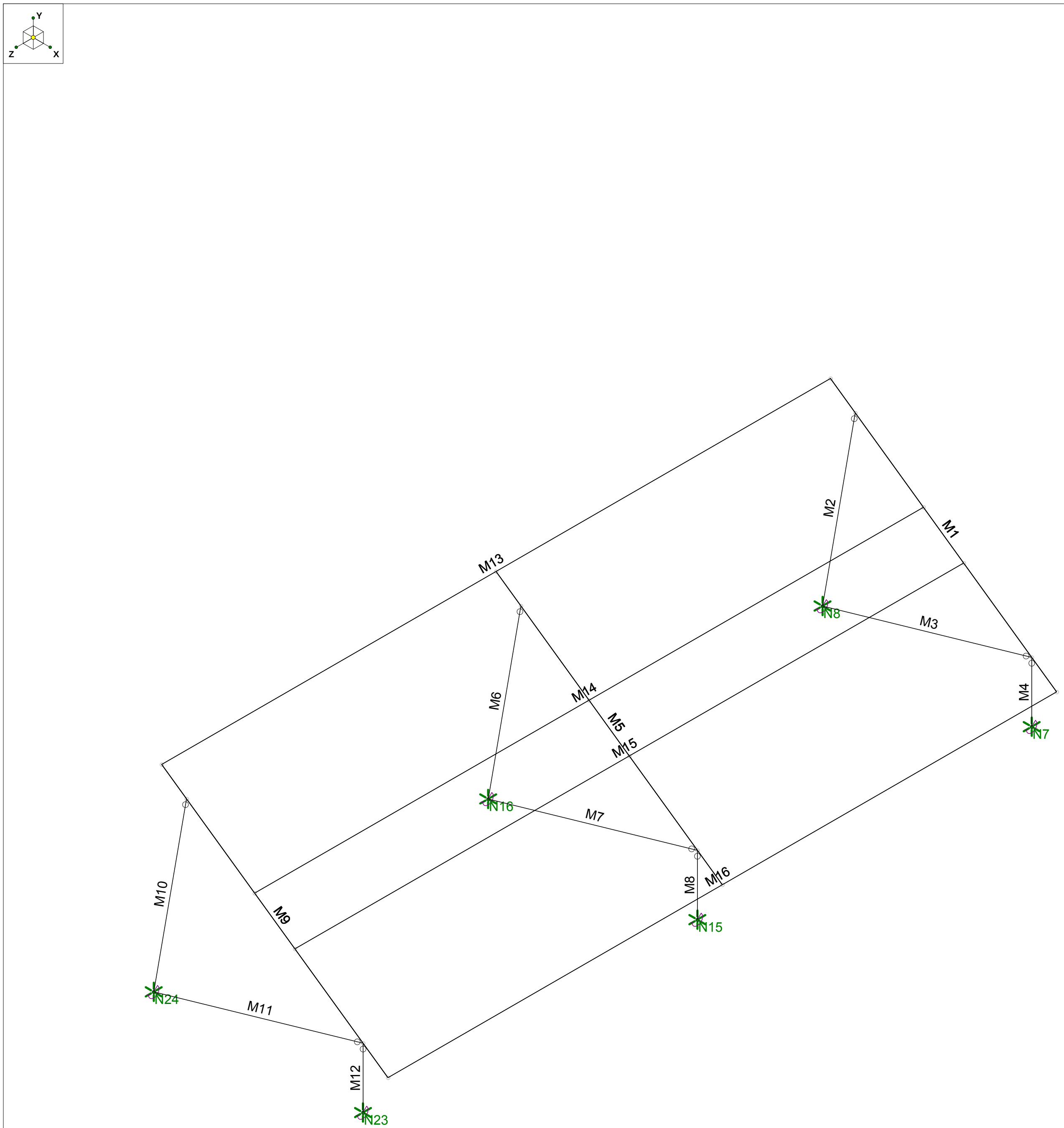


Schletter, Inc.	Standard PVMax Racking System	35° Tilt w/o Seismic Design
HCV	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

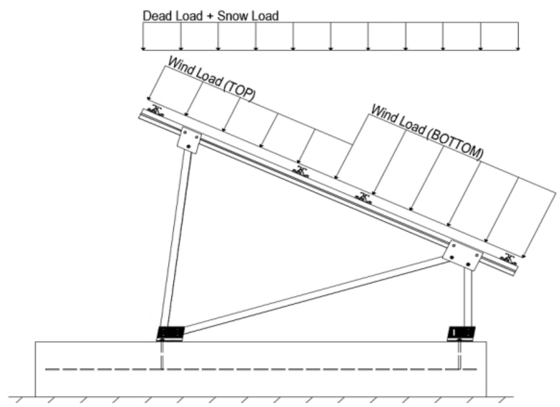
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 35°
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 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

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 = 14.43 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.64
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 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.200	*(Pressure)*
$Cf+_{BOTTOM}$	=	2.000	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.700	
$Cf-_{TOP, INNER PURLIN}$	=	-2.100	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.200	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
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 + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [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

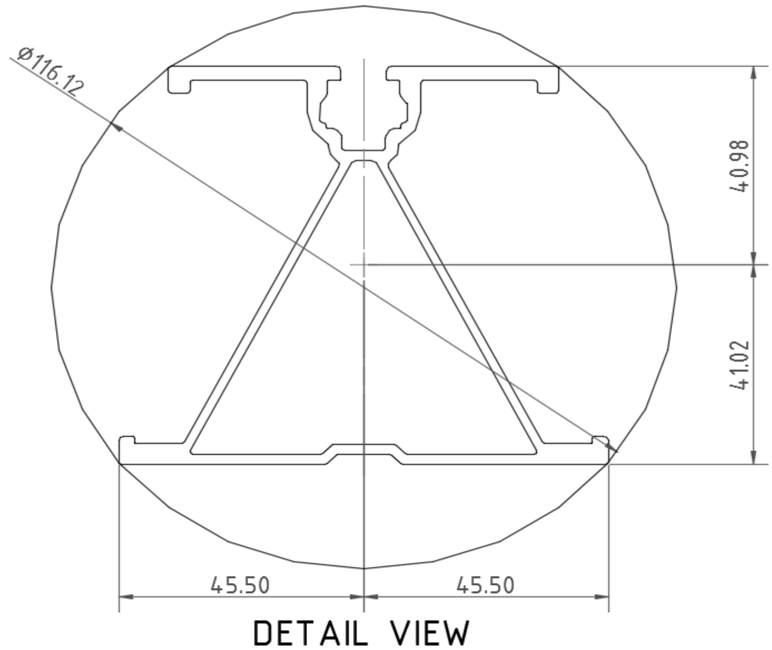
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

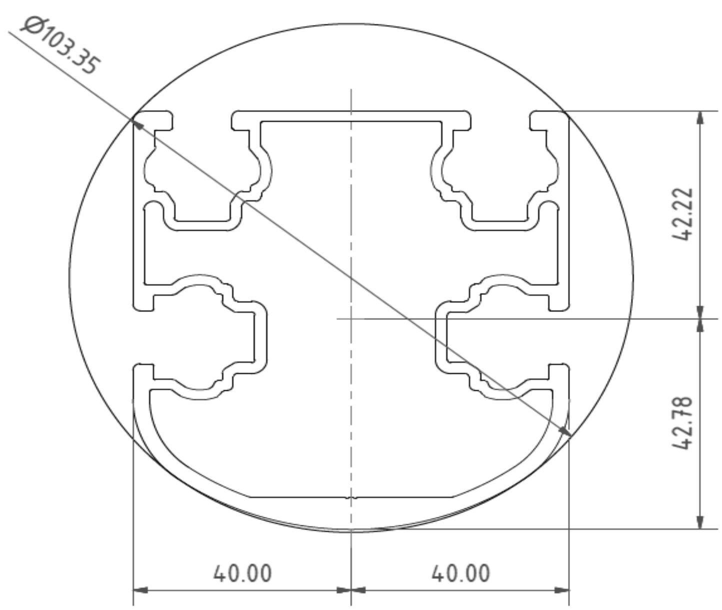
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	99	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.684	k-ft
M_z =	0.106	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	70%	



4.2 Girder Design

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

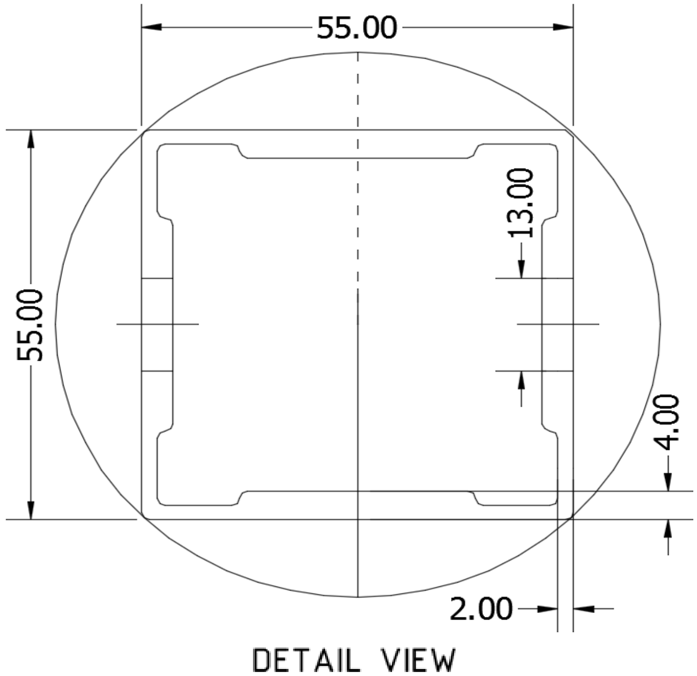
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.761	k-ft
M_z =	0.000	k-ft
P_n =	-0.966	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	81%	



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).

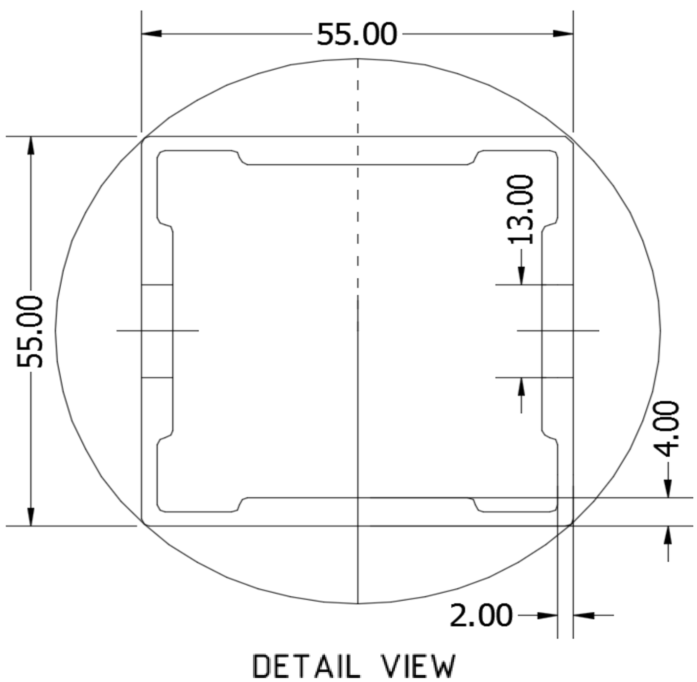
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.993	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	7%	



4.4 Diagonal Strut Design

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

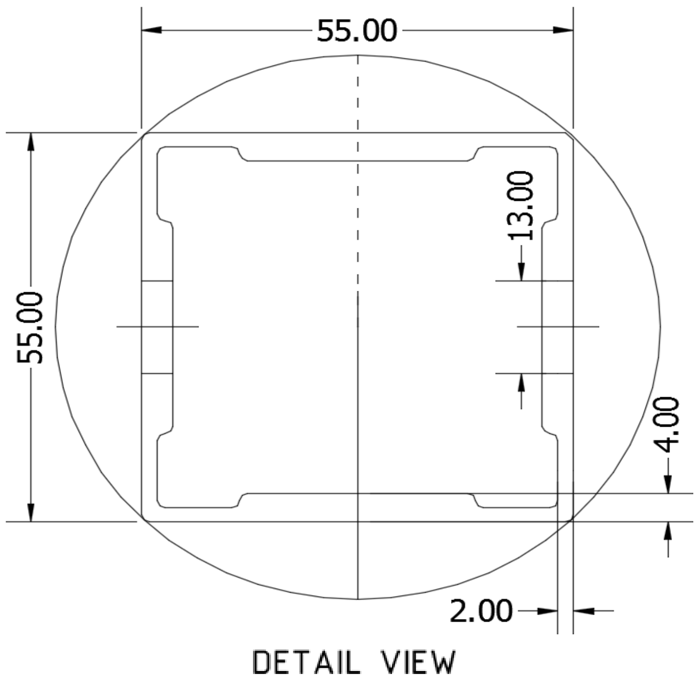
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.821	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	39%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.994	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	35%	



5. FOUNDATION DESIGN CALCULATIONS

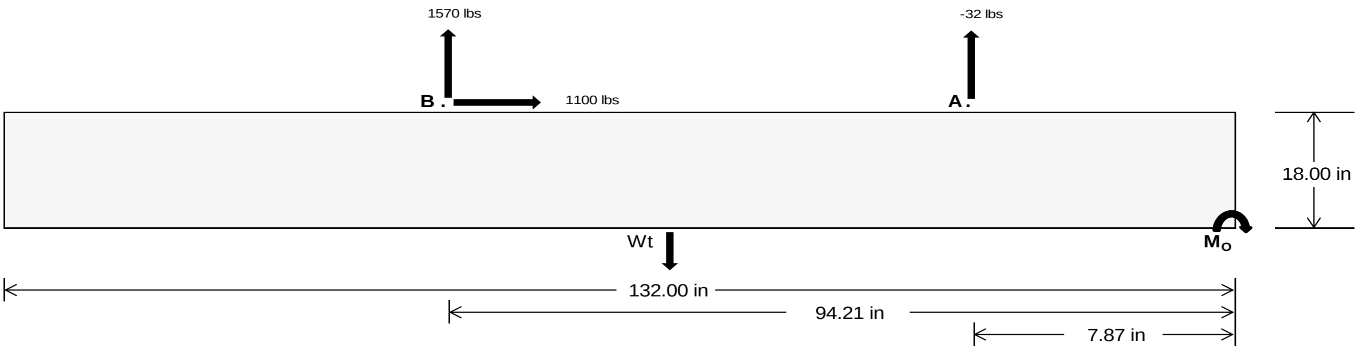
5.1 Helical Pile Foundations

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 =	78.71	6540.73	k
Compressive Load =	2590.61	4852.49	k
Lateral Load =	10.39	4575.55	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC tables 1804.2 (2003, 2006) & 1806.2 (2009).



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O =	167496.0 in-lbs
Resisting Force Required =	2537.82 lbs
S.F. =	1.67
Weight Required =	4229.70 lbs
Minimum Width =	33 in in
Weight Provided =	6579.38 lbs

A minimum 132in long x 33in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	1099.77 lbs
Friction =	0.4
Weight Required =	2749.41 lbs
Resisting Weight =	6579.38 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	1099.77 lbs
Cohesion =	130 psf
Area =	30.25 ft^2
Resisting =	3289.69 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	33 in	34 in	35 in	36 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.75 ft) =	6579 lbs	6779 lbs	6978 lbs	7178 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in
F_A	891 lbs	891 lbs	891 lbs	891 lbs	1043 lbs	1043 lbs	1043 lbs	1043 lbs	1339 lbs	1339 lbs	1339 lbs	1339 lbs	63 lbs	63 lbs	63 lbs	63 lbs
F_B	793 lbs	793 lbs	793 lbs	793 lbs	2196 lbs	2196 lbs	2196 lbs	2196 lbs	2142 lbs	2142 lbs	2142 lbs	2142 lbs	-3141 lbs	-3141 lbs	-3141 lbs	-3141 lbs
F_V	134 lbs	134 lbs	134 lbs	134 lbs	1995 lbs	1995 lbs	1995 lbs	1995 lbs	1582 lbs	1582 lbs	1582 lbs	1582 lbs	-2200 lbs	-2200 lbs	-2200 lbs	-2200 lbs
P_{total}	8263 lbs	8462 lbs	8662 lbs	8861 lbs	9818 lbs	10017 lbs	10217 lbs	10416 lbs	10061 lbs	10261 lbs	10460 lbs	10659 lbs	870 lbs	990 lbs	1109 lbs	1229 lbs
M	2654 lbs-ft	2654 lbs-ft	2654 lbs-ft	2654 lbs-ft	2883 lbs-ft	2883 lbs-ft	2883 lbs-ft	2883 lbs-ft	3824 lbs-ft	3824 lbs-ft	3824 lbs-ft	3824 lbs-ft	4391 lbs-ft	4391 lbs-ft	4391 lbs-ft	4391 lbs-ft
e	0.32 ft	0.31 ft	0.31 ft	0.30 ft	0.29 ft	0.29 ft	0.28 ft	0.28 ft	0.38 ft	0.37 ft	0.37 ft	0.36 ft	5.05 ft	4.44 ft	3.96 ft	3.57 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}	225.3 psf	225.1 psf	224.8 psf	224.6 psf	272.6 psf	271.0 psf	269.4 psf	268.0 psf	263.6 psf	262.3 psf	261.0 psf	259.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	321.0 psf	318.0 psf	315.1 psf	312.4 psf	376.5 psf	371.9 psf	367.5 psf	363.3 psf	401.6 psf	396.1 psf	391.0 psf	386.2 psf	465.2 psf	219.0 psf	164.5 psf	141.7 psf

Maximum Bearing Pressure =	465 psf
Allowable Bearing Pressure =	1500 psf

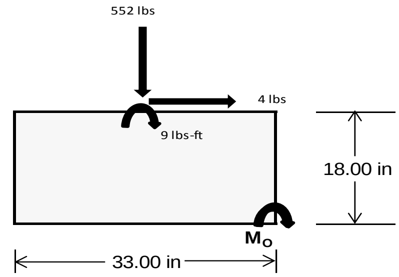
Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 742.9 ft-lbs
Resisting Force Required = 540.29 lbs
S.F. = 1.67
Weight Required = 900.48 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in 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	33 in			33 in			33 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	220 lbs	519 lbs	220 lbs	552 lbs	1443 lbs	552 lbs	64 lbs	152 lbs	64 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	8365 lbs	6579 lbs	8365 lbs	8305 lbs	6579 lbs	8305 lbs	2446 lbs	6579 lbs	2446 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	16 lbs-ft	0 lbs-ft	16 lbs-ft	1 lbs-ft	0 lbs-ft	1 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	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft
f_{min}	276.2 psf	217.5 psf	276.2 psf	273.4 psf	217.5 psf	273.4 psf	80.8 psf	217.5 psf	80.8 psf
f_{max}	276.9 psf	217.5 psf	276.9 psf	275.7 psf	217.5 psf	275.7 psf	80.9 psf	217.5 psf	80.9 psf

Maximum Bearing Pressure = 277 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

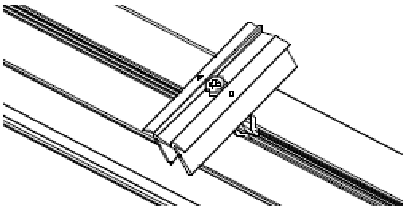
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

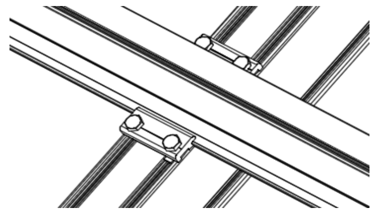
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.773	k
Allowable Uplift =	1.214	k
Utilization =	64%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.286	k
Allowable Uplift =	4.357	k
Utilization =	52%	



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 =	1.993	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	27%	

Rear Strut

Maximum Axial Load =	4.316	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	58%	

Diagonal Strut

Maximum Axial Load =	2.874	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	39%	

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.

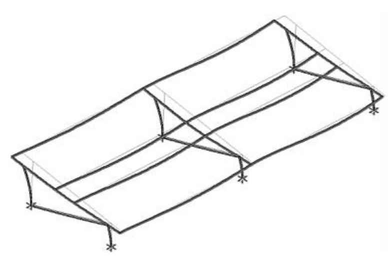
7. SEISMIC DESIGN

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} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.029	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 = 99 in

J = 0.432

273.88

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 99

J = 0.432

174.171

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.1

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

b/t = 32.195

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

b/t = 37.0588

S1 = 12.21

S2 = 32.70

φF_L= (φck2*√(BpE))/(1.6b/t)

φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 21.94 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in

J = 1.08

152.913

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 88.9

J = 1.08

161.829

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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_LSt=	29.4	ksi	φF_LWk=	33.3	ksi
Ix =	984962	mm^4	Iy =	923544	mm^4
	2.366	in^4		2.219	in^4
y =	43.717	mm	x =	40	mm
Sx =	1.375	in^3	Sy =	1.409	in^3
M_{max}St =	3.363	k-ft	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

$\lambda =$ 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

$\varphi cc =$ 0.87952

$\varphi F_L = \varphi cc(Bc\text{-}Dc^*\lambda)$

$\varphi F_L =$ 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)

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

$\varphi F_L =$ 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

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

$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 28.03 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\surd((LbSc)/(Cb^*\surd(IyJ)/2))]$

$\varphi F_L =$ 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

$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\surd((LbSc)/(Cb^*\surd(IyJ)/2))]$

$\varphi F_L =$ 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

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

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 = 78.03 in
J = 0.942
121.773

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

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= 29.8 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

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= 29.8

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
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 = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 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

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 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	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	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	-63.577	-63.577	0	0
2	M14	y	-63.577	-63.577	0	0
3	M15	y	-105.961	-105.961	0	0
4	M16	y	-105.961	-105.961	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	143.047	143.047	0	0
2	M14	y	111.259	111.259	0	0
3	M15	y	63.577	63.577	0	0
4	M16	y	63.577	63.577	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 + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	952.02	2	1175.982	2	.433	1	.001	1	0	1	0	1
2		min	-1128.421	3	-1569.873	3	.026	15	0	15	0	1	0	1
3	N7	max	.032	3	798.935	1	-.458	15	0	15	0	1	0	1
4		min	-.187	2	39.141	15	-7.996	1	-.015	1	0	1	0	1
5	N15	max	.202	3	1992.775	1	0	9	0	11	0	1	0	1
6		min	-1.854	2	79.999	15	0	10	0	10	0	1	0	1
7	N16	max	3232.618	2	3732.682	2	0	12	0	11	0	1	0	1
8		min	-3519.651	3	-5031.332	3	0	9	0	2	0	1	0	1
9	N23	max	.032	3	798.935	1	7.996	1	.015	1	0	1	0	1
10		min	-.187	2	39.141	15	.458	15	0	15	0	1	0	1
11	N24	max	952.02	2	1175.982	2	-.026	15	0	15	0	1	0	1
12		min	-1128.421	3	-1569.873	3	-.433	1	-.001	1	0	1	0	1
13	Totals:	max	5134.43	2	9350.876	2	0	11						
14		min	-5776.227	3	-7784.313	3	0	10						

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	71.353	1	379.32	2	-8.087	15	0	3	.17	1	0	2
2			min	4.028	15	-695.579	3	-145.295	1	-.013	2	.01	15	0	3
3		2	max	71.353	1	264.801	2	-6.209	15	0	3	.052	1	.543	3
4			min	4.028	15	-489.8	3	-111.332	1	-.013	2	.003	15	-.295	2
5		3	max	71.353	1	150.283	2	-4.33	15	0	3	.002	3	.898	3
6			min	4.028	15	-284.022	3	-77.368	1	-.013	2	-.034	1	-.485	2
7		4	max	71.353	1	35.765	2	-2.451	15	0	3	-.003	12	1.064	3
8			min	4.028	15	-78.243	3	-43.405	1	-.013	2	-.089	1	-.571	2
9		5	max	71.353	1	127.535	3	-.446	10	0	3	-.006	12	1.041	3
10			min	4.028	15	-78.754	2	-9.442	1	-.013	2	-.114	1	-.551	2
11		6	max	71.353	1	333.314	3	24.521	1	0	3	-.006	15	.83	3
12			min	4.028	15	-193.272	2	-.404	3	-.013	2	-.107	1	-.426	2
13		7	max	71.353	1	539.092	3	58.485	1	0	3	-.004	15	.43	3
14			min	4.028	15	-307.79	2	1.706	12	-.013	2	-.069	1	-.197	2
15		8	max	71.353	1	744.871	3	92.448	1	0	3	.004	2	.138	2
16			min	4.028	15	-422.309	2	3.585	12	-.013	2	-.006	3	-.158	3
17		9	max	71.353	1	950.649	3	126.411	1	0	3	.101	1	.578	2
18			min	4.028	15	-536.827	2	5.463	12	-.013	2	0	3	-.935	3
19		10	max	71.353	1	651.345	2	-7.341	12	0	3	.232	1	1.122	2
20			min	4.028	15	-1156.428	3	-160.375	1	-.013	2	.006	12	-1.901	3
21		11	max	71.353	1	536.827	2	-5.463	12	.013	2	.101	1	.578	2
22			min	4.028	15	-950.649	3	-126.411	1	0	3	0	3	-.935	3
23		12	max	71.353	1	422.309	2	-3.585	12	.013	2	.004	2	.138	2
24			min	4.028	15	-744.871	3	-92.448	1	0	3	-.006	3	-.158	3
25		13	max	71.353	1	307.79	2	-1.706	12	.013	2	-.004	15	.43	3
26			min	4.028	15	-539.092	3	-58.485	1	0	3	-.069	1	-.197	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	71.353	1	193.272	2	.404	3	.013	2	-.006	15	.83	3
28			min	4.028	15	-333.314	3	-24.521	1	0	3	-.107	1	-.426	2
29		15	max	71.353	1	78.754	2	9.442	1	.013	2	-.006	12	1.041	3
30			min	4.028	15	-127.535	3	.446	10	0	3	-.114	1	-.551	2
31		16	max	71.353	1	78.243	3	43.405	1	.013	2	-.003	12	1.064	3
32			min	4.028	15	-35.765	2	2.451	15	0	3	-.089	1	-.571	2
33		17	max	71.353	1	284.022	3	77.368	1	.013	2	.002	3	.898	3
34			min	4.028	15	-150.283	2	4.33	15	0	3	-.034	1	-.485	2
35		18	max	71.353	1	489.8	3	111.332	1	.013	2	.052	1	.543	3
36			min	4.028	15	-264.801	2	6.209	15	0	3	.003	15	-.295	2
37		19	max	71.353	1	695.579	3	145.295	1	.013	2	.17	1	0	2
38			min	4.028	15	-379.32	2	8.087	15	0	3	.01	15	0	3
39	M14	1	max	37.324	1	421.208	2	-8.38	15	.01	3	.199	1	0	1
40			min	2.101	15	-565.307	3	-150.558	1	-.011	2	.011	15	0	3
41		2	max	37.324	1	306.689	2	-6.501	15	.01	3	.076	1	.445	3
42			min	2.101	15	-406.151	3	-116.595	1	-.011	2	.004	15	-.334	2
43		3	max	37.324	1	192.171	2	-4.623	15	.01	3	.004	3	.745	3
44			min	2.101	15	-246.995	3	-82.632	1	-.011	2	-.015	1	-.562	2
45		4	max	37.324	1	77.653	2	-2.744	15	.01	3	-.002	12	.898	3
46			min	2.101	15	-87.839	3	-48.668	1	-.011	2	-.075	1	-.686	2
47		5	max	37.324	1	71.317	3	-.865	15	.01	3	-.005	12	.906	3
48			min	2.101	15	-36.866	2	-14.705	1	-.011	2	-.104	1	-.705	2
49		6	max	37.324	1	230.473	3	19.258	1	.01	3	-.006	15	.767	3
50			min	2.101	15	-151.384	2	-.841	3	-.011	2	-.102	1	-.618	2
51		7	max	37.324	1	389.629	3	53.221	1	.01	3	-.004	15	.483	3
52			min	2.101	15	-265.902	2	1.414	12	-.011	2	-.069	1	-.427	2
53		8	max	37.324	1	548.785	3	87.185	1	.01	3	.002	10	.053	3
54			min	2.101	15	-380.421	2	3.293	12	-.011	2	-.006	3	-.131	2
55		9	max	37.324	1	707.941	3	121.148	1	.01	3	.091	1	.27	2
56			min	2.101	15	-494.939	2	5.171	12	-.011	2	0	3	-.523	3
57		10	max	37.324	1	609.457	2	-7.049	12	.01	3	.218	1	.777	2
58			min	2.101	15	-867.097	3	-155.111	1	-.011	2	.006	12	-1.245	3
59		11	max	37.324	1	494.939	2	-5.171	12	.011	2	.091	1	.27	2
60			min	2.101	15	-707.941	3	-121.148	1	-.01	3	0	3	-.523	3
61		12	max	37.324	1	380.421	2	-3.293	12	.011	2	.002	10	.053	3
62			min	2.101	15	-548.785	3	-87.185	1	-.01	3	-.006	3	-.131	2
63		13	max	37.324	1	265.902	2	-1.414	12	.011	2	-.004	15	.483	3
64			min	2.101	15	-389.629	3	-53.221	1	-.01	3	-.069	1	-.427	2
65		14	max	37.324	1	151.384	2	.841	3	.011	2	-.006	15	.767	3
66			min	2.101	15	-230.473	3	-19.258	1	-.01	3	-.102	1	-.618	2
67		15	max	37.324	1	36.866	2	14.705	1	.011	2	-.005	12	.906	3
68			min	2.101	15	-71.317	3	.865	15	-.01	3	-.104	1	-.705	2
69		16	max	37.324	1	87.839	3	48.668	1	.011	2	-.002	12	.898	3
70			min	2.101	15	-77.653	2	2.744	15	-.01	3	-.075	1	-.686	2
71		17	max	37.324	1	246.995	3	82.632	1	.011	2	.004	3	.745	3
72			min	2.101	15	-192.171	2	4.623	15	-.01	3	-.015	1	-.562	2
73		18	max	37.324	1	406.151	3	116.595	1	.011	2	.076	1	.445	3
74			min	2.101	15	-306.689	2	6.501	15	-.01	3	.004	15	-.334	2
75		19	max	37.324	1	565.307	3	150.558	1	.011	2	.199	1	0	1
76			min	2.101	15	-421.208	2	8.38	15	-.01	3	.011	15	0	3
77	M15	1	max	-2.193	15	631.042	2	-8.377	15	.012	2	.199	1	0	2
78			min	-38.748	1	-329.511	3	-150.564	1	-.009	3	.011	15	0	3
79		2	max	-2.193	15	454.36	2	-6.499	15	.012	2	.076	1	.261	3
80			min	-38.748	1	-240.289	3	-116.601	1	-.009	3	.004	15	-.497	2
81		3	max	-2.193	15	277.679	2	-4.62	15	.012	2	.004	3	.441	3
82			min	-38.748	1	-151.066	3	-82.638	1	-.009	3	-.015	1	-.833	2
83		4	max	-2.193	15	100.997	2	-2.741	15	.012	2	-.002	12	.538	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	-38.748	1	-61.844	3	-48.675	1	-.009	3	-.075	1	-1.007	2
85		5	max	-2.193	15	27.379	3	-.863	15	.012	2	-.005	12	.554	3
86			min	-38.748	1	-75.684	2	-14.711	1	-.009	3	-.104	1	-1.018	2
87		6	max	-2.193	15	116.601	3	19.252	1	.012	2	-.006	15	.488	3
88			min	-38.748	1	-252.366	2	-.646	3	-.009	3	-.102	1	-.868	2
89		7	max	-2.193	15	205.824	3	53.215	1	.012	2	-.004	15	.34	3
90			min	-38.748	1	-429.048	2	1.537	12	-.009	3	-.069	1	-.555	2
91		8	max	-2.193	15	295.046	3	87.178	1	.012	2	.002	10	.111	3
92			min	-38.748	1	-605.729	2	3.415	12	-.009	3	-.006	3	-.081	2
93		9	max	-2.193	15	384.269	3	121.142	1	.012	2	.091	1	.555	2
94			min	-38.748	1	-782.411	2	5.293	12	-.009	3	0	3	-.201	3
95		10	max	-2.193	15	959.092	2	-7.172	12	.012	2	.218	1	1.353	2
96			min	-38.748	1	-473.491	3	-155.105	1	-.009	3	.006	12	-.594	3
97		11	max	-2.193	15	782.411	2	-5.293	12	.009	3	.091	1	.555	2
98			min	-38.748	1	-384.269	3	-121.142	1	-.012	2	0	3	-.201	3
99		12	max	-2.193	15	605.729	2	-3.415	12	.009	3	.002	10	.111	3
100			min	-38.748	1	-295.046	3	-87.178	1	-.012	2	-.006	3	-.081	2
101		13	max	-2.193	15	429.048	2	-1.537	12	.009	3	-.004	15	.34	3
102			min	-38.748	1	-205.824	3	-53.215	1	-.012	2	-.069	1	-.555	2
103		14	max	-2.193	15	252.366	2	.646	3	.009	3	-.006	15	.488	3
104			min	-38.748	1	-116.601	3	-19.252	1	-.012	2	-.102	1	-.868	2
105		15	max	-2.193	15	75.684	2	14.711	1	.009	3	-.005	12	.554	3
106			min	-38.748	1	-27.379	3	.863	15	-.012	2	-.104	1	-1.018	2
107		16	max	-2.193	15	61.844	3	48.675	1	.009	3	-.002	12	.538	3
108			min	-38.748	1	-100.997	2	2.741	15	-.012	2	-.075	1	-1.007	2
109		17	max	-2.193	15	151.066	3	82.638	1	.009	3	.004	3	.441	3
110			min	-38.748	1	-277.679	2	4.62	15	-.012	2	-.015	1	-.833	2
111		18	max	-2.193	15	240.289	3	116.601	1	.009	3	.076	1	.261	3
112			min	-38.748	1	-454.36	2	6.499	15	-.012	2	.004	15	-.497	2
113		19	max	-2.193	15	329.511	3	150.564	1	.009	3	.199	1	0	2
114			min	-38.748	1	-631.042	2	8.377	15	-.012	2	.011	15	0	3
115	M16	1	max	-4.367	15	590.986	2	-8.096	15	.009	2	.172	1	0	2
116			min	-77.492	1	-294.076	3	-145.633	1	-.012	3	.01	15	0	3
117		2	max	-4.367	15	414.305	2	-6.217	15	.009	2	.054	1	.229	3
118			min	-77.492	1	-204.854	3	-111.67	1	-.012	3	.003	15	-.461	2
119		3	max	-4.367	15	237.623	2	-4.339	15	.009	2	0	3	.376	3
120			min	-77.492	1	-115.631	3	-77.707	1	-.012	3	-.033	1	-.76	2
121		4	max	-4.367	15	60.942	2	-2.46	15	.009	2	-.004	12	.441	3
122			min	-77.492	1	-26.409	3	-43.743	1	-.012	3	-.089	1	-.896	2
123		5	max	-4.367	15	62.814	3	-.581	15	.009	2	-.006	12	.424	3
124			min	-77.492	1	-115.74	2	-9.78	1	-.012	3	-.113	1	-.871	2
125		6	max	-4.367	15	152.036	3	24.183	1	.009	2	-.006	15	.326	3
126			min	-77.492	1	-292.421	2	.236	12	-.012	3	-.107	1	-.684	2
127		7	max	-4.367	15	241.259	3	58.146	1	.009	2	-.004	15	.145	3
128			min	-77.492	1	-469.103	2	2.115	12	-.012	3	-.069	1	-.335	2
129		8	max	-4.367	15	330.481	3	92.11	1	.009	2	.003	2	.176	2
130			min	-77.492	1	-645.784	2	3.993	12	-.012	3	-.004	3	-.117	3
131		9	max	-4.367	15	419.704	3	126.073	1	.009	2	.1	1	.849	2
132			min	-77.492	1	-822.466	2	5.871	12	-.012	3	.002	12	-.461	3
133		10	max	-4.367	15	999.148	2	-7.75	12	.009	2	.231	1	1.684	2
134			min	-77.492	1	-508.926	3	-160.036	1	-.012	3	.008	12	-.886	3
135		11	max	-4.367	15	822.466	2	-5.871	12	.012	3	.1	1	.849	2
136			min	-77.492	1	-419.704	3	-126.073	1	-.009	2	.002	12	-.461	3
137		12	max	-4.367	15	645.784	2	-3.993	12	.012	3	.003	2	.176	2
138			min	-77.492	1	-330.481	3	-92.11	1	-.009	2	-.004	3	-.117	3
139		13	max	-4.367	15	469.103	2	-2.115	12	.012	3	-.004	15	.145	3
140			min	-77.492	1	-241.259	3	-58.146	1	-.009	2	-.069	1	-.335	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-4.367	15	292.421	2	-.236	12	.012	3	-.006	15	.326	3
142			min	-77.492	1	-152.036	3	-24.183	1	-.009	2	-.107	1	-.684	2
143		15	max	-4.367	15	115.74	2	9.78	1	.012	3	-.006	12	.424	3
144			min	-77.492	1	-62.814	3	.581	15	-.009	2	-.113	1	-.871	2
145		16	max	-4.367	15	26.409	3	43.743	1	.012	3	-.004	12	.441	3
146			min	-77.492	1	-60.942	2	2.46	15	-.009	2	-.089	1	-.896	2
147		17	max	-4.367	15	115.631	3	77.707	1	.012	3	0	3	.376	3
148			min	-77.492	1	-237.623	2	4.339	15	-.009	2	-.033	1	-.76	2
149		18	max	-4.367	15	204.854	3	111.67	1	.012	3	.054	1	.229	3
150			min	-77.492	1	-414.305	2	6.217	15	-.009	2	.003	15	-.461	2
151		19	max	-4.367	15	294.076	3	145.633	1	.012	3	.172	1	0	2
152			min	-77.492	1	-590.986	2	8.096	15	-.009	2	.01	15	0	3
153	M2	1	max	949.793	2	2.019	4	.241	1	0	3	0	3	0	1
154			min	-1345.478	3	.475	15	.014	15	0	1	0	2	0	1
155		2	max	950.314	2	1.9	4	.241	1	0	3	0	1	0	15
156			min	-1345.088	3	.447	15	.014	15	0	1	0	15	0	4
157		3	max	950.835	2	1.781	4	.241	1	0	3	0	1	0	15
158			min	-1344.697	3	.419	15	.014	15	0	1	0	15	-.001	4
159		4	max	951.355	2	1.662	4	.241	1	0	3	0	1	0	15
160			min	-1344.307	3	.391	15	.014	15	0	1	0	15	-.002	4
161		5	max	951.876	2	1.543	4	.241	1	0	3	0	1	0	15
162			min	-1343.916	3	.363	15	.014	15	0	1	0	15	-.003	4
163		6	max	952.397	2	1.424	4	.241	1	0	3	0	1	0	15
164			min	-1343.526	3	.335	15	.014	15	0	1	0	15	-.003	4
165		7	max	952.918	2	1.305	4	.241	1	0	3	0	1	0	15
166			min	-1343.135	3	.307	15	.014	15	0	1	0	15	-.004	4
167		8	max	953.438	2	1.187	4	.241	1	0	3	0	1	0	15
168			min	-1342.745	3	.279	15	.014	15	0	1	0	15	-.004	4
169		9	max	953.959	2	1.068	4	.241	1	0	3	0	1	-.001	15
170			min	-1342.354	3	.247	12	.014	15	0	1	0	15	-.004	4
171		10	max	954.48	2	.949	4	.241	1	0	3	0	1	-.001	15
172			min	-1341.964	3	.2	12	.014	15	0	1	0	15	-.005	4
173		11	max	955	2	.845	2	.241	1	0	3	0	1	-.001	15
174			min	-1341.573	3	.154	12	.014	15	0	1	0	15	-.005	4
175		12	max	955.521	2	.752	2	.241	1	0	3	0	1	-.001	15
176			min	-1341.183	3	.108	12	.014	15	0	1	0	15	-.005	4
177		13	max	956.042	2	.659	2	.241	1	0	3	.001	1	-.001	15
178			min	-1340.792	3	.062	12	.014	15	0	1	0	15	-.006	4
179		14	max	956.562	2	.567	2	.241	1	0	3	.001	1	-.001	15
180			min	-1340.402	3	.006	3	.014	15	0	1	0	15	-.006	4
181		15	max	957.083	2	.474	2	.241	1	0	3	.001	1	-.001	15
182			min	-1340.011	3	-.064	3	.014	15	0	1	0	15	-.006	4
183		16	max	957.604	2	.382	2	.241	1	0	3	.001	1	-.001	15
184			min	-1339.62	3	-.133	3	.014	15	0	1	0	15	-.006	4
185		17	max	958.124	2	.289	2	.241	1	0	3	.001	1	-.001	12
186			min	-1339.23	3	-.203	3	.014	15	0	1	0	15	-.006	4
187		18	max	958.645	2	.196	2	.241	1	0	3	.001	1	-.001	12
188			min	-1338.839	3	-.272	3	.014	15	0	1	0	15	-.006	4
189		19	max	959.166	2	.104	2	.241	1	0	3	.002	1	-.001	12
190			min	-1338.449	3	-.341	3	.014	15	0	1	0	15	-.006	4
191	M3	1	max	817.541	2	7.662	4	.232	1	0	3	0	1	.006	4
192			min	-928.33	3	1.801	15	.013	15	0	1	0	15	.001	12
193		2	max	817.37	2	6.901	4	.232	1	0	3	0	1	.004	2
194			min	-928.458	3	1.622	15	.013	15	0	1	0	15	0	3
195		3	max	817.2	2	6.14	4	.232	1	0	3	0	1	.001	2
196			min	-928.586	3	1.444	15	.013	15	0	1	0	15	-.001	3
197		4	max	817.03	2	5.379	4	.232	1	0	3	0	1	0	15

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	-928.714	3	1.265	15	.013	15	0	1	0	15	-.003	3
199		5	max	816.859	2	4.618	4	.232	1	0	3	0	1	0	15
200			min	-928.841	3	1.086	15	.013	15	0	1	0	15	-.004	4
201		6	max	816.689	2	3.857	4	.232	1	0	3	0	1	-.001	15
202			min	-928.969	3	.907	15	.013	15	0	1	0	15	-.006	4
203		7	max	816.518	2	3.096	4	.232	1	0	3	0	1	-.002	15
204			min	-929.097	3	.728	15	.013	15	0	1	0	15	-.007	4
205		8	max	816.348	2	2.335	4	.232	1	0	3	0	1	-.002	15
206			min	-929.225	3	.549	15	.013	15	0	1	0	15	-.008	4
207		9	max	816.178	2	1.574	4	.232	1	0	3	.001	1	-.002	15
208			min	-929.352	3	.37	15	.013	15	0	1	0	15	-.009	4
209		10	max	816.007	2	.813	4	.232	1	0	3	.001	1	-.002	15
210			min	-929.48	3	.172	12	.013	15	0	1	0	15	-.01	4
211		11	max	815.837	2	.211	2	.232	1	0	3	.001	1	-.002	15
212			min	-929.608	3	-.202	3	.013	15	0	1	0	15	-.01	4
213		12	max	815.667	2	-.166	15	.232	1	0	3	.001	1	-.002	15
214			min	-929.736	3	-.709	4	.013	15	0	1	0	15	-.01	4
215		13	max	815.496	2	-.345	15	.232	1	0	3	.001	1	-.002	15
216			min	-929.863	3	-1.47	4	.013	15	0	1	0	15	-.009	4
217		14	max	815.326	2	-.524	15	.232	1	0	3	.002	1	-.002	15
218			min	-929.991	3	-2.231	4	.013	15	0	1	0	15	-.009	4
219		15	max	815.156	2	-.703	15	.232	1	0	3	.002	1	-.002	15
220			min	-930.119	3	-2.992	4	.013	15	0	1	0	15	-.008	4
221		16	max	814.985	2	-.882	15	.232	1	0	3	.002	1	-.001	15
222			min	-930.247	3	-3.752	4	.013	15	0	1	0	15	-.006	4
223		17	max	814.815	2	-1.061	15	.232	1	0	3	.002	1	-.001	15
224			min	-930.374	3	-4.513	4	.013	15	0	1	0	15	-.004	4
225		18	max	814.645	2	-1.24	15	.232	1	0	3	.002	1	0	15
226			min	-930.502	3	-5.274	4	.013	15	0	1	0	15	-.002	4
227		19	max	814.474	2	-1.419	15	.232	1	0	3	.002	1	0	1
228			min	-930.63	3	-6.035	4	.013	15	0	1	0	15	0	1
229	M4	1	max	795.869	1	0	1	-.459	15	0	1	.002	1	0	1
230			min	38.216	15	0	1	-8.167	1	0	1	0	15	0	1
231		2	max	796.039	1	0	1	-.459	15	0	1	0	1	0	1
232			min	38.267	15	0	1	-8.167	1	0	1	0	15	0	1
233		3	max	796.209	1	0	1	-.459	15	0	1	0	1	0	1
234			min	38.319	15	0	1	-8.167	1	0	1	0	10	0	1
235		4	max	796.38	1	0	1	-.459	15	0	1	0	15	0	1
236			min	38.37	15	0	1	-8.167	1	0	1	0	1	0	1
237		5	max	796.55	1	0	1	-.459	15	0	1	0	15	0	1
238			min	38.421	15	0	1	-8.167	1	0	1	-.002	1	0	1
239		6	max	796.72	1	0	1	-.459	15	0	1	0	15	0	1
240			min	38.473	15	0	1	-8.167	1	0	1	-.003	1	0	1
241		7	max	796.891	1	0	1	-.459	15	0	1	0	15	0	1
242			min	38.524	15	0	1	-8.167	1	0	1	-.004	1	0	1
243		8	max	797.061	1	0	1	-.459	15	0	1	0	15	0	1
244			min	38.575	15	0	1	-8.167	1	0	1	-.005	1	0	1
245		9	max	797.231	1	0	1	-.459	15	0	1	0	15	0	1
246			min	38.627	15	0	1	-8.167	1	0	1	-.006	1	0	1
247		10	max	797.402	1	0	1	-.459	15	0	1	0	15	0	1
248			min	38.678	15	0	1	-8.167	1	0	1	-.007	1	0	1
249		11	max	797.572	1	0	1	-.459	15	0	1	0	15	0	1
250			min	38.73	15	0	1	-8.167	1	0	1	-.007	1	0	1
251		12	max	797.742	1	0	1	-.459	15	0	1	0	15	0	1
252			min	38.781	15	0	1	-8.167	1	0	1	-.008	1	0	1
253		13	max	797.913	1	0	1	-.459	15	0	1	0	15	0	1
254			min	38.832	15	0	1	-8.167	1	0	1	-.009	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	798.083	1	0	1	-.459	15	0	1	0	15	0	1
256			min	38.884	15	0	1	-8.167	1	0	1	-.01	1	0	1
257		15	max	798.253	1	0	1	-.459	15	0	1	0	15	0	1
258			min	38.935	15	0	1	-8.167	1	0	1	-.011	1	0	1
259		16	max	798.424	1	0	1	-.459	15	0	1	0	15	0	1
260			min	38.987	15	0	1	-8.167	1	0	1	-.012	1	0	1
261		17	max	798.594	1	0	1	-.459	15	0	1	0	15	0	1
262			min	39.038	15	0	1	-8.167	1	0	1	-.013	1	0	1
263		18	max	798.764	1	0	1	-.459	15	0	1	0	15	0	1
264			min	39.089	15	0	1	-8.167	1	0	1	-.014	1	0	1
265		19	max	798.935	1	0	1	-.459	15	0	1	0	15	0	1
266			min	39.141	15	0	1	-8.167	1	0	1	-.015	1	0	1
267	M6	1	max	2984.304	2	2.235	2	0	1	0	1	0	1	0	1
268			min	-4316.46	3	.254	12	0	1	0	1	0	1	0	1
269		2	max	2984.825	2	2.142	2	0	1	0	1	0	1	0	12
270			min	-4316.069	3	.207	12	0	1	0	1	0	1	0	2
271		3	max	2985.346	2	2.05	2	0	1	0	1	0	1	0	12
272			min	-4315.679	3	.161	12	0	1	0	1	0	1	-.002	2
273		4	max	2985.867	2	1.957	2	0	1	0	1	0	1	0	12
274			min	-4315.288	3	.115	12	0	1	0	1	0	1	-.002	2
275		5	max	2986.387	2	1.864	2	0	1	0	1	0	1	0	12
276			min	-4314.898	3	.049	3	0	1	0	1	0	1	-.003	2
277		6	max	2986.908	2	1.772	2	0	1	0	1	0	1	0	12
278			min	-4314.507	3	-.02	3	0	1	0	1	0	1	-.004	2
279		7	max	2987.429	2	1.679	2	0	1	0	1	0	1	0	12
280			min	-4314.117	3	-.09	3	0	1	0	1	0	1	-.004	2
281		8	max	2987.949	2	1.587	2	0	1	0	1	0	1	0	3
282			min	-4313.726	3	-.159	3	0	1	0	1	0	1	-.005	2
283		9	max	2988.47	2	1.494	2	0	1	0	1	0	1	0	3
284			min	-4313.336	3	-.229	3	0	1	0	1	0	1	-.005	2
285		10	max	2988.991	2	1.401	2	0	1	0	1	0	1	0	3
286			min	-4312.945	3	-.298	3	0	1	0	1	0	1	-.006	2
287		11	max	2989.511	2	1.309	2	0	1	0	1	0	1	0	3
288			min	-4312.555	3	-.368	3	0	1	0	1	0	1	-.006	2
289		12	max	2990.032	2	1.216	2	0	1	0	1	0	1	0	3
290			min	-4312.164	3	-.437	3	0	1	0	1	0	1	-.007	2
291		13	max	2990.553	2	1.123	2	0	1	0	1	0	1	0	3
292			min	-4311.773	3	-.507	3	0	1	0	1	0	1	-.007	2
293		14	max	2991.073	2	1.031	2	0	1	0	1	0	1	0	3
294			min	-4311.383	3	-.576	3	0	1	0	1	0	1	-.008	2
295		15	max	2991.594	2	.938	2	0	1	0	1	0	1	0	3
296			min	-4310.992	3	-.646	3	0	1	0	1	0	1	-.008	2
297		16	max	2992.115	2	.846	2	0	1	0	1	0	1	.001	3
298			min	-4310.602	3	-.715	3	0	1	0	1	0	1	-.008	2
299		17	max	2992.636	2	.753	2	0	1	0	1	0	1	.001	3
300			min	-4310.211	3	-.785	3	0	1	0	1	0	1	-.009	2
301		18	max	2993.156	2	.66	2	0	1	0	1	0	1	.002	3
302			min	-4309.821	3	-.854	3	0	1	0	1	0	1	-.009	2
303		19	max	2993.677	2	.568	2	0	1	0	1	0	1	.002	3
304			min	-4309.43	3	-.923	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2820.562	2	7.685	4	0	1	0	1	0	1	.009	2
306			min	-2871.931	3	1.805	15	0	1	0	1	0	1	-.002	3
307		2	max	2820.391	2	6.924	4	0	1	0	1	0	1	.006	2
308			min	-2872.059	3	1.626	15	0	1	0	1	0	1	-.003	3
309		3	max	2820.221	2	6.163	4	0	1	0	1	0	1	.004	2
310			min	-2872.187	3	1.447	15	0	1	0	1	0	1	-.005	3
311		4	max	2820.051	2	5.402	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	-2872.315	3	1.268	15	0	1	0	1	0	1	-.006	3
313		5	max	2819.88	2	4.641	4	0	1	0	1	0	1	0	2
314			min	-2872.442	3	1.09	15	0	1	0	1	0	1	-.007	3
315		6	max	2819.71	2	3.88	4	0	1	0	1	0	1	-.001	15
316			min	-2872.57	3	.911	15	0	1	0	1	0	1	-.007	3
317		7	max	2819.54	2	3.119	4	0	1	0	1	0	1	-.002	15
318			min	-2872.698	3	.732	15	0	1	0	1	0	1	-.008	3
319		8	max	2819.369	2	2.387	2	0	1	0	1	0	1	-.002	15
320			min	-2872.826	3	.453	12	0	1	0	1	0	1	-.008	4
321		9	max	2819.199	2	1.794	2	0	1	0	1	0	1	-.002	15
322			min	-2872.953	3	.157	12	0	1	0	1	0	1	-.009	4
323		10	max	2819.029	2	1.201	2	0	1	0	1	0	1	-.002	15
324			min	-2873.081	3	-.256	3	0	1	0	1	0	1	-.01	4
325		11	max	2818.858	2	.608	2	0	1	0	1	0	1	-.002	15
326			min	-2873.209	3	-.7	3	0	1	0	1	0	1	-.01	4
327		12	max	2818.688	2	.015	2	0	1	0	1	0	1	-.002	15
328			min	-2873.337	3	-1.145	3	0	1	0	1	0	1	-.01	4
329		13	max	2818.518	2	-.341	15	0	1	0	1	0	1	-.002	15
330			min	-2873.465	3	-1.59	3	0	1	0	1	0	1	-.009	4
331		14	max	2818.347	2	-.52	15	0	1	0	1	0	1	-.002	15
332			min	-2873.592	3	-2.208	4	0	1	0	1	0	1	-.009	4
333		15	max	2818.177	2	-.699	15	0	1	0	1	0	1	-.002	15
334			min	-2873.72	3	-2.969	4	0	1	0	1	0	1	-.007	4
335		16	max	2818.007	2	-.878	15	0	1	0	1	0	1	-.001	15
336			min	-2873.848	3	-3.73	4	0	1	0	1	0	1	-.006	4
337		17	max	2817.836	2	-1.057	15	0	1	0	1	0	1	-.001	15
338			min	-2873.976	3	-4.491	4	0	1	0	1	0	1	-.004	4
339		18	max	2817.666	2	-1.236	15	0	1	0	1	0	1	0	15
340			min	-2874.103	3	-5.252	4	0	1	0	1	0	1	-.002	4
341		19	max	2817.496	2	-1.415	15	0	1	0	1	0	1	0	1
342			min	-2874.231	3	-6.013	4	0	1	0	1	0	1	0	1
343	M8	1	max	1989.708	1	0	1	0	1	0	1	0	1	0	1
344			min	79.074	15	0	1	0	1	0	1	0	1	0	1
345		2	max	1989.879	1	0	1	0	1	0	1	0	1	0	1
346			min	79.125	15	0	1	0	1	0	1	0	1	0	1
347		3	max	1990.049	1	0	1	0	1	0	1	0	1	0	1
348			min	79.177	15	0	1	0	1	0	1	0	1	0	1
349		4	max	1990.219	1	0	1	0	1	0	1	0	1	0	1
350			min	79.228	15	0	1	0	1	0	1	0	1	0	1
351		5	max	1990.39	1	0	1	0	1	0	1	0	1	0	1
352			min	79.28	15	0	1	0	1	0	1	0	1	0	1
353		6	max	1990.56	1	0	1	0	1	0	1	0	1	0	1
354			min	79.331	15	0	1	0	1	0	1	0	1	0	1
355		7	max	1990.73	1	0	1	0	1	0	1	0	1	0	1
356			min	79.382	15	0	1	0	1	0	1	0	1	0	1
357		8	max	1990.901	1	0	1	0	1	0	1	0	1	0	1
358			min	79.434	15	0	1	0	1	0	1	0	1	0	1
359		9	max	1991.071	1	0	1	0	1	0	1	0	1	0	1
360			min	79.485	15	0	1	0	1	0	1	0	1	0	1
361		10	max	1991.241	1	0	1	0	1	0	1	0	1	0	1
362			min	79.537	15	0	1	0	1	0	1	0	1	0	1
363		11	max	1991.412	1	0	1	0	1	0	1	0	1	0	1
364			min	79.588	15	0	1	0	1	0	1	0	1	0	1
365		12	max	1991.582	1	0	1	0	1	0	1	0	1	0	1
366			min	79.639	15	0	1	0	1	0	1	0	1	0	1
367		13	max	1991.752	1	0	1	0	1	0	1	0	1	0	1
368			min	79.691	15	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	1991.923	1	0	1	0	1	0	1	0	1	0	1
370			min	79.742	15	0	1	0	1	0	1	0	1	0	1
371		15	max	1992.093	1	0	1	0	1	0	1	0	1	0	1
372			min	79.794	15	0	1	0	1	0	1	0	1	0	1
373		16	max	1992.263	1	0	1	0	1	0	1	0	1	0	1
374			min	79.845	15	0	1	0	1	0	1	0	1	0	1
375		17	max	1992.434	1	0	1	0	1	0	1	0	1	0	1
376			min	79.896	15	0	1	0	1	0	1	0	1	0	1
377		18	max	1992.604	1	0	1	0	1	0	1	0	1	0	1
378			min	79.948	15	0	1	0	1	0	1	0	1	0	1
379		19	max	1992.775	1	0	1	0	1	0	1	0	1	0	1
380			min	79.999	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	949.793	2	2.019	4	-.014	15	0	1	0	2	0	1
382			min	-1345.478	3	.475	15	-.241	1	0	3	0	3	0	1
383		2	max	950.314	2	1.9	4	-.014	15	0	1	0	15	0	15
384			min	-1345.088	3	.447	15	-.241	1	0	3	0	1	0	4
385		3	max	950.835	2	1.781	4	-.014	15	0	1	0	15	0	15
386			min	-1344.697	3	.419	15	-.241	1	0	3	0	1	-.001	4
387		4	max	951.355	2	1.662	4	-.014	15	0	1	0	15	0	15
388			min	-1344.307	3	.391	15	-.241	1	0	3	0	1	-.002	4
389		5	max	951.876	2	1.543	4	-.014	15	0	1	0	15	0	15
390			min	-1343.916	3	.363	15	-.241	1	0	3	0	1	-.003	4
391		6	max	952.397	2	1.424	4	-.014	15	0	1	0	15	0	15
392			min	-1343.526	3	.335	15	-.241	1	0	3	0	1	-.003	4
393		7	max	952.918	2	1.305	4	-.014	15	0	1	0	15	0	15
394			min	-1343.135	3	.307	15	-.241	1	0	3	0	1	-.004	4
395		8	max	953.438	2	1.187	4	-.014	15	0	1	0	15	0	15
396			min	-1342.745	3	.279	15	-.241	1	0	3	0	1	-.004	4
397		9	max	953.959	2	1.068	4	-.014	15	0	1	0	15	-.001	15
398			min	-1342.354	3	.247	12	-.241	1	0	3	0	1	-.004	4
399		10	max	954.48	2	.949	4	-.014	15	0	1	0	15	-.001	15
400			min	-1341.964	3	.2	12	-.241	1	0	3	0	1	-.005	4
401		11	max	955	2	.845	2	-.014	15	0	1	0	15	-.001	15
402			min	-1341.573	3	.154	12	-.241	1	0	3	0	1	-.005	4
403		12	max	955.521	2	.752	2	-.014	15	0	1	0	15	-.001	15
404			min	-1341.183	3	.108	12	-.241	1	0	3	0	1	-.005	4
405		13	max	956.042	2	.659	2	-.014	15	0	1	0	15	-.001	15
406			min	-1340.792	3	.062	12	-.241	1	0	3	-.001	1	-.006	4
407		14	max	956.562	2	.567	2	-.014	15	0	1	0	15	-.001	15
408			min	-1340.402	3	.006	3	-.241	1	0	3	-.001	1	-.006	4
409		15	max	957.083	2	.474	2	-.014	15	0	1	0	15	-.001	15
410			min	-1340.011	3	-.064	3	-.241	1	0	3	-.001	1	-.006	4
411		16	max	957.604	2	.382	2	-.014	15	0	1	0	15	-.001	15
412			min	-1339.62	3	-.133	3	-.241	1	0	3	-.001	1	-.006	4
413		17	max	958.124	2	.289	2	-.014	15	0	1	0	15	-.001	12
414			min	-1339.23	3	-.203	3	-.241	1	0	3	-.001	1	-.006	4
415		18	max	958.645	2	.196	2	-.014	15	0	1	0	15	-.001	12
416			min	-1338.839	3	-.272	3	-.241	1	0	3	-.001	1	-.006	4
417		19	max	959.166	2	.104	2	-.014	15	0	1	0	15	-.001	12
418			min	-1338.449	3	-.341	3	-.241	1	0	3	-.002	1	-.006	4
419	M11	1	max	817.541	2	7.662	4	-.013	15	0	1	0	15	.006	4
420			min	-928.33	3	1.801	15	-.232	1	0	3	0	1	.001	12
421		2	max	817.37	2	6.901	4	-.013	15	0	1	0	15	.004	2
422			min	-928.458	3	1.622	15	-.232	1	0	3	0	1	0	3
423		3	max	817.2	2	6.14	4	-.013	15	0	1	0	15	.001	2
424			min	-928.586	3	1.444	15	-.232	1	0	3	0	1	-.001	3
425		4	max	817.03	2	5.379	4	-.013	15	0	1	0	15	0	15

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	-928.714	3	1.265	15	-.232	1	0	3	0	1	-.003	3
427		5	max	816.859	2	4.618	4	-.013	15	0	1	0	15	0	15
428			min	-928.841	3	1.086	15	-.232	1	0	3	0	1	-.004	4
429		6	max	816.689	2	3.857	4	-.013	15	0	1	0	15	-.001	15
430			min	-928.969	3	.907	15	-.232	1	0	3	0	1	-.006	4
431		7	max	816.518	2	3.096	4	-.013	15	0	1	0	15	-.002	15
432			min	-929.097	3	.728	15	-.232	1	0	3	0	1	-.007	4
433		8	max	816.348	2	2.335	4	-.013	15	0	1	0	15	-.002	15
434			min	-929.225	3	.549	15	-.232	1	0	3	0	1	-.008	4
435		9	max	816.178	2	1.574	4	-.013	15	0	1	0	15	-.002	15
436			min	-929.352	3	.37	15	-.232	1	0	3	-.001	1	-.009	4
437		10	max	816.007	2	.813	4	-.013	15	0	1	0	15	-.002	15
438			min	-929.48	3	.172	12	-.232	1	0	3	-.001	1	-.01	4
439		11	max	815.837	2	.211	2	-.013	15	0	1	0	15	-.002	15
440			min	-929.608	3	-.202	3	-.232	1	0	3	-.001	1	-.01	4
441		12	max	815.667	2	-.166	15	-.013	15	0	1	0	15	-.002	15
442			min	-929.736	3	-.709	4	-.232	1	0	3	-.001	1	-.01	4
443		13	max	815.496	2	-.345	15	-.013	15	0	1	0	15	-.002	15
444			min	-929.863	3	-1.47	4	-.232	1	0	3	-.001	1	-.009	4
445		14	max	815.326	2	-.524	15	-.013	15	0	1	0	15	-.002	15
446			min	-929.991	3	-2.231	4	-.232	1	0	3	-.002	1	-.009	4
447		15	max	815.156	2	-.703	15	-.013	15	0	1	0	15	-.002	15
448			min	-930.119	3	-2.992	4	-.232	1	0	3	-.002	1	-.008	4
449		16	max	814.985	2	-.882	15	-.013	15	0	1	0	15	-.001	15
450			min	-930.247	3	-3.752	4	-.232	1	0	3	-.002	1	-.006	4
451		17	max	814.815	2	-1.061	15	-.013	15	0	1	0	15	-.001	15
452			min	-930.374	3	-4.513	4	-.232	1	0	3	-.002	1	-.004	4
453		18	max	814.645	2	-1.24	15	-.013	15	0	1	0	15	0	15
454			min	-930.502	3	-5.274	4	-.232	1	0	3	-.002	1	-.002	4
455		19	max	814.474	2	-1.419	15	-.013	15	0	1	0	15	0	1
456			min	-930.63	3	-6.035	4	-.232	1	0	3	-.002	1	0	1
457	M12	1	max	795.869	1	0	1	8.167	1	0	1	0	15	0	1
458			min	38.216	15	0	1	.459	15	0	1	-.002	1	0	1
459		2	max	796.039	1	0	1	8.167	1	0	1	0	15	0	1
460			min	38.267	15	0	1	.459	15	0	1	0	1	0	1
461		3	max	796.209	1	0	1	8.167	1	0	1	0	10	0	1
462			min	38.319	15	0	1	.459	15	0	1	0	1	0	1
463		4	max	796.38	1	0	1	8.167	1	0	1	0	1	0	1
464			min	38.37	15	0	1	.459	15	0	1	0	15	0	1
465		5	max	796.55	1	0	1	8.167	1	0	1	.002	1	0	1
466			min	38.421	15	0	1	.459	15	0	1	0	15	0	1
467		6	max	796.72	1	0	1	8.167	1	0	1	.003	1	0	1
468			min	38.473	15	0	1	.459	15	0	1	0	15	0	1
469		7	max	796.891	1	0	1	8.167	1	0	1	.004	1	0	1
470			min	38.524	15	0	1	.459	15	0	1	0	15	0	1
471		8	max	797.061	1	0	1	8.167	1	0	1	.005	1	0	1
472			min	38.575	15	0	1	.459	15	0	1	0	15	0	1
473		9	max	797.231	1	0	1	8.167	1	0	1	.006	1	0	1
474			min	38.627	15	0	1	.459	15	0	1	0	15	0	1
475		10	max	797.402	1	0	1	8.167	1	0	1	.007	1	0	1
476			min	38.678	15	0	1	.459	15	0	1	0	15	0	1
477		11	max	797.572	1	0	1	8.167	1	0	1	.007	1	0	1
478			min	38.73	15	0	1	.459	15	0	1	0	15	0	1
479		12	max	797.742	1	0	1	8.167	1	0	1	.008	1	0	1
480			min	38.781	15	0	1	.459	15	0	1	0	15	0	1
481		13	max	797.913	1	0	1	8.167	1	0	1	.009	1	0	1
482			min	38.832	15	0	1	.459	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	798.083	1	0	1	8.167	1	0	1	.01	1	0	1
484			min	38.884	15	0	1	.459	15	0	1	0	15	0	1
485		15	max	798.253	1	0	1	8.167	1	0	1	.011	1	0	1
486			min	38.935	15	0	1	.459	15	0	1	0	15	0	1
487		16	max	798.424	1	0	1	8.167	1	0	1	.012	1	0	1
488			min	38.987	15	0	1	.459	15	0	1	0	15	0	1
489		17	max	798.594	1	0	1	8.167	1	0	1	.013	1	0	1
490			min	39.038	15	0	1	.459	15	0	1	0	15	0	1
491		18	max	798.764	1	0	1	8.167	1	0	1	.014	1	0	1
492			min	39.089	15	0	1	.459	15	0	1	0	15	0	1
493		19	max	798.935	1	0	1	8.167	1	0	1	.015	1	0	1
494			min	39.141	15	0	1	.459	15	0	1	0	15	0	1
495	M1	1	max	145.3	1	695.529	3	-4.028	15	0	2	.17	1	0	3
496			min	8.087	15	-378.765	2	-71.282	1	0	3	.01	15	-.013	2
497		2	max	146.122	1	694.649	3	-4.028	15	0	2	.132	1	.187	2
498			min	8.335	15	-379.939	2	-71.282	1	0	3	.007	15	-.366	3
499		3	max	583.094	3	477.214	2	-4.015	15	0	3	.095	1	.377	2
500			min	-334.665	2	-530.12	3	-71.139	1	0	2	.005	15	-.718	3
501		4	max	583.71	3	476.041	2	-4.015	15	0	3	.057	1	.126	2
502			min	-333.843	2	-531	3	-71.139	1	0	2	.003	15	-.438	3
503		5	max	584.326	3	474.867	2	-4.015	15	0	3	.02	1	-.003	15
504			min	-333.021	2	-531.88	3	-71.139	1	0	2	.001	15	-.158	3
505		6	max	584.943	3	473.694	2	-4.015	15	0	3	-.001	15	.123	3
506			min	-332.2	2	-532.76	3	-71.139	1	0	2	-.018	1	-.375	2
507		7	max	585.559	3	472.52	2	-4.015	15	0	3	-.003	15	.405	3
508			min	-331.378	2	-533.64	3	-71.139	1	0	2	-.055	1	-.625	2
509		8	max	586.175	3	471.347	2	-4.015	15	0	3	-.005	15	.686	3
510			min	-330.557	2	-534.52	3	-71.139	1	0	2	-.093	1	-.874	2
511		9	max	601.719	3	52.249	2	-6.115	15	0	9	.057	1	.798	3
512			min	-265.173	2	.359	15	-108.493	1	0	3	.003	15	-1.001	2
513		10	max	602.335	3	51.076	2	-6.115	15	0	9	0	15	.781	3
514			min	-264.351	2	.005	15	-108.493	1	0	3	0	1	-1.028	2
515		11	max	602.952	3	49.902	2	-6.115	15	0	9	-.003	15	.764	3
516			min	-263.53	2	-1.441	4	-108.493	1	0	3	-.058	1	-1.055	2
517		12	max	618.302	3	365.156	3	-3.922	15	0	2	.092	1	.668	3
518			min	-198.065	2	-580.502	2	-69.766	1	0	3	.005	15	-.937	2
519		13	max	618.918	3	364.276	3	-3.922	15	0	2	.055	1	.475	3
520			min	-197.243	2	-581.676	2	-69.766	1	0	3	.003	15	-.63	2
521		14	max	619.535	3	363.396	3	-3.922	15	0	2	.018	1	.283	3
522			min	-196.421	2	-582.849	2	-69.766	1	0	3	.001	15	-.323	2
523		15	max	620.151	3	362.516	3	-3.922	15	0	2	-.001	15	.092	3
524			min	-195.6	2	-584.022	2	-69.766	1	0	3	-.019	1	-.03	1
525		16	max	620.767	3	361.636	3	-3.922	15	0	2	-.003	15	.294	2
526			min	-194.778	2	-585.196	2	-69.766	1	0	3	-.055	1	-.099	3
527		17	max	621.383	3	360.756	3	-3.922	15	0	2	-.005	15	.603	2
528			min	-193.957	2	-586.369	2	-69.766	1	0	3	-.092	1	-.29	3
529		18	max	-8.344	15	592.631	2	-4.368	15	0	3	-.007	15	.304	2
530			min	-146.45	1	-293.285	3	-77.561	1	0	2	-.131	1	-.143	3
531		19	max	-8.096	15	591.458	2	-4.368	15	0	3	-.01	15	.012	3
532			min	-145.629	1	-294.165	3	-77.561	1	0	2	-.172	1	-.009	2
533	M5	1	max	320.738	1	2312.746	3	0	1	0	1	0	1	.027	2
534			min	14.684	12	-1299.75	2	0	1	0	1	0	1	0	3
535		2	max	321.56	1	2311.866	3	0	1	0	1	0	1	.713	2
536			min	15.095	12	-1300.923	2	0	1	0	1	0	1	-1.221	3
537		3	max	1839.158	3	1375.557	2	0	1	0	1	0	1	1.367	2
538			min	-1111.191	2	-1637.512	3	0	1	0	1	0	1	-2.393	3
539		4	max	1839.774	3	1374.384	2	0	1	0	1	0	1	.642	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1110.37	2	-1638.392	3	0	1	0	1	0	1	-1.529	3
541		5	max	1840.391	3	1373.21	2	0	1	0	1	0	1	.01	9
542			min	-1109.548	2	-1639.272	3	0	1	0	1	0	1	-.664	3
543		6	max	1841.007	3	1372.037	2	0	1	0	1	0	1	.201	3
544			min	-1108.727	2	-1640.152	3	0	1	0	1	0	1	-.807	2
545		7	max	1841.623	3	1370.863	2	0	1	0	1	0	1	1.067	3
546			min	-1107.905	2	-1641.032	3	0	1	0	1	0	1	-1.531	2
547		8	max	1842.239	3	1369.69	2	0	1	0	1	0	1	1.933	3
548			min	-1107.083	2	-1641.912	3	0	1	0	1	0	1	-2.254	2
549		9	max	1863.714	3	175.981	2	0	1	0	1	0	1	2.219	3
550			min	-967.278	2	.352	15	0	1	0	1	0	1	-2.576	2
551		10	max	1864.33	3	174.808	2	0	1	0	1	0	1	2.154	3
552			min	-966.457	2	-.002	15	0	1	0	1	0	1	-2.669	2
553		11	max	1864.947	3	173.635	2	0	1	0	1	0	1	2.09	3
554			min	-965.635	2	-1.382	4	0	1	0	1	0	1	-2.761	2
555		12	max	1886.809	3	1104.644	3	0	1	0	1	0	1	1.837	3
556			min	-825.993	2	-1725.653	2	0	1	0	1	0	1	-2.476	2
557		13	max	1887.425	3	1103.764	3	0	1	0	1	0	1	1.254	3
558			min	-825.171	2	-1726.826	2	0	1	0	1	0	1	-1.565	2
559		14	max	1888.042	3	1102.884	3	0	1	0	1	0	1	.672	3
560			min	-824.35	2	-1728	2	0	1	0	1	0	1	-.654	2
561		15	max	1888.658	3	1102.004	3	0	1	0	1	0	1	.259	2
562			min	-823.528	2	-1729.173	2	0	1	0	1	0	1	-.002	13
563		16	max	1889.274	3	1101.124	3	0	1	0	1	0	1	1.171	2
564			min	-822.707	2	-1730.346	2	0	1	0	1	0	1	-.491	3
565		17	max	1889.89	3	1100.244	3	0	1	0	1	0	1	2.085	2
566			min	-821.885	2	-1731.52	2	0	1	0	1	0	1	-1.072	3
567		18	max	-15.909	12	2001.74	2	0	1	0	1	0	1	1.073	2
568			min	-320.903	1	-1017.377	3	0	1	0	1	0	1	-.561	3
569		19	max	-15.498	12	2000.566	2	0	1	0	1	0	1	.017	2
570			min	-320.082	1	-1018.257	3	0	1	0	1	0	1	-.024	3
571	M9	1	max	145.3	1	695.529	3	71.282	1	0	3	-.01	15	0	3
572			min	8.087	15	-378.765	2	4.028	15	0	2	-.17	1	-.013	2
573		2	max	146.122	1	694.649	3	71.282	1	0	3	-.007	15	.187	2
574			min	8.335	15	-379.939	2	4.028	15	0	2	-.132	1	-.366	3
575		3	max	583.094	3	477.214	2	71.139	1	0	2	-.005	15	.377	2
576			min	-334.665	2	-530.12	3	4.015	15	0	3	-.095	1	-.718	3
577		4	max	583.71	3	476.041	2	71.139	1	0	2	-.003	15	.126	2
578			min	-333.843	2	-531	3	4.015	15	0	3	-.057	1	-.438	3
579		5	max	584.326	3	474.867	2	71.139	1	0	2	-.001	15	-.003	15
580			min	-333.021	2	-531.88	3	4.015	15	0	3	-.02	1	-.158	3
581		6	max	584.943	3	473.694	2	71.139	1	0	2	.018	1	.123	3
582			min	-332.2	2	-532.76	3	4.015	15	0	3	.001	15	-.375	2
583		7	max	585.559	3	472.52	2	71.139	1	0	2	.055	1	.405	3
584			min	-331.378	2	-533.64	3	4.015	15	0	3	.003	15	-.625	2
585		8	max	586.175	3	471.347	2	71.139	1	0	2	.093	1	.686	3
586			min	-330.557	2	-534.52	3	4.015	15	0	3	.005	15	-.874	2
587		9	max	601.719	3	52.249	2	108.493	1	0	3	-.003	15	.798	3
588			min	-265.173	2	.359	15	6.115	15	0	9	-.057	1	-1.001	2
589		10	max	602.335	3	51.076	2	108.493	1	0	3	0	1	.781	3
590			min	-264.351	2	.005	15	6.115	15	0	9	0	15	-1.028	2
591		11	max	602.952	3	49.902	2	108.493	1	0	3	.058	1	.764	3
592			min	-263.53	2	-1.441	4	6.115	15	0	9	.003	15	-1.055	2
593		12	max	618.302	3	365.156	3	69.766	1	0	3	-.005	15	.668	3
594			min	-198.065	2	-580.502	2	3.922	15	0	2	-.092	1	-.937	2
595		13	max	618.918	3	364.276	3	69.766	1	0	3	-.003	15	.475	3
596			min	-197.243	2	-581.676	2	3.922	15	0	2	-.055	1	-.63	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	619.535	3	363.396	3	69.766	1	0	3	-.001	15	.283	3
598			min	-196.421	2	-582.849	2	3.922	15	0	2	-.018	1	-.323	2
599		15	max	620.151	3	362.516	3	69.766	1	0	3	.019	1	.092	3
600			min	-195.6	2	-584.022	2	3.922	15	0	2	.001	15	-.03	1
601		16	max	620.767	3	361.636	3	69.766	1	0	3	.055	1	.294	2
602			min	-194.778	2	-585.196	2	3.922	15	0	2	.003	15	-.099	3
603		17	max	621.383	3	360.756	3	69.766	1	0	3	.092	1	.603	2
604			min	-193.957	2	-586.369	2	3.922	15	0	2	.005	15	-.29	3
605		18	max	-8.344	15	592.631	2	77.561	1	0	2	.131	1	.304	2
606			min	-146.45	1	-293.285	3	4.368	15	0	3	.007	15	-.143	3
607		19	max	-8.096	15	591.458	2	77.561	1	0	2	.172	1	.012	3
608			min	-145.629	1	-294.165	3	4.368	15	0	3	.01	15	-.009	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.106	2	.01	3	8.978e-3	2	NC	1	NC	1
2			min	0	15	-.024	3	-.006	2	-2.538e-3	3	NC	1	NC	1
3		2	max	0	1	.162	3	.019	1	1.005e-2	2	NC	4	NC	1
4			min	0	15	0	9	-.002	10	-2.569e-3	3	1061.158	3	NC	1
5		3	max	0	1	.314	3	.046	1	1.113e-2	2	NC	5	NC	2
6			min	0	15	-.046	1	.002	10	-2.599e-3	3	585.801	3	4284.683	1
7		4	max	0	1	.406	3	.068	1	1.22e-2	2	NC	5	NC	3
8			min	0	15	-.078	2	.004	10	-2.63e-3	3	459.843	3	2878.424	1
9		5	max	0	1	.429	3	.079	1	1.327e-2	2	NC	5	NC	3
10			min	0	15	-.074	2	.004	10	-2.66e-3	3	436.831	3	2483.306	1
11		6	max	0	1	.383	3	.075	1	1.434e-2	2	NC	5	NC	3
12			min	0	15	-.042	1	.002	10	-2.691e-3	3	485.823	3	2612.129	1
13		7	max	0	1	.283	3	.057	1	1.542e-2	2	NC	4	NC	2
14			min	0	15	-.003	9	-.002	10	-2.721e-3	3	643.823	3	3418.683	1
15		8	max	0	1	.155	3	.031	3	1.649e-2	2	NC	1	NC	2
16			min	0	15	.002	15	-.007	10	-2.752e-3	3	1100.77	3	6350.196	1
17		9	max	0	1	.184	2	.031	3	1.756e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.016	2	-2.782e-3	3	2534.932	2	9527.097	3
19		10	max	0	1	.215	2	.03	3	1.864e-2	2	NC	3	NC	1
20			min	0	1	-.013	3	-.021	2	-2.813e-3	3	1808.358	2	9699.899	3
21		11	max	0	15	.184	2	.031	3	1.756e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.016	2	-2.782e-3	3	2534.932	2	9527.097	3
23		12	max	0	15	.155	3	.031	3	1.649e-2	2	NC	1	NC	2
24			min	0	1	.002	15	-.007	10	-2.752e-3	3	1100.77	3	6350.196	1
25		13	max	0	15	.283	3	.057	1	1.542e-2	2	NC	4	NC	2
26			min	0	1	-.003	9	-.002	10	-2.721e-3	3	643.823	3	3418.683	1
27		14	max	0	15	.383	3	.075	1	1.434e-2	2	NC	5	NC	3
28			min	0	1	-.042	1	.002	10	-2.691e-3	3	485.823	3	2612.129	1
29		15	max	0	15	.429	3	.079	1	1.327e-2	2	NC	5	NC	3
30			min	0	1	-.074	2	.004	10	-2.66e-3	3	436.831	3	2483.306	1
31		16	max	0	15	.406	3	.068	1	1.22e-2	2	NC	5	NC	3
32			min	0	1	-.078	2	.004	10	-2.63e-3	3	459.843	3	2878.424	1
33		17	max	0	15	.314	3	.046	1	1.113e-2	2	NC	5	NC	2
34			min	0	1	-.046	1	.002	10	-2.599e-3	3	585.801	3	4284.683	1
35		18	max	0	15	.162	3	.019	1	1.005e-2	2	NC	4	NC	1
36			min	0	1	0	9	-.002	10	-2.569e-3	3	1061.158	3	NC	1
37		19	max	0	15	.106	2	.01	3	8.978e-3	2	NC	1	NC	1
38			min	0	1	-.024	3	-.006	2	-2.538e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.247	3	.009	3	5.058e-3	2	NC	1	NC	1
40			min	0	15	-.34	2	-.005	2	-4.178e-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	.458	3	.012	1	5.952e-3	2	NC	5	NC	1
42			min	0	15	-.528	2	-.002	10	-4.992e-3	3	935.115	3	NC	1
43		3	max	0	1	.641	3	.036	1	6.846e-3	2	NC	5	NC	2
44			min	0	15	-.694	2	0	10	-5.806e-3	3	501.775	3	5506.201	1
45		4	max	0	1	.775	3	.057	1	7.74e-3	2	NC	5	NC	3
46			min	0	15	-.824	2	.003	10	-6.62e-3	3	374.56	3	3438.369	1
47		5	max	0	1	.85	3	.069	1	8.633e-3	2	NC	5	NC	3
48			min	0	15	-.908	2	.004	10	-7.434e-3	3	328.049	3	2848.868	1
49		6	max	0	1	.866	3	.068	1	9.527e-3	2	NC	5	NC	3
50			min	0	15	-.946	2	.002	10	-8.249e-3	3	319.903	3	2919.693	1
51		7	max	0	1	.831	3	.053	1	1.042e-2	2	NC	5	NC	2
52			min	0	15	-.943	2	-.002	10	-9.063e-3	3	328.248	2	3749.488	1
53		8	max	0	1	.764	3	.029	1	1.131e-2	2	NC	5	NC	2
54			min	0	15	-.912	2	-.006	10	-9.877e-3	3	345.825	2	6844.64	1
55		9	max	0	1	.695	3	.027	3	1.221e-2	2	NC	5	NC	1
56			min	0	15	-.874	2	-.014	2	-1.069e-2	3	370.965	2	NC	1
57		10	max	0	1	.662	3	.027	3	1.31e-2	2	NC	5	NC	1
58			min	0	1	-.853	2	-.02	2	-1.151e-2	3	385.55	2	NC	1
59		11	max	0	15	.695	3	.027	3	1.221e-2	2	NC	5	NC	1
60			min	0	1	-.874	2	-.014	2	-1.069e-2	3	370.965	2	NC	1
61		12	max	0	15	.764	3	.029	1	1.131e-2	2	NC	5	NC	2
62			min	0	1	-.912	2	-.006	10	-9.877e-3	3	345.825	2	6844.64	1
63		13	max	0	15	.831	3	.053	1	1.042e-2	2	NC	5	NC	2
64			min	0	1	-.943	2	-.002	10	-9.063e-3	3	328.248	2	3749.488	1
65		14	max	0	15	.866	3	.068	1	9.527e-3	2	NC	5	NC	3
66			min	0	1	-.946	2	.002	10	-8.249e-3	3	319.903	3	2919.693	1
67		15	max	0	15	.85	3	.069	1	8.633e-3	2	NC	5	NC	3
68			min	0	1	-.908	2	.004	10	-7.434e-3	3	328.049	3	2848.868	1
69		16	max	0	15	.775	3	.057	1	7.74e-3	2	NC	5	NC	3
70			min	0	1	-.824	2	.003	10	-6.62e-3	3	374.56	3	3438.369	1
71		17	max	0	15	.641	3	.036	1	6.846e-3	2	NC	5	NC	2
72			min	0	1	-.694	2	0	10	-5.806e-3	3	501.775	3	5506.201	1
73		18	max	0	15	.458	3	.012	1	5.952e-3	2	NC	5	NC	1
74			min	0	1	-.528	2	-.002	10	-4.992e-3	3	935.115	3	NC	1
75		19	max	0	15	.247	3	.009	3	5.058e-3	2	NC	1	NC	1
76			min	0	1	-.34	2	-.005	2	-4.178e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.25	3	.008	3	3.711e-3	3	NC	1	NC	1
78			min	0	1	-.339	2	-.005	2	-5.324e-3	2	NC	1	NC	1
79		2	max	0	15	.4	3	.013	1	4.438e-3	3	NC	5	NC	1
80			min	0	1	-.582	2	-.002	10	-6.271e-3	2	812.624	2	NC	1
81		3	max	0	15	.533	3	.036	1	5.165e-3	3	NC	5	NC	2
82			min	0	1	-.794	2	.001	10	-7.219e-3	2	435.128	2	5484.961	1
83		4	max	0	15	.637	3	.058	1	5.893e-3	3	NC	5	NC	3
84			min	0	1	-.951	2	.003	10	-8.166e-3	2	323.646	2	3426.488	1
85		5	max	0	15	.705	3	.07	1	6.62e-3	3	NC	5	NC	3
86			min	0	1	-1.041	2	.004	10	-9.114e-3	2	281.93	2	2838.538	1
87		6	max	0	15	.737	3	.068	1	7.348e-3	3	NC	5	NC	3
88			min	0	1	-1.065	2	.002	10	-1.006e-2	2	272.789	2	2906.909	1
89		7	max	0	15	.737	3	.053	1	8.075e-3	3	NC	5	NC	2
90			min	0	1	-1.031	2	0	10	-1.101e-2	2	285.96	2	3725.862	1
91		8	max	0	15	.715	3	.029	1	8.802e-3	3	NC	5	NC	2
92			min	0	1	-.962	2	-.006	10	-1.196e-2	2	317.902	2	6760.056	1
93		9	max	0	15	.686	3	.025	3	9.53e-3	3	NC	5	NC	1
94			min	0	1	-.888	2	-.013	2	-1.29e-2	2	360.821	2	NC	1
95		10	max	0	1	.67	3	.025	3	1.026e-2	3	NC	5	NC	1
96			min	0	1	-.851	2	-.019	2	-1.385e-2	2	386.287	2	NC	1
97		11	max	0	1	.686	3	.025	3	9.53e-3	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.888	2	-.013	2	-1.29e-2	2	360.821	2	NC	1
99		12	max	0	1	.715	3	.029	1	8.802e-3	3	NC	5	NC	2
100			min	0	15	-.962	2	-.006	10	-1.196e-2	2	317.902	2	6760.056	1
101		13	max	0	1	.737	3	.053	1	8.075e-3	3	NC	5	NC	2
102			min	0	15	-1.031	2	0	10	-1.101e-2	2	285.96	2	3725.862	1
103		14	max	0	1	.737	3	.068	1	7.348e-3	3	NC	5	NC	3
104			min	0	15	-1.065	2	.002	10	-1.006e-2	2	272.789	2	2906.909	1
105		15	max	0	1	.705	3	.07	1	6.62e-3	3	NC	5	NC	3
106			min	0	15	-1.041	2	.004	10	-9.114e-3	2	281.93	2	2838.538	1
107		16	max	0	1	.637	3	.058	1	5.893e-3	3	NC	5	NC	3
108			min	0	15	-.951	2	.003	10	-8.166e-3	2	323.646	2	3426.488	1
109		17	max	0	1	.533	3	.036	1	5.165e-3	3	NC	5	NC	2
110			min	0	15	-.794	2	.001	10	-7.219e-3	2	435.128	2	5484.961	1
111		18	max	0	1	.4	3	.013	1	4.438e-3	3	NC	5	NC	1
112			min	0	15	-.582	2	-.002	10	-6.271e-3	2	812.624	2	NC	1
113		19	max	0	1	.25	3	.008	3	3.711e-3	3	NC	1	NC	1
114			min	0	15	-.339	2	-.005	2	-5.324e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.093	2	.007	3	6.66e-3	3	NC	1	NC	1
116			min	0	1	-.082	3	-.005	2	-7.317e-3	2	NC	1	NC	1
117		2	max	0	15	.003	4	.019	1	7.609e-3	3	NC	4	NC	1
118			min	0	1	-.052	2	0	10	-8.007e-3	2	1367.285	2	NC	1
119		3	max	0	15	.028	3	.046	1	8.558e-3	3	NC	5	NC	2
120			min	0	1	-.167	2	.003	10	-8.698e-3	2	762.118	2	4285.965	1
121		4	max	0	15	.051	3	.069	1	9.507e-3	3	NC	5	NC	3
122			min	0	1	-.232	2	.004	15	-9.388e-3	2	609.147	2	2870.611	1
123		5	max	0	15	.045	3	.08	1	1.046e-2	3	NC	5	NC	3
124			min	0	1	-.238	2	.005	15	-1.008e-2	2	597.437	2	2468.708	1
125		6	max	0	15	.011	3	.076	1	1.14e-2	3	NC	5	NC	3
126			min	0	1	-.188	2	.004	10	-1.077e-2	2	705.656	2	2584.938	1
127		7	max	0	15	.003	4	.059	1	1.235e-2	3	NC	4	NC	2
128			min	0	1	-.092	2	0	10	-1.146e-2	2	1070.032	2	3353.636	1
129		8	max	0	15	.041	1	.032	1	1.33e-2	3	NC	4	NC	2
130			min	0	1	-.108	3	-.004	10	-1.215e-2	2	2909.918	2	6075.852	1
131		9	max	0	15	.129	2	.022	3	1.425e-2	3	NC	4	NC	1
132			min	0	1	-.164	3	-.011	2	-1.284e-2	2	2411.05	3	NC	1
133		10	max	0	1	.176	2	.022	3	1.52e-2	3	NC	4	NC	1
134			min	0	1	-.189	3	-.017	2	-1.353e-2	2	1851.13	3	NC	1
135		11	max	0	1	.129	2	.022	3	1.425e-2	3	NC	4	NC	1
136			min	0	15	-.164	3	-.011	2	-1.284e-2	2	2411.05	3	NC	1
137		12	max	0	1	.041	1	.032	1	1.33e-2	3	NC	4	NC	2
138			min	0	15	-.108	3	-.004	10	-1.215e-2	2	2909.918	2	6075.852	1
139		13	max	0	1	.003	4	.059	1	1.235e-2	3	NC	4	NC	2
140			min	0	15	-.092	2	0	10	-1.146e-2	2	1070.032	2	3353.636	1
141		14	max	0	1	.011	3	.076	1	1.14e-2	3	NC	5	NC	3
142			min	0	15	-.188	2	.004	10	-1.077e-2	2	705.656	2	2584.938	1
143		15	max	0	1	.045	3	.08	1	1.046e-2	3	NC	5	NC	3
144			min	0	15	-.238	2	.005	15	-1.008e-2	2	597.437	2	2468.708	1
145		16	max	0	1	.051	3	.069	1	9.507e-3	3	NC	5	NC	3
146			min	0	15	-.232	2	.004	15	-9.388e-3	2	609.147	2	2870.611	1
147		17	max	0	1	.028	3	.046	1	8.558e-3	3	NC	5	NC	2
148			min	0	15	-.167	2	.003	10	-8.698e-3	2	762.118	2	4285.965	1
149		18	max	0	1	.003	4	.019	1	7.609e-3	3	NC	4	NC	1
150			min	0	15	-.052	2	0	10	-8.007e-3	2	1367.285	2	NC	1
151		19	max	0	1	.093	2	.007	3	6.66e-3	3	NC	1	NC	1
152			min	0	15	-.082	3	-.005	2	-7.317e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.01	2	.006	1	-8.747e-6	15	NC	1	NC	1
154			min	-.01	3	-.015	3	0	15	-1.547e-4	1	7825.767	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	2	.008	2	.005	1	-8.29e-6	15	NC	1	NC	1
156			min	-.009	3	-.015	3	0	15	-1.466e-4	1	9112.374	2	NC	1
157		3	max	.006	2	.007	2	.005	1	-7.833e-6	15	NC	1	NC	1
158			min	-.009	3	-.014	3	0	15	-1.385e-4	1	NC	1	NC	1
159		4	max	.006	2	.006	2	.004	1	-7.376e-6	15	NC	1	NC	1
160			min	-.008	3	-.014	3	0	15	-1.304e-4	1	NC	1	NC	1
161		5	max	.006	2	.004	2	.004	1	-6.919e-6	15	NC	1	NC	1
162			min	-.008	3	-.013	3	0	15	-1.223e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.003	1	-6.463e-6	15	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-1.143e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.003	1	-6.006e-6	15	NC	1	NC	1
166			min	-.007	3	-.012	3	0	15	-1.062e-4	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.003	1	-5.549e-6	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-9.809e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.002	1	-5.092e-6	15	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-9.e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	.002	1	-4.635e-6	15	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-8.192e-5	1	NC	1	NC	1
173		11	max	.003	2	-.001	2	.001	1	-4.179e-6	15	NC	1	NC	1
174			min	-.004	3	-.009	3	0	15	-7.384e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	15	.001	1	-3.722e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-6.575e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-3.265e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-5.767e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-2.808e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-4.959e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-2.352e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-4.15e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.895e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-3.342e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.438e-6	15	NC	1	NC	1
186			min	-.001	3	-.003	4	0	15	-2.533e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-9.812e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-1.725e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-5.244e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-9.167e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.983e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	1.139e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	1.61e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	9.055e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	15	3.022e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	1.697e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	15	4.434e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	1	2.489e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	15	5.845e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	1	3.28e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	7.257e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	3	4.072e-6	15	9252.673	4	NC	1
203		7	max	.003	3	-.003	15	0	1	8.669e-5	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	3	4.864e-6	15	8001.332	4	NC	1
205		8	max	.003	3	-.003	15	0	1	1.008e-4	1	NC	2	NC	1
206			min	-.003	2	-.013	4	0	12	5.655e-6	15	7231.252	4	NC	1
207		9	max	.004	3	-.003	15	0	1	1.149e-4	1	NC	5	NC	1
208			min	-.003	2	-.014	4	0	15	6.447e-6	15	6781.963	4	NC	1
209		10	max	.004	3	-.003	15	0	1	1.29e-4	1	NC	5	NC	1
210			min	-.004	2	-.014	4	0	15	7.239e-6	15	6576.206	4	NC	1
211		11	max	.004	3	-.003	15	0	1	1.432e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.004	2	-.014	4	0	15	8.03e-6	15	6583.936	4	NC	1
213		12	max	.005	3	-.003	15	.001	1	1.573e-4	1	NC	5	NC	1
214			min	-.004	2	-.014	4	0	15	8.822e-6	15	6810.791	4	NC	1
215		13	max	.005	3	-.003	15	.002	1	1.714e-4	1	NC	2	NC	1
216			min	-.005	2	-.013	4	0	15	9.613e-6	15	7301.753	4	NC	1
217		14	max	.006	3	-.003	15	.002	1	1.855e-4	1	NC	1	NC	1
218			min	-.005	2	-.012	4	0	15	1.041e-5	15	8163.912	4	NC	1
219		15	max	.006	3	-.002	15	.003	1	1.996e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	1.12e-5	15	9632.542	4	NC	1
221		16	max	.007	3	-.002	15	.003	1	2.137e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	1.199e-5	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.004	1	2.279e-4	1	NC	1	NC	1
224			min	-.006	2	-.006	4	0	15	1.278e-5	15	NC	1	NC	1
225		18	max	.008	3	0	15	.004	1	2.42e-4	1	NC	1	NC	1
226			min	-.007	2	-.004	3	0	15	1.357e-5	15	NC	1	NC	1
227		19	max	.008	3	0	10	.005	1	2.561e-4	1	NC	1	NC	1
228			min	-.007	2	-.003	3	0	15	1.436e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	9.642e-5	1	NC	1	NC	2
230			min	0	15	-.008	3	-.005	1	5.428e-6	15	NC	1	4664.192	1
231		2	max	.002	1	.006	2	0	15	9.642e-5	1	NC	1	NC	2
232			min	0	15	-.008	3	-.005	1	5.428e-6	15	NC	1	5054.775	1
233		3	max	.002	1	.006	2	0	15	9.642e-5	1	NC	1	NC	2
234			min	0	15	-.007	3	-.004	1	5.428e-6	15	NC	1	5520.75	1
235		4	max	.002	1	.006	2	0	15	9.642e-5	1	NC	1	NC	2
236			min	0	15	-.007	3	-.004	1	5.428e-6	15	NC	1	6081.506	1
237		5	max	.001	1	.005	2	0	15	9.642e-5	1	NC	1	NC	2
238			min	0	15	-.007	3	-.004	1	5.428e-6	15	NC	1	6763.408	1
239		6	max	.001	1	.005	2	0	15	9.642e-5	1	NC	1	NC	2
240			min	0	15	-.006	3	-.003	1	5.428e-6	15	NC	1	7603.024	1
241		7	max	.001	1	.005	2	0	15	9.642e-5	1	NC	1	NC	2
242			min	0	15	-.006	3	-.003	1	5.428e-6	15	NC	1	8652.259	1
243		8	max	.001	1	.004	2	0	15	9.642e-5	1	NC	1	NC	2
244			min	0	15	-.005	3	-.002	1	5.428e-6	15	NC	1	9986.8	1
245		9	max	.001	1	.004	2	0	15	9.642e-5	1	NC	1	NC	1
246			min	0	15	-.005	3	-.002	1	5.428e-6	15	NC	1	NC	1
247		10	max	0	1	.003	2	0	15	9.642e-5	1	NC	1	NC	1
248			min	0	15	-.004	3	-.002	1	5.428e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	9.642e-5	1	NC	1	NC	1
250			min	0	15	-.004	3	-.001	1	5.428e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	9.642e-5	1	NC	1	NC	1
252			min	0	15	-.003	3	-.001	1	5.428e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	9.642e-5	1	NC	1	NC	1
254			min	0	15	-.003	3	0	1	5.428e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	9.642e-5	1	NC	1	NC	1
256			min	0	15	-.002	3	0	1	5.428e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	9.642e-5	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	5.428e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	9.642e-5	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	5.428e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	9.642e-5	1	NC	1	NC	1
262			min	0	15	0	3	0	1	5.428e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	9.642e-5	1	NC	1	NC	1
264			min	0	15	0	3	0	1	5.428e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	9.642e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	5.428e-6	15	NC	1	NC	1
267	M6	1	max	.022	2	.034	2	0	1	0	1	NC	4	NC	1
268			min	-.032	3	-.048	3	0	1	0	1	1597.513	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.021	2	.031	2	0	1	0	1	NC	4	NC	1
270			min	-.03	3	-.046	3	0	1	0	1	1691.175	3	NC	1
271		3	max	.02	2	.028	2	0	1	0	1	NC	4	NC	1
272			min	-.028	3	-.043	3	0	1	0	1	1796.643	3	NC	1
273		4	max	.018	2	.025	2	0	1	0	1	NC	4	NC	1
274			min	-.027	3	-.04	3	0	1	0	1	1916.421	3	NC	1
275		5	max	.017	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.025	3	-.037	3	0	1	0	1	2053.731	3	NC	1
277		6	max	.016	2	.019	2	0	1	0	1	NC	4	NC	1
278			min	-.023	3	-.035	3	0	1	0	1	2212.784	3	NC	1
279		7	max	.015	2	.017	2	0	1	0	1	NC	1	NC	1
280			min	-.021	3	-.032	3	0	1	0	1	2399.199	3	NC	1
281		8	max	.014	2	.014	2	0	1	0	1	NC	1	NC	1
282			min	-.02	3	-.029	3	0	1	0	1	2620.639	3	NC	1
283		9	max	.012	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.018	3	-.027	3	0	1	0	1	2887.84	3	NC	1
285		10	max	.011	2	.01	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.024	3	0	1	0	1	3216.314	3	NC	1
287		11	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3629.346	3	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.018	3	0	1	0	1	4163.54	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.016	3	0	1	0	1	4879.934	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5888.437	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	7408.928	3	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	9954.57	3	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8821.234	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7883.123	3	NC	1
319		8	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7323.521	4	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6863.316	4	NC	1
323		10	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.012	2	-.017	3	0	1	0	1	6650.839	4	NC	1
325		11	max	.014	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	-.014	2	-.017	3	0	1	0	1	6655.047	4	NC	1
327		12	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.015	2	-.017	3	0	1	0	1	6881.184	4	NC	1
329		13	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7374.352	4	NC	1
331		14	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.018	2	-.015	3	0	1	0	1	8242.405	4	NC	1
333		15	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9722.568	4	NC	1
335		16	max	.021	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.02	2	-.013	3	0	1	0	1	NC	1	NC	1
337		17	max	.022	3	0	2	0	1	0	1	NC	1	NC	1
338			min	-.022	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.023	3	0	2	0	1	0	1	NC	1	NC	1
340			min	-.023	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	.002	2	0	1	0	1	NC	1	NC	1
342			min	-.024	2	-.008	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.005	1	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.004	1	.023	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.025	3	0	1	0	1	NC	1	NC	1
347		3	max	.004	1	.021	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.004	1	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.022	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	1	.019	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.003	1	.017	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.019	3	0	1	0	1	NC	1	NC	1
355		7	max	.003	1	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	1	.015	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	1	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.002	1	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	1	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.012	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.001	1	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	15	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.01	2	0	15	1.547e-4	1	NC	1	NC	1
382			min	-.01	3	-.015	3	-.006	1	8.747e-6	15	7825.767	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	2	.008	2	0	15	1.466e-4	1	NC	1	NC	1
384			min	-.009	3	-.015	3	-.005	1	8.29e-6	15	9112.374	2	NC	1
385		3	max	.006	2	.007	2	0	15	1.385e-4	1	NC	1	NC	1
386			min	-.009	3	-.014	3	-.005	1	7.833e-6	15	NC	1	NC	1
387		4	max	.006	2	.006	2	0	15	1.304e-4	1	NC	1	NC	1
388			min	-.008	3	-.014	3	-.004	1	7.376e-6	15	NC	1	NC	1
389		5	max	.006	2	.004	2	0	15	1.223e-4	1	NC	1	NC	1
390			min	-.008	3	-.013	3	-.004	1	6.919e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.143e-4	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.003	1	6.463e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	1.062e-4	1	NC	1	NC	1
394			min	-.007	3	-.012	3	-.003	1	6.006e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	9.809e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.003	1	5.549e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	9.e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.002	1	5.092e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	8.192e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	-.002	1	4.635e-6	15	NC	1	NC	1
401		11	max	.003	2	-.001	2	0	15	7.384e-5	1	NC	1	NC	1
402			min	-.004	3	-.009	3	-.001	1	4.179e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	15	0	15	6.575e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	-.001	1	3.722e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	5.767e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	0	1	3.265e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	4.959e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	2.808e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	4.15e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	2.352e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	3.342e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	1.895e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	2.533e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	4	0	1	1.438e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	1.725e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	9.812e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	9.167e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	5.244e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-1.139e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.983e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-9.055e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-1.61e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-1.697e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	15	-3.022e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	1	-2.489e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	15	-4.434e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	1	-3.28e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	15	-5.845e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	3	-4.072e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-7.257e-5	1	9252.673	4	NC	1
431		7	max	.003	3	-.003	15	0	3	-4.864e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-8.669e-5	1	8001.332	4	NC	1
433		8	max	.003	3	-.003	15	0	12	-5.655e-6	15	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-1.008e-4	1	7231.252	4	NC	1
435		9	max	.004	3	-.003	15	0	15	-6.447e-6	15	NC	5	NC	1
436			min	-.003	2	-.014	4	0	1	-1.149e-4	1	6781.963	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-7.239e-6	15	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-1.29e-4	1	6576.206	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-8.03e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.014	4	0	1	-1.432e-4	1	6583.936	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-8.822e-6	15	NC	5	NC	1
442			min	-.004	2	-.014	4	-.001	1	-1.573e-4	1	6810.791	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-9.613e-6	15	NC	2	NC	1
444			min	-.005	2	-.013	4	-.002	1	-1.714e-4	1	7301.753	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-1.041e-5	15	NC	1	NC	1
446			min	-.005	2	-.012	4	-.002	1	-1.855e-4	1	8163.912	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-1.12e-5	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.003	1	-1.996e-4	1	9632.542	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-1.199e-5	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.003	1	-2.137e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-1.278e-5	15	NC	1	NC	1
452			min	-.006	2	-.006	4	-.004	1	-2.279e-4	1	NC	1	NC	1
453		18	max	.008	3	0	15	0	15	-1.357e-5	15	NC	1	NC	1
454			min	-.007	2	-.004	3	-.004	1	-2.42e-4	1	NC	1	NC	1
455		19	max	.008	3	0	10	0	15	-1.436e-5	15	NC	1	NC	1
456			min	-.007	2	-.003	3	-.005	1	-2.561e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.005	1	-5.428e-6	15	NC	1	NC	2
458			min	0	15	-.008	3	0	15	-9.642e-5	1	NC	1	4664.192	1
459		2	max	.002	1	.006	2	.005	1	-5.428e-6	15	NC	1	NC	2
460			min	0	15	-.008	3	0	15	-9.642e-5	1	NC	1	5054.775	1
461		3	max	.002	1	.006	2	.004	1	-5.428e-6	15	NC	1	NC	2
462			min	0	15	-.007	3	0	15	-9.642e-5	1	NC	1	5520.75	1
463		4	max	.002	1	.006	2	.004	1	-5.428e-6	15	NC	1	NC	2
464			min	0	15	-.007	3	0	15	-9.642e-5	1	NC	1	6081.506	1
465		5	max	.001	1	.005	2	.004	1	-5.428e-6	15	NC	1	NC	2
466			min	0	15	-.007	3	0	15	-9.642e-5	1	NC	1	6763.408	1
467		6	max	.001	1	.005	2	.003	1	-5.428e-6	15	NC	1	NC	2
468			min	0	15	-.006	3	0	15	-9.642e-5	1	NC	1	7603.024	1
469		7	max	.001	1	.005	2	.003	1	-5.428e-6	15	NC	1	NC	2
470			min	0	15	-.006	3	0	15	-9.642e-5	1	NC	1	8652.259	1
471		8	max	.001	1	.004	2	.002	1	-5.428e-6	15	NC	1	NC	2
472			min	0	15	-.005	3	0	15	-9.642e-5	1	NC	1	9986.8	1
473		9	max	.001	1	.004	2	.002	1	-5.428e-6	15	NC	1	NC	1
474			min	0	15	-.005	3	0	15	-9.642e-5	1	NC	1	NC	1
475		10	max	0	1	.003	2	.002	1	-5.428e-6	15	NC	1	NC	1
476			min	0	15	-.004	3	0	15	-9.642e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	.001	1	-5.428e-6	15	NC	1	NC	1
478			min	0	15	-.004	3	0	15	-9.642e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	.001	1	-5.428e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-9.642e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-5.428e-6	15	NC	1	NC	1
482			min	0	15	-.003	3	0	15	-9.642e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-5.428e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-9.642e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-5.428e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-9.642e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-5.428e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-9.642e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-5.428e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-9.642e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-5.428e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-9.642e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-5.428e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-9.642e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.106	2	0	1	8.048e-3	2	NC	1	NC	1
496			min	-.006	2	-.024	3	0	15	-1.761e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.01	3	.049	2	0	15	3.945e-3	2	NC	4	NC	1
498			min	-.006	2	-.008	3	-.004	1	-8.714e-3	3	2023.155	2	NC	1
499		3	max	.01	3	.016	3	0	15	2.222e-5	10	NC	5	NC	1
500			min	-.006	2	-.012	2	-.006	1	-1.071e-4	3	978.965	2	NC	1
501		4	max	.01	3	.054	3	0	15	3.244e-3	2	NC	5	NC	1
502			min	-.006	2	-.08	2	-.005	1	-3.749e-3	3	621.53	2	NC	1
503		5	max	.009	3	.1	3	0	15	6.479e-3	2	NC	5	NC	1
504			min	-.006	2	-.15	2	-.004	1	-7.39e-3	3	450.764	2	NC	1
505		6	max	.009	3	.149	3	0	15	9.714e-3	2	NC	15	NC	1
506			min	-.006	2	-.218	2	-.002	1	-1.103e-2	3	356.369	2	NC	1
507		7	max	.009	3	.196	3	0	1	1.295e-2	2	NC	15	NC	1
508			min	-.005	2	-.278	2	0	3	-1.467e-2	3	300.487	2	NC	1
509		8	max	.009	3	.235	3	0	1	1.618e-2	2	NC	15	NC	1
510			min	-.005	2	-.325	2	0	15	-1.831e-2	3	267.361	2	NC	1
511		9	max	.009	3	.26	3	0	15	1.846e-2	2	NC	15	NC	1
512			min	-.005	2	-.356	2	0	1	-1.867e-2	3	250.088	2	NC	1
513		10	max	.008	3	.269	3	0	1	2.01e-2	2	NC	15	NC	1
514			min	-.005	2	-.366	2	0	15	-1.684e-2	3	245.054	2	NC	1
515		11	max	.008	3	.262	3	0	1	2.174e-2	2	NC	15	NC	1
516			min	-.005	2	-.355	2	0	15	-1.502e-2	3	251.088	2	NC	1
517		12	max	.008	3	.24	3	0	15	2.107e-2	2	NC	15	NC	1
518			min	-.005	2	-.324	2	0	1	-1.289e-2	3	270.377	2	NC	1
519		13	max	.008	3	.204	3	0	15	1.69e-2	2	NC	15	NC	1
520			min	-.005	2	-.273	2	0	1	-1.032e-2	3	307.774	2	NC	1
521		14	max	.008	3	.159	3	.001	1	1.273e-2	2	NC	15	NC	1
522			min	-.005	2	-.21	2	0	15	-7.744e-3	3	371.841	2	NC	1
523		15	max	.007	3	.109	3	.003	1	8.557e-3	2	NC	5	NC	1
524			min	-.005	2	-.14	2	0	15	-5.17e-3	3	482.406	2	NC	1
525		16	max	.007	3	.056	3	.005	1	4.387e-3	2	NC	5	NC	1
526			min	-.005	2	-.071	2	0	15	-2.596e-3	3	687.78	2	NC	1
527		17	max	.007	3	.006	3	.005	1	3.651e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-2.282e-5	3	1128.085	2	NC	1
529		18	max	.007	3	.046	2	.004	1	6.84e-3	2	NC	4	NC	1
530			min	-.005	2	-.039	3	0	15	-2.919e-3	3	2401.088	2	NC	1
531		19	max	.007	3	.093	2	0	15	1.371e-2	2	NC	1	NC	1
532			min	-.005	2	-.082	3	0	1	-5.943e-3	3	NC	1	NC	1
533	M5	1	max	.03	3	.215	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	-.013	3	0	1	0	1	NC	1	NC	1
535		2	max	.03	3	.096	2	0	1	0	1	NC	5	NC	1
536			min	-.022	2	.002	15	0	1	0	1	972.16	2	NC	1
537		3	max	.03	3	.051	3	0	1	0	1	NC	5	NC	1
538			min	-.022	2	-.038	2	0	1	0	1	458.138	2	NC	1
539		4	max	.03	3	.14	3	0	1	0	1	NC	15	NC	1
540			min	-.021	2	-.197	2	0	1	0	1	281.046	2	NC	1
541		5	max	.029	3	.259	3	0	1	0	1	9585.122	15	NC	1
542			min	-.021	2	-.369	2	0	1	0	1	198.174	2	NC	1
543		6	max	.028	3	.392	3	0	1	0	1	7368.557	15	NC	1
544			min	-.02	2	-.539	2	0	1	0	1	153.387	2	NC	1
545		7	max	.028	3	.521	3	0	1	0	1	6090.729	15	NC	1
546			min	-.02	2	-.693	2	0	1	0	1	127.367	2	NC	1
547		8	max	.027	3	.629	3	0	1	0	1	5348.716	15	NC	1
548			min	-.02	2	-.816	2	0	1	0	1	112.173	2	NC	1
549		9	max	.027	3	.697	3	0	1	0	1	4968.58	15	NC	1
550			min	-.019	2	-.894	2	0	1	0	1	104.355	2	NC	1
551		10	max	.026	3	.721	3	0	1	0	1	4854.149	15	NC	1
552			min	-.019	2	-.921	2	0	1	0	1	102.082	2	NC	1
553		11	max	.025	3	.702	3	0	1	0	1	4968.902	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	-.019	2	-.894	2	0	1	0	1	104.803	2	NC	1
555		12	max	.025	3	.641	3	0	1	0	1	5349.458	15	NC	1
556			min	-.018	2	-.811	2	0	1	0	1	113.648	2	NC	1
557		13	max	.024	3	.543	3	0	1	0	1	6092.194	15	NC	1
558			min	-.018	2	-.679	2	0	1	0	1	131.216	2	NC	1
559		14	max	.023	3	.42	3	0	1	0	1	7371.349	15	NC	1
560			min	-.018	2	-.516	2	0	1	0	1	162.11	2	NC	1
561		15	max	.023	3	.284	3	0	1	0	1	9590.539	15	NC	1
562			min	-.018	2	-.34	2	0	1	0	1	217.307	2	NC	1
563		16	max	.022	3	.146	3	0	1	0	1	NC	15	NC	1
564			min	-.017	2	-.168	2	0	1	0	1	324.656	2	NC	1
565		17	max	.022	3	.017	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.021	2	0	1	0	1	566.887	2	NC	1
567		18	max	.022	3	.089	2	0	1	0	1	NC	5	NC	1
568			min	-.017	2	-.091	3	0	1	0	1	1269.706	2	NC	1
569		19	max	.022	3	.176	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.189	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.106	2	0	15	1.761e-2	3	NC	1	NC	1
572			min	-.006	2	-.024	3	0	1	-8.048e-3	2	NC	1	NC	1
573		2	max	.01	3	.049	2	.004	1	8.714e-3	3	NC	4	NC	1
574			min	-.006	2	-.008	3	0	15	-3.945e-3	2	2023.155	2	NC	1
575		3	max	.01	3	.016	3	.006	1	1.071e-4	3	NC	5	NC	1
576			min	-.006	2	-.012	2	0	15	-2.222e-5	10	978.965	2	NC	1
577		4	max	.01	3	.054	3	.005	1	3.749e-3	3	NC	5	NC	1
578			min	-.006	2	-.08	2	0	15	-3.244e-3	2	621.53	2	NC	1
579		5	max	.009	3	.1	3	.004	1	7.39e-3	3	NC	5	NC	1
580			min	-.006	2	-.15	2	0	15	-6.479e-3	2	450.764	2	NC	1
581		6	max	.009	3	.149	3	.002	1	1.103e-2	3	NC	15	NC	1
582			min	-.006	2	-.218	2	0	15	-9.714e-3	2	356.369	2	NC	1
583		7	max	.009	3	.196	3	0	3	1.467e-2	3	NC	15	NC	1
584			min	-.005	2	-.278	2	0	1	-1.295e-2	2	300.487	2	NC	1
585		8	max	.009	3	.235	3	0	15	1.831e-2	3	NC	15	NC	1
586			min	-.005	2	-.325	2	0	1	-1.618e-2	2	267.361	2	NC	1
587		9	max	.009	3	.26	3	0	1	1.867e-2	3	NC	15	NC	1
588			min	-.005	2	-.356	2	0	15	-1.846e-2	2	250.088	2	NC	1
589		10	max	.008	3	.269	3	0	15	1.684e-2	3	NC	15	NC	1
590			min	-.005	2	-.366	2	0	1	-2.01e-2	2	245.054	2	NC	1
591		11	max	.008	3	.262	3	0	15	1.502e-2	3	NC	15	NC	1
592			min	-.005	2	-.355	2	0	1	-2.174e-2	2	251.088	2	NC	1
593		12	max	.008	3	.24	3	0	1	1.289e-2	3	NC	15	NC	1
594			min	-.005	2	-.324	2	0	15	-2.107e-2	2	270.377	2	NC	1
595		13	max	.008	3	.204	3	0	1	1.032e-2	3	NC	15	NC	1
596			min	-.005	2	-.273	2	0	15	-1.69e-2	2	307.774	2	NC	1
597		14	max	.008	3	.159	3	0	15	7.744e-3	3	NC	15	NC	1
598			min	-.005	2	-.21	2	-.001	1	-1.273e-2	2	371.841	2	NC	1
599		15	max	.007	3	.109	3	0	15	5.17e-3	3	NC	5	NC	1
600			min	-.005	2	-.14	2	-.003	1	-8.557e-3	2	482.406	2	NC	1
601		16	max	.007	3	.056	3	0	15	2.596e-3	3	NC	5	NC	1
602			min	-.005	2	-.071	2	-.005	1	-4.387e-3	2	687.78	2	NC	1
603		17	max	.007	3	.006	3	0	15	2.282e-5	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.005	1	-3.651e-4	1	1128.085	2	NC	1
605		18	max	.007	3	.046	2	0	15	2.919e-3	3	NC	4	NC	1
606			min	-.005	2	-.039	3	-.004	1	-6.84e-3	2	2401.088	2	NC	1
607		19	max	.007	3	.093	2	0	1	5.943e-3	3	NC	1	NC	1
608			min	-.005	2	-.082	3	0	15	-1.371e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

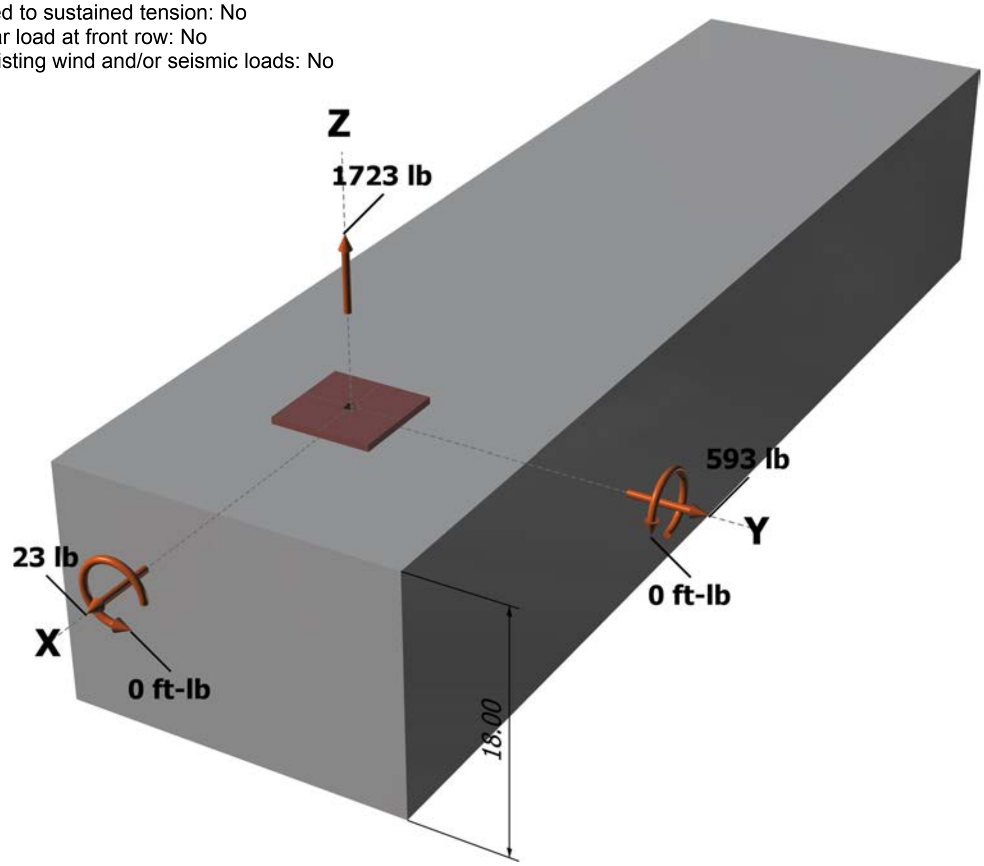
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

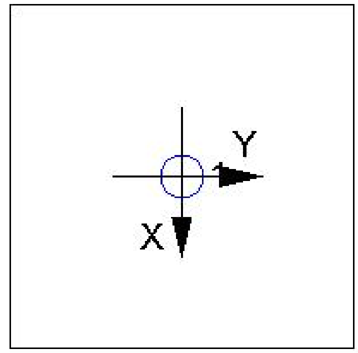
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (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

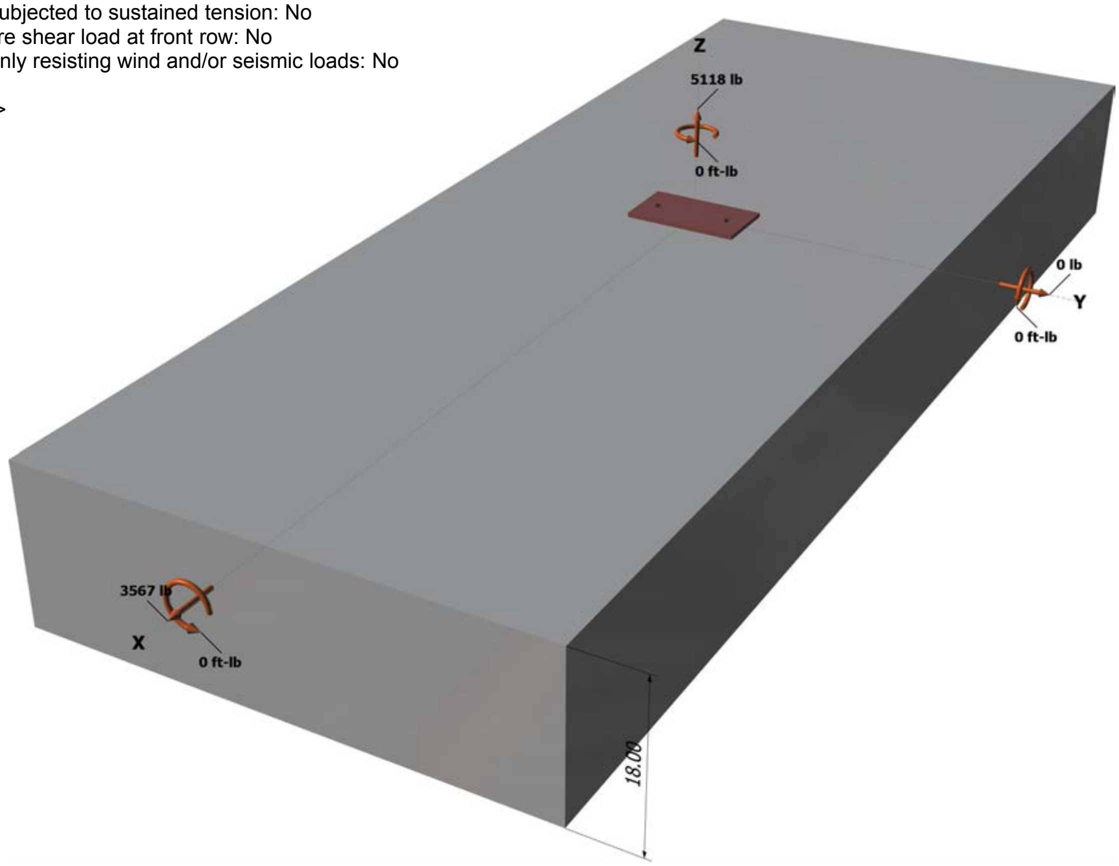
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

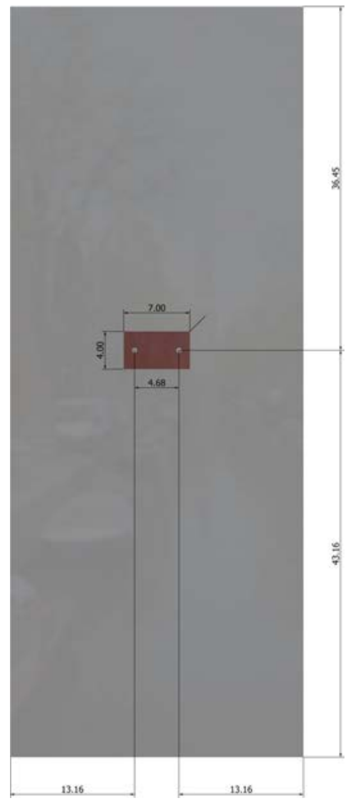
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



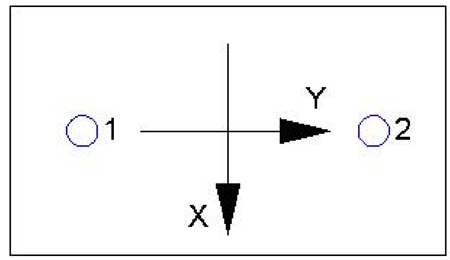
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

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	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	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.