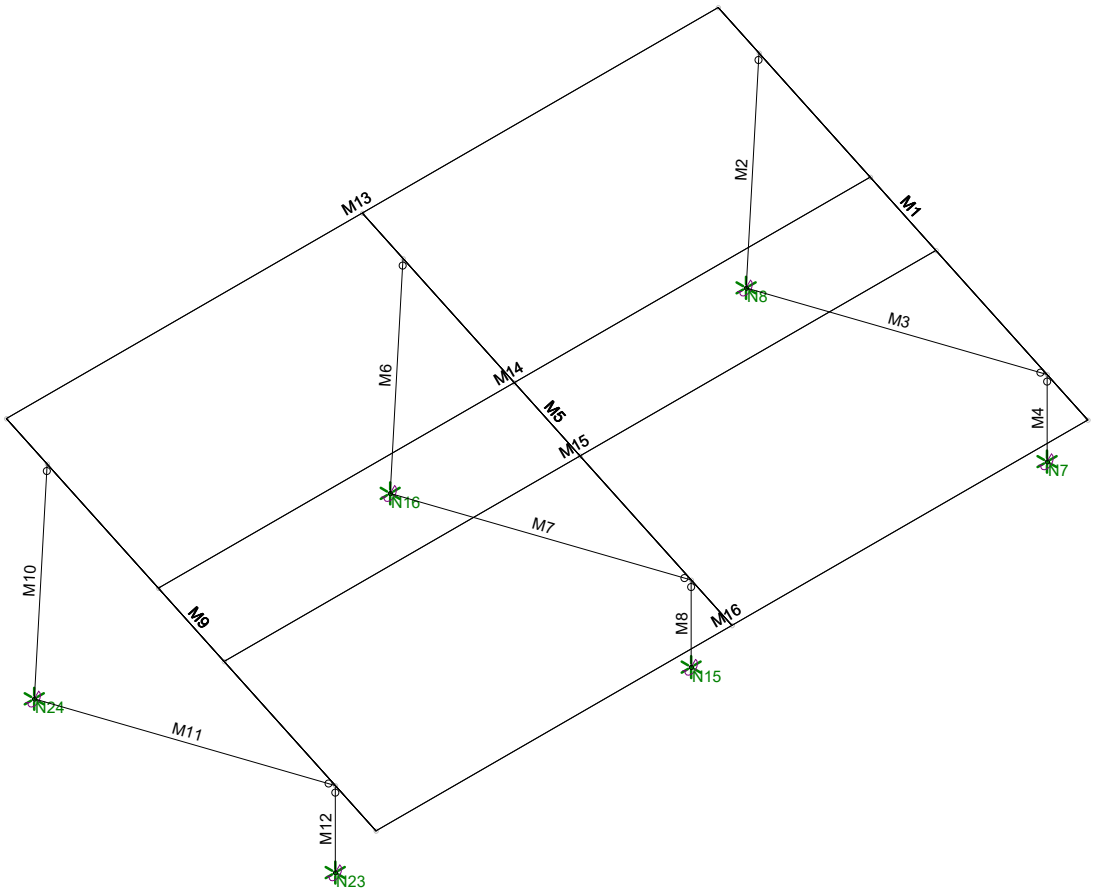


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

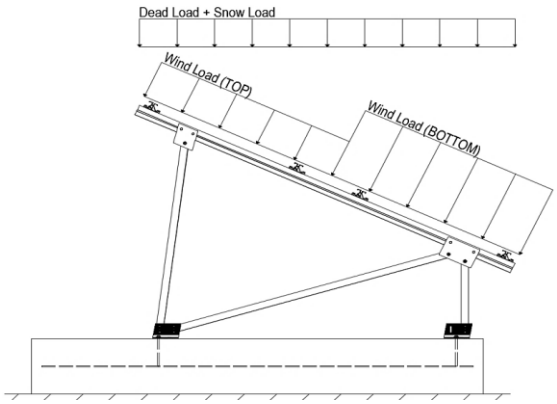
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum		Minimum	
Height =	2000	mm	1900	mm
Width =	1050	mm	970	mm
Dead Load =	3.00	psf	1.75	psf

Modules Per Row =	2
Module Tilt =	25°
Maximum Height Above Grade =	3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	18.56	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.82		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	130	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	26.53	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.100	*(Pressure)*	*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.*
$Cf+_{BOTTOM}$ =	1.700		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.500		
$Cf-_{TOP, INNER PURLIN}$ =	-1.900	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.000		

2.4 Seismic Loads

S_S =	2.50	R =	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.*
S_{DS} =	1.67	C_S =	0.8	
S_1 =	1.00	ρ =	1.3	
S_{D1} =	1.00	Ω =	1.25	
T_a =	0.06	C_d =	1.25	

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

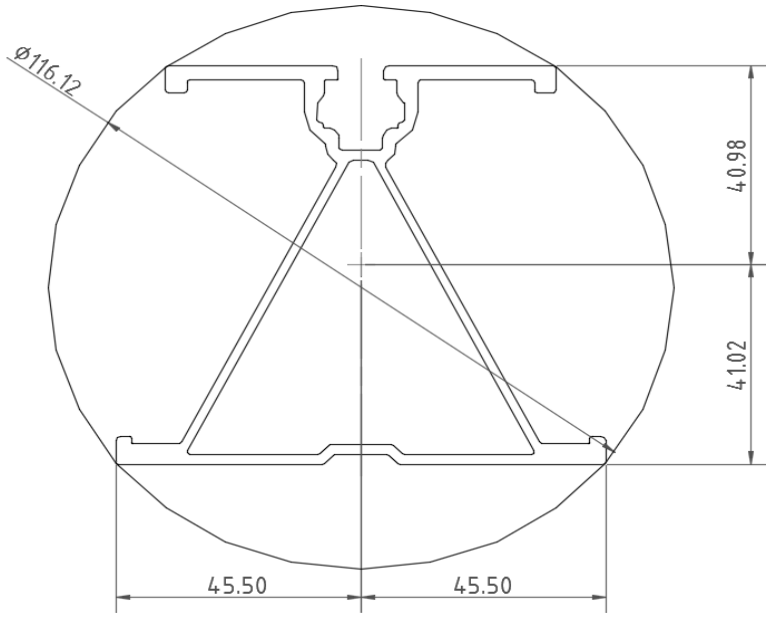
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	105	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 =	1.664	k-ft
M_z =	0.303	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	86%	

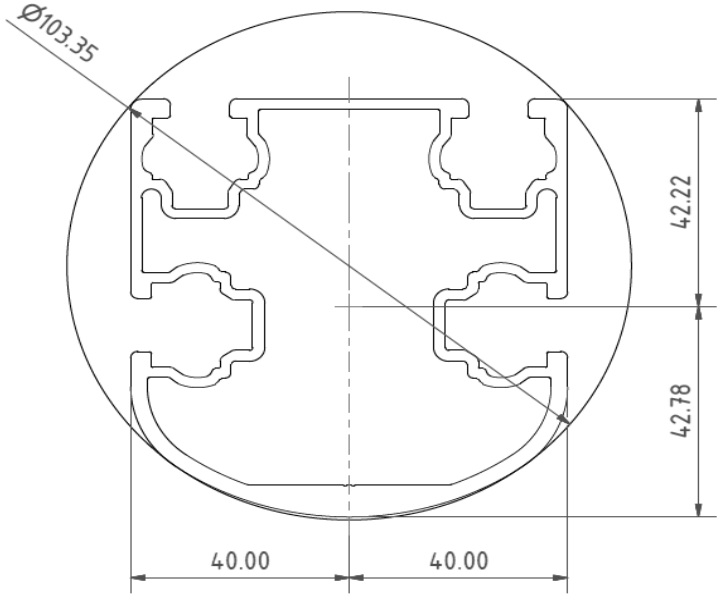


DETAIL VIEW

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).

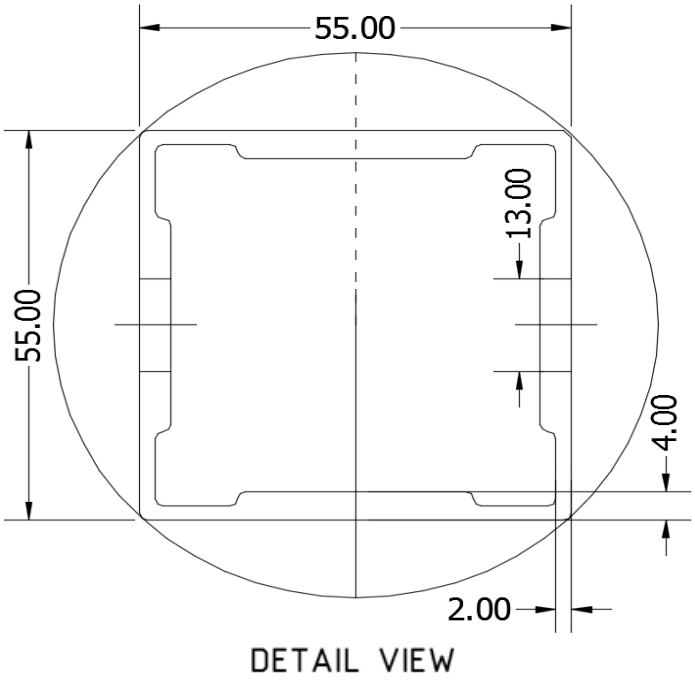
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.342	k-ft
M_z =	0.000	k-ft
P_n =	-0.854	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



4.3 Front Strut Design

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

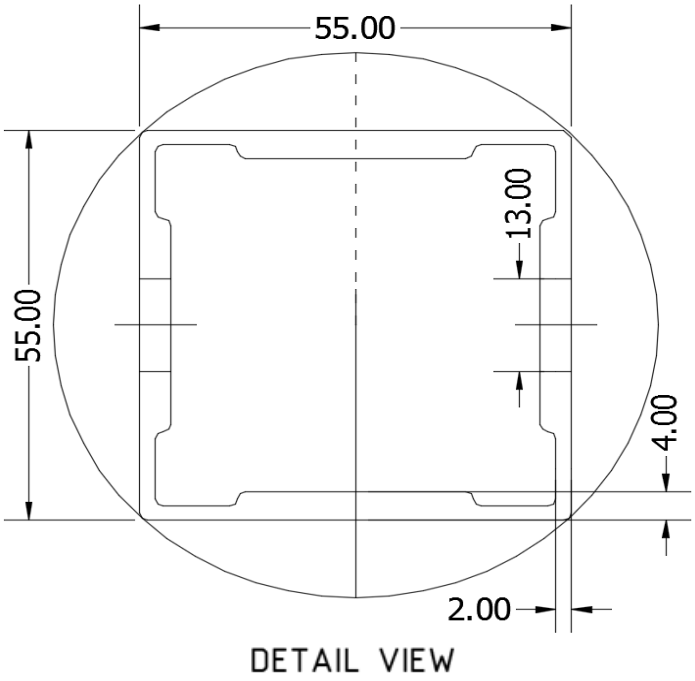
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.548	k-ft
P_n =	0.615	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	41%	



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).

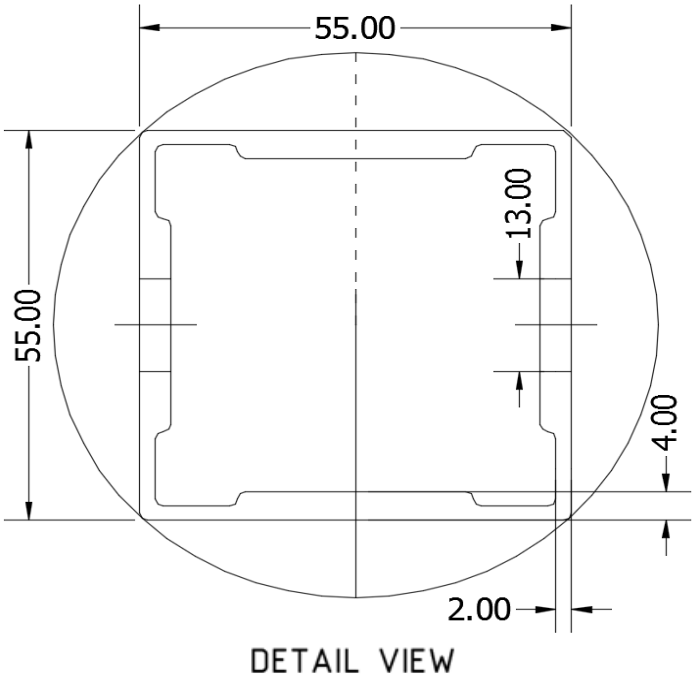
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.176	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	37%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	69.80	in
$\Phi F_{ty\ AXIAL}$ =	10.82	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.327	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.629	k
Utilization =	32%	



5. FOUNDATION DESIGN CALCULATIONS

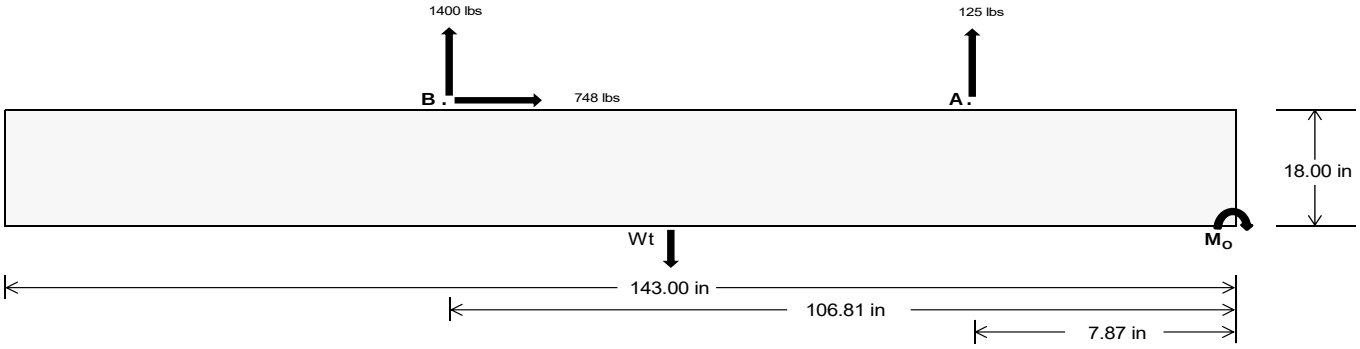
5.1 Helical Pile Foundations

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 =	564.73	6087.38	k
Compressive Load =	3951.75	4888.68	k
Lateral Load =	370.22	3243.22	k
Moment (Weak Axis) =	0.74	0.34	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	164007.6 in-lbs
Resisting Force Required =	2293.81 lbs
S.F. =	1.67
Weight Required =	3823.02 lbs
Minimum Width =	35 in in
Weight Provided =	7559.64 lbs

Sliding

Force =	748.19 lbs
Friction =	0.4
Weight Required =	1870.47 lbs
Resisting Weight =	7559.64 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	748.19 lbs
Cohesion =	130 psf
Area =	34.76 ft^2
Resisting =	3779.82 lbs
Additional Weight Required =	0 lbs

Shear Key

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1379 lbs	1379 lbs	1379 lbs	1379 lbs	1379 lbs	1379 lbs	1379 lbs	1379 lbs	1941 lbs	1941 lbs	1941 lbs	1941 lbs	-251 lbs	-251 lbs	-251 lbs	-251 lbs
F_B	1432 lbs	1432 lbs	1432 lbs	1432 lbs	1978 lbs	1978 lbs	1978 lbs	1978 lbs	2427 lbs	2427 lbs	2427 lbs	2427 lbs	-2800 lbs	-2800 lbs	-2800 lbs	-2800 lbs
F_V	173 lbs	173 lbs	173 lbs	173 lbs	1347 lbs	1347 lbs	1347 lbs	1347 lbs	1126 lbs	1126 lbs	1126 lbs	1126 lbs	-1496 lbs	-1496 lbs	-1496 lbs	-1496 lbs
P_{total}	10371 lbs	10587 lbs	10803 lbs	11019 lbs	10916 lbs	11132 lbs	11348 lbs	11564 lbs	11928 lbs	12144 lbs	12360 lbs	12576 lbs	1485 lbs	1614 lbs	1744 lbs	1873 lbs
M	3359 lbs-ft	3359 lbs-ft	3359 lbs-ft	3359 lbs-ft	3512 lbs-ft	3512 lbs-ft	3512 lbs-ft	3512 lbs-ft	4841 lbs-ft	4841 lbs-ft	4841 lbs-ft	4841 lbs-ft	4665 lbs-ft	4665 lbs-ft	4665 lbs-ft	4665 lbs-ft
e	0.32 ft	0.32 ft	0.31 ft	0.30 ft	0.32 ft	0.32 ft	0.31 ft	0.30 ft	0.41 ft	0.40 ft	0.39 ft	0.38 ft	3.14 ft	2.89 ft	2.68 ft	2.49 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	249.7 psf	248.8 psf	248.0 psf	247.2 psf	263.2 psf	261.9 psf	260.7 psf	259.6 psf	273.0 psf	271.5 psf	270.0 psf	268.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	347.1 psf	343.5 psf	340.1 psf	336.8 psf	364.9 psf	360.9 psf	357.0 psf	353.3 psf	413.3 psf	407.9 psf	402.7 psf	397.8 psf	120.5 psf	116.9 psf	114.8 psf	113.7 psf

Maximum Bearing Pressure = 413 psf
Allowable Bearing Pressure = 1500 psf

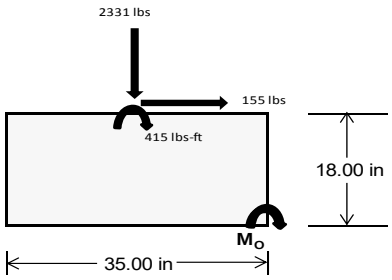
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	2750.9 ft-lbs
Resisting Force Required =	1886.35 lbs
S.F. =	1.67
Weight Required =	3143.91 lbs
Minimum Width =	35 in in
Weight Provided =	7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	304 lbs	640 lbs	207 lbs	869 lbs	2331 lbs	794 lbs	123 lbs	187 lbs	27 lbs
F_V	218 lbs	212 lbs	222 lbs	160 lbs	155 lbs	173 lbs	218 lbs	213 lbs	220 lbs
P_{total}	9663 lbs	9999 lbs	9566 lbs	9778 lbs	11240 lbs	9703 lbs	2860 lbs	2924 lbs	2763 lbs
M	869 lbs-ft	855 lbs-ft	883 lbs-ft	648 lbs-ft	648 lbs-ft	695 lbs-ft	868 lbs-ft	853 lbs-ft	873 lbs-ft
e	0.09 ft	0.09 ft	0.09 ft	0.07 ft	0.06 ft	0.07 ft	0.30 ft	0.29 ft	0.32 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	226.6 psf	237.1 psf	223.0 psf	243.0 psf	285.0 psf	238.0 psf	30.9 psf	33.6 psf	27.8 psf
f_{max}	329.5 psf	338.3 psf	327.5 psf	319.7 psf	361.7 psf	320.3 psf	133.7 psf	134.6 psf	131.2 psf

Maximum Bearing Pressure = 362 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 30in 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.

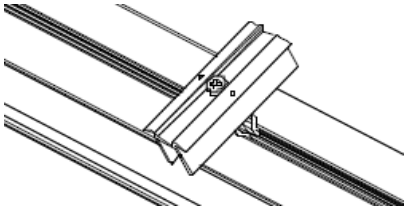
6. DESIGN OF JOINTS AND CONNECTIONS

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.

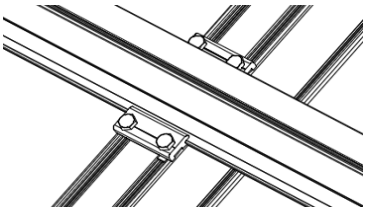
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.732 k
Allowable Uplift	=	1.214 k
Utilization	=	60%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	2.278 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	=	3.040 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	41%

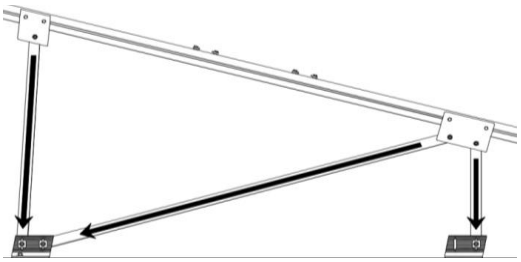
Rear Strut

Maximum Axial Load	=	4.140 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	56%

Diagonal Strut

Maximum Axial Load	=	2.311 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	31%

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

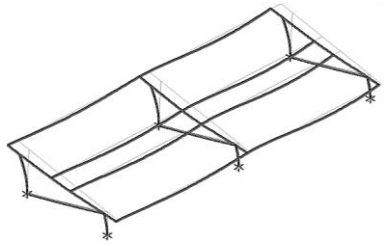
7.1 Seismic Drift

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}	=	56.48 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		1.130 in
Max Drift, Δ_{MAX}	=	0.762 in

0.762 ≤ 1.13, OK.

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:	Weak Axis:
3.4.14	**3.4.14**
L_b = 105 in	L_b = 105
J = 0.432	J = 0.432
290.479	184.727
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$
S1 = 0.51461	S1 = 0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$	$S2 = \left(\frac{C_c}{1.6}\right)^2$
S2 = 1701.56	S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 27.8 ksi	φF_L= 28.9
3.4.16	**3.4.16**
b/t = 32.195	b/t = 37.0588
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$	$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$
S1 = 12.2	S1 = 12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$	$S2 = \frac{k_1 Bp}{1.6Dp}$
S2 = 46.7	S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]	φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi	φF_L= 23.1 ksi
3.4.16.1 Not Used	**3.4.16.1**
Rb/t =	N/A for Weak Direction
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$	
S1 = 1.1	
$S2 = C_t$	
S2 = 141.0	
φF_L= 1.17φyFcy	
φF_L= 38.9 ksi	
3.4.18	**3.4.18**
h/t = 37.0588	h/t = 32.195
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$
S1 = 36.9	S1 = 36.9
m = 0.65	m = 0.65
C_0 = 40.985	C_0 = 45.5
Cc = 41.015	Cc = 45.5
$S2 = \frac{k_1 Bbr}{mDbr}$	$S2 = \frac{k_1 Bbr}{mDbr}$
S2 = 77.2	S2 = 77.3
φF_L= φb[Bbr-mDbr*h/t]	φF_L= 1.3φyFcy
φF_L= 43.2 ksi	φF_L= 43.2 ksi
φF_LSt= 25.1 ksi	φF_LWk= 23.1 ksi
Ix = 897074 mm^4	Iy = 446476 mm^4
2.155 in^4	1.073 in^4
y = 41.015 mm	x = 45.5 mm
Sx = 1.335 in^3	Sy = 0.599 in^3
M_{max}St = 2.788 k-ft	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 = 104.56 in
J = 1.08
179.85

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 29.0 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 = 104.56
J = 1.08
190.335

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

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 = 28.9

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.323 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L = φb[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = 1.17φyFcy

φF_L = 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L St$ = 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L = φb[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L Wk$ = 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.87952

φF_L = φcc(Bc-Dc*λ)

φF_L = 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

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

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

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

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 = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 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 = 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 69.80 in
J = 0.942
108.93

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 69.8
J = 0.942
108.93

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.61471

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80606

φF_L= (φccFcy)/(λ²)

φF_L= 10.8205 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 = 10.82 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 11.14 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			.8			8		

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	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	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	-55.176	-55.176	0	0
2	M14	Y	-55.176	-55.176	0	0
3	M15	Y	-55.176	-55.176	0	0
4	M16	Y	-55.176	-55.176	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	-95.761	-95.761	0	0
2	M14	y	-95.761	-95.761	0	0
3	M15	y	-147.995	-147.995	0	0
4	M16	y	-147.995	-147.995	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	217.64	217.64	0	0
2	M14	y	165.406	165.406	0	0
3	M15	y	87.056	87.056	0	0
4	M16	y	87.056	87.056	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	7.874	7.874	0	0
2	M14	Z	7.874	7.874	0	0
3	M15	Z	7.874	7.874	0	0
4	M16	Z	7.874	7.874	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	651.422	2	1197.722	2	.76	1	.004	1	0	1	0	1
2		min	-812.692	3	-1468.723	3	-48.092	5	-.256	4	0	1	0	1
3	N7	max	.034	9	1134.062	1	-.753	12	-.001	12	0	1	0	1
4		min	-.211	2	-110.597	3	-284.785	4	-.571	4	0	1	0	1
5	N15	max	0	13	3039.804	1	0	12	0	12	0	1	0	1
6		min	-2.249	2	-434.408	3	-269.146	4	-.548	4	0	1	0	1
7	N16	max	2305.378	2	3760.52	2	0	3	0	1	0	1	0	1
8		min	-2494.782	3	-4682.603	3	-48.008	5	-.259	4	0	1	0	1
9	N23	max	.045	14	1134.062	1	13.06	1	.026	1	0	1	0	1
10		min	-.211	2	-110.597	3	-275.393	5	-.556	4	0	1	0	1
11	N24	max	651.422	2	1197.722	2	-.058	12	0	12	0	1	0	1
12		min	-812.692	3	-1468.723	3	-48.844	5	-.258	4	0	1	0	1
13	Totals:	max	3605.551	2	11162.57	1	0	12						
14		min	-4120.64	3	-8275.653	3	-967.852	4						

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	78.636	4	451.115	1	-8.48	12	0	15	.219	1	0	4
2			min	4.892	12	-697.285	3	-178.676	1	-.015	2	.014	12	0	3
3		2	max	78.392	1	314.779	1	-6.764	12	0	15	.121	4	.578	3
4			min	4.892	12	-491.208	3	-136.809	1	-.015	2	.005	10	-.372	1
5		3	max	78.392	1	178.442	1	-5.049	12	0	15	.07	5	.955	3
6			min	4.892	12	-285.132	3	-94.941	1	-.015	2	-.047	1	-.612	1
7		4	max	78.392	1	42.106	1	-3.334	12	0	15	.039	5	1.132	3
8			min	4.892	12	-79.055	3	-53.073	1	-.015	2	-.119	1	-.719	1
9		5	max	78.392	1	127.021	3	-.499	10	0	15	.01	5	1.109	3
10			min	4.892	12	-94.23	1	-31.573	4	-.015	2	-.15	1	-.694	1
11		6	max	78.392	1	333.098	3	30.663	1	0	15	-.007	12	.885	3
12			min	2.262	15	-230.567	1	-25.772	5	-.015	2	-.14	1	-.536	1
13		7	max	78.392	1	539.174	3	72.531	1	0	15	-.006	12	.461	3
14			min	-7.905	5	-366.903	1	-23.161	5	-.015	2	-.09	1	-.246	1
15		8	max	78.392	1	745.251	3	114.398	1	0	15	.003	2	.177	1
16			min	-19.378	5	-503.239	1	-20.55	5	-.015	2	-.063	4	-.163	3
17		9	max	78.392	1	951.327	3	156.266	1	0	15	.132	1	.733	1
18			min	-30.851	5	-639.575	1	-17.939	5	-.015	2	-.08	5	-.988	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
19		10	max	78.392	1	1157.404	3	198.134	1	.004	14	.305	1	1.421	1
20			min	4.892	12	-775.912	1	-120.703	14	-.015	2	.007	12	-2.013	3
21		11	max	78.392	1	639.575	1	-5.243	12	.015	2	.132	1	.733	1
22			min	4.892	12	-951.327	3	-156.266	1	0	15	.001	3	-.988	3
23		12	max	78.392	1	503.239	1	-3.528	12	.015	2	.062	4	.177	1
24			min	4.892	12	-745.251	3	-114.398	1	0	15	-.005	3	-.163	3
25		13	max	78.392	1	366.903	1	-1.812	12	.015	2	.029	5	.461	3
26			min	4.892	12	-539.174	3	-72.531	1	0	15	-.09	1	-.246	1
27		14	max	78.392	1	230.567	1	.04	3	.015	2	0	15	.885	3
28			min	4.056	15	-333.098	3	-36.628	4	0	15	-.14	1	-.536	1
29		15	max	78.392	1	94.23	1	11.205	1	.015	2	-.006	12	1.109	3
30			min	-5.325	5	-127.021	3	-26.899	5	0	15	-.15	1	-.694	1
31		16	max	78.392	1	79.055	3	53.073	1	.015	2	-.003	12	1.132	3
32			min	-16.797	5	-42.106	1	-24.288	5	0	15	-.119	1	-.719	1
33		17	max	78.392	1	285.132	3	94.941	1	.015	2	.001	3	.955	3
34			min	-28.27	5	-178.442	1	-21.677	5	0	15	-.087	4	-.612	1
35		18	max	78.392	1	491.208	3	136.809	1	.015	2	.066	1	.578	3
36			min	-39.743	5	-314.779	1	-19.066	5	0	15	-.096	5	-.372	1
37		19	max	78.392	1	697.285	3	178.676	1	.015	2	.219	1	0	1
38			min	-51.216	5	-451.115	1	-16.456	5	0	15	-.113	5	0	3
39	M14	1	max	52.327	4	504.936	1	-8.78	12	.012	3	.272	4	0	1
40			min	2.547	12	-556.281	3	-185.771	1	-.015	2	.016	12	0	3
41		2	max	46.225	1	368.6	1	-7.065	12	.012	3	.183	4	.465	3
42			min	2.547	12	-400.988	3	-143.903	1	-.015	2	.008	12	-.425	1
43		3	max	46.225	1	232.264	1	-5.349	12	.012	3	.108	5	.78	3
44			min	2.547	12	-245.694	3	-102.036	1	-.015	2	-.019	1	-.717	1
45		4	max	46.225	1	95.927	1	-3.634	12	.012	3	.06	5	.943	3
46			min	2.547	12	-90.401	3	-61.938	4	-.015	2	-.098	1	-.876	1
47		5	max	46.225	1	64.893	3	-1.259	10	.012	3	.015	5	.955	3
48			min	-3.619	5	-40.409	1	-50.224	4	-.015	2	-.136	1	-.903	1
49		6	max	46.225	1	220.186	3	23.568	1	.012	3	-.006	12	.817	3
50			min	-15.092	5	-176.745	1	-42.484	5	-.015	2	-.134	1	-.798	1
51		7	max	46.225	1	375.479	3	65.436	1	.012	3	-.005	12	.527	3
52			min	-26.565	5	-313.081	1	-39.873	5	-.015	2	-.09	1	-.56	1
53		8	max	46.225	1	530.773	3	107.303	1	.012	3	.001	10	.087	3
54			min	-38.037	5	-449.418	1	-37.262	5	-.015	2	-.11	4	-.202	2
55		9	max	46.225	1	686.066	3	149.171	1	.012	3	.118	1	.314	1
56			min	-49.51	5	-585.754	1	-34.651	5	-.015	2	-.14	5	-.505	3
57		10	max	76.468	4	841.36	3	191.039	1	.012	3	.284	1	.95	1
58			min	2.547	12	-722.09	1	-125.512	14	-.015	2	.006	12	-1.247	3
59		11	max	64.995	4	585.754	1	-4.943	12	.015	2	.183	4	.314	1
60			min	2.547	12	-686.066	3	-149.171	1	-.012	3	0	3	-.505	3
61		12	max	53.523	4	449.418	1	-3.227	12	.015	2	.105	4	.087	3
62			min	2.547	12	-530.773	3	-107.303	1	-.012	3	-.006	1	-.202	2
63		13	max	46.225	1	313.081	1	-1.512	12	.015	2	.056	5	.527	3
64			min	2.547	12	-375.479	3	-65.436	1	-.012	3	-.09	1	-.56	1
65		14	max	46.225	1	176.745	1	.492	3	.015	2	.011	5	.817	3
66			min	2.547	12	-220.186	3	-51.298	4	-.012	3	-.134	1	-.798	1
67		15	max	46.225	1	40.409	1	18.3	1	.015	2	-.005	12	.955	3
68			min	2.547	12	-64.893	3	-42.725	5	-.012	3	-.136	1	-.903	1
69		16	max	46.225	1	90.401	3	60.168	1	.015	2	-.002	12	.943	3
70			min	-2.649	5	-95.927	1	-40.114	5	-.012	3	-.098	1	-.876	1
71		17	max	46.225	1	245.694	3	102.036	1	.015	2	.003	3	.78	3
72			min	-14.122	5	-232.264	1	-37.503	5	-.012	3	-.116	4	-.717	1
73		18	max	46.225	1	400.988	3	143.903	1	.015	2	.1	1	.465	3
74			min	-25.595	5	-368.6	1	-34.892	5	-.012	3	-.145	5	-.425	1
75		19	max	46.225	1	556.281	3	185.771	1	.015	2	.261	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
76			min	-37.067	5	-504.936	1	-32.281	5	-.012	3	-.178	5	0	3
77	M15	1	max	89.418	5	653.992	2	-8.68	12	.015	2	.34	4	0	2
78			min	-49.141	1	-299.867	3	-185.727	1	-.01	3	.015	12	0	3
79		2	max	77.945	5	473.802	2	-6.965	12	.015	2	.236	4	.253	3
80			min	-49.141	1	-220.747	3	-143.86	1	-.01	3	.008	12	-.548	2
81		3	max	66.473	5	293.611	2	-5.25	12	.015	2	.146	5	.429	3
82			min	-49.141	1	-141.627	3	-101.992	1	-.01	3	-.019	1	-.921	2
83		4	max	55	5	113.42	2	-3.534	12	.015	2	.083	5	.528	3
84			min	-49.141	1	-62.507	3	-77.027	4	-.01	3	-.098	1	-1.119	2
85		5	max	43.527	5	16.613	3	-1.302	10	.015	2	.024	5	.551	3
86			min	-49.141	1	-66.77	2	-65.313	4	-.01	3	-.136	1	-1.142	2
87		6	max	32.055	5	95.732	3	23.612	1	.015	2	-.006	12	.496	3
88			min	-49.141	1	-246.961	2	-57.533	5	-.01	3	-.134	1	-.989	2
89		7	max	20.582	5	174.852	3	65.479	1	.015	2	-.005	12	.365	3
90			min	-49.141	1	-427.152	2	-54.922	5	-.01	3	-.11	4	-.662	2
91		8	max	9.109	5	253.972	3	107.347	1	.015	2	.001	10	.156	3
92			min	-49.141	1	-607.343	2	-52.311	5	-.01	3	-.145	4	-.167	1
93		9	max	-1.492	15	333.092	3	149.215	1	.015	2	.118	1	.519	2
94			min	-49.141	1	-787.533	2	-49.7	5	-.01	3	-.19	5	-.129	3
95		10	max	-3.132	12	412.212	3	191.083	1	.015	2	.338	4	1.373	2
96			min	-49.141	1	-967.724	2	-133.216	14	-.01	3	.007	12	-.492	3
97		11	max	-2.808	15	787.533	2	-5.043	12	.01	3	.233	4	.519	2
98			min	-49.141	1	-333.092	3	-149.215	1	-.015	2	.001	3	-.129	3
99		12	max	-3.132	12	607.343	2	-3.327	12	.01	3	.14	4	.156	3
100			min	-49.141	1	-253.972	3	-107.347	1	-.015	2	-.006	1	-.167	1
101		13	max	-3.132	12	427.152	2	-1.612	12	.01	3	.077	5	.365	3
102			min	-49.141	1	-174.852	3	-78.142	4	-.015	2	-.09	1	-.662	2
103		14	max	-3.132	12	246.961	2	.327	3	.01	3	.017	5	.496	3
104			min	-50.475	4	-95.732	3	-66.428	4	-.015	2	-.134	1	-.989	2
105		15	max	-3.132	12	66.77	2	18.256	1	.01	3	-.005	12	.551	3
106			min	-61.947	4	-16.613	3	-57.777	5	-.015	2	-.136	1	-1.142	2
107		16	max	-3.132	12	62.507	3	60.124	1	.01	3	-.003	12	.528	3
108			min	-73.42	4	-113.42	2	-55.166	5	-.015	2	-.118	4	-1.119	2
109		17	max	-3.132	12	141.627	3	101.992	1	.01	3	.003	3	.429	3
110			min	-84.893	4	-293.611	2	-52.555	5	-.015	2	-.154	4	-.921	2
111		18	max	-3.132	12	220.747	3	143.86	1	.01	3	.1	1	.253	3
112			min	-96.366	4	-473.802	2	-49.944	5	-.015	2	-.198	5	-.548	2
113		19	max	-3.132	12	299.867	3	185.727	1	.01	3	.26	1	0	2
114			min	-107.838	4	-653.992	2	-47.333	5	-.015	2	-.245	5	0	5
115	M16	1	max	84.344	5	600.782	2	-8.17	12	.011	1	.245	4	0	2
116			min	-87.776	1	-258.474	3	-179.196	1	-.013	3	.013	12	0	3
117		2	max	72.872	5	420.591	2	-6.455	12	.011	1	.163	4	.213	3
118			min	-87.776	1	-179.354	3	-137.328	1	-.013	3	.005	12	-.496	2
119		3	max	61.399	5	240.4	2	-4.739	12	.011	1	.1	5	.349	3
120			min	-87.776	1	-100.234	3	-95.46	1	-.013	3	-.045	1	-.818	2
121		4	max	49.926	5	60.21	2	-3.024	12	.011	1	.057	5	.408	3
122			min	-87.776	1	-21.114	3	-55.041	4	-.013	3	-.117	1	-.964	2
123		5	max	38.454	5	58.006	3	-.716	10	.011	1	.017	5	.39	3
124			min	-87.776	1	-119.981	2	-43.327	4	-.013	3	-.149	1	-.935	2
125		6	max	26.981	5	137.125	3	30.143	1	.011	1	-.006	12	.295	3
126			min	-87.776	1	-300.172	2	-37.342	5	-.013	3	-.14	1	-.731	2
127		7	max	15.508	5	216.245	3	72.011	1	.011	1	-.005	12	.123	3
128			min	-87.776	1	-480.362	2	-34.731	5	-.013	3	-.091	1	-.351	2
129		8	max	4.035	5	295.365	3	113.879	1	.011	1	.002	2	.203	2
130			min	-87.776	1	-660.553	2	-32.12	5	-.013	3	-.09	4	-.126	3
131		9	max	-4.939	15	374.485	3	155.747	1	.011	1	.131	1	.933	2
132			min	-87.776	1	-840.744	2	-29.509	5	-.013	3	-.118	5	-.451	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
133		10	max	-5.002	12	453.605	3	197.614	1	.013	3	.303	1	1.838	2
134			min	-87.776	1	-1020.935	2	-126.448	14	-.005	9	.009	12	-.854	3
135		11	max	-2.155	15	840.744	2	-5.553	12	.013	3	.164	4	.933	2
136			min	-87.776	1	-374.485	3	-155.747	1	-.011	1	.002	12	-.451	3
137		12	max	-5.002	12	660.553	2	-3.838	12	.013	3	.089	4	.203	2
138			min	-87.776	1	-295.365	3	-113.879	1	-.011	1	-.004	3	-.126	3
139		13	max	-5.002	12	480.362	2	-2.122	12	.013	3	.044	5	.123	3
140			min	-87.776	1	-216.245	3	-72.011	1	-.011	1	-.091	1	-.351	2
141		14	max	-5.002	12	300.172	2	-.407	12	.013	3	.003	5	.295	3
142			min	-87.776	1	-137.125	3	-48.193	4	-.011	1	-.14	1	-.731	2
143		15	max	-5.002	12	119.981	2	11.725	1	.013	3	-.006	12	.39	3
144			min	-87.776	1	-58.006	3	-38.441	5	-.011	1	-.149	1	-.935	2
145		16	max	-5.002	12	21.114	3	53.592	1	.013	3	-.004	12	.408	3
146			min	-87.776	1	-60.21	2	-35.83	5	-.011	1	-.117	1	-.964	2
147		17	max	-5.002	12	100.234	3	95.46	1	.013	3	0	3	.349	3
148			min	-92.53	4	-240.4	2	-33.22	5	-.011	1	-.117	4	-.818	2
149		18	max	-5.002	12	179.354	3	137.328	1	.013	3	.068	1	.213	3
150			min	-104.003	4	-420.591	2	-30.609	5	-.011	1	-.137	5	-.496	2
151		19	max	-5.002	12	258.474	3	179.196	1	.013	3	.222	1	0	2
152			min	-115.475	4	-600.782	2	-27.998	5	-.011	1	-.165	5	0	5
153	M2	1	max	1065.523	1	2.068	4	.626	1	0	3	0	3	0	1
154			min	-1298.617	3	.505	15	-41.577	4	0	4	0	1	0	1
155		2	max	1065.997	1	2.031	4	.626	1	0	3	0	1	0	15
156			min	-1298.262	3	.496	15	-41.988	4	0	4	-.013	4	0	4
157		3	max	1066.47	1	1.994	4	.626	1	0	3	0	1	0	15
158			min	-1297.906	3	.488	15	-42.4	4	0	4	-.027	4	-.001	4
159		4	max	1066.944	1	1.957	4	.626	1	0	3	0	1	0	15
160			min	-1297.551	3	.479	15	-42.811	4	0	4	-.04	4	-.002	4
161		5	max	1067.418	1	1.92	4	.626	1	0	3	0	1	0	15
162			min	-1297.196	3	.47	15	-43.222	4	0	4	-.054	4	-.003	4
163		6	max	1067.892	1	1.883	4	.626	1	0	3	0	1	0	15
164			min	-1296.841	3	.462	15	-43.634	4	0	4	-.068	4	-.003	4
165		7	max	1068.365	1	1.845	4	.626	1	0	3	.001	1	0	15
166			min	-1296.485	3	.453	15	-44.045	4	0	4	-.082	4	-.004	4
167		8	max	1068.839	1	1.808	4	.626	1	0	3	.001	1	-.001	15
168			min	-1296.13	3	.444	15	-44.456	4	0	4	-.096	4	-.004	4
169		9	max	1069.313	1	1.771	4	.626	1	0	3	.002	1	-.001	15
170			min	-1295.775	3	.435	15	-44.868	4	0	4	-.111	4	-.005	4
171		10	max	1069.787	1	1.734	4	.626	1	0	3	.002	1	-.001	15
172			min	-1295.419	3	.427	15	-45.279	4	0	4	-.125	4	-.005	4
173		11	max	1070.26	1	1.697	4	.626	1	0	3	.002	1	-.001	15
174			min	-1295.064	3	.418	15	-45.69	4	0	4	-.14	4	-.006	4
175		12	max	1070.734	1	1.66	4	.626	1	0	3	.002	1	-.002	15
176			min	-1294.709	3	.409	15	-46.102	4	0	4	-.154	4	-.007	4
177		13	max	1071.208	1	1.623	4	.626	1	0	3	.002	1	-.002	15
178			min	-1294.353	3	.401	15	-46.513	4	0	4	-.169	4	-.007	4
179		14	max	1071.682	1	1.586	4	.626	1	0	3	.003	1	-.002	15
180			min	-1293.998	3	.392	15	-46.924	4	0	4	-.184	4	-.008	4
181		15	max	1072.155	1	1.549	4	.626	1	0	3	.003	1	-.002	15
182			min	-1293.643	3	.383	15	-47.336	4	0	4	-.199	4	-.008	4
183		16	max	1072.629	1	1.512	4	.626	1	0	3	.003	1	-.002	15
184			min	-1293.287	3	.375	15	-47.747	4	0	4	-.214	4	-.009	4
185		17	max	1073.103	1	1.475	4	.626	1	0	3	.003	1	-.002	15
186			min	-1292.932	3	.366	15	-48.158	4	0	4	-.23	4	-.009	4
187		18	max	1073.576	1	1.438	4	.626	1	0	3	.003	1	-.002	15
188			min	-1292.577	3	.356	12	-48.57	4	0	4	-.245	4	-.01	4
189		19	max	1074.05	1	1.401	4	.626	1	0	3	.004	1	-.002	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
190			min	-1292.222	3	.342	12	-48.981	4	0	4	-.261	4	-.01	4
191	M3	1	max	606.648	2	9.023	4	.278	1	0	12	0	1	.01	4
192			min	-755.784	3	2.134	15	-.636	5	0	4	-.016	4	.002	15
193		2	max	606.477	2	8.151	4	.278	1	0	12	0	1	.006	4
194			min	-755.911	3	1.929	15	-.029	5	0	4	-.016	4	.001	12
195		3	max	606.307	2	7.279	4	.704	4	0	12	0	1	.003	2
196			min	-756.039	3	1.724	15	.016	12	0	4	-.016	4	0	3
197		4	max	606.137	2	6.407	4	1.311	4	0	12	0	1	0	2
198			min	-756.167	3	1.519	15	.016	12	0	4	-.016	4	-.002	3
199		5	max	605.966	2	5.535	4	1.918	4	0	12	0	1	0	15
200			min	-756.295	3	1.314	15	.016	12	0	4	-.015	4	-.004	6
201		6	max	605.796	2	4.663	4	2.525	4	0	12	0	1	-.001	15
202			min	-756.422	3	1.109	15	.016	12	0	4	-.014	5	-.006	6
203		7	max	605.626	2	3.791	4	3.132	4	0	12	.001	1	-.002	15
204			min	-756.55	3	.904	15	.016	12	0	4	-.013	5	-.008	6
205		8	max	605.455	2	2.919	4	3.739	4	0	12	.001	1	-.002	15
206			min	-756.678	3	.699	15	.016	12	0	4	-.011	5	-.01	6
207		9	max	605.285	2	2.047	4	4.346	4	0	12	.001	1	-.003	15
208			min	-756.806	3	.494	15	.016	12	0	4	-.009	5	-.011	6
209		10	max	605.115	2	1.175	4	4.954	4	0	12	.001	1	-.003	15
210			min	-756.934	3	.289	15	.016	12	0	4	-.007	5	-.012	6
211		11	max	604.944	2	.366	2	5.561	4	0	12	.002	1	-.003	15
212			min	-757.061	3	-.051	3	.016	12	0	4	-.005	5	-.012	6
213		12	max	604.774	2	-.121	15	6.168	4	0	12	.002	1	-.003	15
214			min	-757.189	3	-.57	6	.016	12	0	4	-.002	5	-.012	6
215		13	max	604.604	2	-.326	15	6.775	4	0	12	.002	1	-.003	15
216			min	-757.317	3	-1.442	6	.016	12	0	4	0	12	-.011	6
217		14	max	604.433	2	-.531	15	7.382	4	0	12	.005	4	-.002	15
218			min	-757.445	3	-2.314	6	.016	12	0	4	0	12	-.011	6
219		15	max	604.263	2	-.736	15	7.989	4	0	12	.008	4	-.002	15
220			min	-757.572	3	-3.186	6	.016	12	0	4	0	12	-.009	6
221		16	max	604.093	2	-.941	15	8.596	4	0	12	.012	4	-.002	15
222			min	-757.7	3	-4.058	6	.016	12	0	4	0	12	-.008	6
223		17	max	603.922	2	-1.146	15	9.203	4	0	12	.016	4	-.001	15
224			min	-757.828	3	-4.93	6	.016	12	0	4	0	12	-.005	6
225		18	max	603.752	2	-1.351	15	9.81	4	0	12	.021	4	0	15
226			min	-757.956	3	-5.802	6	.016	12	0	4	0	12	-.003	6
227		19	max	603.582	2	-1.556	15	10.418	4	0	12	.026	4	0	1
228			min	-758.083	3	-6.674	6	.016	12	0	4	0	12	0	1
229	M4	1	max	1130.995	1	0	1	-.752	12	0	1	.018	4	0	1
230			min	-112.897	3	0	1	-283.382	4	0	1	0	12	0	1
231		2	max	1131.166	1	0	1	-.752	12	0	1	0	1	0	1
232			min	-112.769	3	0	1	-283.53	4	0	1	-.015	4	0	1
233		3	max	1131.336	1	0	1	-.752	12	0	1	0	12	0	1
234			min	-112.641	3	0	1	-283.677	4	0	1	-.047	4	0	1
235		4	max	1131.506	1	0	1	-.752	12	0	1	0	12	0	1
236			min	-112.514	3	0	1	-283.825	4	0	1	-.08	4	0	1
237		5	max	1131.677	1	0	1	-.752	12	0	1	0	12	0	1
238			min	-112.386	3	0	1	-283.973	4	0	1	-.112	4	0	1
239		6	max	1131.847	1	0	1	-.752	12	0	1	0	12	0	1
240			min	-112.258	3	0	1	-284.12	4	0	1	-.145	4	0	1
241		7	max	1132.018	1	0	1	-.752	12	0	1	0	12	0	1
242			min	-112.13	3	0	1	-284.268	4	0	1	-.178	4	0	1
243		8	max	1132.188	1	0	1	-.752	12	0	1	0	12	0	1
244			min	-112.003	3	0	1	-284.415	4	0	1	-.21	4	0	1
245		9	max	1132.358	1	0	1	-.752	12	0	1	0	12	0	1
246			min	-111.875	3	0	1	-284.563	4	0	1	-.243	4	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
247		10	max	1132.529	1	0	1	-.752	12	0	1	0	12	0	1
248			min	-111.747	3	0	1	-284.711	4	0	1	-.276	4	0	1
249		11	max	1132.699	1	0	1	-.752	12	0	1	0	12	0	1
250			min	-111.619	3	0	1	-284.858	4	0	1	-.308	4	0	1
251		12	max	1132.869	1	0	1	-.752	12	0	1	0	12	0	1
252			min	-111.492	3	0	1	-285.006	4	0	1	-.341	4	0	1
253		13	max	1133.04	1	0	1	-.752	12	0	1	0	12	0	1
254			min	-111.364	3	0	1	-285.154	4	0	1	-.374	4	0	1
255		14	max	1133.21	1	0	1	-.752	12	0	1	-.001	12	0	1
256			min	-111.236	3	0	1	-285.301	4	0	1	-.407	4	0	1
257		15	max	1133.38	1	0	1	-.752	12	0	1	-.001	12	0	1
258			min	-111.108	3	0	1	-285.449	4	0	1	-.439	4	0	1
259		16	max	1133.551	1	0	1	-.752	12	0	1	-.001	12	0	1
260			min	-110.981	3	0	1	-285.597	4	0	1	-.472	4	0	1
261		17	max	1133.721	1	0	1	-.752	12	0	1	-.001	12	0	1
262			min	-110.853	3	0	1	-285.744	4	0	1	-.505	4	0	1
263		18	max	1133.891	1	0	1	-.752	12	0	1	-.001	12	0	1
264			min	-110.725	3	0	1	-285.892	4	0	1	-.538	4	0	1
265		19	max	1134.062	1	0	1	-.752	12	0	1	-.001	12	0	1
266			min	-110.597	3	0	1	-286.039	4	0	1	-.571	4	0	1
267	M6	1	max	3318.131	1	2.356	2	0	1	0	1	0	4	0	1
268			min	-4139.929	3	.209	12	-42.045	4	0	4	0	1	0	1
269		2	max	3318.605	1	2.327	2	0	1	0	1	0	1	0	12
270			min	-4139.573	3	.194	3	-42.456	4	0	4	-.014	4	0	2
271		3	max	3319.078	1	2.298	2	0	1	0	1	0	1	0	3
272			min	-4139.218	3	.173	3	-42.867	4	0	4	-.027	4	-.001	2
273		4	max	3319.552	1	2.269	2	0	1	0	1	0	1	0	3
274			min	-4138.863	3	.151	3	-43.279	4	0	4	-.041	4	-.002	2
275		5	max	3320.026	1	2.24	2	0	1	0	1	0	1	0	3
276			min	-4138.508	3	.129	3	-43.69	4	0	4	-.055	4	-.003	2
277		6	max	3320.5	1	2.211	2	0	1	0	1	0	1	0	3
278			min	-4138.152	3	.108	3	-44.101	4	0	4	-.069	4	-.004	2
279		7	max	3320.973	1	2.183	2	0	1	0	1	0	1	0	3
280			min	-4137.797	3	.086	3	-44.513	4	0	4	-.083	4	-.004	2
281		8	max	3321.447	1	2.154	2	0	1	0	1	0	1	0	3
282			min	-4137.442	3	.064	3	-44.924	4	0	4	-.097	4	-.005	2
283		9	max	3321.921	1	2.125	2	0	1	0	1	0	1	0	3
284			min	-4137.086	3	.043	3	-45.335	4	0	4	-.112	4	-.006	2
285		10	max	3322.395	1	2.096	2	0	1	0	1	0	1	0	3
286			min	-4136.731	3	.021	3	-45.747	4	0	4	-.126	4	-.006	2
287		11	max	3322.868	1	2.067	2	0	1	0	1	0	1	0	3
288			min	-4136.376	3	0	3	-46.158	4	0	4	-.141	4	-.007	2
289		12	max	3323.342	1	2.038	2	0	1	0	1	0	1	0	3
290			min	-4136.02	3	-.022	3	-46.569	4	0	4	-.156	4	-.008	2
291		13	max	3323.816	1	2.009	2	0	1	0	1	0	1	0	3
292			min	-4135.665	3	-.044	3	-46.981	4	0	4	-.171	4	-.008	2
293		14	max	3324.29	1	1.98	2	0	1	0	1	0	1	0	3
294			min	-4135.31	3	-.065	3	-47.392	4	0	4	-.186	4	-.009	2
295		15	max	3324.763	1	1.952	2	0	1	0	1	0	1	0	3
296			min	-4134.955	3	-.087	3	-47.803	4	0	4	-.201	4	-.01	2
297		16	max	3325.237	1	1.923	2	0	1	0	1	0	1	0	3
298			min	-4134.599	3	-.109	3	-48.215	4	0	4	-.217	4	-.01	2
299		17	max	3325.711	1	1.894	2	0	1	0	1	0	1	0	3
300			min	-4134.244	3	-.13	3	-48.626	4	0	4	-.232	4	-.011	2
301		18	max	3326.185	1	1.865	2	0	1	0	1	0	1	0	3
302			min	-4133.889	3	-.152	3	-49.037	4	0	4	-.248	4	-.011	2
303		19	max	3326.658	1	1.836	2	0	1	0	1	0	1	0	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
304			min	-4133.533	3	-.174	3	-49.449	4	0	4	-.263	4	-.012	2
305	M7	1	max	2175.639	2	9.027	6	0	1	0	1	0	1	.012	2
306			min	-2308.862	3	2.119	15	-.923	5	0	4	-.017	4	0	3
307		2	max	2175.468	2	8.155	6	0	1	0	1	0	1	.009	2
308			min	-2308.99	3	1.914	15	-.316	5	0	4	-.017	4	-.002	3
309		3	max	2175.298	2	7.283	6	.349	4	0	1	0	1	.006	2
310			min	-2309.117	3	1.709	15	0	1	0	4	-.017	4	-.004	3
311		4	max	2175.128	2	6.411	6	.957	4	0	1	0	1	.003	2
312			min	-2309.245	3	1.504	15	0	1	0	4	-.016	4	-.005	3
313		5	max	2174.957	2	5.539	6	1.564	4	0	1	0	1	0	2
314			min	-2309.373	3	1.299	15	0	1	0	4	-.016	4	-.007	3
315		6	max	2174.787	2	4.667	6	2.171	4	0	1	0	1	-.001	15
316			min	-2309.501	3	1.094	15	0	1	0	4	-.015	4	-.008	3
317		7	max	2174.617	2	3.795	6	2.778	4	0	1	0	1	-.002	15
318			min	-2309.628	3	.889	15	0	1	0	4	-.014	4	-.009	3
319		8	max	2174.446	2	2.923	6	3.385	4	0	1	0	1	-.002	15
320			min	-2309.756	3	.684	15	0	1	0	4	-.012	4	-.01	4
321		9	max	2174.276	2	2.1	2	3.992	4	0	1	0	1	-.003	15
322			min	-2309.884	3	.393	12	0	1	0	4	-.011	4	-.011	4
323		10	max	2174.105	2	1.42	2	4.599	4	0	1	0	1	-.003	15
324			min	-2310.012	3	.014	3	0	1	0	4	-.009	4	-.012	4
325		11	max	2173.935	2	.741	2	5.206	4	0	1	0	1	-.003	15
326			min	-2310.139	3	-.495	3	0	1	0	4	-.006	4	-.012	4
327		12	max	2173.765	2	.061	2	5.813	4	0	1	0	1	-.003	15
328			min	-2310.267	3	-1.005	3	0	1	0	4	-.004	4	-.012	4
329		13	max	2173.594	2	-.341	15	6.421	4	0	1	0	1	-.003	15
330			min	-2310.395	3	-1.515	3	0	1	0	4	0	5	-.011	4
331		14	max	2173.424	2	-.546	15	7.028	4	0	1	.002	4	-.002	15
332			min	-2310.523	3	-2.31	4	0	1	0	4	0	1	-.011	4
333		15	max	2173.254	2	-.751	15	7.635	4	0	1	.006	4	-.002	15
334			min	-2310.651	3	-3.182	4	0	1	0	4	0	1	-.009	4
335		16	max	2173.083	2	-.956	15	8.242	4	0	1	.01	4	-.002	15
336			min	-2310.778	3	-4.054	4	0	1	0	4	0	1	-.008	4
337		17	max	2172.913	2	-1.161	15	8.849	4	0	1	.014	4	-.001	15
338			min	-2310.906	3	-4.926	4	0	1	0	4	0	1	-.005	4
339		18	max	2172.743	2	-1.366	15	9.456	4	0	1	.018	4	0	15
340			min	-2311.034	3	-5.798	4	0	1	0	4	0	1	-.003	4
341		19	max	2172.572	2	-1.571	15	10.063	4	0	1	.023	4	0	1
342			min	-2311.162	3	-6.67	4	0	1	0	4	0	1	0	1
343	M8	1	max	3036.737	1	0	1	0	1	0	1	.016	4	0	1
344			min	-436.708	3	0	1	-271.532	4	0	1	0	1	0	1
345		2	max	3036.908	1	0	1	0	1	0	1	0	1	0	1
346			min	-436.58	3	0	1	-271.68	4	0	1	-.015	4	0	1
347		3	max	3037.078	1	0	1	0	1	0	1	0	1	0	1
348			min	-436.453	3	0	1	-271.828	4	0	1	-.047	4	0	1
349		4	max	3037.248	1	0	1	0	1	0	1	0	1	0	1
350			min	-436.325	3	0	1	-271.975	4	0	1	-.078	4	0	1
351		5	max	3037.419	1	0	1	0	1	0	1	0	1	0	1
352			min	-436.197	3	0	1	-272.123	4	0	1	-.109	4	0	1
353		6	max	3037.589	1	0	1	0	1	0	1	0	1	0	1
354			min	-436.069	3	0	1	-272.27	4	0	1	-.14	4	0	1
355		7	max	3037.76	1	0	1	0	1	0	1	0	1	0	1
356			min	-435.942	3	0	1	-272.418	4	0	1	-.172	4	0	1
357		8	max	3037.93	1	0	1	0	1	0	1	0	1	0	1
358			min	-435.814	3	0	1	-272.566	4	0	1	-.203	4	0	1
359		9	max	3038.1	1	0	1	0	1	0	1	0	1	0	1
360			min	-435.686	3	0	1	-272.713	4	0	1	-.234	4	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
361		10	max	3038.271	1	0	1	0	1	0	1	0	1	0	1
362			min	-435.558	3	0	1	-272.861	4	0	1	-.266	4	0	1
363		11	max	3038.441	1	0	1	0	1	0	1	0	1	0	1
364			min	-435.43	3	0	1	-273.009	4	0	1	-.297	4	0	1
365		12	max	3038.611	1	0	1	0	1	0	1	0	1	0	1
366			min	-435.303	3	0	1	-273.156	4	0	1	-.328	4	0	1
367		13	max	3038.782	1	0	1	0	1	0	1	0	1	0	1
368			min	-435.175	3	0	1	-273.304	4	0	1	-.36	4	0	1
369		14	max	3038.952	1	0	1	0	1	0	1	0	1	0	1
370			min	-435.047	3	0	1	-273.452	4	0	1	-.391	4	0	1
371		15	max	3039.122	1	0	1	0	1	0	1	0	1	0	1
372			min	-434.919	3	0	1	-273.599	4	0	1	-.422	4	0	1
373		16	max	3039.293	1	0	1	0	1	0	1	0	1	0	1
374			min	-434.792	3	0	1	-273.747	4	0	1	-.454	4	0	1
375		17	max	3039.463	1	0	1	0	1	0	1	0	1	0	1
376			min	-434.664	3	0	1	-273.894	4	0	1	-.485	4	0	1
377		18	max	3039.633	1	0	1	0	1	0	1	0	1	0	1
378			min	-434.536	3	0	1	-274.042	4	0	1	-.517	4	0	1
379		19	max	3039.804	1	0	1	0	1	0	1	0	1	0	1
380			min	-434.408	3	0	1	-274.19	4	0	1	-.548	4	0	1
381	M10	1	max	1065.523	1	1.981	6	-.037	12	0	1	0	4	0	1
382			min	-1298.617	3	.447	15	-41.931	4	0	5	0	3	0	1
383		2	max	1065.997	1	1.944	6	-.037	12	0	1	0	10	0	15
384			min	-1298.262	3	.438	15	-42.342	4	0	5	-.013	4	0	6
385		3	max	1066.47	1	1.906	6	-.037	12	0	1	0	12	0	15
386			min	-1297.906	3	.429	15	-42.754	4	0	5	-.027	4	-.001	6
387		4	max	1066.944	1	1.869	6	-.037	12	0	1	0	12	0	15
388			min	-1297.551	3	.42	15	-43.165	4	0	5	-.041	4	-.002	6
389		5	max	1067.418	1	1.832	6	-.037	12	0	1	0	12	0	15
390			min	-1297.196	3	.412	15	-43.576	4	0	5	-.055	4	-.002	6
391		6	max	1067.892	1	1.795	6	-.037	12	0	1	0	12	0	15
392			min	-1296.841	3	.403	15	-43.988	4	0	5	-.069	4	-.003	6
393		7	max	1068.365	1	1.758	6	-.037	12	0	1	0	12	0	15
394			min	-1296.485	3	.394	15	-44.399	4	0	5	-.083	4	-.004	6
395		8	max	1068.839	1	1.721	6	-.037	12	0	1	0	12	0	15
396			min	-1296.13	3	.386	15	-44.81	4	0	5	-.097	4	-.004	6
397		9	max	1069.313	1	1.684	6	-.037	12	0	1	0	12	-.001	15
398			min	-1295.775	3	.377	15	-45.222	4	0	5	-.112	4	-.005	6
399		10	max	1069.787	1	1.647	6	-.037	12	0	1	0	12	-.001	15
400			min	-1295.419	3	.368	15	-45.633	4	0	5	-.126	4	-.005	6
401		11	max	1070.26	1	1.61	6	-.037	12	0	1	0	12	-.001	15
402			min	-1295.064	3	.36	15	-46.044	4	0	5	-.141	4	-.006	6
403		12	max	1070.734	1	1.573	6	-.037	12	0	1	0	12	-.001	15
404			min	-1294.709	3	.351	15	-46.456	4	0	5	-.156	4	-.006	6
405		13	max	1071.208	1	1.536	6	-.037	12	0	1	0	12	-.002	15
406			min	-1294.353	3	.342	15	-46.867	4	0	5	-.17	4	-.007	6
407		14	max	1071.682	1	1.499	6	-.037	12	0	1	0	12	-.002	15
408			min	-1293.998	3	.333	15	-47.278	4	0	5	-.186	4	-.007	6
409		15	max	1072.155	1	1.462	6	-.037	12	0	1	0	12	-.002	15
410			min	-1293.643	3	.325	15	-47.69	4	0	5	-.201	4	-.008	6
411		16	max	1072.629	1	1.425	6	-.037	12	0	1	0	12	-.002	15
412			min	-1293.287	3	.316	15	-48.101	4	0	5	-.216	4	-.008	6
413		17	max	1073.103	1	1.388	6	-.037	12	0	1	0	12	-.002	15
414			min	-1292.932	3	.307	15	-48.512	4	0	5	-.231	4	-.009	6
415		18	max	1073.576	1	1.351	6	-.037	12	0	1	0	12	-.002	15
416			min	-1292.577	3	.299	15	-48.924	4	0	5	-.247	4	-.009	6
417		19	max	1074.05	1	1.314	6	-.037	12	0	1	0	12	-.002	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
418			min	-1292.222	3	.29	15	-49.335	4	0	5	-.263	4	-.009	6
419	M11	1	max	606.648	2	8.964	6	-.016	12	0	1	0	12	.009	6
420			min	-755.784	3	2.094	15	-.671	5	0	4	-.016	4	.002	15
421		2	max	606.477	2	8.092	6	-.016	12	0	1	0	12	.006	2
422			min	-755.911	3	1.889	15	-.278	1	0	4	-.017	4	.001	15
423		3	max	606.307	2	7.22	6	.547	4	0	1	0	12	.003	2
424			min	-756.039	3	1.684	15	-.278	1	0	4	-.017	4	0	3
425		4	max	606.137	2	6.348	6	1.154	4	0	1	0	12	0	2
426			min	-756.167	3	1.479	15	-.278	1	0	4	-.016	4	-.002	3
427		5	max	605.966	2	5.476	6	1.761	4	0	1	0	12	-.001	15
428			min	-756.295	3	1.274	15	-.278	1	0	4	-.015	4	-.004	4
429		6	max	605.796	2	4.604	6	2.368	4	0	1	0	12	-.002	15
430			min	-756.422	3	1.069	15	-.278	1	0	4	-.014	4	-.007	4
431		7	max	605.626	2	3.732	6	2.976	4	0	1	0	12	-.002	15
432			min	-756.55	3	.864	15	-.278	1	0	4	-.013	4	-.009	4
433		8	max	605.455	2	2.86	6	3.583	4	0	1	0	12	-.002	15
434			min	-756.678	3	.659	15	-.278	1	0	4	-.012	4	-.01	4
435		9	max	605.285	2	1.988	6	4.19	4	0	1	0	12	-.003	15
436			min	-756.806	3	.454	15	-.278	1	0	4	-.01	4	-.011	4
437		10	max	605.115	2	1.116	6	4.797	4	0	1	0	12	-.003	15
438			min	-756.934	3	.249	15	-.278	1	0	4	-.008	4	-.012	4
439		11	max	604.944	2	.366	2	5.404	4	0	1	0	12	-.003	15
440			min	-757.061	3	-.051	3	-.278	1	0	4	-.005	4	-.012	4
441		12	max	604.774	2	-.16	15	6.011	4	0	1	0	12	-.003	15
442			min	-757.189	3	-.629	4	-.278	1	0	4	-.003	4	-.012	4
443		13	max	604.604	2	-.365	15	6.618	4	0	1	0	5	-.003	15
444			min	-757.317	3	-1.501	4	-.278	1	0	4	-.002	1	-.012	4
445		14	max	604.433	2	-.57	15	7.225	4	0	1	.004	5	-.003	15
446			min	-757.445	3	-2.373	4	-.278	1	0	4	-.002	1	-.011	4
447		15	max	604.263	2	-.775	15	7.832	4	0	1	.008	5	-.002	15
448			min	-757.572	3	-3.245	4	-.278	1	0	4	-.002	1	-.009	4
449		16	max	604.093	2	-.98	15	8.44	4	0	1	.011	5	-.002	15
450			min	-757.7	3	-4.117	4	-.278	1	0	4	-.002	1	-.008	4
451		17	max	603.922	2	-1.185	15	9.047	4	0	1	.016	5	-.001	15
452			min	-757.828	3	-4.989	4	-.278	1	0	4	-.002	1	-.006	4
453		18	max	603.752	2	-1.39	15	9.654	4	0	1	.02	5	0	15
454			min	-757.956	3	-5.861	4	-.278	1	0	4	-.002	1	-.003	4
455		19	max	603.582	2	-1.595	15	10.261	4	0	1	.025	5	0	1
456			min	-758.083	3	-6.733	4	-.278	1	0	4	-.003	1	0	1
457	M12	1	max	1130.995	1	0	1	13.496	1	0	1	.017	5	0	1
458			min	-112.897	3	0	1	-275.707	4	0	1	-.002	1	0	1
459		2	max	1131.166	1	0	1	13.496	1	0	1	0	10	0	1
460			min	-112.769	3	0	1	-275.855	4	0	1	-.015	4	0	1
461		3	max	1131.336	1	0	1	13.496	1	0	1	.001	1	0	1
462			min	-112.641	3	0	1	-276.002	4	0	1	-.046	4	0	1
463		4	max	1131.506	1	0	1	13.496	1	0	1	.003	1	0	1
464			min	-112.514	3	0	1	-276.15	4	0	1	-.078	4	0	1
465		5	max	1131.677	1	0	1	13.496	1	0	1	.004	1	0	1
466			min	-112.386	3	0	1	-276.298	4	0	1	-.11	4	0	1
467		6	max	1131.847	1	0	1	13.496	1	0	1	.006	1	0	1
468			min	-112.258	3	0	1	-276.445	4	0	1	-.142	4	0	1
469		7	max	1132.018	1	0	1	13.496	1	0	1	.008	1	0	1
470			min	-112.13	3	0	1	-276.593	4	0	1	-.173	4	0	1
471		8	max	1132.188	1	0	1	13.496	1	0	1	.009	1	0	1
472			min	-112.003	3	0	1	-276.74	4	0	1	-.205	4	0	1
473		9	max	1132.358	1	0	1	13.496	1	0	1	.011	1	0	1
474			min	-111.875	3	0	1	-276.888	4	0	1	-.237	4	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
475		10	max	1132.529	1	0	1	13.496	1	0	1	.012	1	0	1
476			min	-111.747	3	0	1	-277.036	4	0	1	-.269	4	0	1
477		11	max	1132.699	1	0	1	13.496	1	0	1	.014	1	0	1
478			min	-111.619	3	0	1	-277.183	4	0	1	-.301	4	0	1
479		12	max	1132.869	1	0	1	13.496	1	0	1	.015	1	0	1
480			min	-111.492	3	0	1	-277.331	4	0	1	-.332	4	0	1
481		13	max	1133.04	1	0	1	13.496	1	0	1	.017	1	0	1
482			min	-111.364	3	0	1	-277.479	4	0	1	-.364	4	0	1
483		14	max	1133.21	1	0	1	13.496	1	0	1	.018	1	0	1
484			min	-111.236	3	0	1	-277.626	4	0	1	-.396	4	0	1
485		15	max	1133.38	1	0	1	13.496	1	0	1	.02	1	0	1
486			min	-111.108	3	0	1	-277.774	4	0	1	-.428	4	0	1
487		16	max	1133.551	1	0	1	13.496	1	0	1	.021	1	0	1
488			min	-110.981	3	0	1	-277.921	4	0	1	-.46	4	0	1
489		17	max	1133.721	1	0	1	13.496	1	0	1	.023	1	0	1
490			min	-110.853	3	0	1	-278.069	4	0	1	-.492	4	0	1
491		18	max	1133.891	1	0	1	13.496	1	0	1	.025	1	0	1
492			min	-110.725	3	0	1	-278.217	4	0	1	-.524	4	0	1
493		19	max	1134.062	1	0	1	13.496	1	0	1	.026	1	0	1
494			min	-110.597	3	0	1	-278.364	4	0	1	-.556	4	0	1
495	M1	1	max	178.683	1	697.234	3	51.165	5	0	1	.219	1	0	15
496			min	-16.456	5	-448.857	1	-78.259	1	0	3	-.113	5	-.015	2
497		2	max	179.395	1	696.088	3	52.625	5	0	1	.171	1	.265	1
498			min	-16.123	5	-450.384	1	-78.259	1	0	3	-.081	5	-.435	3
499		3	max	490.769	3	534.673	1	13.667	5	0	3	.122	1	.534	1
500			min	-306.051	2	-517.234	3	-77.87	1	0	1	-.048	5	-.853	3
501		4	max	491.303	3	533.146	1	15.127	5	0	3	.074	1	.203	1
502			min	-305.339	2	-518.379	3	-77.87	1	0	1	-.039	5	-.532	3
503		5	max	491.837	3	531.619	1	16.587	5	0	3	.026	1	-.005	15
504			min	-304.627	2	-519.524	3	-77.87	1	0	1	-.029	5	-.21	3
505		6	max	492.371	3	530.092	1	18.048	5	0	3	-.001	12	.113	3
506			min	-303.915	2	-520.669	3	-77.87	1	0	1	-.023	4	-.478	2
507		7	max	492.905	3	528.565	1	19.508	5	0	3	-.004	12	.436	3
508			min	-303.203	2	-521.814	3	-77.87	1	0	1	-.071	1	-.804	2
509		8	max	493.439	3	527.038	1	20.968	5	0	3	.006	5	.76	3
510			min	-302.491	2	-522.96	3	-77.87	1	0	1	-.119	1	-1.129	2
511		9	max	507.33	3	43.382	2	59.321	5	0	9	.076	1	.889	3
512			min	-227.801	2	.458	15	-124.15	1	0	3	-.145	5	-1.29	2
513		10	max	507.864	3	41.855	2	60.781	5	0	9	0	10	.867	3
514			min	-227.089	2	-.006	5	-124.15	1	0	3	-.108	4	-1.317	2
515		11	max	508.398	3	40.328	2	62.241	5	0	9	-.005	12	.846	3
516			min	-226.377	2	-1.905	4	-124.15	1	0	3	-.086	4	-1.342	2
517		12	max	522.124	3	337.741	3	159.544	5	0	2	.117	1	.739	3
518			min	-151.638	2	-613.159	2	-75.051	1	0	3	-.251	5	-1.189	2
519		13	max	522.658	3	336.595	3	161.004	5	0	2	.07	1	.53	3
520			min	-150.926	2	-614.686	2	-75.051	1	0	3	-.152	5	-.808	2
521		14	max	523.192	3	335.45	3	162.465	5	0	2	.024	1	.321	3
522			min	-150.214	2	-616.213	2	-75.051	1	0	3	-.051	5	-.431	1
523		15	max	523.726	3	334.305	3	163.925	5	0	2	.05	5	.113	3
524			min	-149.502	2	-617.74	2	-75.051	1	0	3	-.023	1	-.072	1
525		16	max	524.26	3	333.16	3	165.385	5	0	2	.152	5	.34	2
526			min	-148.79	2	-619.267	2	-75.051	1	0	3	-.069	1	-.094	3
527		17	max	524.794	3	332.015	3	166.845	5	0	2	.255	5	.725	2
528			min	-148.078	2	-620.794	2	-75.051	1	0	3	-.116	1	-.3	3
529		18	max	27.665	5	603.151	2	-5.003	12	0	5	.225	5	.364	2
530			min	-179.902	1	-257.435	3	-116.991	4	0	2	-.167	1	-.147	3
531		19	max	27.997	5	601.624	2	-5.003	12	0	5	.165	5	.013	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
532			min	-179.19	1	-258.58	3	-115.531	4	0	2	-.222	1	-.011	1
533	M5	1	max	396.255	1	2314.732	3	94.433	5	0	1	0	1	.03	2
534			min	13.918	12	-1541.392	1	0	1	0	4	-.235	4	0	15
535		2	max	396.967	1	2313.586	3	95.893	5	0	1	0	1	.985	1
536			min	14.274	12	-1542.919	1	0	1	0	4	-.177	4	-1.431	3
537		3	max	1537.612	3	1505.639	1	60.629	4	0	4	0	1	1.91	1
538			min	-1016.712	2	-1573.845	3	0	1	0	1	-.117	4	-2.824	3
539		4	max	1538.146	3	1504.112	1	62.089	4	0	4	0	1	.976	1
540			min	-1016	2	-1574.99	3	0	1	0	1	-.079	4	-1.847	3
541		5	max	1538.68	3	1502.585	1	63.55	4	0	4	0	1	.043	1
542			min	-1015.288	2	-1576.135	3	0	1	0	1	-.04	4	-.869	3
543		6	max	1539.214	3	1501.058	1	65.01	4	0	4	0	1	.11	3
544			min	-1014.576	2	-1577.28	3	0	1	0	1	0	5	-.935	2
545		7	max	1539.748	3	1499.532	1	66.47	4	0	4	.04	4	1.089	3
546			min	-1013.864	2	-1578.426	3	0	1	0	1	0	1	-1.853	2
547		8	max	1540.282	3	1498.005	1	67.93	4	0	4	.082	4	2.069	3
548			min	-1013.152	2	-1579.571	3	0	1	0	1	0	1	-2.771	2
549		9	max	1560.417	3	145.81	2	197.228	4	0	1	0	1	2.388	3
550			min	-855.655	2	.463	15	0	1	0	1	-.217	4	-3.163	2
551		10	max	1560.951	3	144.283	2	198.689	4	0	1	0	1	2.304	3
552			min	-854.943	2	.002	15	0	1	0	1	-.094	4	-3.253	2
553		11	max	1561.485	3	142.756	2	200.149	4	0	1	.03	4	2.222	3
554			min	-854.231	2	-1.657	6	0	1	0	1	0	1	-3.342	2
555		12	max	1581.949	3	994.065	3	221.75	4	0	1	0	1	1.946	3
556			min	-696.83	2	-1770.095	2	0	1	0	4	-.359	4	-2.985	2
557		13	max	1582.483	3	992.92	3	223.21	4	0	1	0	1	1.329	3
558			min	-696.118	2	-1771.622	2	0	1	0	4	-.221	4	-1.886	2
559		14	max	1583.017	3	991.775	3	224.67	4	0	1	0	1	.713	3
560			min	-695.406	2	-1773.149	2	0	1	0	4	-.082	4	-.812	1
561		15	max	1583.551	3	990.63	3	226.13	4	0	1	.058	4	.314	2
562			min	-694.694	2	-1774.676	2	0	1	0	4	0	1	0	15
563		16	max	1584.085	3	989.485	3	227.59	4	0	1	.199	4	1.416	2
564			min	-693.982	2	-1776.203	2	0	1	0	4	0	1	-.516	3
565		17	max	1584.619	3	988.339	3	229.051	4	0	1	.341	4	2.519	2
566			min	-693.27	2	-1777.73	2	0	1	0	4	0	1	-1.13	3
567		18	max	-14.892	12	2047.063	2	0	1	0	4	.35	4	1.29	2
568			min	-395.952	1	-906.528	3	-28.468	5	0	1	0	1	-.589	3
569		19	max	-14.536	12	2045.537	2	0	1	0	4	.334	4	.023	1
570			min	-395.24	1	-907.674	3	-27.008	5	0	1	0	1	-.026	3
571	M9	1	max	178.683	1	697.234	3	78.873	4	0	3	-.014	12	0	15
572			min	8.479	12	-448.857	1	4.892	12	0	4	-.219	1	-.015	2
573		2	max	179.395	1	696.088	3	80.333	4	0	3	-.011	12	.265	1
574			min	8.835	12	-450.384	1	4.892	12	0	4	-.171	1	-.435	3
575		3	max	490.769	3	534.673	1	77.87	1	0	1	-.008	12	.534	1
576			min	-306.051	2	-517.234	3	4.852	12	0	3	-.122	1	-.853	3
577		4	max	491.303	3	533.146	1	77.87	1	0	1	-.005	12	.203	1
578			min	-305.339	2	-518.379	3	4.852	12	0	3	-.074	1	-.532	3
579		5	max	491.837	3	531.619	1	77.87	1	0	1	-.002	12	-.005	15
580			min	-304.627	2	-519.524	3	4.852	12	0	3	-.039	4	-.21	3
581		6	max	492.371	3	530.092	1	77.87	1	0	1	.023	1	.113	3
582			min	-303.915	2	-520.669	3	4.852	12	0	3	-.015	5	-.478	2
583		7	max	492.905	3	528.565	1	77.87	1	0	1	.071	1	.436	3
584			min	-303.203	2	-521.814	3	4.852	12	0	3	.001	15	-.804	2
585		8	max	493.439	3	527.038	1	77.87	1	0	1	.119	1	.76	3
586			min	-302.491	2	-522.96	3	4.852	12	0	3	.007	12	-1.129	2
587		9	max	507.33	3	43.382	2	124.15	1	0	3	-.004	12	.889	3
588			min	-227.801	2	.473	15	7.394	12	0	9	-.172	4	-1.29	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
589		10	max	507.864	3	41.855	2	124.15	1	0	3	.001	1	.867	3
590			min	-227.089	2	.012	15	7.394	12	0	9	-.108	4	-1.317	2
591		11	max	508.398	3	40.328	2	124.15	1	0	3	.078	1	.846	3
592			min	-226.377	2	-1.788	6	7.394	12	0	9	-.059	5	-1.342	2
593		12	max	522.124	3	337.741	3	188.174	4	0	3	-.007	12	.739	3
594			min	-151.638	2	-613.159	2	4.267	12	0	2	-.295	4	-1.189	2
595		13	max	522.658	3	336.595	3	189.634	4	0	3	-.004	12	.53	3
596			min	-150.926	2	-614.686	2	4.267	12	0	2	-.178	4	-.808	2
597		14	max	523.192	3	335.45	3	191.094	4	0	3	-.001	12	.321	3
598			min	-150.214	2	-616.213	2	4.267	12	0	2	-.06	4	-.431	1
599		15	max	523.726	3	334.305	3	192.554	4	0	3	.059	4	.113	3
600			min	-149.502	2	-617.74	2	4.267	12	0	2	.001	12	-.072	1
601		16	max	524.26	3	333.16	3	194.014	4	0	3	.179	4	.34	2
602			min	-148.79	2	-619.267	2	4.267	12	0	2	.004	12	-.094	3
603		17	max	524.794	3	332.015	3	195.475	4	0	3	.3	4	.725	2
604			min	-148.078	2	-620.794	2	4.267	12	0	2	.006	12	-.3	3
605		18	max	-8.526	12	603.151	2	87.901	1	0	2	.286	4	.364	2
606			min	-179.902	1	-257.435	3	-86.037	5	0	3	.009	12	-.147	3
607		19	max	-8.17	12	601.624	2	87.901	1	0	2	.245	4	.013	3
608			min	-179.19	1	-258.58	3	-84.577	5	0	3	.013	12	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.196	2	.01	3	1.342e-2	2	NC	1	NC	1
2			min	-.792	4	-.041	3	-.005	2	-2.715e-3	3	NC	1	NC	1
3		2	max	0	1	.184	3	.03	1	1.472e-2	2	NC	5	NC	2
4			min	-.792	4	.003	15	-.018	5	-2.485e-3	3	933.074	3	7054.933	1
5		3	max	0	1	.367	3	.07	1	1.602e-2	2	NC	5	NC	3
6			min	-.792	4	-.022	1	-.023	5	-2.254e-3	3	514.651	3	3000.179	1
7		4	max	0	1	.479	3	.104	1	1.732e-2	2	NC	5	NC	3
8			min	-.792	4	-.069	1	-.018	5	-2.024e-3	3	403.353	3	2024.888	1
9		5	max	0	1	.508	3	.12	1	1.862e-2	2	NC	5	NC	3
10			min	-.793	4	-.063	1	-.006	5	-1.794e-3	3	382.124	3	1749.079	1
11		6	max	0	1	.455	3	.115	1	1.992e-2	2	NC	5	NC	3
12			min	-.793	4	-.014	9	.004	10	-1.564e-3	3	422.904	3	1836.502	1
13		7	max	0	1	.337	3	.088	1	2.123e-2	2	NC	4	NC	3
14			min	-.793	4	.003	15	0	10	-1.334e-3	3	554.924	3	2386.664	1
15		8	max	0	1	.232	2	.049	1	2.253e-2	2	NC	1	NC	2
16			min	-.793	4	.006	15	-.005	10	-1.104e-3	3	925.284	3	4325.722	1
17		9	max	0	1	.328	2	.03	3	2.383e-2	2	NC	4	NC	1
18			min	-.793	4	.009	15	-.012	2	-8.736e-4	3	1589.873	2	9233.429	4
19		10	max	0	1	.371	2	.029	3	2.513e-2	2	NC	5	NC	1
20			min	-.793	4	-.015	3	-.02	2	-6.434e-4	3	1201.064	2	NC	1
21		11	max	0	12	.328	2	.03	3	2.383e-2	2	NC	4	NC	1
22			min	-.793	4	.008	15	-.014	5	-8.736e-4	3	1589.873	2	NC	1
23		12	max	0	12	.232	2	.049	1	2.253e-2	2	NC	1	NC	2
24			min	-.793	4	.006	15	-.014	5	-1.104e-3	3	925.284	3	4325.722	1
25		13	max	0	12	.337	3	.088	1	2.123e-2	2	NC	4	NC	3
26			min	-.793	4	.003	15	-.005	5	-1.334e-3	3	554.924	3	2386.664	1
27		14	max	0	12	.455	3	.115	1	1.992e-2	2	NC	5	NC	3
28			min	-.793	4	-.014	9	.004	10	-1.564e-3	3	422.904	3	1836.502	1
29		15	max	0	12	.508	3	.12	1	1.862e-2	2	NC	5	NC	3
30			min	-.793	4	-.063	1	.006	10	-1.794e-3	3	382.124	3	1749.079	1
31		16	max	0	12	.479	3	.104	1	1.732e-2	2	NC	5	NC	3
32			min	-.793	4	-.069	1	.006	10	-2.024e-3	3	403.353	3	2024.888	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
33		17	max	0	12	.367	3	.07	1	1.602e-2	2	NC	5	NC	3
34			min	-.793	4	-.022	1	.003	10	-2.254e-3	3	514.651	3	3000.179	1
35		18	max	0	12	.184	3	.031	4	1.472e-2	2	NC	5	NC	2
36			min	-.793	4	.002	15	0	10	-2.485e-3	3	933.074	3	6649.095	4
37		19	max	0	12	.196	2	.01	3	1.342e-2	2	NC	1	NC	1
38			min	-.793	4	-.041	3	-.005	2	-2.715e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.366	3	.009	3	7.672e-3	2	NC	1	NC	1
40			min	-.589	4	-.595	2	-.005	2	-5.604e-3	3	NC	1	NC	1
41		2	max	0	1	.626	3	.02	1	8.923e-3	2	NC	5	NC	1
42			min	-.589	4	-.867	2	-.028	5	-6.639e-3	3	757.244	1	8014.424	5
43		3	max	0	1	.853	3	.054	1	1.017e-2	2	NC	5	NC	2
44			min	-.589	4	-1.111	2	-.034	5	-7.674e-3	3	401.054	1	3930.209	1
45		4	max	0	1	1.022	3	.086	1	1.142e-2	2	NC	15	NC	3
46			min	-.589	4	-1.303	2	-.024	5	-8.709e-3	3	292.891	1	2453.681	1
47		5	max	0	1	1.121	3	.104	1	1.268e-2	2	9735.078	15	NC	3
48			min	-.589	4	-1.433	2	-.006	5	-9.744e-3	3	248.385	1	2029.491	1
49		6	max	0	1	1.149	3	.102	1	1.393e-2	2	9118.332	15	NC	3
50			min	-.589	4	-1.499	2	.004	10	-1.078e-2	3	231.53	1	2072.049	1
51		7	max	0	1	1.117	3	.08	1	1.518e-2	2	9149.523	15	NC	3
52			min	-.589	4	-1.507	2	0	10	-1.181e-2	3	230.056	2	2638.326	1
53		8	max	0	1	1.046	3	.052	4	1.643e-2	2	9626.039	15	NC	2
54			min	-.589	4	-1.475	2	-.005	10	-1.285e-2	3	238.417	2	3962.085	4
55		9	max	0	1	.97	3	.035	4	1.768e-2	2	NC	15	NC	1
56			min	-.589	4	-1.429	2	-.011	2	-1.388e-2	3	251.658	2	5794.531	4
57		10	max	0	1	.933	3	.026	3	1.893e-2	2	NC	15	NC	1
58			min	-.589	4	-1.404	2	-.018	2	-1.492e-2	3	259.461	2	NC	1
59		11	max	0	12	.97	3	.026	3	1.768e-2	2	NC	15	NC	1
60			min	-.589	4	-1.429	2	-.028	5	-1.388e-2	3	251.658	2	8034.933	5
61		12	max	0	12	1.046	3	.045	1	1.643e-2	2	9625.941	15	NC	2
62			min	-.589	4	-1.475	2	-.033	5	-1.285e-2	3	238.417	2	4694.227	1
63		13	max	0	12	1.117	3	.08	1	1.518e-2	2	9149.35	15	NC	3
64			min	-.589	4	-1.507	2	-.022	5	-1.181e-2	3	230.056	2	2638.326	1
65		14	max	0	12	1.149	3	.102	1	1.393e-2	2	9118.078	15	NC	3
66			min	-.589	4	-1.499	2	-.002	5	-1.078e-2	3	231.53	1	2072.049	1
67		15	max	0	12	1.121	3	.104	1	1.268e-2	2	9734.714	15	NC	3
68			min	-.589	4	-1.433	2	.005	10	-9.744e-3	3	248.385	1	2029.491	1
69		16	max	0	12	1.022	3	.086	1	1.142e-2	2	NC	15	NC	3
70			min	-.589	4	-1.303	2	.004	10	-8.709e-3	3	292.891	1	2453.681	1
71		17	max	0	12	.853	3	.055	4	1.017e-2	2	NC	5	NC	2
72			min	-.589	4	-1.111	2	.002	10	-7.674e-3	3	401.054	1	3748.325	4
73		18	max	0	12	.626	3	.037	4	8.923e-3	2	NC	5	NC	1
74			min	-.589	4	-.867	2	-.001	10	-6.639e-3	3	757.244	1	5610.27	4
75		19	max	0	12	.366	3	.009	3	7.672e-3	2	NC	1	NC	1
76			min	-.589	4	-.595	2	-.005	2	-5.604e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.375	3	.008	3	4.687e-3	3	NC	1	NC	1
78			min	-.475	4	-.593	2	-.004	2	-7.947e-3	2	NC	1	NC	1
79		2	max	0	12	.556	3	.02	1	5.547e-3	3	NC	5	NC	1
80			min	-.475	4	-.921	2	-.039	5	-9.249e-3	2	641.836	2	5595.224	5
81		3	max	0	12	.719	3	.054	1	6.407e-3	3	NC	5	NC	2
82			min	-.475	4	-1.208	2	-.049	5	-1.055e-2	2	341.826	2	3907.615	1
83		4	max	0	12	.85	3	.087	1	7.267e-3	3	NC	15	NC	3
84			min	-.475	4	-1.427	2	-.036	5	-1.185e-2	2	251.95	2	2442.193	1
85		5	max	0	12	.941	3	.105	1	8.127e-3	3	9754.375	15	NC	3
86			min	-.475	4	-1.563	2	-.011	5	-1.316e-2	2	216.539	2	2020.426	1
87		6	max	0	12	.992	3	.103	1	8.988e-3	3	9138.682	15	NC	3
88			min	-.475	4	-1.615	2	.004	10	-1.446e-2	2	205.568	2	2061.87	1
89		7	max	0	12	1.006	3	.081	1	9.848e-3	3	9172.895	15	NC	3

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
90			min	-.475	4	-1.594	2	0	10	-1.576e-2	2	209.957	2	2621.294	1
91		8	max	0	12	.994	3	.063	4	1.071e-2	3	9654.355	15	NC	2
92			min	-.475	4	-1.524	2	-.004	10	-1.706e-2	2	225.73	2	3268.618	4
93		9	max	0	12	.97	3	.045	4	1.157e-2	3	NC	15	NC	1
94			min	-.475	4	-1.443	2	-.01	2	-1.837e-2	2	247.169	2	4605.696	4
95		10	max	0	1	.956	3	.024	3	1.243e-2	3	NC	15	NC	1
96			min	-.475	4	-1.402	2	-.017	2	-1.967e-2	2	259.589	2	NC	1
97		11	max	0	1	.97	3	.024	3	1.157e-2	3	NC	15	NC	1
98			min	-.475	4	-1.443	2	-.037	5	-1.837e-2	2	247.169	2	5894.902	5
99		12	max	0	1	.994	3	.046	1	1.071e-2	3	9654.28	15	NC	2
100			min	-.475	4	-1.524	2	-.044	5	-1.706e-2	2	225.73	2	4640.159	1
101		13	max	0	1	1.006	3	.081	1	9.848e-3	3	9172.768	15	NC	3
102			min	-.475	4	-1.594	2	-.029	5	-1.576e-2	2	209.957	2	2621.294	1
103		14	max	0	1	.992	3	.103	1	8.988e-3	3	9138.497	15	NC	3
104			min	-.475	4	-1.615	2	-.003	5	-1.446e-2	2	205.568	2	2061.87	1
105		15	max	0	1	.941	3	.105	1	8.127e-3	3	9754.115	15	NC	3
106			min	-.475	4	-1.563	2	.006	10	-1.316e-2	2	216.539	2	2020.426	1
107		16	max	0	1	.85	3	.087	1	7.267e-3	3	NC	15	NC	3
108			min	-.475	4	-1.427	2	.005	10	-1.185e-2	2	251.95	2	2442.193	1
109		17	max	0	1	.719	3	.07	4	6.407e-3	3	NC	5	NC	2
110			min	-.475	4	-1.208	2	.002	10	-1.055e-2	2	341.826	2	2974.581	4
111		18	max	0	1	.556	3	.048	4	5.547e-3	3	NC	5	NC	1
112			min	-.475	4	-.921	2	-.001	10	-9.249e-3	2	641.836	2	4310.736	4
113		19	max	0	1	.375	3	.008	3	4.687e-3	3	NC	1	NC	1
114			min	-.475	4	-.593	2	-.004	2	-7.947e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.181	1	.007	3	8.797e-3	3	NC	1	NC	1
116			min	-.14	4	-.131	3	-.004	2	-1.174e-2	1	NC	1	NC	1
117		2	max	0	12	.032	1	.03	1	9.895e-3	3	NC	5	NC	2
118			min	-.14	4	-.072	3	-.028	5	-1.271e-2	1	1231.32	2	7135.816	1
119		3	max	0	12	.002	13	.07	1	1.099e-2	3	NC	5	NC	3
120			min	-.14	4	-.128	2	-.036	5	-1.368e-2	1	688.634	2	3015.252	1
121		4	max	0	12	0	15	.104	1	1.209e-2	3	NC	5	NC	3
122			min	-.14	4	-.203	2	-.028	5	-1.466e-2	1	553.932	2	2027.109	1
123		5	max	0	12	0	15	.121	1	1.319e-2	3	NC	5	NC	3
124			min	-.14	4	-.205	2	-.012	5	-1.563e-2	1	549.657	2	1744.788	1
125		6	max	0	12	.003	13	.116	1	1.429e-2	3	NC	5	NC	3
126			min	-.14	4	-.139	2	.004	15	-1.66e-2	1	664.606	2	1823.73	1
127		7	max	0	12	.034	9	.09	1	1.538e-2	3	NC	3	NC	3
128			min	-.14	4	-.125	3	.003	10	-1.757e-2	1	1070.4	2	2351.211	1
129		8	max	0	12	.161	1	.051	1	1.648e-2	3	NC	1	NC	2
130			min	-.14	4	-.196	3	-.003	10	-1.854e-2	1	3206.619	3	4171.317	1
131		9	max	0	12	.278	1	.029	4	1.758e-2	3	NC	4	NC	1
132			min	-.14	4	-.258	3	-.008	2	-1.951e-2	1	1656.219	3	7139.911	4
133		10	max	0	1	.33	1	.021	3	1.868e-2	3	NC	5	NC	1
134			min	-.14	4	-.285	3	-.016	2	-2.049e-2	1	1365.595	3	NC	1
135		11	max	0	1	.278	1	.021	3	1.758e-2	3	NC	4	NC	1
136			min	-.14	4	-.258	3	-.021	5	-1.951e-2	1	1656.219	3	NC	1
137		12	max	0	1	.161	1	.051	1	1.648e-2	3	NC	1	NC	2
138			min	-.14	4	-.196	3	-.022	5	-1.854e-2	1	3206.619	3	4171.317	1
139		13	max	0	1	.034	9	.09	1	1.538e-2	3	NC	3	NC	3
140			min	-.14	4	-.125	3	-.01	5	-1.757e-2	1	1070.4	2	2351.211	1
141		14	max	0	1	.003	13	.116	1	1.429e-2	3	NC	5	NC	3
142			min	-.14	4	-.139	2	.006	15	-1.66e-2	1	664.606	2	1823.73	1
143		15	max	0	1	0	15	.121	1	1.319e-2	3	NC	5	NC	3
144			min	-.14	4	-.205	2	.008	10	-1.563e-2	1	549.657	2	1744.788	1
145		16	max	0	1	-.001	15	.104	1	1.209e-2	3	NC	5	NC	3
146			min	-.14	4	-.203	2	.007	10	-1.466e-2	1	553.932	2	2027.109	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
147		17	max	0	1	.001	13	.07	1	1.099e-2	3	NC	5	NC	3
148			min	-.14	4	-.128	2	.004	10	-1.368e-2	1	688.634	2	3015.252	1
149		18	max	0	1	.032	1	.04	4	9.895e-3	3	NC	5	NC	2
150			min	-.14	4	-.072	3	0	10	-1.271e-2	1	1231.32	2	5198.237	4
151		19	max	0	1	.181	1	.007	3	8.797e-3	3	NC	1	NC	1
152			min	-.14	4	-.131	3	-.004	2	-1.174e-2	1	NC	1	NC	1
153	M2	1	max	.007	1	.008	2	.01	1	2.456e-3	5	NC	1	NC	2
154			min	-.009	3	-.014	3	-.743	4	-2.319e-4	1	8161.083	2	93.065	4
155		2	max	.007	1	.007	2	.009	1	2.486e-3	5	NC	1	NC	2
156			min	-.008	3	-.013	3	-.682	4	-2.189e-4	1	9539.056	2	101.366	4
157		3	max	.006	1	.006	2	.009	1	2.516e-3	5	NC	1	NC	2
158			min	-.008	3	-.013	3	-.621	4	-2.058e-4	1	NC	1	111.229	4
159		4	max	.006	1	.005	2	.008	1	2.546e-3	5	NC	1	NC	2
160			min	-.007	3	-.012	3	-.562	4	-1.928e-4	1	NC	1	123.064	4
161		5	max	.006	1	.004	2	.007	1	2.576e-3	5	NC	1	NC	1
162			min	-.007	3	-.012	3	-.503	4	-1.798e-4	1	NC	1	137.429	4
163		6	max	.005	1	.003	2	.006	1	2.606e-3	5	NC	1	NC	1
164			min	-.006	3	-.011	3	-.446	4	-1.668e-4	1	NC	1	155.094	4
165		7	max	.005	1	.002	2	.005	1	2.636e-3	5	NC	1	NC	1
166			min	-.006	3	-.011	3	-.39	4	-1.537e-4	1	NC	1	177.158	4
167		8	max	.004	1	0	2	.005	1	2.668e-3	4	NC	1	NC	1
168			min	-.005	3	-.01	3	-.337	4	-1.407e-4	1	NC	1	205.223	4
169		9	max	.004	1	0	2	.004	1	2.702e-3	4	NC	1	NC	1
170			min	-.005	3	-.01	3	-.286	4	-1.277e-4	1	NC	1	241.707	4
171		10	max	.004	1	0	15	.003	1	2.736e-3	4	NC	1	NC	1
172			min	-.004	3	-.009	3	-.238	4	-1.147e-4	1	NC	1	290.395	4
173		11	max	.003	1	0	15	.003	1	2.77e-3	4	NC	1	NC	1
174			min	-.004	3	-.008	3	-.193	4	-1.016e-4	1	NC	1	357.496	4
175		12	max	.003	1	0	15	.002	1	2.804e-3	4	NC	1	NC	1
176			min	-.003	3	-.008	3	-.152	4	-8.86e-5	1	NC	1	453.788	4
177		13	max	.002	1	0	15	.002	1	2.838e-3	4	NC	1	NC	1
178			min	-.003	3	-.007	3	-.115	4	-7.557e-5	1	NC	1	599.351	4
179		14	max	.002	1	0	15	.001	1	2.872e-3	4	NC	1	NC	1
180			min	-.002	3	-.006	3	-.083	4	-6.255e-5	1	NC	1	835.264	4
181		15	max	.002	1	0	15	0	1	2.906e-3	4	NC	1	NC	1
182			min	-.002	3	-.005	3	-.055	4	-4.952e-5	1	NC	1	1256.922	4
183		16	max	.001	1	0	15	0	1	2.939e-3	4	NC	1	NC	1
184			min	-.001	3	-.004	3	-.032	4	-3.649e-5	1	NC	1	2130.932	4
185		17	max	0	1	0	15	0	1	2.973e-3	4	NC	1	NC	1
186			min	0	3	-.003	3	-.015	4	-2.347e-5	1	NC	1	4463.681	4
187		18	max	0	1	0	15	0	1	3.007e-3	4	NC	1	NC	1
188			min	0	3	-.001	6	-.005	4	-1.044e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.041e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-2.766e-7	3	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-5.581e-8	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-6.313e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.016	4	7.934e-5	4	NC	1	NC	1
194			min	0	2	-.003	6	0	3	1.467e-6	12	NC	1	NC	1
195		3	max	0	3	-.001	15	.032	4	7.9e-4	4	NC	1	NC	1
196			min	0	2	-.005	6	0	3	2.989e-6	12	NC	1	NC	1
197		4	max	.001	3	-.002	15	.047	4	1.501e-3	4	NC	1	NC	1
198			min	0	2	-.008	6	0	12	4.512e-6	12	NC	1	8889.584	5
199		5	max	.002	3	-.002	15	.06	4	2.211e-3	4	NC	1	NC	1
200			min	-.001	2	-.011	6	0	12	6.034e-6	12	8976.75	6	7563.226	5
201		6	max	.002	3	-.003	15	.073	4	2.922e-3	4	NC	2	NC	1
202			min	-.002	2	-.014	6	0	12	7.557e-6	12	7232.85	6	6964.658	5
203		7	max	.002	3	-.004	15	.085	4	3.633e-3	4	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
204			min	-.002	2	-.017	6	0	12	9.079e-6	12	6184.735	6	6796.538	5
205		8	max	.003	3	-.004	15	.097	4	4.343e-3	4	NC	5	NC	1
206			min	-.002	2	-.018	6	0	12	1.06e-5	12	5537.84	6	6964.457	5
207		9	max	.003	3	-.004	15	.107	4	5.054e-3	4	NC	5	NC	1
208			min	-.003	2	-.02	6	0	12	1.212e-5	12	5153.677	6	7473.167	5
209		10	max	.004	3	-.005	15	.118	4	5.764e-3	4	NC	5	NC	1
210			min	-.003	2	-.021	6	0	12	1.365e-5	12	4964.867	6	8414.399	5
211		11	max	.004	3	-.005	15	.127	4	6.475e-3	4	NC	5	NC	1
212			min	-.003	2	-.021	6	0	12	1.517e-5	12	4943.433	6	NC	1
213		12	max	.005	3	-.004	15	.137	4	7.186e-3	4	NC	5	NC	1
214			min	-.004	2	-.02	6	0	12	1.669e-5	12	5090.053	6	NC	1
215		13	max	.005	3	-.004	15	.146	4	7.896e-3	4	NC	5	NC	1
216			min	-.004	2	-.019	6	0	12	1.821e-5	12	5435.677	6	NC	1
217		14	max	.005	3	-.004	15	.156	4	8.607e-3	4	NC	5	NC	1
218			min	-.004	2	-.017	6	0	12	1.974e-5	12	6057.735	6	NC	1
219		15	max	.006	3	-.003	15	.166	4	9.318e-3	4	NC	3	NC	1
220			min	-.005	2	-.014	6	0	12	2.126e-5	12	7128.493	6	NC	1
221		16	max	.006	3	-.002	15	.176	4	1.003e-2	4	NC	1	NC	1
222			min	-.005	2	-.011	6	0	12	2.278e-5	12	9065.655	6	NC	1
223		17	max	.007	3	-.001	15	.187	4	1.074e-2	4	NC	1	NC	1
224			min	-.005	2	-.008	1	0	12	2.43e-5	12	NC	1	NC	1
225		18	max	.007	3	0	15	.199	4	1.145e-2	4	NC	1	NC	1
226			min	-.006	2	-.005	1	0	12	2.583e-5	12	NC	1	NC	1
227		19	max	.007	3	0	5	.212	4	1.216e-2	4	NC	1	NC	1
228			min	-.006	2	-.002	1	0	12	2.735e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.006	2	0	12	1.274e-4	1	NC	1	NC	3
230			min	0	3	-.008	3	-.212	4	-6.078e-4	5	NC	1	116.93	4
231		2	max	.003	1	.005	2	0	12	1.274e-4	1	NC	1	NC	3
232			min	0	3	-.007	3	-.195	4	-6.078e-4	5	NC	1	127.237	4
233		3	max	.002	1	.005	2	0	12	1.274e-4	1	NC	1	NC	3
234			min	0	3	-.007	3	-.178	4	-6.078e-4	5	NC	1	139.499	4
235		4	max	.002	1	.005	2	0	12	1.274e-4	1	NC	1	NC	3
236			min	0	3	-.006	3	-.161	4	-6.078e-4	5	NC	1	154.223	4
237		5	max	.002	1	.004	2	0	12	1.274e-4	1	NC	1	NC	3
238			min	0	3	-.006	3	-.144	4	-6.078e-4	5	NC	1	172.101	4
239		6	max	.002	1	.004	2	0	12	1.274e-4	1	NC	1	NC	2
240			min	0	3	-.005	3	-.128	4	-6.078e-4	5	NC	1	194.091	4
241		7	max	.002	1	.004	2	0	12	1.274e-4	1	NC	1	NC	2
242			min	0	3	-.005	3	-.112	4	-6.078e-4	5	NC	1	221.554	4
243		8	max	.002	1	.003	2	0	12	1.274e-4	1	NC	1	NC	2
244			min	0	3	-.005	3	-.097	4	-6.078e-4	5	NC	1	256.474	4
245		9	max	.002	1	.003	2	0	12	1.274e-4	1	NC	1	NC	2
246			min	0	3	-.004	3	-.082	4	-6.078e-4	5	NC	1	301.837	4
247		10	max	.001	1	.003	2	0	12	1.274e-4	1	NC	1	NC	2
248			min	0	3	-.004	3	-.068	4	-6.078e-4	5	NC	1	362.313	4
249		11	max	.001	1	.002	2	0	12	1.274e-4	1	NC	1	NC	2
250			min	0	3	-.003	3	-.056	4	-6.078e-4	5	NC	1	445.542	4
251		12	max	.001	1	.002	2	0	12	1.274e-4	1	NC	1	NC	1
252			min	0	3	-.003	3	-.044	4	-6.078e-4	5	NC	1	564.739	4
253		13	max	0	1	.002	2	0	12	1.274e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	-.033	4	-6.078e-4	5	NC	1	744.436	4
255		14	max	0	1	.002	2	0	12	1.274e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.024	4	-6.078e-4	5	NC	1	1034.544	4
257		15	max	0	1	.001	2	0	12	1.274e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	-.016	4	-6.078e-4	5	NC	1	1550.125	4
259		16	max	0	1	0	2	0	12	1.274e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	-.01	4	-6.078e-4	5	NC	1	2609.288	4

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
261		17	max	0	1	0	2	0	12	1.274e-4	1	NC	1	NC	1
262			min	0	3	0	3	-.005	4	-6.078e-4	5	NC	1	5391.667	4
263		18	max	0	1	0	2	0	12	1.274e-4	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-6.078e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.274e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-6.078e-4	5	NC	1	NC	1
267	M6	1	max	.022	1	.03	2	0	1	2.577e-3	4	NC	3	NC	1
268			min	-.028	3	-.042	3	-.75	4	0	1	2275.603	2	92.098	4
269		2	max	.021	1	.028	2	0	1	2.605e-3	4	NC	3	NC	1
270			min	-.026	3	-.04	3	-.689	4	0	1	2496.673	2	100.312	4
271		3	max	.02	1	.025	2	0	1	2.632e-3	4	NC	3	NC	1
272			min	-.024	3	-.038	3	-.628	4	0	1	2763.155	2	110.074	4
273		4	max	.018	1	.022	2	0	1	2.659e-3	4	NC	3	NC	1
274			min	-.023	3	-.035	3	-.567	4	0	1	3087.944	2	121.788	4
275		5	max	.017	1	.02	2	0	1	2.686e-3	4	NC	3	NC	1
276			min	-.021	3	-.033	3	-.508	4	0	1	3489.01	2	136.004	4
277		6	max	.016	1	.017	2	0	1	2.714e-3	4	NC	3	NC	1
278			min	-.02	3	-.031	3	-.45	4	0	1	3992.009	2	153.488	4
279		7	max	.015	1	.015	2	0	1	2.741e-3	4	NC	3	NC	1
280			min	-.018	3	-.028	3	-.394	4	0	1	4634.607	2	175.325	4
281		8	max	.014	1	.013	2	0	1	2.768e-3	4	NC	1	NC	1
282			min	-.017	3	-.026	3	-.34	4	0	1	5473.969	2	203.103	4
283		9	max	.012	1	.01	2	0	1	2.796e-3	4	NC	1	NC	1
284			min	-.015	3	-.024	3	-.289	4	0	1	6600.347	2	239.213	4
285		10	max	.011	1	.008	2	0	1	2.823e-3	4	NC	1	NC	1
286			min	-.014	3	-.021	3	-.24	4	0	1	8163.264	2	287.402	4
287		11	max	.01	1	.007	2	0	1	2.85e-3	4	NC	1	NC	1
288			min	-.012	3	-.019	3	-.195	4	0	1	NC	1	353.818	4
289		12	max	.009	1	.005	2	0	1	2.878e-3	4	NC	1	NC	1
290			min	-.011	3	-.017	3	-.154	4	0	1	NC	1	449.126	4
291		13	max	.007	1	.004	2	0	1	2.905e-3	4	NC	1	NC	1
292			min	-.009	3	-.014	3	-.116	4	0	1	NC	1	593.205	4
293		14	max	.006	1	.002	2	0	1	2.932e-3	4	NC	1	NC	1
294			min	-.008	3	-.012	3	-.084	4	0	1	NC	1	826.716	4
295		15	max	.005	1	.001	2	0	1	2.96e-3	4	NC	1	NC	1
296			min	-.006	3	-.01	3	-.056	4	0	1	NC	1	1244.088	4
297		16	max	.004	1	0	2	0	1	2.987e-3	4	NC	1	NC	1
298			min	-.005	3	-.007	3	-.033	4	0	1	NC	1	2109.24	4
299		17	max	.002	1	0	2	0	1	3.014e-3	4	NC	1	NC	1
300			min	-.003	3	-.005	3	-.016	4	0	1	NC	1	4418.445	4
301		18	max	.001	1	0	2	0	1	3.042e-3	4	NC	1	NC	1
302			min	-.002	3	-.002	3	-.005	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.069e-3	4	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	-6.369e-4	4	NC	1	NC	1
307		2	max	.001	3	0	15	.017	4	5.202e-5	4	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	.032	4	7.41e-4	4	NC	1	NC	1
310			min	-.002	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.002	15	.047	4	1.43e-3	4	NC	1	NC	1
312			min	-.004	2	-.01	3	0	1	0	1	NC	1	7859.191	4
313		5	max	.005	3	-.003	15	.061	4	2.119e-3	4	NC	1	NC	1
314			min	-.005	2	-.013	3	0	1	0	1	8475.34	3	6616.63	4
315		6	max	.006	3	-.003	15	.074	4	2.808e-3	4	NC	1	NC	1
316			min	-.006	2	-.016	3	0	1	0	1	7129.233	3	6017.203	4
317		7	max	.008	3	-.004	15	.086	4	3.497e-3	4	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
318			min	-.007	2	-.018	3	0	1	0	1	6201.443	4	5783.714	4
319		8	max	.009	3	-.004	15	.097	4	4.186e-3	4	NC	2	NC	1
320			min	-.008	2	-.019	3	0	1	0	1	5551.685	4	5816.863	4
321		9	max	.01	3	-.005	15	.107	4	4.875e-3	4	NC	5	NC	1
322			min	-.009	2	-.02	4	0	1	0	1	5165.704	4	6095.832	4
323		10	max	.011	3	-.005	15	.117	4	5.564e-3	4	NC	5	NC	1
324			min	-.011	2	-.021	4	0	1	0	1	4975.763	4	6654.717	4
325		11	max	.013	3	-.005	15	.127	4	6.252e-3	4	NC	5	NC	1
326			min	-.012	2	-.021	4	0	1	0	1	4953.706	4	7592.159	4
327		12	max	.014	3	-.005	15	.136	4	6.941e-3	4	NC	5	NC	1
328			min	-.013	2	-.021	4	0	1	0	1	5100.131	4	9117.81	4
329		13	max	.015	3	-.005	15	.145	4	7.63e-3	4	NC	5	NC	1
330			min	-.014	2	-.02	4	0	1	0	1	5445.993	4	NC	1
331		14	max	.016	3	-.004	15	.154	4	8.319e-3	4	NC	2	NC	1
332			min	-.015	2	-.018	4	0	1	0	1	6068.819	4	NC	1
333		15	max	.018	3	-.004	15	.163	4	9.008e-3	4	NC	1	NC	1
334			min	-.017	2	-.016	3	0	1	0	1	7141.141	4	NC	1
335		16	max	.019	3	-.003	15	.172	4	9.697e-3	4	NC	1	NC	1
336			min	-.018	2	-.013	3	0	1	0	1	9081.345	4	NC	1
337		17	max	.02	3	-.002	15	.182	4	1.039e-2	4	NC	1	NC	1
338			min	-.019	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.021	3	-.001	15	.192	4	1.108e-2	4	NC	1	NC	1
340			min	-.02	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.023	3	0	15	.204	4	1.176e-2	4	NC	1	NC	1
342			min	-.021	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.02	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.023	3	-.204	4	-7.603e-4	4	NC	1	121.526	4
345		2	max	.007	1	.019	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.022	3	-.188	4	-7.603e-4	4	NC	1	132.254	4
347		3	max	.006	1	.018	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.021	3	-.171	4	-7.603e-4	4	NC	1	145.014	4
349		4	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.019	3	-.155	4	-7.603e-4	4	NC	1	160.337	4
351		5	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.018	3	-.139	4	-7.603e-4	4	NC	1	178.94	4
353		6	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.017	3	-.123	4	-7.603e-4	4	NC	1	201.823	4
355		7	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.015	3	-.108	4	-7.603e-4	4	NC	1	230.399	4
357		8	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.014	3	-.093	4	-7.603e-4	4	NC	1	266.734	4
359		9	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	-.079	4	-7.603e-4	4	NC	1	313.936	4
361		10	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	-.066	4	-7.603e-4	4	NC	1	376.865	4
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	-.054	4	-7.603e-4	4	NC	1	463.469	4
365		12	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	-.042	4	-7.603e-4	4	NC	1	587.504	4
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	-.032	4	-7.603e-4	4	NC	1	774.497	4
369		14	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	-.023	4	-7.603e-4	4	NC	1	1076.391	4
371		15	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	-.015	4	-7.603e-4	4	NC	1	1612.935	4
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	-.009	4	-7.603e-4	4	NC	1	2715.208	4

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
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	-.004	4	-7.603e-4	4	NC	1	5610.997	4
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-7.603e-4	4	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	-7.603e-4	4	NC	1	NC	1
381	M10	1	max	.007	1	.008	2	0	12	2.562e-3	4	NC	1	NC	2
382			min	-.009	3	-.014	3	-.748	4	1.541e-5	12	8161.083	2	92.344	4
383		2	max	.007	1	.007	2	0	12	2.588e-3	4	NC	1	NC	2
384			min	-.008	3	-.013	3	-.687	4	1.456e-5	12	9539.056	2	100.581	4
385		3	max	.006	1	.006	2	0	12	2.615e-3	4	NC	1	NC	2
386			min	-.008	3	-.013	3	-.626	4	1.371e-5	12	NC	1	110.369	4
387		4	max	.006	1	.005	2	0	12	2.641e-3	4	NC	1	NC	2
388			min	-.007	3	-.012	3	-.566	4	1.287e-5	12	NC	1	122.114	4
389		5	max	.006	1	.004	2	0	12	2.668e-3	4	NC	1	NC	1
390			min	-.007	3	-.012	3	-.507	4	1.202e-5	12	NC	1	136.369	4
391		6	max	.005	1	.003	2	0	12	2.694e-3	4	NC	1	NC	1
392			min	-.006	3	-.011	3	-.449	4	1.117e-5	12	NC	1	153.901	4
393		7	max	.005	1	.002	2	0	12	2.721e-3	4	NC	1	NC	1
394			min	-.006	3	-.011	3	-.393	4	1.032e-5	12	NC	1	175.798	4
395		8	max	.004	1	0	2	0	12	2.747e-3	4	NC	1	NC	1
396			min	-.005	3	-.01	3	-.339	4	9.477e-6	12	NC	1	203.651	4
397		9	max	.004	1	0	2	0	12	2.774e-3	4	NC	1	NC	1
398			min	-.005	3	-.01	3	-.288	4	8.63e-6	12	NC	1	239.861	4
399		10	max	.004	1	0	2	0	12	2.801e-3	4	NC	1	NC	1
400			min	-.004	3	-.009	3	-.24	4	7.782e-6	12	NC	1	288.184	4
401		11	max	.003	1	-.001	2	0	12	2.827e-3	4	NC	1	NC	1
402			min	-.004	3	-.008	3	-.195	4	6.935e-6	12	NC	1	354.786	4
403		12	max	.003	1	-.002	2	0	12	2.854e-3	4	NC	1	NC	1
404			min	-.003	3	-.008	3	-.153	4	6.088e-6	12	NC	1	450.364	4
405		13	max	.002	1	-.002	15	0	12	2.88e-3	4	NC	1	NC	1
406			min	-.003	3	-.007	3	-.116	4	5.24e-6	12	NC	1	594.857	4
407		14	max	.002	1	-.002	15	0	12	2.907e-3	4	NC	1	NC	1
408			min	-.002	3	-.006	3	-.083	4	4.393e-6	12	NC	1	829.05	4
409		15	max	.002	1	-.001	15	0	12	2.933e-3	4	NC	1	NC	1
410			min	-.002	3	-.005	4	-.055	4	3.546e-6	12	NC	1	1247.675	4
411		16	max	.001	1	-.001	15	0	12	2.96e-3	4	NC	1	NC	1
412			min	-.001	3	-.004	4	-.033	4	2.699e-6	12	NC	1	2115.527	4
413		17	max	0	1	0	15	0	12	2.986e-3	4	NC	1	NC	1
414			min	0	3	-.003	4	-.016	4	1.851e-6	12	NC	1	4432.429	4
415		18	max	0	1	0	15	0	12	3.013e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.005	4	8.738e-7	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.039e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.584e-6	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	2.14e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-6.3e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.016	4	6.786e-5	5	NC	1	NC	1
422			min	0	2	-.003	4	0	1	-2.571e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	.032	4	7.596e-4	4	NC	1	NC	1
424			min	0	2	-.006	4	0	1	-5.356e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	.047	4	1.454e-3	4	NC	1	NC	1
426			min	0	2	-.009	4	0	1	-8.14e-5	1	NC	1	8437.578	4
427		5	max	.002	3	-.003	15	.06	4	2.149e-3	4	NC	1	NC	1
428			min	-.001	2	-.012	4	0	1	-1.093e-4	1	8617.02	4	7153.39	4
429		6	max	.002	3	-.004	15	.073	4	2.844e-3	4	NC	2	NC	1
430			min	-.002	2	-.015	4	0	1	-1.371e-4	1	6969.257	4	6558.98	4
431		7	max	.002	3	-.004	15	.085	4	3.539e-3	4	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
432			min	-.002	2	-.018	4	0	1	-1.649e-4	1	5977.503	4	6366.656	4
433		8	max	.003	3	-.005	15	.096	4	4.233e-3	4	NC	5	NC	1
434			min	-.002	2	-.02	4	0	1	-1.928e-4	1	5365.647	4	6480.249	4
435		9	max	.003	3	-.005	15	.107	4	4.928e-3	4	NC	5	NC	1
436			min	-.003	2	-.021	4	-.001	1	-2.206e-4	1	5003.769	4	6893.352	4
437		10	max	.004	3	-.005	15	.117	4	5.623e-3	4	NC	5	NC	1
438			min	-.003	2	-.022	4	-.002	1	-2.485e-4	1	4828.799	4	7671.678	4
439		11	max	.004	3	-.005	15	.126	4	6.318e-3	4	NC	5	NC	1
440			min	-.003	2	-.022	4	-.002	1	-2.763e-4	1	4814.95	4	8980.985	4
441		12	max	.005	3	-.005	15	.135	4	7.013e-3	4	NC	5	NC	1
442			min	-.004	2	-.021	4	-.003	1	-3.042e-4	1	4963.832	4	NC	1
443		13	max	.005	3	-.005	15	.145	4	7.707e-3	4	NC	5	NC	1
444			min	-.004	2	-.02	4	-.003	1	-3.32e-4	1	5306.33	4	NC	1
445		14	max	.005	3	-.005	15	.154	4	8.402e-3	4	NC	5	NC	1
446			min	-.004	2	-.018	4	-.004	1	-3.599e-4	1	5918.632	4	NC	1
447		15	max	.006	3	-.004	15	.163	4	9.097e-3	4	NC	3	NC	1
448			min	-.005	2	-.016	4	-.005	1	-3.877e-4	1	6969.645	4	NC	1
449		16	max	.006	3	-.003	15	.173	4	9.792e-3	4	NC	1	NC	1
450			min	-.005	2	-.013	4	-.006	1	-4.156e-4	1	8868.484	4	NC	1
451		17	max	.007	3	-.002	15	.183	4	1.049e-2	4	NC	1	NC	1
452			min	-.005	2	-.009	4	-.007	1	-4.434e-4	1	NC	1	NC	1
453		18	max	.007	3	-.002	15	.194	4	1.118e-2	4	NC	1	NC	1
454			min	-.006	2	-.005	4	-.008	1	-4.713e-4	1	NC	1	NC	1
455		19	max	.007	3	0	10	.207	4	1.188e-2	4	NC	1	NC	1
456			min	-.006	2	-.002	1	-.01	1	-4.991e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.006	2	.01	1	-7.524e-6	12	NC	1	NC	3
458			min	0	3	-.008	3	-.207	4	-6.61e-4	4	NC	1	120.002	4
459		2	max	.003	1	.005	2	.009	1	-7.524e-6	12	NC	1	NC	3
460			min	0	3	-.007	3	-.19	4	-6.61e-4	4	NC	1	130.585	4
461		3	max	.002	1	.005	2	.008	1	-7.524e-6	12	NC	1	NC	3
462			min	0	3	-.007	3	-.173	4	-6.61e-4	4	NC	1	143.175	4
463		4	max	.002	1	.005	2	.007	1	-7.524e-6	12	NC	1	NC	3
464			min	0	3	-.006	3	-.157	4	-6.61e-4	4	NC	1	158.293	4
465		5	max	.002	1	.004	2	.007	1	-7.524e-6	12	NC	1	NC	3
466			min	0	3	-.006	3	-.14	4	-6.61e-4	4	NC	1	176.649	4
467		6	max	.002	1	.004	2	.006	1	-7.524e-6	12	NC	1	NC	2
468			min	0	3	-.005	3	-.124	4	-6.61e-4	4	NC	1	199.226	4
469		7	max	.002	1	.004	2	.005	1	-7.524e-6	12	NC	1	NC	2
470			min	0	3	-.005	3	-.109	4	-6.61e-4	4	NC	1	227.422	4
471		8	max	.002	1	.003	2	.004	1	-7.524e-6	12	NC	1	NC	2
472			min	0	3	-.005	3	-.094	4	-6.61e-4	4	NC	1	263.274	4
473		9	max	.002	1	.003	2	.004	1	-7.524e-6	12	NC	1	NC	2
474			min	0	3	-.004	3	-.08	4	-6.61e-4	4	NC	1	309.848	4
475		10	max	.001	1	.003	2	.003	1	-7.524e-6	12	NC	1	NC	2
476			min	0	3	-.004	3	-.067	4	-6.61e-4	4	NC	1	371.939	4
477		11	max	.001	1	.002	2	.003	1	-7.524e-6	12	NC	1	NC	2
478			min	0	3	-.003	3	-.054	4	-6.61e-4	4	NC	1	457.39	4
479		12	max	.001	1	.002	2	.002	1	-7.524e-6	12	NC	1	NC	1
480			min	0	3	-.003	3	-.043	4	-6.61e-4	4	NC	1	579.771	4
481		13	max	0	1	.002	2	.002	1	-7.524e-6	12	NC	1	NC	1
482			min	0	3	-.003	3	-.032	4	-6.61e-4	4	NC	1	764.269	4
483		14	max	0	1	.002	2	.001	1	-7.524e-6	12	NC	1	NC	1
484			min	0	3	-.002	3	-.023	4	-6.61e-4	4	NC	1	1062.13	4
485		15	max	0	1	.001	2	0	1	-7.524e-6	12	NC	1	NC	1
486			min	0	3	-.002	3	-.016	4	-6.61e-4	4	NC	1	1591.496	4
487		16	max	0	1	0	2	0	1	-7.524e-6	12	NC	1	NC	1
488			min	0	3	-.001	3	-.009	4	-6.61e-4	4	NC	1	2678.991	4

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
489		17	max	0	1	0	2	0	1	-7.524e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-6.61e-4	4	NC	1	5535.855	4
491		18	max	0	1	0	2	0	1	-7.524e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-6.61e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.524e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.61e-4	4	NC	1	NC	1
495	M1	1	max	.01	3	.196	2	.793	4	1.066e-2	1	NC	1	NC	1
496			min	-.005	2	-.041	3	0	12	-2.001e-2	3	NC	1	NC	1
497		2	max	.01	3	.096	2	.768	4	8.877e-3	4	NC	5	NC	1
498			min	-.005	2	-.02	3	-.007	1	-9.932e-3	3	1348.411	2	NC	1
499		3	max	.01	3	.014	3	.742	4	1.559e-2	4	NC	5	NC	1
500			min	-.005	2	-.012	2	-.01	1	-2.106e-4	1	651.516	2	5595.762	5
501		4	max	.009	3	.069	3	.715	4	1.351e-2	4	NC	15	NC	1
502			min	-.005	2	-.131	2	-.01	1	-4.322e-3	3	413.204	2	4033.131	5
503		5	max	.009	3	.139	3	.688	4	1.142e-2	4	NC	15	NC	1
504			min	-.005	2	-.256	2	-.007	1	-8.54e-3	3	299.247	2	3240.782	5
505		6	max	.009	3	.214	3	.66	4	1.34e-2	1	7965.14	15	NC	1
506			min	-.005	2	-.376	2	-.003	1	-1.276e-2	3	236.287	2	2756.658	5
507		7	max	.009	3	.287	3	.631	4	1.793e-2	1	6722.516	15	NC	1
508			min	-.005	2	-.484	2	0	3	-1.698e-2	3	199.048	2	2411.456	4
509		8	max	.009	3	.347	3	.601	4	2.247e-2	1	5986.863	15	NC	1
510			min	-.005	2	-.569	2	0	12	-2.119e-2	3	176.993	2	2150.147	4
511		9	max	.008	3	.387	3	.57	4	2.478e-2	2	5601.865	15	NC	1
512			min	-.005	2	-.622	2	0	1	-2.156e-2	3	165.489	2	1974.655	4
513		10	max	.008	3	.401	3	.536	4	2.63e-2	2	5484.172	15	NC	1
514			min	-.005	2	-.64	2	0	12	-1.935e-2	3	162.104	2	1918.511	4
515		11	max	.008	3	.392	3	.499	4	2.781e-2	2	5601.613	15	NC	1
516			min	-.004	2	-.622	2	0	12	-1.715e-2	3	166.013	2	1952.836	4
517		12	max	.008	3	.359	3	.458	4	2.66e-2	2	5986.264	15	NC	1
518			min	-.004	2	-.567	2	-.001	1	-1.465e-2	3	178.548	2	2082.508	4
519		13	max	.008	3	.306	3	.412	4	2.134e-2	2	6721.346	15	NC	1
520			min	-.004	2	-.478	2	0	1	-1.172e-2	3	202.748	2	2467.19	4
521		14	max	.007	3	.238	3	.361	4	1.608e-2	2	7962.99	15	NC	1
522			min	-.004	2	-.367	2	0	12	-8.792e-3	3	244.075	2	3334.483	4
523		15	max	.007	3	.162	3	.31	4	1.083e-2	2	NC	15	NC	1
524			min	-.004	2	-.245	2	0	12	-5.863e-3	3	315.051	2	5428.006	4
525		16	max	.007	3	.082	3	.259	4	9.729e-3	4	NC	15	NC	1
526			min	-.004	2	-.121	2	0	12	-2.934e-3	3	446.004	2	NC	1
527		17	max	.007	3	.005	3	.213	4	1.096e-2	4	NC	5	NC	1
528			min	-.004	2	-.006	2	0	12	-4.67e-6	3	719.453	1	NC	1
529		18	max	.007	3	.093	1	.173	4	7.661e-3	2	NC	5	NC	1
530			min	-.004	2	-.065	3	0	12	-2.625e-3	3	1511.796	1	NC	1
531		19	max	.007	3	.181	1	.14	4	1.524e-2	2	NC	1	NC	1
532			min	-.004	2	-.131	3	0	1	-5.345e-3	3	NC	1	NC	1
533	M5	1	max	.029	3	.371	2	.793	4	0	1	NC	1	NC	1
534			min	-.02	2	-.015	3	0	1	-9.771e-6	4	NC	1	NC	1
535		2	max	.029	3	.181	2	.774	4	7.985e-3	4	NC	5	NC	1
536			min	-.02	2	-.006	3	0	1	0	1	717.195	2	7664.036	4
537		3	max	.029	3	.043	3	.75	4	1.579e-2	4	NC	15	NC	1
538			min	-.02	2	-.035	2	0	1	0	1	335.158	2	4507.31	4
539		4	max	.028	3	.163	3	.722	4	1.286e-2	4	7699.522	15	NC	1
540			min	-.02	2	-.297	2	0	1	0	1	203.59	2	3487.685	4
541		5	max	.028	3	.334	3	.692	4	9.94e-3	4	5358.678	15	NC	1
542			min	-.02	2	-.584	2	0	1	0	1	142.319	2	2993.771	4
543		6	max	.027	3	.529	3	.661	4	7.016e-3	4	4108.755	15	NC	1
544			min	-.019	2	-.87	2	0	1	0	1	109.435	2	2685.115	4
545		7	max	.027	3	.721	3	.63	4	4.092e-3	4	3389.864	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
546			min	-.019	2	-1.131	2	0	1	0	1	90.445	2	2434.602	4
547		8	max	.026	3	.883	3	.6	4	1.169e-3	4	2973.283	15	NC	1
548			min	-.018	2	-1.34	2	0	1	0	1	79.409	2	2183.258	4
549		9	max	.025	3	.987	3	.571	4	0	1	2759.929	15	NC	1
550			min	-.018	2	-1.473	2	0	1	-5.584e-6	5	73.748	2	1968.359	4
551		10	max	.025	3	1.026	3	.536	4	0	1	2695.634	15	NC	1
552			min	-.018	2	-1.518	2	0	1	-5.351e-6	5	72.09	2	1935.275	4
553		11	max	.024	3	1.001	3	.498	4	0	1	2760.057	15	NC	1
554			min	-.017	2	-1.473	2	0	1	-5.119e-6	5	74.005	2	1981.814	4
555		12	max	.024	3	.914	3	.46	4	7.741e-4	4	2973.588	15	NC	1
556			min	-.017	2	-1.336	2	0	1	0	1	80.251	2	2041.882	4
557		13	max	.023	3	.773	3	.413	4	2.712e-3	4	3390.482	15	NC	1
558			min	-.017	2	-1.116	2	0	1	0	1	92.636	2	2403.591	4
559		14	max	.022	3	.596	3	.361	4	4.65e-3	4	4109.957	15	NC	1
560			min	-.017	2	-.843	2	0	1	0	1	114.413	2	3407.794	4
561		15	max	.022	3	.399	3	.306	4	6.588e-3	4	5361.049	15	NC	1
562			min	-.016	2	-.55	2	0	1	0	1	153.169	1	6547.373	4
563		16	max	.021	3	.199	3	.252	4	8.526e-3	4	7704.491	15	NC	1
564			min	-.016	2	-.264	2	0	1	0	1	225.681	1	NC	1
565		17	max	.021	3	.014	3	.205	4	1.046e-2	4	NC	15	NC	1
566			min	-.016	2	-.018	2	0	1	0	1	386.055	1	NC	1
567		18	max	.021	3	.174	1	.167	4	5.293e-3	4	NC	5	NC	1
568			min	-.016	2	-.144	3	0	1	0	1	851.482	1	NC	1
569		19	max	.021	3	.33	1	.14	4	0	1	NC	1	NC	1
570			min	-.016	2	-.285	3	0	1	-5.315e-6	4	NC	1	NC	1
571	M9	1	max	.01	3	.196	2	.792	4	2.001e-2	3	NC	1	NC	1
572			min	-.005	2	-.041	3	0	1	-1.066e-2	1	NC	1	NC	1
573		2	max	.01	3	.096	2	.772	4	9.932e-3	3	NC	5	NC	1
574			min	-.005	2	-.02	3	0	12	-5.136e-3	1	1348.411	2	8332.382	4
575		3	max	.01	3	.014	3	.748	4	1.573e-2	4	NC	5	NC	1
576			min	-.005	2	-.012	2	0	12	-1.265e-5	10	651.516	2	4795.693	4
577		4	max	.009	3	.069	3	.721	4	1.236e-2	5	NC	15	NC	1
578			min	-.005	2	-.131	2	0	12	-4.395e-3	2	413.204	2	3623.475	4
579		5	max	.009	3	.139	3	.692	4	9.331e-3	5	NC	15	NC	1
580			min	-.005	2	-.256	2	0	12	-8.86e-3	1	299.247	2	3040.983	4
581		6	max	.009	3	.214	3	.661	4	1.276e-2	3	7930.781	15	NC	1
582			min	-.005	2	-.376	2	0	12	-1.34e-2	1	236.287	2	2679.59	4
583		7	max	.009	3	.287	3	.631	4	1.698e-2	3	6694.383	15	NC	1
584			min	-.005	2	-.484	2	0	1	-1.793e-2	1	199.048	2	2407.933	4
585		8	max	.009	3	.347	3	.601	4	2.119e-2	3	5962.331	15	NC	1
586			min	-.005	2	-.569	2	0	1	-2.247e-2	1	176.993	2	2166.268	4
587		9	max	.008	3	.387	3	.571	4	2.156e-2	3	5579.17	15	NC	1
588			min	-.005	2	-.622	2	0	12	-2.478e-2	2	165.489	2	1968.482	4
589		10	max	.008	3	.401	3	.536	4	1.935e-2	3	5462.009	15	NC	1
590			min	-.005	2	-.64	2	0	1	-2.63e-2	2	162.104	2	1919.486	4
591		11	max	.008	3	.392	3	.498	4	1.715e-2	3	5578.899	15	NC	1
592			min	-.004	2	-.622	2	0	1	-2.781e-2	2	166.013	2	1960.365	4
593		12	max	.008	3	.359	3	.459	4	1.465e-2	3	5961.817	15	NC	1
594			min	-.004	2	-.567	2	0	12	-2.66e-2	2	178.548	2	2067.258	4
595		13	max	.008	3	.306	3	.412	4	1.172e-2	3	6693.601	15	NC	1
596			min	-.004	2	-.478	2	0	10	-2.134e-2	2	202.748	2	2465.968	4
597		14	max	.007	3	.238	3	.36	4	8.792e-3	3	7929.622	15	NC	1
598			min	-.004	2	-.367	2	-.002	1	-1.608e-2	2	244.075	2	3427.095	5
599		15	max	.007	3	.162	3	.306	4	6.298e-3	5	NC	15	NC	1
600			min	-.004	2	-.245	2	-.006	1	-1.083e-2	2	315.051	2	5951.53	5
601		16	max	.007	3	.082	3	.254	4	8.434e-3	5	NC	15	NC	1
602			min	-.004	2	-.121	2	-.009	1	-5.566e-3	2	446.004	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
603		17	max	.007	3	.005	3	.207	4	1.062e-2	4	NC	5	NC	1
604			min	-.004	2	-.006	2	-.01	1	-6.342e-4	1	719.453	1	NC	1
605		18	max	.007	3	.093	1	.17	4	5.131e-3	5	NC	5	NC	1
606			min	-.004	2	-.065	3	-.007	1	-7.661e-3	2	1511.796	1	NC	1
607		19	max	.007	3	.181	1	.14	4	5.345e-3	3	NC	1	NC	1
608			min	-.004	2	-.131	3	0	12	-1.524e-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

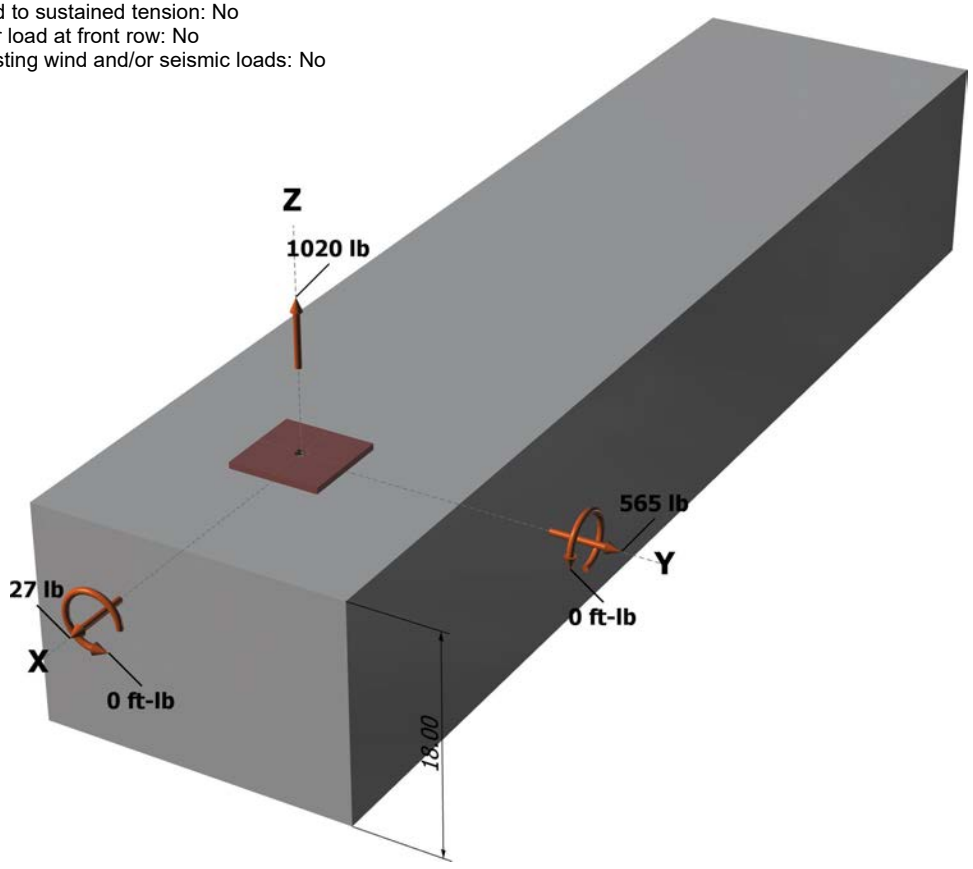
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

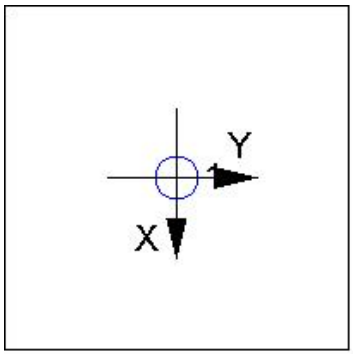
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	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

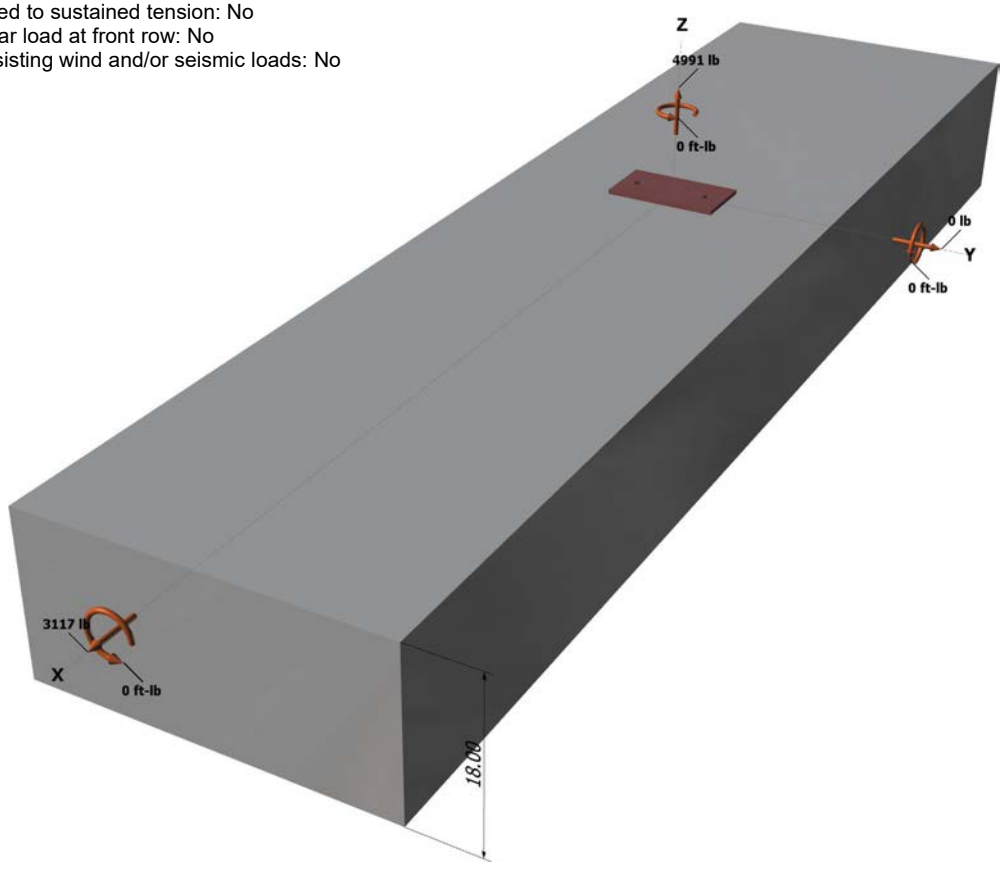
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

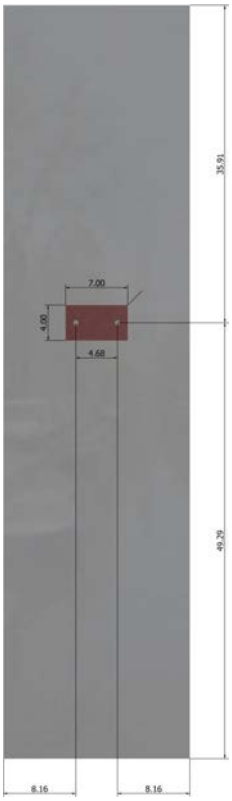
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



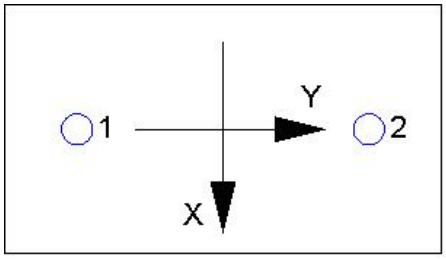
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

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

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

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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

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

k_{cp}	A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	1559	3156	0.49	Pass
T Concrete breakout x+	**3117**	**5323**	**0.59**	**Pass (Governs)**

|| Concrete breakout y-	**1559**	**12241**	**0.13**	**Pass (Governs)**
Pryout	3117	19833	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	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.