1
599		15	max	.003	3	.06	3	0	15	4.07e-3	3	NC	15	NC	1
600			min	0	10	-.149	1	-.004	1	-1.194e-2	1	442.669	1	NC	1
601		16	max	.003	3	.03	3	0	15	2.047e-3	3	NC	5	NC	1
602			min	0	10	-.074	1	-.006	1	-6.23e-3	1	625.655	1	NC	1
603		17	max	.003	3	.002	3	0	15	2.475e-5	3	NC	5	NC	1
604			min	0	10	-.004	1	-.007	1	-5.169e-4	1	1015.131	1	NC	1
605		18	max	.003	3	.055	1	0	15	3.299e-3	3	NC	5	NC	1
606			min	0	10	-.023	3	-.005	1	-1.101e-2	1	2142.99	1	NC	1
607		19	max	.003	3	.108	1	0	1	6.697e-3	3	NC	1	NC	1
608			min	0	10	-.047	3	0	15	-2.189e-2	1	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

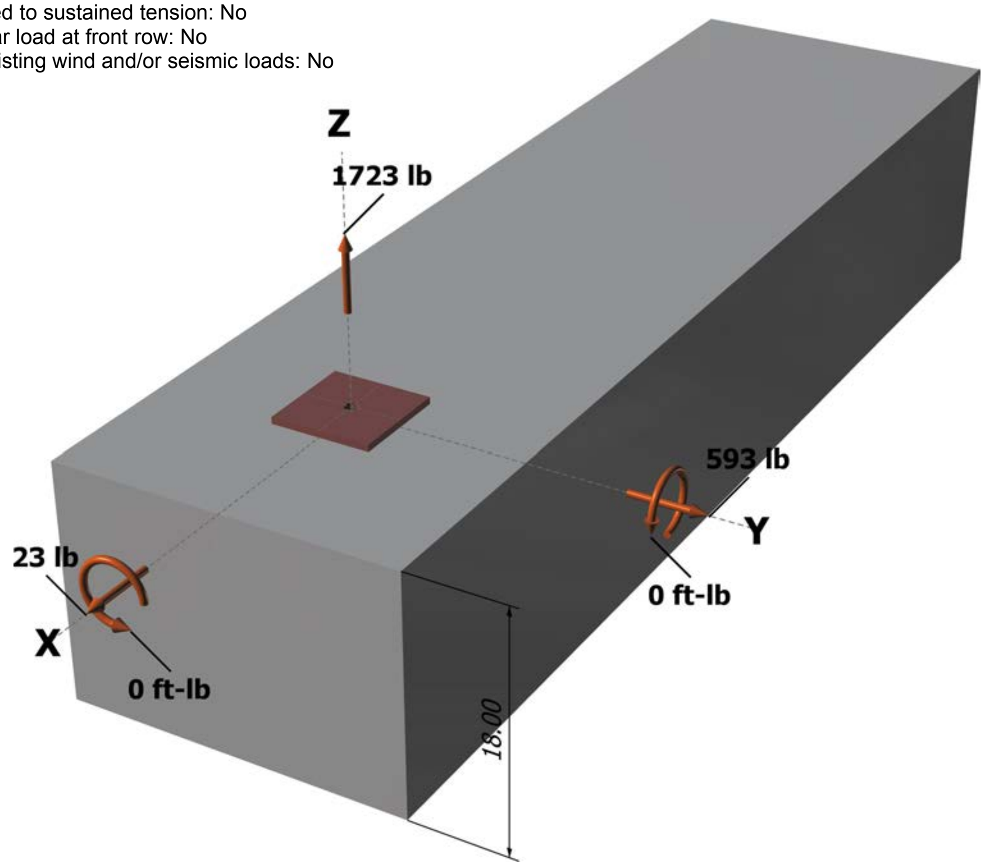
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

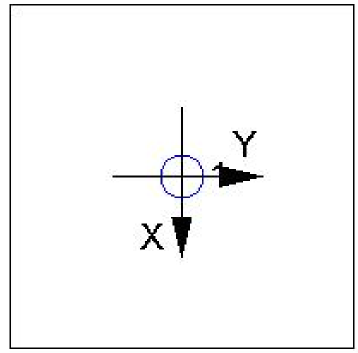
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

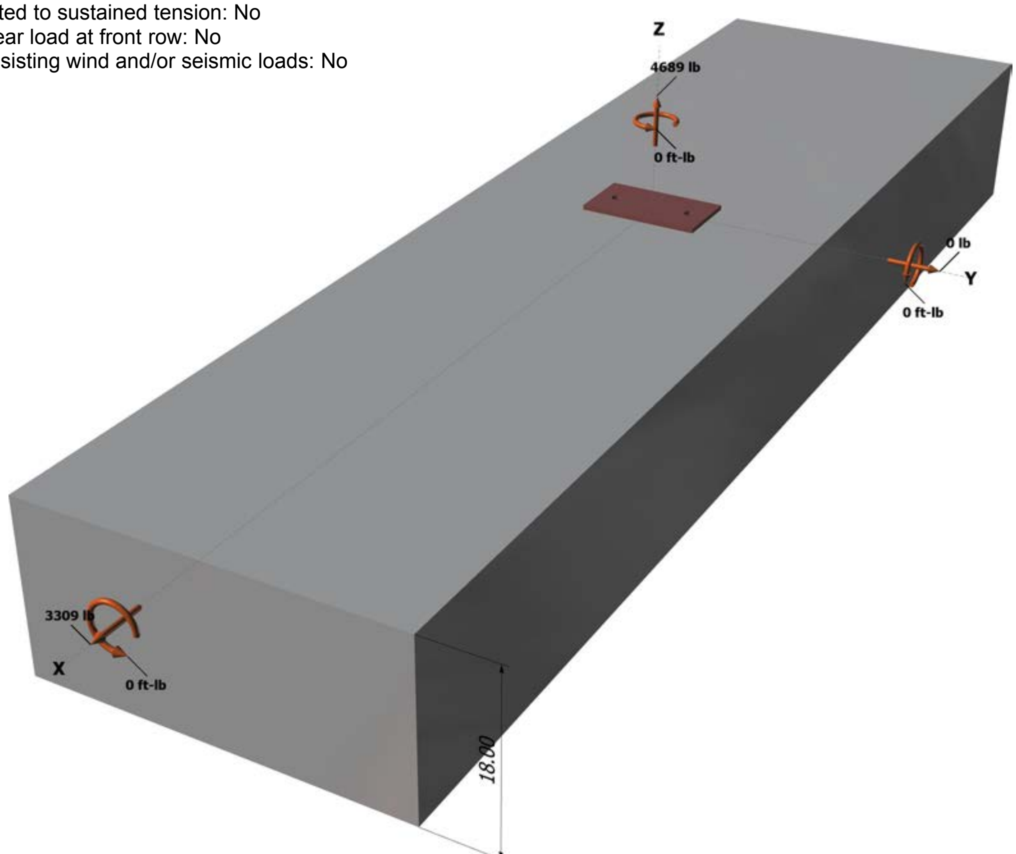
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

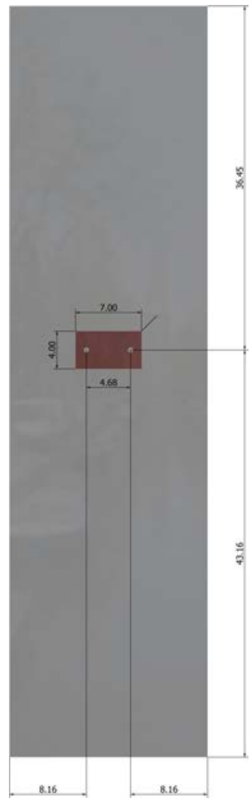
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



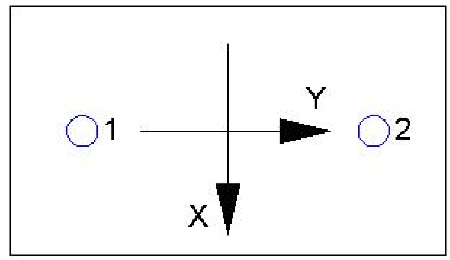
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

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

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

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

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

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

12. Warnings

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

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

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