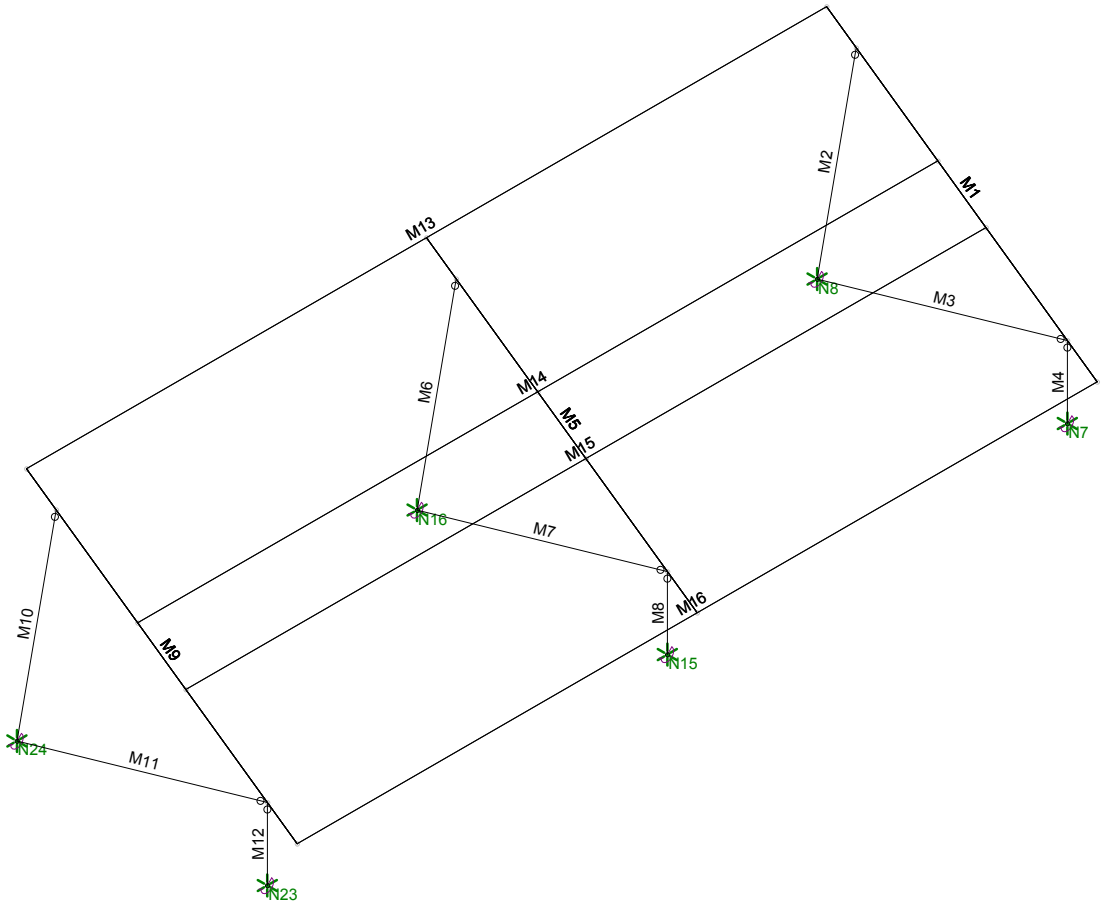


Schletter, Inc.		35° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

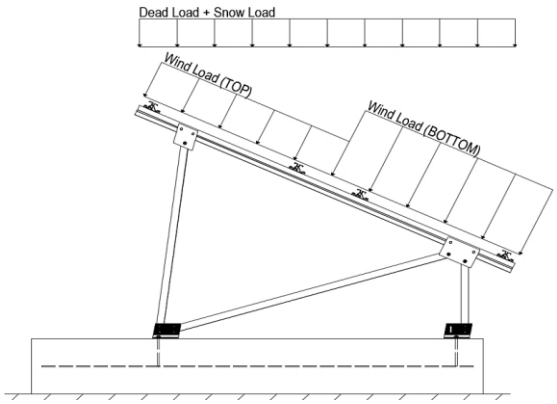
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row =	2
Module Tilt =	35°
Maximum Height Above Grade =	3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} =	3.00	psf	*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 =	14.43	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	85	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	11.34	psf	*Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

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

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 + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

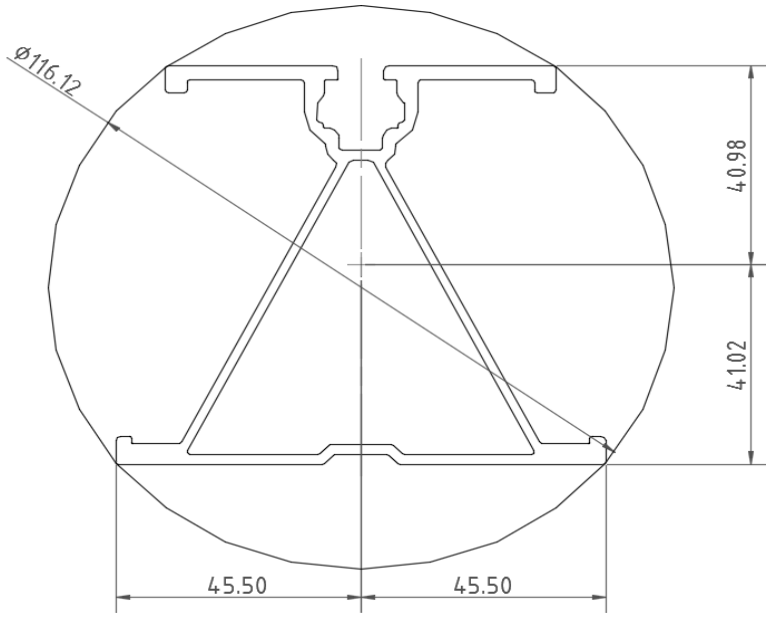
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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 =	138	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 =	1.742	k-ft
M_z =	0.436	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	100%	

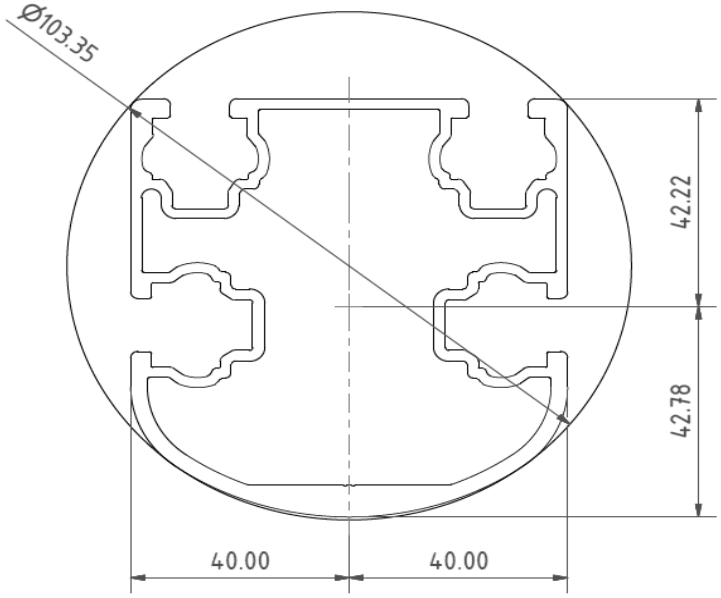


DETAIL VIEW

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).

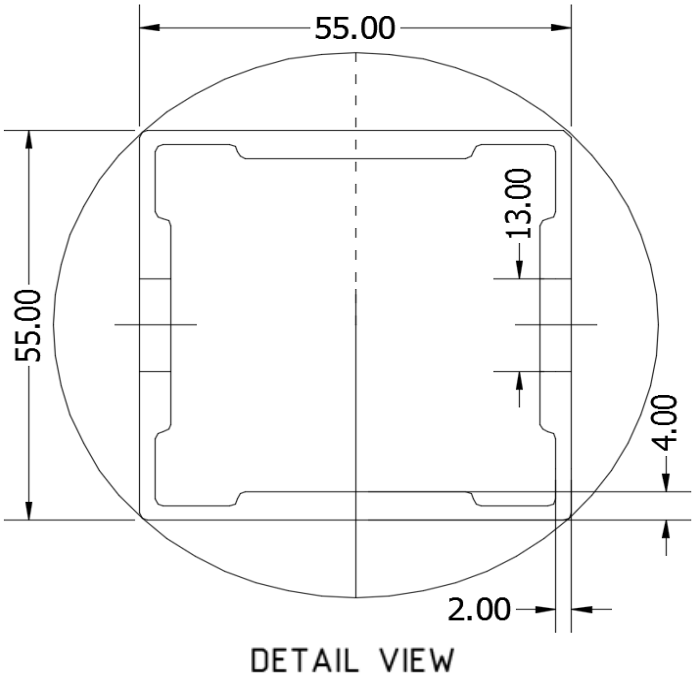
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.642	k-ft
M_z =	0.000	k-ft
P_n =	-0.791	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	78%	



4.3 Front Strut Design

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

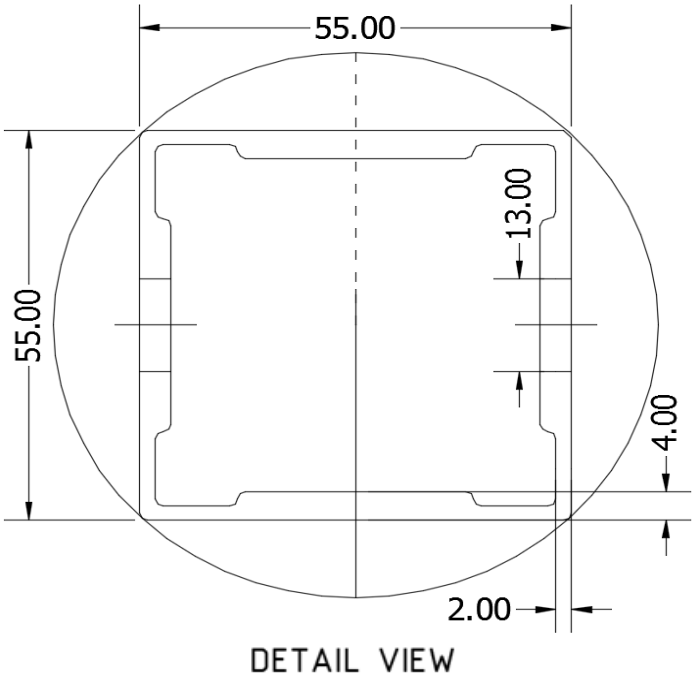
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.651	k-ft
P_n =	0.185	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	47%	



4.4 Diagonal Strut Design

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

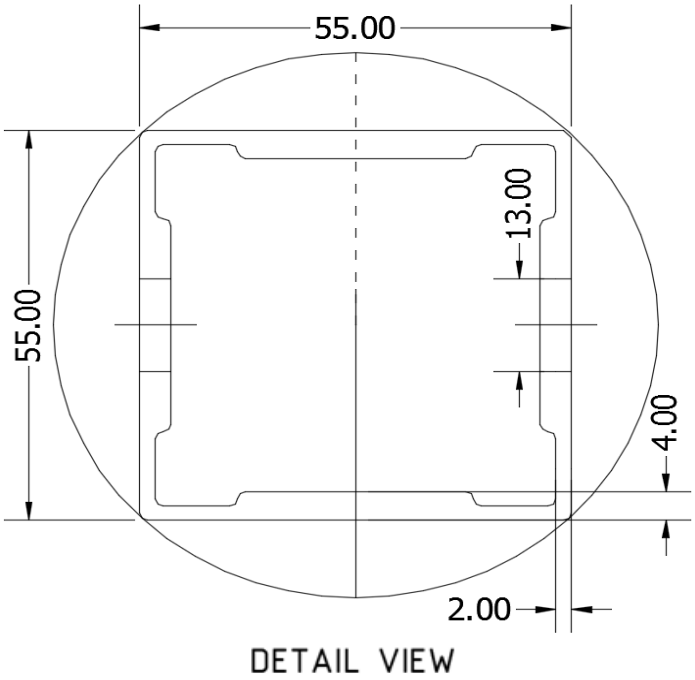
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.008	k-ft
M_z =	0.000	k-ft
P_n =	2.387	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	33%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.008	k-ft
M_z =	0.000	k-ft
P_n =	2.820	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

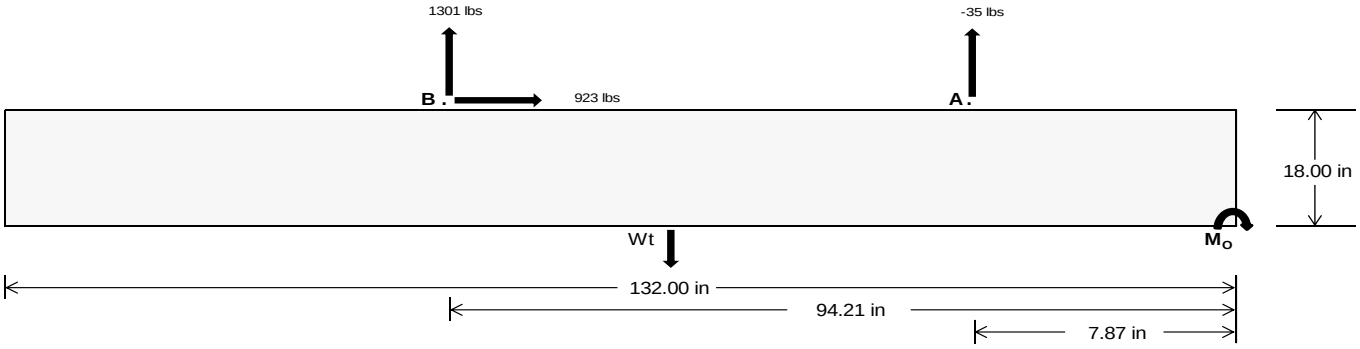
5.1 Helical Pile Foundations

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 =	45.46	5424.08	k
Compressive Load =	3113.65	4473.98	k
Lateral Load =	441.55	3841.39	k
Moment (Weak Axis) =	0.85	0.28	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	138889.2 in-lbs
Resisting Force Required =	2104.38 lbs
S.F. =	1.67
Weight Required =	3507.30 lbs
Minimum Width =	27 in in
Weight Provided =	5383.13 lbs

Sliding

Force =	922.93 lbs
Friction =	0.4
Weight Required =	2307.33 lbs
Resisting Weight =	5383.13 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	922.93 lbs
Cohesion =	130 psf
Area =	24.75 ft^2
Resisting =	2691.56 lbs
Additional Weight Required =	0 lbs

Shear Key

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

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

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

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in	27 in	28 in	29 in	30 in
F_A	1231 lbs	1231 lbs	1231 lbs	1231 lbs	985 lbs	985 lbs	985 lbs	985 lbs	1512 lbs	1512 lbs	1512 lbs	1512 lbs	71 lbs	71 lbs	71 lbs	71 lbs
F_B	1113 lbs	1113 lbs	1113 lbs	1113 lbs	1955 lbs	1955 lbs	1955 lbs	1955 lbs	2166 lbs	2166 lbs	2166 lbs	2166 lbs	-2602 lbs	-2602 lbs	-2602 lbs	-2602 lbs
F_V	205 lbs	205 lbs	205 lbs	205 lbs	1703 lbs	1703 lbs	1703 lbs	1703 lbs	1408 lbs	1408 lbs	1408 lbs	1408 lbs	-1846 lbs	-1846 lbs	-1846 lbs	-1846 lbs
P_{total}	7727 lbs	7926 lbs	8125 lbs	8325 lbs	8324 lbs	8523 lbs	8722 lbs	8922 lbs	9060 lbs	9260 lbs	9459 lbs	9658 lbs	699 lbs	819 lbs	938 lbs	1058 lbs
M	3652 lbs-ft	3652 lbs-ft	3652 lbs-ft	3652 lbs-ft	2730 lbs-ft	2730 lbs-ft	2730 lbs-ft	2730 lbs-ft	4342 lbs-ft	4342 lbs-ft	4342 lbs-ft	4342 lbs-ft	3691 lbs-ft	3691 lbs-ft	3691 lbs-ft	3691 lbs-ft
e	0.47 ft	0.46 ft	0.45 ft	0.44 ft	0.33 ft	0.32 ft	0.31 ft	0.31 ft	0.48 ft	0.47 ft	0.46 ft	0.45 ft	5.28 ft	4.51 ft	3.93 ft	3.49 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	231.7 psf	231.2 psf	230.7 psf	230.3 psf	276.1 psf	274.0 psf	272.1 psf	270.3 psf	270.4 psf	268.5 psf	266.7 psf	265.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	392.7 psf	386.4 psf	380.6 psf	375.2 psf	396.5 psf	390.1 psf	384.1 psf	378.6 psf	461.8 psf	453.0 psf	444.9 psf	437.3 psf	941.8 psf	235.9 psf	165.2 psf	140.3 psf

Maximum Bearing Pressure = 942 psf
Allowable Bearing Pressure = 1500 psf

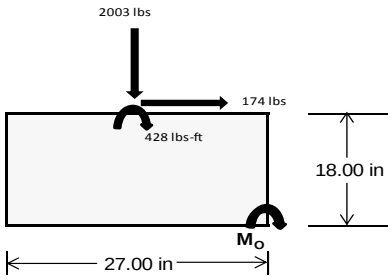
Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	1565.0 ft-lbs
Resisting Force Required =	1391.10 lbs
S.F. =	1.67
Weight Required =	2318.50 lbs
Minimum Width =	27 in in
Weight Provided =	5383.13 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	27 in			27 in			27 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	340 lbs	708 lbs	229 lbs	787 lbs	2003 lbs	702 lbs	138 lbs	207 lbs	28 lbs
F_V	240 lbs	235 lbs	247 lbs	175 lbs	174 lbs	193 lbs	242 lbs	237 lbs	244 lbs
P_{total}	7004 lbs	7372 lbs	6894 lbs	7131 lbs	8347 lbs	7046 lbs	2087 lbs	2156 lbs	1977 lbs
M	923 lbs-ft	912 lbs-ft	944 lbs-ft	684 lbs-ft	688 lbs-ft	740 lbs-ft	925 lbs-ft	910 lbs-ft	931 lbs-ft
e	0.13 ft	0.12 ft	0.14 ft	0.10 ft	0.08 ft	0.11 ft	0.44 ft	0.42 ft	0.47 ft
L/6	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft
f_{min}	183.5 psf	199.6 psf	176.8 psf	214.4 psf	263.1 psf	204.9 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	382.5 psf	396.1 psf	380.2 psf	361.8 psf	411.4 psf	364.4 psf	185.6 psf	185.9 psf	183.2 psf

Maximum Bearing Pressure = 411 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

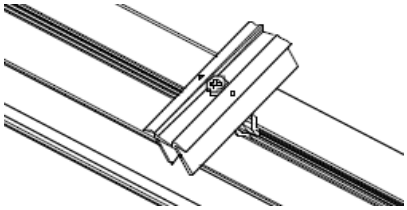
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

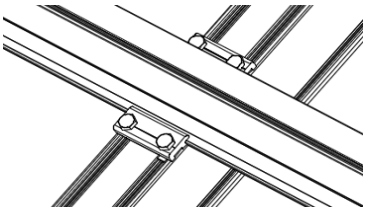
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.456 k
Allowable Uplift	=	1.214 k
Utilization	=	38%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	1.861 k
Allowable Uplift	=	4.357 k
Utilization	=	43%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	2.395 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	32%

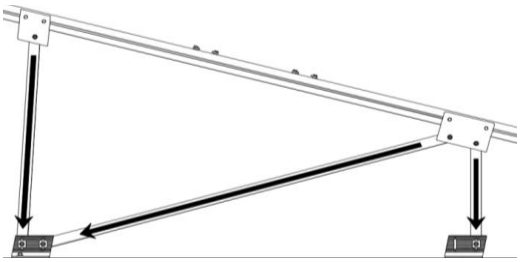
Rear Strut

Maximum Axial Load	=	3.570 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	48%

Diagonal Strut

Maximum Axial Load	=	2.424 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	33%

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

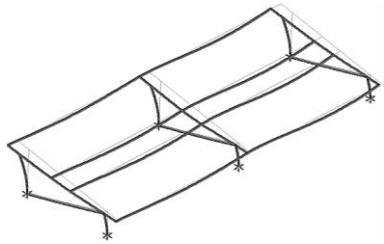
7.1 Seismic Drift

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}	=	53.78 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		1.076 in
Max Drift, Δ_{MAX}	=	0.854 in

0.854 ≤ 1.076, 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 =	138 in	L_b =	138
J =	0.432	J =	0.432
	381.773		242.785
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$	
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=	27.0 ksi	φF_L=	28.3
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 = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.363 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.87952

φF_L = φcc(Bc-Dc*λ)

φF_L = 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

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

$\varphi F_L St$= 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

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 29.8 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 29.8

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

φF_L = 33.25 ksi

φF_L = 8.94 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 9.21 kips

APPENDIX B

B.1

The following pages will contain the results from RISA. Please refer back to Section 2 for load information and Section 4-5 for member and foundation design.

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.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	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	0	0

Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-37.962	-37.962	0	0
2	M14	y	-37.962	-37.962	0	0
3	M15	y	-63.27	-63.27	0	0
4	M16	y	-63.27	-63.27	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	85.415	85.415	0	0
2	M14	y	66.434	66.434	0	0
3	M15	y	37.962	37.962	0	0
4	M16	y	37.962	37.962	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	6.693	6.693	0	0
2	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	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 + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	744.893	2	1039.849	2	.802	1	.003	1	0	1	0	1
2		min	-926.545	3	-1267.936	3	-30.29	5	-.21	4	0	1	0	1
3	N7	max	.043	9	993.32	1	-.987	12	-.002	12	0	1	0	1
4		min	-.144	2	-34.968	5	-339.656	4	-.651	4	0	1	0	1
5	N15	max	.204	3	2395.114	1	0	1	0	1	0	1	0	1
6		min	-1.558	2	108.376	15	-321.682	4	-.627	4	0	1	0	1
7	N16	max	2785.592	2	3441.52	2	0	12	0	2	0	1	0	1
8		min	-2954.918	3	-4172.372	3	-30.053	5	-.212	4	0	1	0	1
9	N23	max	.048	14	993.32	1	15.802	1	.03	1	0	1	0	1
10		min	-.144	2	70.764	12	-327.748	5	-.631	4	0	1	0	1
11	N24	max	744.893	2	1039.849	2	-.056	12	0	12	0	1	0	1
12		min	-926.545	3	-1267.936	3	-31.065	5	-.212	4	0	1	0	1
13	Totals:	max	4273.532	2	9142.89	1	0	1						
14		min	-4807.744	3	-6261.849	3	-1073.033	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	147.095	1	358.879	2	-11.877	12	.002	3	.352	1	0	4
2			min	9.271	12	-570.411	3	-205.668	1	-.011	2	.022	12	0	3
3		2	max	147.095	1	251.616	2	-9.258	12	.002	3	.161	4	.621	3
4			min	9.271	12	-401.393	3	-158.326	1	-.011	2	.009	12	-.39	2
5		3	max	147.095	1	144.353	2	-6.64	12	.002	3	.081	5	1.026	3
6			min	9.271	12	-232.376	3	-110.983	1	-.011	2	-.052	1	-.643	2
7		4	max	147.095	1	37.144	1	-4.022	12	.002	3	.039	5	1.215	3
8			min	9.271	12	-63.359	3	-63.64	1	-.011	2	-.164	1	-.759	2
9		5	max	147.095	1	105.658	3	-1.404	12	.002	3	.002	5	1.188	3
10			min	9.271	12	-70.173	2	-31.267	4	-.011	2	-.215	1	-.738	2
11		6	max	147.095	1	274.676	3	31.045	1	.002	3	-.012	12	.945	3
12			min	4.226	15	-177.437	2	-22.584	5	-.011	2	-.205	1	-.58	2
13		7	max	147.095	1	443.693	3	78.388	1	.002	3	-.009	12	.486	3
14			min	-6.343	5	-284.7	2	-18.533	5	-.011	2	-.135	1	-.285	1
15		8	max	147.095	1	612.71	3	125.731	1	.002	3	0	10	.148	2
16			min	-19.46	5	-391.963	2	-14.482	5	-.011	2	-.079	4	-.189	3
17		9	max	147.095	1	781.728	3	173.074	1	.002	3	.186	1	.717	2
18			min	-32.577	5	-499.226	2	-10.431	5	-.011	2	-.092	5	-1.08	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	147.095	1	606.489	2	-11.688	12	.003	14	.437	1	1.424	2
20			min	9.271	12	-950.745	3	-220.416	1	-.011	2	.021	12	-2.187	3
21		11	max	147.095	1	499.226	2	-9.07	12	.011	2	.186	1	.717	2
22			min	9.271	12	-781.728	3	-173.074	1	-.002	3	.008	12	-1.08	3
23		12	max	147.095	1	391.963	2	-6.451	12	.011	2	.075	5	.148	2
24			min	9.271	12	-612.71	3	-125.731	1	-.002	3	-.005	1	-.189	3
25		13	max	147.095	1	284.7	2	-3.833	12	.011	2	.032	5	.486	3
26			min	9.271	12	-443.693	3	-78.388	1	-.002	3	-.135	1	-.285	1
27		14	max	147.095	1	177.437	2	-1.215	12	.011	2	-.004	15	.945	3
28			min	9.271	12	-274.676	3	-36.039	4	-.002	3	-.205	1	-.58	2
29		15	max	147.095	1	70.173	2	16.297	1	.011	2	-.012	12	1.188	3
30			min	3.178	15	-105.658	3	-23.794	5	-.002	3	-.215	1	-.738	2
31		16	max	147.095	1	63.359	3	63.64	1	.011	2	-.008	12	1.215	3
32			min	-7.972	5	-37.144	1	-19.743	5	-.002	3	-.164	1	-.759	2
33		17	max	147.095	1	232.376	3	110.983	1	.011	2	-.001	12	1.026	3
34			min	-21.089	5	-144.353	2	-15.692	5	-.002	3	-.104	4	-.643	2
35		18	max	147.095	1	401.393	3	158.326	1	.011	2	.12	1	.621	3
36			min	-34.205	5	-251.616	2	-11.641	5	-.002	3	-.107	5	-.39	2
37		19	max	147.095	1	570.411	3	205.668	1	.011	2	.352	1	0	1
38			min	-47.322	5	-358.879	2	-7.59	5	-.002	3	-.119	5	0	3
39	M14	1	max	70.023	4	375.416	2	-12.177	12	.006	3	.396	1	0	4
40			min	3.764	12	-448.988	3	-211.347	1	-.008	2	.025	12	0	3
41		2	max	62.695	1	268.152	2	-9.559	12	.006	3	.222	4	.491	3
42			min	3.764	12	-318.777	3	-164.005	1	-.008	2	.011	12	-.411	2
43		3	max	62.695	1	160.889	2	-6.94	12	.006	3	.117	5	.815	3
44			min	3.764	12	-188.565	3	-116.662	1	-.008	2	-.023	1	-.685	2
45		4	max	62.695	1	53.626	2	-4.322	12	.006	3	.06	5	.972	3
46			min	3.764	12	-58.353	3	-69.319	1	-.008	2	-.142	1	-.822	2
47		5	max	62.695	1	71.858	3	-1.704	12	.006	3	.008	5	.964	3
48			min	1.118	15	-54.311	1	-45.045	4	-.008	2	-.2	1	-.822	2
49		6	max	62.695	1	202.07	3	25.366	1	.006	3	-.011	12	.789	3
50			min	-11.361	5	-160.9	2	-34.703	5	-.008	2	-.198	1	-.685	2
51		7	max	62.695	1	332.282	3	72.709	1	.006	3	-.008	12	.447	3
52			min	-24.478	5	-268.164	2	-30.652	5	-.008	2	-.136	1	-.411	2
53		8	max	62.695	1	462.493	3	120.052	1	.006	3	0	10	.01	1
54			min	-37.594	5	-375.427	2	-26.601	5	-.008	2	-.123	4	-.06	3
55		9	max	62.695	1	592.705	3	167.395	1	.006	3	.171	1	.555	1
56			min	-50.711	5	-482.69	2	-22.55	5	-.008	2	-.149	5	-.735	3
57		10	max	89.896	4	589.953	2	-11.388	12	.006	3	.415	1	1.236	1
58			min	3.764	12	-722.917	3	-214.737	1	-.008	2	.02	12	-1.575	3
59		11	max	76.779	4	482.69	2	-8.769	12	.008	2	.224	4	.555	1
60			min	3.764	12	-592.705	3	-167.395	1	-.006	3	.007	12	-.735	3
61		12	max	63.662	4	375.427	2	-6.151	12	.008	2	.115	5	.01	1
62			min	3.764	12	-462.493	3	-120.052	1	-.006	3	-.012	1	-.06	3
63		13	max	62.695	1	268.164	2	-3.533	12	.008	2	.057	5	.447	3
64			min	3.764	12	-332.282	3	-72.709	1	-.006	3	-.136	1	-.411	2
65		14	max	62.695	1	160.9	2	-.915	12	.008	2	.005	5	.789	3
66			min	3.764	12	-202.07	3	-45.986	4	-.006	3	-.198	1	-.685	2
67		15	max	62.695	1	54.311	1	21.976	1	.008	2	-.011	12	.964	3
68			min	3.764	12	-71.858	3	-34.942	5	-.006	3	-.2	1	-.822	2
69		16	max	62.695	1	58.353	3	69.319	1	.008	2	-.007	12	.972	3
70			min	-4.736	5	-53.626	2	-30.891	5	-.006	3	-.142	1	-.822	2
71		17	max	62.695	1	188.565	3	116.662	1	.008	2	0	3	.815	3
72			min	-17.853	5	-160.889	2	-26.84	5	-.006	3	-.129	4	-.685	2
73		18	max	62.695	1	318.777	3	164.005	1	.008	2	.156	1	.491	3
74			min	-30.97	5	-268.152	2	-22.79	5	-.006	3	-.153	5	-.411	2
75		19	max	62.695	1	448.988	3	211.347	1	.008	2	.396	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	-44.086	5	-375.416	2	-18.739	5	-.006	3	-.179	5	0	3
77	M15	1	max	95.945	5	550.05	2	-12.136	12	.009	2	.402	4	0	2
78			min	-66.228	1	-252.605	3	-211.311	1	-.006	3	.024	12	0	3
79		2	max	82.828	5	391.046	2	-9.518	12	.009	2	.262	4	.277	3
80			min	-66.228	1	-180.603	3	-163.968	1	-.006	3	.011	12	-.601	2
81		3	max	69.712	5	232.042	2	-6.9	12	.009	2	.146	5	.462	3
82			min	-66.228	1	-108.601	3	-116.626	1	-.006	3	-.023	1	-.999	2
83		4	max	56.595	5	73.038	2	-4.282	12	.009	2	.077	5	.554	3
84			min	-66.228	1	-36.599	3	-69.744	4	-.006	3	-.142	1	-1.194	2
85		5	max	43.478	5	35.404	3	-1.663	12	.009	2	.014	5	.555	3
86			min	-66.228	1	-85.966	2	-53.771	4	-.006	3	-.201	1	-1.186	2
87		6	max	30.362	5	107.406	3	25.403	1	.009	2	-.011	12	.464	3
88			min	-66.228	1	-244.97	2	-43.379	5	-.006	3	-.198	1	-.975	2
89		7	max	17.245	5	179.408	3	72.745	1	.009	2	-.008	12	.281	3
90			min	-66.228	1	-403.974	2	-39.328	5	-.006	3	-.136	1	-.56	2
91		8	max	4.128	5	251.41	3	120.088	1	.009	2	0	10	.058	2
92			min	-66.228	1	-562.978	2	-35.277	5	-.006	3	-.15	4	0	15
93		9	max	-4.251	12	323.413	3	167.431	1	.009	2	.171	1	.879	2
94			min	-66.228	1	-721.982	2	-31.226	5	-.006	3	-.187	5	-.362	3
95		10	max	-4.251	12	880.986	2	-11.428	12	.009	2	.415	1	1.903	2
96			min	-66.228	1	-395.415	3	-214.774	1	-.006	3	.02	12	-.821	3
97		11	max	-1.754	15	721.982	2	-8.81	12	.006	3	.262	4	.879	2
98			min	-66.228	1	-323.413	3	-167.431	1	-.009	2	.007	12	-.362	3
99		12	max	-4.251	12	562.978	2	-6.192	12	.006	3	.142	5	.058	2
100			min	-66.228	1	-251.41	3	-120.088	1	-.009	2	-.012	1	0	15
101		13	max	-4.251	12	403.974	2	-3.573	12	.006	3	.074	5	.281	3
102			min	-66.228	1	-179.408	3	-72.745	1	-.009	2	-.136	1	-.56	2
103		14	max	-4.251	12	244.97	2	-.955	12	.006	3	.01	5	.464	3
104			min	-66.228	1	-107.406	3	-54.746	4	-.009	2	-.198	1	-.975	2
105		15	max	-4.251	12	85.966	2	21.94	1	.006	3	-.011	12	.555	3
106			min	-72.976	4	-35.404	3	-43.625	5	-.009	2	-.201	1	-1.186	2
107		16	max	-4.251	12	36.599	3	69.283	1	.006	3	-.007	12	.554	3
108			min	-86.093	4	-73.038	2	-39.574	5	-.009	2	-.142	1	-1.194	2
109		17	max	-4.251	12	108.601	3	116.626	1	.006	3	0	3	.462	3
110			min	-99.209	4	-232.042	2	-35.523	5	-.009	2	-.158	4	-.999	2
111		18	max	-4.251	12	180.603	3	163.968	1	.006	3	.156	1	.277	3
112			min	-112.326	4	-391.046	2	-31.472	5	-.009	2	-.192	5	-.601	2
113		19	max	-4.251	12	252.605	3	211.311	1	.006	3	.396	1	0	2
114			min	-125.443	4	-550.05	2	-27.421	5	-.009	2	-.23	5	0	5
115	M16	1	max	93.41	5	534.069	2	-11.749	12	.008	1	.354	1	0	2
116			min	-158.562	1	-240.393	3	-205.898	1	-.009	3	.022	12	0	3
117		2	max	80.294	5	375.065	2	-9.13	12	.008	1	.205	4	.261	3
118			min	-158.562	1	-168.391	3	-158.556	1	-.009	3	.008	12	-.581	2
119		3	max	67.177	5	216.061	2	-6.512	12	.008	1	.113	5	.43	3
120			min	-158.562	1	-96.389	3	-111.213	1	-.009	3	-.051	1	-.958	2
121		4	max	54.061	5	57.057	2	-3.894	12	.008	1	.059	5	.507	3
122			min	-158.562	1	-24.386	3	-63.87	1	-.009	3	-.163	1	-1.133	2
123		5	max	40.944	5	47.616	3	-1.275	12	.008	1	.01	5	.493	3
124			min	-158.562	1	-101.947	2	-40.938	4	-.009	3	-.214	1	-1.104	2
125		6	max	27.827	5	119.618	3	30.815	1	.008	1	-.012	12	.386	3
126			min	-158.562	1	-260.951	2	-32.095	5	-.009	3	-.205	1	-.872	2
127		7	max	14.711	5	191.62	3	78.158	1	.008	1	-.008	12	.187	3
128			min	-158.562	1	-419.955	2	-28.044	5	-.009	3	-.136	1	-.437	2
129		8	max	1.594	5	263.623	3	125.501	1	.008	1	0	10	.201	2
130			min	-158.562	1	-578.959	2	-23.993	5	-.009	3	-.108	4	-.104	3
131		9	max	-7.468	15	335.625	3	172.844	1	.008	1	.185	1	1.042	2
132			min	-158.562	1	-737.963	2	-19.942	5	-.009	3	-.133	5	-.487	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	-9.714	12	896.967	2	-11.816	12	.008	1	.436	1	2.087	2
134			min	-158.562	1	-407.627	3	-220.186	1	-.009	3	.022	12	-.962	3
135		11	max	-9.714	12	737.963	2	-9.198	12	.009	3	.213	4	1.042	2
136			min	-158.562	1	-335.625	3	-172.844	1	-.008	1	.009	12	-.487	3
137		12	max	-9.714	12	578.959	2	-6.579	12	.009	3	.104	4	.201	2
138			min	-158.562	1	-263.623	3	-125.501	1	-.008	1	-.006	1	-.104	3
139		13	max	-9.714	12	419.955	2	-3.961	12	.009	3	.049	5	.187	3
140			min	-158.562	1	-191.62	3	-78.158	1	-.008	1	-.136	1	-.437	2
141		14	max	-9.714	12	260.951	2	-1.343	12	.009	3	0	15	.386	3
142			min	-158.562	1	-119.618	3	-45.603	4	-.008	1	-.205	1	-.872	2
143		15	max	-9.714	12	101.947	2	16.527	1	.009	3	-.012	12	.493	3
144			min	-158.562	1	-47.616	3	-33.283	5	-.008	1	-.214	1	-1.104	2
145		16	max	-9.714	12	24.386	3	63.87	1	.009	3	-.008	12	.507	3
146			min	-158.562	1	-57.057	2	-29.232	5	-.008	1	-.163	1	-1.133	2
147		17	max	-9.714	12	96.389	3	111.213	1	.009	3	-.002	12	.43	3
148			min	-158.562	1	-216.061	2	-25.181	5	-.008	1	-.136	4	-.958	2
149		18	max	-9.714	12	168.391	3	158.556	1	.009	3	.121	1	.261	3
150			min	-158.562	1	-375.065	2	-21.13	5	-.008	1	-.151	5	-.581	2
151		19	max	-9.714	12	240.393	3	205.898	1	.009	3	.354	1	0	2
152			min	-161.847	4	-534.069	2	-17.079	5	-.008	1	-.176	5	0	3
153	M2	1	max	867.812	2	2.038	4	.498	1	0	12	0	3	0	1
154			min	-1084.334	3	.489	15	-30.89	4	0	4	0	1	0	1
155		2	max	868.332	2	1.92	4	.498	1	0	12	0	1	0	15
156			min	-1083.943	3	.461	15	-31.348	4	0	4	-.011	4	0	4
157		3	max	868.853	2	1.801	4	.498	1	0	12	0	1	0	15
158			min	-1083.553	3	.433	15	-31.806	4	0	4	-.022	4	-.001	4
159		4	max	869.374	2	1.682	4	.498	1	0	12	0	1	0	15
160			min	-1083.162	3	.405	15	-32.265	4	0	4	-.034	4	-.002	4
161		5	max	869.894	2	1.563	4	.498	1	0	12	0	1	0	15
162			min	-1082.772	3	.377	15	-32.723	4	0	4	-.045	4	-.003	4
163		6	max	870.415	2	1.444	4	.498	1	0	12	0	1	0	15
164			min	-1082.381	3	.349	15	-33.181	4	0	4	-.057	4	-.003	4
165		7	max	870.936	2	1.325	4	.498	1	0	12	.001	1	0	15
166			min	-1081.991	3	.321	15	-33.64	4	0	4	-.069	4	-.004	4
167		8	max	871.456	2	1.206	4	.498	1	0	12	.001	1	0	15
168			min	-1081.6	3	.293	15	-34.098	4	0	4	-.081	4	-.004	4
169		9	max	871.977	2	1.088	4	.498	1	0	12	.001	1	-.001	15
170			min	-1081.209	3	.265	15	-34.556	4	0	4	-.093	4	-.004	4
171		10	max	872.498	2	.969	4	.498	1	0	12	.002	1	-.001	15
172			min	-1080.819	3	.231	12	-35.015	4	0	4	-.106	4	-.005	4
173		11	max	873.018	2	.85	4	.498	1	0	12	.002	1	-.001	15
174			min	-1080.428	3	.185	12	-35.473	4	0	4	-.118	4	-.005	4
175		12	max	873.539	2	.731	4	.498	1	0	12	.002	1	-.001	15
176			min	-1080.038	3	.139	12	-35.931	4	0	4	-.131	4	-.005	4
177		13	max	874.06	2	.62	2	.498	1	0	12	.002	1	-.001	15
178			min	-1079.647	3	.092	12	-36.39	4	0	4	-.144	4	-.006	4
179		14	max	874.581	2	.527	2	.498	1	0	12	.002	1	-.001	15
180			min	-1079.257	3	.046	12	-36.848	4	0	4	-.157	4	-.006	4
181		15	max	875.101	2	.434	2	.498	1	0	12	.002	1	-.001	15
182			min	-1078.866	3	-.014	3	-37.306	4	0	4	-.17	4	-.006	4
183		16	max	875.622	2	.342	2	.498	1	0	12	.003	1	-.001	15
184			min	-1078.476	3	-.084	3	-37.765	4	0	4	-.184	4	-.006	4
185		17	max	876.143	2	.249	2	.498	1	0	12	.003	1	-.002	15
186			min	-1078.085	3	-.153	3	-38.223	4	0	4	-.197	4	-.006	4
187		18	max	876.663	2	.156	2	.498	1	0	12	.003	1	-.002	15
188			min	-1077.695	3	-.223	3	-38.682	4	0	4	-.211	4	-.006	4
189		19	max	877.184	2	.064	2	.498	1	0	12	.003	1	-.001	12

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	-1077.304	3	-.292	3	-39.14	4	0	4	-.225	4	-.006	4
191	M3	1	max	616.964	2	7.679	4	7.901	4	0	12	0	1	.006	4
192			min	-766.005	3	1.814	15	.025	12	0	4	-.041	4	.001	12
193		2	max	616.794	2	6.918	4	8.435	4	0	12	0	1	.003	2
194			min	-766.133	3	1.635	15	.025	12	0	4	-.038	4	0	12
195		3	max	616.623	2	6.157	4	8.97	4	0	12	0	1	.001	2
196			min	-766.261	3	1.456	15	.025	12	0	4	-.034	4	-.001	3
197		4	max	616.453	2	5.396	4	9.505	4	0	12	.001	1	0	15
198			min	-766.389	3	1.277	15	.025	12	0	4	-.03	4	-.002	3
199		5	max	616.283	2	4.635	4	10.04	4	0	12	.001	1	0	15
200			min	-766.516	3	1.098	15	.025	12	0	4	-.026	4	-.004	6
201		6	max	616.112	2	3.874	4	10.574	4	0	12	.001	1	-.001	15
202			min	-766.644	3	.919	15	.025	12	0	4	-.022	5	-.006	6
203		7	max	615.942	2	3.113	4	11.109	4	0	12	.002	1	-.002	15
204			min	-766.772	3	.74	15	.025	12	0	4	-.017	5	-.007	6
205		8	max	615.772	2	2.352	4	11.644	4	0	12	.002	1	-.002	15
206			min	-766.9	3	.561	15	.025	12	0	4	-.013	5	-.008	6
207		9	max	615.601	2	1.591	4	12.178	4	0	12	.002	1	-.002	15
208			min	-767.027	3	.383	15	.025	12	0	4	-.008	5	-.009	6
209		10	max	615.431	2	.83	4	12.713	4	0	12	.002	1	-.002	15
210			min	-767.155	3	.198	12	.025	12	0	4	-.003	5	-.01	6
211		11	max	615.261	2	.176	2	13.248	4	0	12	.003	4	-.002	15
212			min	-767.283	3	-.159	3	.025	12	0	4	0	12	-.01	6
213		12	max	615.09	2	-.154	15	13.782	4	0	12	.009	4	-.002	15
214			min	-767.411	3	-.692	6	.025	12	0	4	0	12	-.01	6
215		13	max	614.92	2	-.333	15	14.317	4	0	12	.015	4	-.002	15
216			min	-767.538	3	-1.453	6	.025	12	0	4	0	12	-.009	6
217		14	max	614.749	2	-.512	15	14.852	4	0	12	.021	4	-.002	15
218			min	-767.666	3	-2.214	6	.025	12	0	4	0	12	-.009	6
219		15	max	614.579	2	-.691	15	15.386	4	0	12	.027	4	-.002	15
220			min	-767.794	3	-2.975	6	.025	12	0	4	0	12	-.007	6
221		16	max	614.409	2	-.87	15	15.921	4	0	12	.033	4	-.001	15
222			min	-767.922	3	-3.736	6	.025	12	0	4	0	12	-.006	6
223		17	max	614.238	2	-1.049	15	16.456	4	0	12	.04	4	-.001	15
224			min	-768.049	3	-4.497	6	.025	12	0	4	0	12	-.004	6
225		18	max	614.068	2	-1.227	15	16.99	4	0	12	.047	4	0	15
226			min	-768.177	3	-5.258	6	.025	12	0	4	0	12	-.002	6
227		19	max	613.898	2	-1.406	15	17.525	4	0	12	.054	4	0	1
228			min	-768.305	3	-6.019	6	.025	12	0	4	0	12	0	1
229	M4	1	max	990.254	1	0	1	-.989	12	0	1	.051	4	0	1
230			min	-36.398	5	0	1	-338.749	4	0	1	0	12	0	1
231		2	max	990.424	1	0	1	-.989	12	0	1	.013	4	0	1
232			min	-36.319	5	0	1	-338.896	4	0	1	0	12	0	1
233		3	max	990.595	1	0	1	-.989	12	0	1	0	12	0	1
234			min	-36.239	5	0	1	-339.044	4	0	1	-.026	4	0	1
235		4	max	990.765	1	0	1	-.989	12	0	1	0	12	0	1
236			min	-36.16	5	0	1	-339.192	4	0	1	-.065	4	0	1
237		5	max	990.936	1	0	1	-.989	12	0	1	0	12	0	1
238			min	-36.08	5	0	1	-339.339	4	0	1	-.104	4	0	1
239		6	max	991.106	1	0	1	-.989	12	0	1	0	12	0	1
240			min	-36.001	5	0	1	-339.487	4	0	1	-.143	4	0	1
241		7	max	991.276	1	0	1	-.989	12	0	1	0	12	0	1
242			min	-35.921	5	0	1	-339.635	4	0	1	-.182	4	0	1
243		8	max	991.447	1	0	1	-.989	12	0	1	0	12	0	1
244			min	-35.842	5	0	1	-339.782	4	0	1	-.221	4	0	1
245		9	max	991.617	1	0	1	-.989	12	0	1	0	12	0	1
246			min	-35.763	5	0	1	-339.93	4	0	1	-.26	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	991.787	1	0	1	-.989	12	0	1	0	12	0	1
248			min	-35.683	5	0	1	-340.077	4	0	1	-.299	4	0	1
249		11	max	991.958	1	0	1	-.989	12	0	1	0	12	0	1
250			min	-35.604	5	0	1	-340.225	4	0	1	-.338	4	0	1
251		12	max	992.128	1	0	1	-.989	12	0	1	-.001	12	0	1
252			min	-35.524	5	0	1	-340.373	4	0	1	-.377	4	0	1
253		13	max	992.298	1	0	1	-.989	12	0	1	-.001	12	0	1
254			min	-35.445	5	0	1	-340.52	4	0	1	-.417	4	0	1
255		14	max	992.469	1	0	1	-.989	12	0	1	-.001	12	0	1
256			min	-35.365	5	0	1	-340.668	4	0	1	-.456	4	0	1
257		15	max	992.639	1	0	1	-.989	12	0	1	-.001	12	0	1
258			min	-35.286	5	0	1	-340.816	4	0	1	-.495	4	0	1
259		16	max	992.809	1	0	1	-.989	12	0	1	-.001	12	0	1
260			min	-35.206	5	0	1	-340.963	4	0	1	-.534	4	0	1
261		17	max	992.98	1	0	1	-.989	12	0	1	-.002	12	0	1
262			min	-35.127	5	0	1	-341.111	4	0	1	-.573	4	0	1
263		18	max	993.15	1	0	1	-.989	12	0	1	-.002	12	0	1
264			min	-35.047	5	0	1	-341.258	4	0	1	-.612	4	0	1
265		19	max	993.32	1	0	1	-.989	12	0	1	-.002	12	0	1
266			min	-34.968	5	0	1	-341.406	4	0	1	-.651	4	0	1
267	M6	1	max	2810.319	2	2.151	2	0	1	0	1	0	4	0	1
268			min	-3570.279	3	.34	12	-31.237	4	0	4	0	1	0	1
269		2	max	2810.839	2	2.058	2	0	1	0	1	0	1	0	12
270			min	-3569.889	3	.294	12	-31.696	4	0	4	-.011	4	0	2
271		3	max	2811.36	2	1.966	2	0	1	0	1	0	1	0	12
272			min	-3569.498	3	.248	12	-32.154	4	0	4	-.023	4	-.001	2
273		4	max	2811.881	2	1.873	2	0	1	0	1	0	1	0	12
274			min	-3569.108	3	.201	12	-32.612	4	0	4	-.034	4	-.002	2
275		5	max	2812.401	2	1.78	2	0	1	0	1	0	1	0	12
276			min	-3568.717	3	.155	12	-33.071	4	0	4	-.046	4	-.003	2
277		6	max	2812.922	2	1.688	2	0	1	0	1	0	1	0	12
278			min	-3568.327	3	.109	12	-33.529	4	0	4	-.058	4	-.003	2
279		7	max	2813.443	2	1.595	2	0	1	0	1	0	1	0	12
280			min	-3567.936	3	.048	3	-33.987	4	0	4	-.07	4	-.004	2
281		8	max	2813.964	2	1.503	2	0	1	0	1	0	1	0	12
282			min	-3567.546	3	-.021	3	-34.446	4	0	4	-.082	4	-.005	2
283		9	max	2814.484	2	1.41	2	0	1	0	1	0	1	0	12
284			min	-3567.155	3	-.09	3	-34.904	4	0	4	-.094	4	-.005	2
285		10	max	2815.005	2	1.317	2	0	1	0	1	0	1	0	12
286			min	-3566.765	3	-.16	3	-35.362	4	0	4	-.107	4	-.006	2
287		11	max	2815.526	2	1.225	2	0	1	0	1	0	1	0	12
288			min	-3566.374	3	-.229	3	-35.821	4	0	4	-.12	4	-.006	2
289		12	max	2816.046	2	1.132	2	0	1	0	1	0	1	0	3
290			min	-3565.984	3	-.299	3	-36.279	4	0	4	-.132	4	-.006	2
291		13	max	2816.567	2	1.039	2	0	1	0	1	0	1	0	3
292			min	-3565.593	3	-.368	3	-36.737	4	0	4	-.145	4	-.007	2
293		14	max	2817.088	2	.947	2	0	1	0	1	0	1	0	3
294			min	-3565.203	3	-.438	3	-37.196	4	0	4	-.159	4	-.007	2
295		15	max	2817.608	2	.854	2	0	1	0	1	0	1	0	3
296			min	-3564.812	3	-.507	3	-37.654	4	0	4	-.172	4	-.007	2
297		16	max	2818.129	2	.762	2	0	1	0	1	0	1	0	3
298			min	-3564.422	3	-.577	3	-38.113	4	0	4	-.185	4	-.008	2
299		17	max	2818.65	2	.669	2	0	1	0	1	0	1	0	3
300			min	-3564.031	3	-.646	3	-38.571	4	0	4	-.199	4	-.008	2
301		18	max	2819.17	2	.576	2	0	1	0	1	0	1	0	3
302			min	-3563.641	3	-.716	3	-39.029	4	0	4	-.213	4	-.008	2
303		19	max	2819.691	2	.484	2	0	1	0	1	0	1	.001	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	-3563.25	3	-.785	3	-39.488	4	0	4	-.227	4	-.008	2
305	M7	1	max	2386.944	2	7.695	6	7.437	4	0	1	0	1	.008	2
306			min	-2421.286	3	1.807	15	0	1	0	4	-.041	4	-.001	3
307		2	max	2386.773	2	6.934	6	7.972	4	0	1	0	1	.006	2
308			min	-2421.413	3	1.628	15	0	1	0	4	-.038	4	-.003	3
309		3	max	2386.603	2	6.173	6	8.507	4	0	1	0	1	.004	2
310			min	-2421.541	3	1.449	15	0	1	0	4	-.035	4	-.004	3
311		4	max	2386.433	2	5.412	6	9.042	4	0	1	0	1	.001	2
312			min	-2421.669	3	1.27	15	0	1	0	4	-.031	4	-.005	3
313		5	max	2386.262	2	4.651	6	9.576	4	0	1	0	1	0	2
314			min	-2421.797	3	1.091	15	0	1	0	4	-.027	4	-.006	3
315		6	max	2386.092	2	3.89	6	10.111	4	0	1	0	1	-.001	15
316			min	-2421.924	3	.912	15	0	1	0	4	-.023	4	-.007	3
317		7	max	2385.922	2	3.129	6	10.646	4	0	1	0	1	-.002	15
318			min	-2422.052	3	.733	15	0	1	0	4	-.019	4	-.007	3
319		8	max	2385.751	2	2.368	6	11.18	4	0	1	0	1	-.002	15
320			min	-2422.18	3	.527	12	0	1	0	4	-.014	4	-.008	4
321		9	max	2385.581	2	1.722	2	11.715	4	0	1	0	1	-.002	15
322			min	-2422.308	3	.231	12	0	1	0	4	-.009	4	-.009	4
323		10	max	2385.411	2	1.129	2	12.25	4	0	1	0	1	-.002	15
324			min	-2422.435	3	-.137	3	0	1	0	4	-.005	4	-.01	4
325		11	max	2385.24	2	.536	2	12.784	4	0	1	0	4	-.002	15
326			min	-2422.563	3	-.582	3	0	1	0	4	0	1	-.01	4
327		12	max	2385.07	2	-.057	2	13.319	4	0	1	.006	4	-.002	15
328			min	-2422.691	3	-1.027	3	0	1	0	4	0	1	-.01	4
329		13	max	2384.9	2	-.34	15	13.854	4	0	1	.012	4	-.002	15
330			min	-2422.819	3	-1.471	3	0	1	0	4	0	1	-.009	4
331		14	max	2384.729	2	-.519	15	14.388	4	0	1	.018	4	-.002	15
332			min	-2422.946	3	-2.198	4	0	1	0	4	0	1	-.009	4
333		15	max	2384.559	2	-.698	15	14.923	4	0	1	.024	4	-.002	15
334			min	-2423.074	3	-2.959	4	0	1	0	4	0	1	-.007	4
335		16	max	2384.389	2	-.877	15	15.458	4	0	1	.03	4	-.001	15
336			min	-2423.202	3	-3.72	4	0	1	0	4	0	1	-.006	4
337		17	max	2384.218	2	-1.055	15	15.993	4	0	1	.037	4	-.001	15
338			min	-2423.33	3	-4.481	4	0	1	0	4	0	1	-.004	4
339		18	max	2384.048	2	-1.234	15	16.527	4	0	1	.043	4	0	15
340			min	-2423.457	3	-5.242	4	0	1	0	4	0	1	-.002	4
341		19	max	2383.878	2	-1.413	15	17.062	4	0	1	.05	4	0	1
342			min	-2423.585	3	-6.003	4	0	1	0	4	0	1	0	1
343	M8	1	max	2392.048	1	0	1	0	1	0	1	.048	4	0	1
344			min	107.451	15	0	1	-324.952	4	0	1	0	1	0	1
345		2	max	2392.218	1	0	1	0	1	0	1	.01	4	0	1
346			min	107.503	15	0	1	-325.1	4	0	1	0	1	0	1
347		3	max	2392.388	1	0	1	0	1	0	1	0	1	0	1
348			min	107.554	15	0	1	-325.248	4	0	1	-.027	4	0	1
349		4	max	2392.559	1	0	1	0	1	0	1	0	1	0	1
350			min	107.605	15	0	1	-325.395	4	0	1	-.064	4	0	1
351		5	max	2392.729	1	0	1	0	1	0	1	0	1	0	1
352			min	107.657	15	0	1	-325.543	4	0	1	-.102	4	0	1
353		6	max	2392.899	1	0	1	0	1	0	1	0	1	0	1
354			min	107.708	15	0	1	-325.69	4	0	1	-.139	4	0	1
355		7	max	2393.07	1	0	1	0	1	0	1	0	1	0	1
356			min	107.76	15	0	1	-325.838	4	0	1	-.176	4	0	1
357		8	max	2393.24	1	0	1	0	1	0	1	0	1	0	1
358			min	107.811	15	0	1	-325.986	4	0	1	-.214	4	0	1
359		9	max	2393.41	1	0	1	0	1	0	1	0	1	0	1
360			min	107.862	15	0	1	-326.133	4	0	1	-.251	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	2393.581	1	0	1	0	1	0	1	0	1	0	1
362			min	107.914	15	0	1	-326.281	4	0	1	-.289	4	0	1
363		11	max	2393.751	1	0	1	0	1	0	1	0	1	0	1
364			min	107.965	15	0	1	-326.429	4	0	1	-.326	4	0	1
365		12	max	2393.921	1	0	1	0	1	0	1	0	1	0	1
366			min	108.016	15	0	1	-326.576	4	0	1	-.364	4	0	1
367		13	max	2394.092	1	0	1	0	1	0	1	0	1	0	1
368			min	108.068	15	0	1	-326.724	4	0	1	-.401	4	0	1
369		14	max	2394.262	1	0	1	0	1	0	1	0	1	0	1
370			min	108.119	15	0	1	-326.872	4	0	1	-.439	4	0	1
371		15	max	2394.432	1	0	1	0	1	0	1	0	1	0	1
372			min	108.171	15	0	1	-327.019	4	0	1	-.476	4	0	1
373		16	max	2394.603	1	0	1	0	1	0	1	0	1	0	1
374			min	108.222	15	0	1	-327.167	4	0	1	-.514	4	0	1
375		17	max	2394.773	1	0	1	0	1	0	1	0	1	0	1
376			min	108.273	15	0	1	-327.314	4	0	1	-.551	4	0	1
377		18	max	2394.943	1	0	1	0	1	0	1	0	1	0	1
378			min	108.325	15	0	1	-327.462	4	0	1	-.589	4	0	1
379		19	max	2395.114	1	0	1	0	1	0	1	0	1	0	1
380			min	108.376	15	0	1	-327.61	4	0	1	-.627	4	0	1
381	M10	1	max	867.812	2	1.995	6	-.028	12	0	1	0	4	0	1
382			min	-1084.334	3	.46	15	-31.226	4	0	5	0	3	0	1
383		2	max	868.332	2	1.876	6	-.028	12	0	1	0	10	0	15
384			min	-1083.943	3	.432	15	-31.684	4	0	5	-.011	4	0	6
385		3	max	868.853	2	1.757	6	-.028	12	0	1	0	12	0	15
386			min	-1083.553	3	.404	15	-32.143	4	0	5	-.023	4	-.001	6
387		4	max	869.374	2	1.638	6	-.028	12	0	1	0	12	0	15
388			min	-1083.162	3	.376	15	-32.601	4	0	5	-.034	4	-.002	6
389		5	max	869.894	2	1.52	6	-.028	12	0	1	0	12	0	15
390			min	-1082.772	3	.348	15	-33.059	4	0	5	-.046	4	-.003	6
391		6	max	870.415	2	1.401	6	-.028	12	0	1	0	12	0	15
392			min	-1082.381	3	.32	15	-33.518	4	0	5	-.058	4	-.003	6
393		7	max	870.936	2	1.282	6	-.028	12	0	1	0	12	0	15
394			min	-1081.991	3	.292	15	-33.976	4	0	5	-.07	4	-.004	6
395		8	max	871.456	2	1.163	6	-.028	12	0	1	0	12	0	15
396			min	-1081.6	3	.264	15	-34.435	4	0	5	-.082	4	-.004	6
397		9	max	871.977	2	1.044	6	-.028	12	0	1	0	12	0	15
398			min	-1081.209	3	.236	15	-34.893	4	0	5	-.094	4	-.004	6
399		10	max	872.498	2	.925	6	-.028	12	0	1	0	12	-.001	15
400			min	-1080.819	3	.208	15	-35.351	4	0	5	-.107	4	-.005	6
401		11	max	873.018	2	.806	6	-.028	12	0	1	0	12	-.001	15
402			min	-1080.428	3	.18	15	-35.81	4	0	5	-.119	4	-.005	6
403		12	max	873.539	2	.712	2	-.028	12	0	1	0	12	-.001	15
404			min	-1080.038	3	.139	12	-36.268	4	0	5	-.132	4	-.005	6
405		13	max	874.06	2	.62	2	-.028	12	0	1	0	12	-.001	15
406			min	-1079.647	3	.092	12	-36.726	4	0	5	-.145	4	-.005	6
407		14	max	874.581	2	.527	2	-.028	12	0	1	0	12	-.001	15
408			min	-1079.257	3	.046	12	-37.185	4	0	5	-.159	4	-.006	6
409		15	max	875.101	2	.434	2	-.028	12	0	1	0	12	-.001	15
410			min	-1078.866	3	-.014	3	-37.643	4	0	5	-.172	4	-.006	6
411		16	max	875.622	2	.342	2	-.028	12	0	1	0	12	-.001	15
412			min	-1078.476	3	-.084	3	-38.101	4	0	5	-.185	4	-.006	6
413		17	max	876.143	2	.249	2	-.028	12	0	1	0	12	-.001	15
414			min	-1078.085	3	-.153	3	-38.56	4	0	5	-.199	4	-.006	6
415		18	max	876.663	2	.156	2	-.028	12	0	1	0	12	-.001	15
416			min	-1077.695	3	-.223	3	-39.018	4	0	5	-.213	4	-.006	6
417		19	max	877.184	2	.064	2	-.028	12	0	1	0	12	-.001	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	-1077.304	3	-.292	3	-39.476	4	0	5	-.227	4	-.006	6
419	M11	1	max	616.964	2	7.642	6	7.619	4	0	1	0	12	.006	6
420			min	-766.005	3	1.788	15	-.416	1	0	4	-.041	4	.001	15
421		2	max	616.794	2	6.881	6	8.154	4	0	1	0	12	.003	2
422			min	-766.133	3	1.61	15	-.416	1	0	4	-.038	4	0	12
423		3	max	616.623	2	6.12	6	8.689	4	0	1	0	12	.001	2
424			min	-766.261	3	1.431	15	-.416	1	0	4	-.035	4	-.001	3
425		4	max	616.453	2	5.359	6	9.224	4	0	1	0	12	0	15
426			min	-766.389	3	1.252	15	-.416	1	0	4	-.031	4	-.002	3
427		5	max	616.283	2	4.598	6	9.758	4	0	1	0	12	-.001	15
428			min	-766.516	3	1.073	15	-.416	1	0	4	-.027	4	-.004	4
429		6	max	616.112	2	3.837	6	10.293	4	0	1	0	12	-.001	15
430			min	-766.644	3	.894	15	-.416	1	0	4	-.023	4	-.006	4
431		7	max	615.942	2	3.076	6	10.828	4	0	1	0	12	-.002	15
432			min	-766.772	3	.715	15	-.416	1	0	4	-.018	4	-.007	4
433		8	max	615.772	2	2.315	6	11.362	4	0	1	0	12	-.002	15
434			min	-766.9	3	.536	15	-.416	1	0	4	-.014	4	-.009	4
435		9	max	615.601	2	1.554	6	11.897	4	0	1	0	12	-.002	15
436			min	-767.027	3	.357	15	-.416	1	0	4	-.009	4	-.009	4
437		10	max	615.431	2	.793	6	12.432	4	0	1	0	12	-.002	15
438			min	-767.155	3	.179	15	-.416	1	0	4	-.004	4	-.01	4
439		11	max	615.261	2	.176	2	12.966	4	0	1	.002	5	-.002	15
440			min	-767.283	3	-.159	3	-.416	1	0	4	-.002	1	-.01	4
441		12	max	615.09	2	-.179	15	13.501	4	0	1	.007	5	-.002	15
442			min	-767.411	3	-.73	4	-.416	1	0	4	-.002	1	-.01	4
443		13	max	614.92	2	-.358	15	14.036	4	0	1	.013	5	-.002	15
444			min	-767.538	3	-1.491	4	-.416	1	0	4	-.003	1	-.009	4
445		14	max	614.749	2	-.537	15	14.57	4	0	1	.019	5	-.002	15
446			min	-767.666	3	-2.252	4	-.416	1	0	4	-.003	1	-.009	4
447		15	max	614.579	2	-.716	15	15.105	4	0	1	.025	5	-.002	15
448			min	-767.794	3	-3.012	4	-.416	1	0	4	-.003	1	-.008	4
449		16	max	614.409	2	-.895	15	15.64	4	0	1	.032	5	-.001	15
450			min	-767.922	3	-3.773	4	-.416	1	0	4	-.003	1	-.006	4
451		17	max	614.238	2	-1.074	15	16.175	4	0	1	.038	5	-.001	15
452			min	-768.049	3	-4.534	4	-.416	1	0	4	-.003	1	-.004	4
453		18	max	614.068	2	-1.253	15	16.709	4	0	1	.045	5	0	15
454			min	-768.177	3	-5.295	4	-.416	1	0	4	-.004	1	-.002	4
455		19	max	613.898	2	-1.431	15	17.244	4	0	1	.052	5	0	1
456			min	-768.305	3	-6.056	4	-.416	1	0	4	-.004	1	0	1
457	M12	1	max	990.254	1	0	1	16.231	1	0	1	.049	5	0	1
458			min	69.23	12	0	1	-327.735	4	0	1	-.003	1	0	1
459		2	max	990.424	1	0	1	16.231	1	0	1	.012	5	0	1
460			min	69.316	12	0	1	-327.882	4	0	1	-.002	1	0	1
461		3	max	990.595	1	0	1	16.231	1	0	1	0	1	0	1
462			min	69.401	12	0	1	-328.03	4	0	1	-.026	4	0	1
463		4	max	990.765	1	0	1	16.231	1	0	1	.002	1	0	1
464			min	69.486	12	0	1	-328.178	4	0	1	-.064	4	0	1
465		5	max	990.936	1	0	1	16.231	1	0	1	.004	1	0	1
466			min	69.571	12	0	1	-328.325	4	0	1	-.102	4	0	1
467		6	max	991.106	1	0	1	16.231	1	0	1	.006	1	0	1
468			min	69.656	12	0	1	-328.473	4	0	1	-.139	4	0	1
469		7	max	991.276	1	0	1	16.231	1	0	1	.008	1	0	1
470			min	69.741	12	0	1	-328.621	4	0	1	-.177	4	0	1
471		8	max	991.447	1	0	1	16.231	1	0	1	.01	1	0	1
472			min	69.827	12	0	1	-328.768	4	0	1	-.215	4	0	1
473		9	max	991.617	1	0	1	16.231	1	0	1	.011	1	0	1
474			min	69.912	12	0	1	-328.916	4	0	1	-.252	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	991.787	1	0	1	16.231	1	0	1	.013	1	0	1
476			min	69.997	12	0	1	-329.063	4	0	1	-.29	4	0	1
477		11	max	991.958	1	0	1	16.231	1	0	1	.015	1	0	1
478			min	70.082	12	0	1	-329.211	4	0	1	-.328	4	0	1
479		12	max	992.128	1	0	1	16.231	1	0	1	.017	1	0	1
480			min	70.167	12	0	1	-329.359	4	0	1	-.366	4	0	1
481		13	max	992.298	1	0	1	16.231	1	0	1	.019	1	0	1
482			min	70.252	12	0	1	-329.506	4	0	1	-.404	4	0	1
483		14	max	992.469	1	0	1	16.231	1	0	1	.021	1	0	1
484			min	70.338	12	0	1	-329.654	4	0	1	-.442	4	0	1
485		15	max	992.639	1	0	1	16.231	1	0	1	.023	1	0	1
486			min	70.423	12	0	1	-329.802	4	0	1	-.479	4	0	1
487		16	max	992.809	1	0	1	16.231	1	0	1	.024	1	0	1
488			min	70.508	12	0	1	-329.949	4	0	1	-.517	4	0	1
489		17	max	992.98	1	0	1	16.231	1	0	1	.026	1	0	1
490			min	70.593	12	0	1	-330.097	4	0	1	-.555	4	0	1
491		18	max	993.15	1	0	1	16.231	1	0	1	.028	1	0	1
492			min	70.678	12	0	1	-330.244	4	0	1	-.593	4	0	1
493		19	max	993.32	1	0	1	16.231	1	0	1	.03	1	0	1
494			min	70.764	12	0	1	-330.392	4	0	1	-.631	4	0	1
495	M1	1	max	205.676	1	570.375	3	47.289	5	0	1	.352	1	.002	3
496			min	-7.59	5	-358.244	2	-146.882	1	0	3	-.119	5	-.011	2
497		2	max	206.497	1	569.495	3	48.53	5	0	1	.275	1	.178	2
498			min	-7.207	5	-359.418	2	-146.882	1	0	3	-.094	5	-.299	3
499		3	max	476.584	3	424.247	2	19.757	5	0	3	.197	1	.359	2
500			min	-272.698	2	-416.828	3	-146.672	1	0	2	-.069	5	-.588	3
501		4	max	477.2	3	423.073	2	20.999	5	0	3	.12	1	.146	1
502			min	-271.877	2	-417.708	3	-146.672	1	0	2	-.058	5	-.367	3
503		5	max	477.816	3	421.9	2	22.24	5	0	3	.043	1	-.003	15
504			min	-271.055	2	-418.588	3	-146.672	1	0	2	-.046	5	-.147	3
505		6	max	478.433	3	420.727	2	23.482	5	0	3	-.002	12	.074	3
506			min	-270.233	2	-419.468	3	-146.672	1	0	2	-.043	4	-.31	2
507		7	max	479.049	3	419.553	2	24.723	5	0	3	-.007	12	.296	3
508			min	-269.412	2	-420.348	3	-146.672	1	0	2	-.112	1	-.532	2
509		8	max	479.665	3	418.38	2	25.965	5	0	3	-.005	15	.518	3
510			min	-268.59	2	-421.228	3	-146.672	1	0	2	-.19	1	-.753	2
511		9	max	498.593	3	44.12	2	71.158	5	0	9	.109	1	.604	3
512			min	-175.548	2	.355	15	-209.412	1	0	3	-.16	5	-.863	2
513		10	max	499.209	3	42.946	2	72.399	5	0	9	0	12	.589	3
514			min	-174.727	2	.001	15	-209.412	1	0	3	-.123	4	-.886	2
515		11	max	499.825	3	41.773	2	73.641	5	0	9	-.007	12	.574	3
516			min	-173.905	2	-1.436	4	-209.412	1	0	3	-.112	1	-.908	2
517		12	max	518.69	3	281.995	3	182.556	5	0	2	.187	1	.5	3
518			min	-99.524	10	-508.913	2	-143.285	1	0	3	-.251	5	-.806	2
519		13	max	519.306	3	281.115	3	183.797	5	0	2	.111	1	.352	3
520			min	-98.839	10	-510.086	2	-143.285	1	0	3	-.155	5	-.537	2
521		14	max	519.922	3	280.235	3	185.038	5	0	2	.036	1	.203	3
522			min	-98.154	10	-511.259	2	-143.285	1	0	3	-.057	5	-.268	2
523		15	max	520.538	3	279.355	3	186.28	5	0	2	.041	5	.056	3
524			min	-97.47	10	-512.433	2	-143.285	1	0	3	-.04	1	-.019	9
525		16	max	521.154	3	278.475	3	187.521	5	0	2	.139	5	.273	2
526			min	-96.785	10	-513.606	2	-143.285	1	0	3	-.115	1	-.091	3
527		17	max	521.771	3	277.594	3	188.763	5	0	2	.239	5	.545	2
528			min	-96.1	10	-514.78	2	-143.285	1	0	3	-.191	1	-.238	3
529		18	max	16.695	5	535.778	2	-9.715	12	0	3	.24	5	.274	2
530			min	-206.714	1	-239.592	3	-163.33	4	0	2	-.27	1	-.118	3
531		19	max	17.079	5	534.604	2	-9.715	12	0	3	.176	5	.009	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	-205.892	1	-240.472	3	-162.088	4	0	2	-.354	1	-.008	1
533	M5	1	max	440.818	1	1901.32	3	116.58	5	0	1	0	1	.022	2
534			min	23.377	12	-1208.998	2	0	1	0	4	-.285	4	-.003	3
535		2	max	441.64	1	1900.44	3	117.821	5	0	1	0	1	.66	2
536			min	23.788	12	-1210.172	2	0	1	0	4	-.224	4	-1.006	3
537		3	max	1538.928	3	1311.249	2	92.856	4	0	4	0	1	1.269	2
538			min	-986.985	2	-1362.303	3	0	1	0	1	-.162	4	-1.969	3
539		4	max	1539.544	3	1310.075	2	94.097	4	0	4	0	1	.596	1
540			min	-986.163	2	-1363.183	3	0	1	0	1	-.112	4	-1.25	3
541		5	max	1540.16	3	1308.902	2	95.339	4	0	4	0	1	0	9
542			min	-985.342	2	-1364.064	3	0	1	0	1	-.062	4	-.531	3
543		6	max	1540.776	3	1307.729	2	96.58	4	0	4	0	1	.189	3
544			min	-984.52	2	-1364.944	3	0	1	0	1	-.012	4	-.804	2
545		7	max	1541.393	3	1306.555	2	97.822	4	0	4	.04	4	.91	3
546			min	-983.699	2	-1365.824	3	0	1	0	1	0	1	-1.494	2
547		8	max	1542.009	3	1305.382	2	99.063	4	0	4	.092	4	1.631	3
548			min	-982.877	2	-1366.704	3	0	1	0	1	0	1	-2.183	2
549		9	max	1576.696	3	146.976	2	239.112	4	0	1	0	1	1.873	3
550			min	-792.77	2	.357	15	0	1	0	1	-.24	4	-2.488	2
551		10	max	1577.312	3	145.803	2	240.353	4	0	1	0	1	1.82	3
552			min	-791.949	2	.003	15	0	1	0	1	-.114	4	-2.565	2
553		11	max	1577.928	3	144.629	2	241.595	4	0	1	.013	4	1.768	3
554			min	-791.127	2	-1.218	6	0	1	0	1	0	1	-2.642	2
555		12	max	1612.742	3	916.085	3	274.989	4	0	1	0	1	1.555	3
556			min	-601.032	2	-1604.276	2	0	1	0	4	-.38	4	-2.367	2
557		13	max	1613.358	3	915.205	3	276.23	4	0	1	0	1	1.072	3
558			min	-600.21	2	-1605.45	2	0	1	0	4	-.235	4	-1.52	2
559		14	max	1613.974	3	914.325	3	277.472	4	0	1	0	1	.589	3
560			min	-599.389	2	-1606.623	2	0	1	0	4	-.089	4	-.673	2
561		15	max	1614.59	3	913.445	3	278.713	4	0	1	.058	4	.175	2
562			min	-598.567	2	-1607.797	2	0	1	0	4	0	1	-.005	6
563		16	max	1615.207	3	912.565	3	279.955	4	0	1	.206	4	1.024	2
564			min	-597.745	2	-1608.97	2	0	1	0	4	0	1	-.375	3
565		17	max	1615.823	3	911.685	3	281.196	4	0	1	.354	4	1.873	2
566			min	-596.924	2	-1610.143	2	0	1	0	4	0	1	-.856	3
567		18	max	-24.042	12	1798.339	2	0	1	0	4	.404	4	.965	2
568			min	-441.206	1	-814.909	3	-23.416	5	0	1	0	1	-.447	3
569		19	max	-23.631	12	1797.166	2	0	1	0	4	.393	4	.016	1
570			min	-440.385	1	-815.789	3	-22.174	5	0	1	0	1	-.017	3
571	M9	1	max	205.676	1	570.375	3	146.882	1	0	3	-.022	12	.002	3
572			min	11.876	12	-358.244	2	9.27	12	0	4	-.352	1	-.011	2
573		2	max	206.497	1	569.495	3	146.882	1	0	3	-.017	12	.178	2
574			min	12.287	12	-359.418	2	9.27	12	0	4	-.275	1	-.299	3
575		3	max	476.584	3	424.247	2	146.672	1	0	2	-.012	12	.359	2
576			min	-272.698	2	-416.828	3	9.243	12	0	3	-.197	1	-.588	3
577		4	max	477.2	3	423.073	2	146.672	1	0	2	-.008	12	.146	1
578			min	-271.877	2	-417.708	3	9.243	12	0	3	-.12	1	-.367	3
579		5	max	477.816	3	421.9	2	146.672	1	0	2	-.003	12	-.003	15
580			min	-271.055	2	-418.588	3	9.243	12	0	3	-.065	4	-.147	3
581		6	max	478.433	3	420.727	2	146.672	1	0	2	.035	1	.074	3
582			min	-270.233	2	-419.468	3	9.243	12	0	3	-.028	5	-.31	2
583		7	max	479.049	3	419.553	2	146.672	1	0	2	.112	1	.296	3
584			min	-269.412	2	-420.348	3	9.243	12	0	3	-.002	5	-.532	2
585		8	max	479.665	3	418.38	2	146.672	1	0	2	.19	1	.518	3
586			min	-268.59	2	-421.228	3	9.243	12	0	3	.012	12	-.753	2
587		9	max	498.593	3	44.12	2	209.412	1	0	3	-.007	12	.604	3
588			min	-175.548	2	.363	15	12.999	12	0	9	-.208	4	-.863	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	499.209	3	42.946	2	209.412	1	0	3	.001	1	.589	3
590			min	-174.727	2	.009	15	12.999	12	0	9	-.122	4	-.886	2
591		11	max	499.825	3	41.773	2	209.412	1	0	3	.112	1	.574	3
592			min	-173.905	2	-1.386	6	12.999	12	0	9	-.064	5	-.908	2
593		12	max	518.69	3	281.995	3	246.391	4	0	3	-.011	12	.5	3
594			min	-99.524	10	-508.913	2	8.755	12	0	2	-.334	4	-.806	2
595		13	max	519.306	3	281.115	3	247.633	4	0	3	-.007	12	.352	3
596			min	-98.839	10	-510.086	2	8.755	12	0	2	-.204	4	-.537	2
597		14	max	519.922	3	280.235	3	248.874	4	0	3	-.002	12	.203	3
598			min	-98.154	10	-511.259	2	8.755	12	0	2	-.073	4	-.268	2
599		15	max	520.538	3	279.355	3	250.116	4	0	3	.059	4	.056	3
600			min	-97.47	10	-512.433	2	8.755	12	0	2	.002	12	-.019	9
601		16	max	521.154	3	278.475	3	251.357	4	0	3	.191	4	.273	2
602			min	-96.785	10	-513.606	2	8.755	12	0	2	.007	12	-.091	3
603		17	max	521.771	3	277.594	3	252.599	4	0	3	.324	4	.545	2
604			min	-96.1	10	-514.78	2	8.755	12	0	2	.012	12	-.238	3
605		18	max	-12.16	12	535.778	2	158.768	1	0	2	.358	4	.274	2
606			min	-206.714	1	-239.592	3	-94.984	5	0	3	.016	12	-.118	3
607		19	max	-11.749	12	534.604	2	158.768	1	0	2	.354	1	.009	3
608			min	-205.892	1	-240.472	3	-93.742	5	0	3	.022	12	-.008	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	.002	1	.087	2	.008	3	7.369e-3	2	NC	1	NC	1
2			min	-.887	4	-.012	3	-.004	2	-1.415e-3	3	NC	1	NC	1
3		2	max	.001	1	.398	3	.068	1	8.616e-3	2	NC	5	NC	3
4			min	-.887	4	-.161	1	-.037	5	-1.584e-3	3	673.811	3	4134.473	1
5		3	max	.001	1	.729	3	.168	1	9.864e-3	2	NC	5	NC	3
6			min	-.887	4	-.352	1	-.042	5	-1.753e-3	3	372.414	3	1662.346	1
7		4	max	.001	1	.93	3	.255	1	1.111e-2	2	NC	15	NC	3
8			min	-.887	4	-.462	1	-.026	5	-1.922e-3	3	292.98	3	1090.775	1
9		5	max	0	1	.976	3	.3	1	1.236e-2	2	NC	15	NC	5
10			min	-.887	4	-.475	1	0	15	-2.091e-3	3	279.374	3	923.963	1
11		6	max	0	1	.87	3	.291	1	1.361e-2	2	NC	5	NC	5
12			min	-.887	4	-.395	1	.018	15	-2.26e-3	3	312.835	3	952.441	1
13		7	max	0	1	.645	3	.23	1	1.485e-2	2	NC	5	NC	12
14			min	-.887	4	-.241	1	.026	12	-2.429e-3	3	420.4	3	1206.879	1
15		8	max	0	1	.358	3	.135	1	1.61e-2	2	NC	5	NC	3
16			min	-.887	4	-.052	1	.011	10	-2.598e-3	3	745.581	3	2065.298	1
17		9	max	0	1	.14	2	.052	4	1.735e-2	2	NC	4	NC	2
18			min	-.887	4	.004	15	-.004	10	-2.767e-3	3	2493.5	3	5343.956	4
19		10	max	0	1	.217	2	.026	3	1.86e-2	2	NC	3	NC	1
20			min	-.887	4	-.018	3	-.017	2	-2.936e-3	3	2127.458	2	NC	1
21		11	max	0	12	.14	2	.04	1	1.735e-2	2	NC	4	NC	2
22			min	-.887	4	.004	15	-.03	5	-2.767e-3	3	2493.5	3	7154.807	1
23		12	max	0	12	.358	3	.135	1	1.61e-2	2	NC	5	NC	3
24			min	-.887	4	-.052	1	-.028	5	-2.598e-3	3	745.581	3	2065.298	1
25		13	max	0	12	.645	3	.23	1	1.485e-2	2	NC	5	NC	5
26			min	-.887	4	-.241	1	-.007	5	-2.429e-3	3	420.4	3	1206.879	1
27		14	max	0	12	.87	3	.291	1	1.361e-2	2	NC	5	NC	5
28			min	-.887	4	-.395	1	.015	15	-2.26e-3	3	312.835	3	952.441	1
29		15	max	0	12	.976	3	.3	1	1.236e-2	2	NC	15	NC	12
30			min	-.887	4	-.475	1	.027	12	-2.091e-3	3	279.374	3	923.963	1
31		16	max	0	12	.93	3	.255	1	1.111e-2	2	NC	15	NC	3
32			min	-.888	4	-.462	1	.022	12	-1.922e-3	3	292.98	3	1090.775	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	.729	3	.168	1	9.864e-3	2	NC	5	NC	3
34			min	-.888	4	-.352	1	.016	12	-1.753e-3	3	372.414	3	1662.346	1
35		18	max	0	12	.398	3	.068	1	8.616e-3	2	NC	5	NC	3
36			min	-.888	4	-.161	1	.007	10	-1.584e-3	3	673.811	3	4077.433	4
37		19	max	0	12	.087	2	.008	3	7.369e-3	2	NC	1	NC	1
38			min	-.888	4	-.012	3	-.004	2	-1.415e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.184	3	.007	3	4.363e-3	2	NC	1	NC	1
40			min	-.642	4	-.29	2	-.003	2	-3.159e-3	3	NC	1	NC	1
41		2	max	0	1	.563	3	.048	1	5.28e-3	2	NC	5	NC	2
42			min	-.642	4	-.64	2	-.053	5	-3.89e-3	3	727.633	3	5043.158	5
43		3	max	0	1	.88	3	.137	1	6.197e-3	2	NC	15	NC	3
44			min	-.642	4	-.938	2	-.061	5	-4.621e-3	3	396.057	3	2037.176	1
45		4	max	0	1	1.094	3	.221	1	7.114e-3	2	9742.62	15	NC	3
46			min	-.642	4	-1.148	2	-.038	5	-5.351e-3	3	303.072	3	1257.622	1
47		5	max	0	1	1.184	3	.269	1	8.031e-3	2	8750.487	15	NC	5
48			min	-.642	4	-1.254	2	0	15	-6.082e-3	3	275.921	3	1030.72	1
49		6	max	0	1	1.15	3	.267	1	8.948e-3	2	8862.043	15	NC	12
50			min	-.642	4	-1.254	2	.025	12	-6.812e-3	3	285.47	3	1040.592	1
51		7	max	0	1	1.016	3	.214	1	9.864e-3	2	9938.556	15	NC	10
52			min	-.642	4	-1.167	2	.024	12	-7.543e-3	3	314.806	2	1299.408	1
53		8	max	0	1	.826	3	.127	1	1.078e-2	2	NC	15	NC	3
54			min	-.642	4	-1.028	2	.011	10	-8.273e-3	3	373.983	2	2197.471	1
55		9	max	0	1	.646	3	.073	4	1.17e-2	2	NC	5	NC	2
56			min	-.642	4	-.891	2	-.004	10	-9.004e-3	3	459.418	2	3878.101	4
57		10	max	0	1	.563	3	.023	3	1.261e-2	2	NC	5	NC	1
58			min	-.642	4	-.826	2	-.016	2	-9.734e-3	3	514.89	2	NC	1
59		11	max	0	12	.646	3	.039	1	1.17e-2	2	NC	5	NC	2
60			min	-.642	4	-.891	2	-.052	5	-9.004e-3	3	459.418	2	5309.268	5
61		12	max	0	12	.826	3	.127	1	1.078e-2	2	NC	15	NC	3
62			min	-.642	4	-1.028	2	-.057	5	-8.273e-3	3	373.983	2	2197.471	1
63		13	max	0	12	1.016	3	.214	1	9.864e-3	2	9938.257	15	NC	4
64			min	-.642	4	-1.167	2	-.033	5	-7.543e-3	3	314.806	2	1299.408	1
65		14	max	0	12	1.15	3	.267	1	8.948e-3	2	8861.69	15	NC	5
66			min	-.642	4	-1.254	2	.004	15	-6.812e-3	3	285.47	3	1040.592	1
67		15	max	0	12	1.184	3	.269	1	8.031e-3	2	8750.055	15	NC	12
68			min	-.642	4	-1.254	2	.024	12	-6.082e-3	3	275.921	3	1030.72	1
69		16	max	0	12	1.094	3	.221	1	7.114e-3	2	9742.042	15	NC	3
70			min	-.642	4	-1.148	2	.019	12	-5.351e-3	3	303.072	3	1257.622	1
71		17	max	0	12	.88	3	.137	1	6.197e-3	2	NC	15	NC	3
72			min	-.642	4	-.938	2	.013	12	-4.621e-3	3	396.057	3	2037.176	1
73		18	max	0	12	.563	3	.076	4	5.28e-3	2	NC	5	NC	2
74			min	-.642	4	-.64	2	.004	10	-3.89e-3	3	727.633	3	3647.156	4
75		19	max	0	12	.184	3	.007	3	4.363e-3	2	NC	1	NC	1
76			min	-.643	4	-.29	2	-.003	2	-3.159e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.186	3	.007	3	2.788e-3	3	NC	1	NC	1
78			min	-.512	4	-.289	2	-.003	2	-4.584e-3	2	NC	1	NC	1
79		2	max	0	12	.425	3	.049	1	3.439e-3	3	NC	5	NC	2
80			min	-.512	4	-.764	2	-.067	5	-5.551e-3	2	580.946	2	4011.49	5
81		3	max	0	12	.629	3	.137	1	4.091e-3	3	NC	15	NC	3
82			min	-.512	4	-1.164	2	-.079	5	-6.519e-3	2	315.621	2	2032.089	1
83		4	max	0	12	.774	3	.222	1	4.743e-3	3	9756.355	15	NC	3
84			min	-.512	4	-1.436	2	-.053	5	-7.487e-3	2	240.719	2	1255.237	1
85		5	max	0	12	.848	3	.27	1	5.394e-3	3	8764.844	15	NC	5
86			min	-.512	4	-1.555	2	-.006	5	-8.454e-3	2	217.988	2	1028.991	1
87		6	max	0	12	.851	3	.267	1	6.046e-3	3	8879.75	15	NC	12
88			min	-.512	4	-1.524	2	.024	12	-9.422e-3	2	223.623	2	1038.831	1
89		7	max	0	12	.796	3	.214	1	6.697e-3	3	9963.974	15	NC	12

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	-.512	4	-1.368	2	.023	12	-1.039e-2	2	255.973	2	1296.792	1
91		8	max	0	12	.704	3	.132	4	7.349e-3	3	NC	15	NC	3
92			min	-.512	4	-1.141	2	.011	10	-1.136e-2	2	323.979	2	2120.388	4
93		9	max	0	12	.613	3	.086	4	8.001e-3	3	NC	5	NC	2
94			min	-.512	4	-.925	2	-.003	10	-1.232e-2	2	434.469	2	3281.602	4
95		10	max	0	1	.57	3	.021	3	8.652e-3	3	NC	5	NC	1
96			min	-.512	4	-.824	2	-.015	2	-1.329e-2	2	516.215	2	NC	1
97		11	max	0	1	.613	3	.039	1	8.001e-3	3	NC	5	NC	2
98			min	-.512	4	-.925	2	-.065	5	-1.232e-2	2	434.469	2	4256.603	5
99		12	max	0	1	.704	3	.128	1	7.349e-3	3	NC	15	NC	3
100			min	-.512	4	-1.141	2	-.073	5	-1.136e-2	2	323.979	2	2190.521	1
101		13	max	0	1	.796	3	.214	1	6.697e-3	3	9963.739	15	NC	4
102			min	-.512	4	-1.368	2	-.045	5	-1.039e-2	2	255.973	2	1296.792	1
103		14	max	0	1	.851	3	.267	1	6.046e-3	3	8879.478	15	NC	5
104			min	-.512	4	-1.524	2	.001	15	-9.422e-3	2	223.623	2	1038.831	1
105		15	max	0	1	.848	3	.27	1	5.394e-3	3	8764.515	15	NC	12
106			min	-.512	4	-1.555	2	.023	12	-8.454e-3	2	217.988	2	1028.991	1
107		16	max	0	1	.774	3	.222	1	4.743e-3	3	9755.917	15	NC	3
108			min	-.512	4	-1.436	2	.019	12	-7.487e-3	2	240.719	2	1255.237	1
109		17	max	0	1	.629	3	.14	4	4.091e-3	3	NC	15	NC	3
110			min	-.512	4	-1.164	2	.013	12	-6.519e-3	2	315.621	2	1975.039	4
111		18	max	0	1	.425	3	.09	4	3.439e-3	3	NC	5	NC	2
112			min	-.511	4	-.764	2	.004	10	-5.551e-3	2	580.946	2	3067.869	4
113		19	max	0	1	.186	3	.007	3	2.788e-3	3	NC	1	NC	1
114			min	-.511	4	-.289	2	-.003	2	-4.584e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.077	2	.006	3	4.761e-3	3	NC	1	NC	1
116			min	-.152	4	-.058	3	-.003	2	-6.016e-3	2	NC	1	NC	1
117		2	max	0	12	.099	3	.068	1	5.721e-3	3	NC	5	NC	3
118			min	-.152	4	-.291	2	-.053	5	-6.938e-3	2	749.346	2	4164.768	1
119		3	max	0	12	.223	3	.167	1	6.681e-3	3	NC	5	NC	3
120			min	-.152	4	-.587	2	-.063	5	-7.859e-3	2	415.924	2	1668.652	1
121		4	max	0	12	.293	3	.254	1	7.641e-3	3	NC	15	NC	3
122			min	-.152	4	-.76	2	-.044	5	-8.781e-3	2	329.807	2	1092.944	1
123		5	max	0	12	.297	3	.3	1	8.602e-3	3	NC	15	NC	5
124			min	-.152	4	-.788	2	-.009	5	-9.703e-3	2	318.883	2	924.538	1
125		6	max	0	12	.239	3	.291	1	9.562e-3	3	NC	5	NC	12
126			min	-.152	4	-.676	2	.019	15	-1.062e-2	2	366.383	2	951.638	1
127		7	max	0	12	.132	3	.231	1	1.052e-2	3	NC	5	NC	12
128			min	-.152	4	-.453	2	.022	12	-1.155e-2	2	520.506	2	1203.131	1
129		8	max	0	12	.004	12	.136	1	1.148e-2	3	NC	5	NC	3
130			min	-.152	4	-.176	2	.013	10	-1.247e-2	2	1092.137	2	2047.801	1
131		9	max	0	12	.092	1	.065	4	1.244e-2	3	NC	1	NC	2
132			min	-.152	4	-.114	3	-.002	10	-1.339e-2	2	4942.994	3	4354.604	4
133		10	max	0	1	.186	2	.018	3	1.34e-2	3	NC	4	NC	1
134			min	-.152	4	-.166	3	-.014	2	-1.431e-2	2	2510.016	1	NC	1
135		11	max	0	1	.092	1	.041	1	1.244e-2	3	NC	1	NC	2
136			min	-.152	4	-.114	3	-.043	5	-1.339e-2	2	4942.994	3	6353.454	5
137		12	max	0	1	.004	12	.136	1	1.148e-2	3	NC	5	NC	3
138			min	-.152	4	-.176	2	-.044	5	-1.247e-2	2	1092.137	2	2047.801	1
139		13	max	0	1	.132	3	.231	1	1.052e-2	3	NC	5	NC	5
140			min	-.152	4	-.453	2	-.017	5	-1.155e-2	2	520.506	2	1203.131	1
141		14	max	0	1	.239	3	.291	1	9.562e-3	3	NC	5	NC	5
142			min	-.152	4	-.676	2	.014	15	-1.062e-2	2	366.383	2	951.638	1
143		15	max	0	1	.297	3	.3	1	8.602e-3	3	NC	15	NC	12
144			min	-.152	4	-.788	2	.024	12	-9.703e-3	2	318.883	2	924.538	1
145		16	max	.001	1	.293	3	.254	1	7.641e-3	3	NC	15	NC	3
146			min	-.152	4	-.76	2	.02	12	-8.781e-3	2	329.807	2	1092.944	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	.001	1	.223	3	.167	1	6.681e-3	3	NC	5	NC	3
148			min	-.152	4	-.587	2	.014	12	-7.859e-3	2	415.924	2	1668.652	1
149		18	max	.002	1	.099	3	.084	4	5.721e-3	3	NC	5	NC	3
150			min	-.151	4	-.291	2	.007	10	-6.938e-3	2	749.346	2	3290.423	4
151		19	max	.002	1	.077	2	.006	3	4.761e-3	3	NC	1	NC	1
152			min	-.151	4	-.058	3	-.003	2	-6.016e-3	2	NC	1	NC	1
153	M2	1	max	.006	2	.007	2	.011	1	1.74e-3	5	NC	1	NC	2
154			min	-.008	3	-.013	3	-.826	4	-3.391e-4	1	NC	1	93.248	4
155		2	max	.006	2	.006	2	.01	1	1.857e-3	5	NC	1	NC	2
156			min	-.008	3	-.012	3	-.759	4	-3.208e-4	1	NC	1	101.402	4
157		3	max	.006	2	.005	2	.009	1	1.974e-3	5	NC	1	NC	2
158			min	-.007	3	-.012	3	-.693	4	-3.024e-4	1	NC	1	111.061	4
159		4	max	.005	2	.004	2	.009	1	2.091e-3	5	NC	1	NC	2
160			min	-.007	3	-.012	3	-.628	4	-2.841e-4	1	NC	1	122.612	4
161		5	max	.005	2	.003	2	.008	1	2.208e-3	5	NC	1	NC	1
162			min	-.006	3	-.011	3	-.564	4	-2.657e-4	1	NC	1	136.578	4
163		6	max	.005	2	.002	2	.007	1	2.325e-3	5	NC	1	NC	1
164			min	-.006	3	-.011	3	-.501	4	-2.473e-4	1	NC	1	153.682	4
165		7	max	.004	2	0	2	.006	1	2.442e-3	5	NC	1	NC	1
166			min	-.005	3	-.011	3	-.44	4	-2.29e-4	1	NC	1	174.943	4
167		8	max	.004	2	0	2	.005	1	2.559e-3	5	NC	1	NC	1
168			min	-.005	3	-.01	3	-.382	4	-2.106e-4	1	NC	1	201.84	4
169		9	max	.004	2	0	15	.004	1	2.676e-3	5	NC	1	NC	1
170			min	-.004	3	-.01	3	-.325	4	-1.923e-4	1	NC	1	236.582	4
171		10	max	.003	2	-.001	15	.004	1	2.793e-3	5	NC	1	NC	1
172			min	-.004	3	-.009	3	-.272	4	-1.739e-4	1	NC	1	282.593	4
173		11	max	.003	2	-.001	15	.003	1	2.91e-3	4	NC	1	NC	1
174			min	-.004	3	-.008	3	-.223	4	-1.556e-4	1	NC	1	345.422	4
175		12	max	.003	2	-.001	15	.002	1	3.034e-3	4	NC	1	NC	1
176			min	-.003	3	-.007	3	-.177	4	-1.372e-4	1	NC	1	434.552	4
177		13	max	.002	2	-.001	15	.002	1	3.158e-3	4	NC	1	NC	1
178			min	-.003	3	-.007	3	-.136	4	-1.189e-4	1	NC	1	567.327	4
179		14	max	.002	2	-.001	15	.001	1	3.282e-3	4	NC	1	NC	1
180			min	-.002	3	-.006	3	-.099	4	-1.005e-4	1	NC	1	778.368	4
181		15	max	.001	2	0	15	0	1	3.406e-3	4	NC	1	NC	1
182			min	-.002	3	-.005	3	-.067	4	-8.216e-5	1	NC	1	1145.495	4
183		16	max	.001	2	0	15	0	1	3.529e-3	4	NC	1	NC	1
184			min	-.001	3	-.004	6	-.041	4	-6.38e-5	1	NC	1	1876.314	4
185		17	max	0	2	0	15	0	1	3.653e-3	4	NC	1	NC	1
186			min	0	3	-.003	6	-.021	4	-4.545e-5	1	NC	1	3699.547	4
187		18	max	0	2	0	15	0	1	3.777e-3	4	NC	1	NC	1
188			min	0	3	-.001	6	-.007	4	-2.71e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.901e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-8.743e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.24e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.008e-3	4	NC	1	NC	1
193		2	max	0	3	0	15	.018	4	3.046e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	1	-2.415e-4	5	NC	1	9610.42	14
195		3	max	0	3	0	15	.035	4	5.343e-4	4	NC	1	NC	1
196			min	0	2	-.004	6	0	1	3.608e-6	12	NC	1	5029.687	14
197		4	max	.001	3	-.001	15	.05	4	1.306e-3	4	NC	1	NC	1
198			min	0	2	-.006	6	0	3	5.362e-6	12	NC	1	3505.767	14
199		5	max	.001	3	-.002	15	.064	4	2.077e-3	4	NC	1	NC	1
200			min	-.001	2	-.008	6	0	12	7.117e-6	12	NC	1	2744.765	14
201		6	max	.002	3	-.002	15	.077	4	2.848e-3	4	NC	1	NC	1
202			min	-.001	2	-.01	6	0	12	8.871e-6	12	9349.812	6	2287.631	14
203		7	max	.002	3	-.002	15	.088	4	3.619e-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
204			min	-.002	2	-.011	6	0	12	1.063e-5	12	8079.141	6	1981.111	14
205		8	max	.003	3	-.003	15	.099	4	4.391e-3	4	NC	2	NC	1
206			min	-.002	2	-.012	6	0	12	1.238e-5	12	7296.91	6	1759.327	14
207		9	max	.003	3	-.003	15	.11	4	5.162e-3	4	NC	5	NC	1
208			min	-.002	2	-.013	6	0	12	1.413e-5	12	6839.866	6	1589.19	14
209		10	max	.003	3	-.003	15	.12	4	5.933e-3	4	NC	5	NC	1
210			min	-.003	2	-.014	6	0	12	1.589e-5	12	6629.336	6	1452.219	14
211		11	max	.004	3	-.003	15	.13	4	6.705e-3	4	NC	5	NC	1
212			min	-.003	2	-.014	6	0	12	1.764e-5	12	6634.566	6	1337.286	14
213		12	max	.004	3	-.003	15	.14	4	7.476e-3	4	NC	3	NC	1
214			min	-.003	2	-.013	6	0	12	1.94e-5	12	6860.917	6	1237.342	14
215		13	max	.004	3	-.003	15	.15	4	8.247e-3	4	NC	2	NC	1
216			min	-.004	2	-.012	6	0	12	2.115e-5	12	7353.456	6	1147.779	14
217		14	max	.005	3	-.002	15	.162	4	9.019e-3	4	NC	1	NC	1
218			min	-.004	2	-.011	6	0	12	2.291e-5	12	8219.817	6	1065.561	14
219		15	max	.005	3	-.002	15	.174	4	9.79e-3	4	NC	1	NC	1
220			min	-.004	2	-.01	6	0	12	2.466e-5	12	9696.666	6	988.717	14
221		16	max	.006	3	-.001	15	.187	4	1.056e-2	4	NC	1	NC	1
222			min	-.004	2	-.008	6	0	12	2.642e-5	12	NC	1	916.023	14
223		17	max	.006	3	0	15	.202	4	1.133e-2	4	NC	1	NC	1
224			min	-.005	2	-.006	1	0	12	2.817e-5	12	NC	1	846.793	14
225		18	max	.006	3	0	15	.218	4	1.21e-2	4	NC	1	NC	2
226			min	-.005	2	-.004	1	0	12	2.992e-5	12	NC	1	780.711	14
227		19	max	.007	3	0	5	.237	4	1.288e-2	4	NC	1	NC	2
228			min	-.005	2	-.002	1	0	12	3.168e-5	12	NC	1	717.709	14
229	M4	1	max	.002	1	.005	2	0	12	2.438e-4	4	NC	1	NC	3
230			min	0	5	-.007	3	-.237	4	1.062e-5	12	NC	1	104.795	4
231		2	max	.002	1	.005	2	0	12	2.438e-4	4	NC	1	NC	3
232			min	0	5	-.007	3	-.218	4	1.062e-5	12	NC	1	113.806	4
233		3	max	.002	1	.004	2	0	12	2.438e-4	4	NC	1	NC	3
234			min	0	5	-.006	3	-.199	4	1.062e-5	12	NC	1	124.539	4
235		4	max	.002	1	.004	2	0	12	2.438e-4	4	NC	1	NC	3
236			min	0	5	-.006	3	-.18	4	1.062e-5	12	NC	1	137.44	4
237		5	max	.002	1	.004	2	0	12	2.438e-4	4	NC	1	NC	3
238			min	0	5	-.005	3	-.162	4	1.062e-5	12	NC	1	153.114	4
239		6	max	.002	1	.004	2	0	12	2.438e-4	4	NC	1	NC	3
240			min	0	5	-.005	3	-.144	4	1.062e-5	12	NC	1	172.402	4
241		7	max	.002	1	.003	2	0	12	2.438e-4	4	NC	1	NC	3
242			min	0	5	-.005	3	-.126	4	1.062e-5	12	NC	1	196.496	4
243		8	max	.001	1	.003	2	0	12	2.438e-4	4	NC	1	NC	2
244			min	0	5	-.004	3	-.109	4	1.062e-5	12	NC	1	227.134	4
245		9	max	.001	1	.003	2	0	12	2.438e-4	4	NC	1	NC	2
246			min	0	5	-.004	3	-.093	4	1.062e-5	12	NC	1	266.936	4
247		10	max	.001	1	.003	2	0	12	2.438e-4	4	NC	1	NC	2
248			min	0	5	-.003	3	-.078	4	1.062e-5	12	NC	1	319.991	4
249		11	max	.001	1	.002	2	0	12	2.438e-4	4	NC	1	NC	2
250			min	0	5	-.003	3	-.063	4	1.062e-5	12	NC	1	392.992	4
251		12	max	0	1	.002	2	0	12	2.438e-4	4	NC	1	NC	1
252			min	0	5	-.003	3	-.05	4	1.062e-5	12	NC	1	497.51	4
253		13	max	0	1	.002	2	0	12	2.438e-4	4	NC	1	NC	1
254			min	0	5	-.002	3	-.038	4	1.062e-5	12	NC	1	655.018	4
255		14	max	0	1	.001	2	0	12	2.438e-4	4	NC	1	NC	1
256			min	0	5	-.002	3	-.027	4	1.062e-5	12	NC	1	909.186	4
257		15	max	0	1	.001	2	0	12	2.438e-4	4	NC	1	NC	1
258			min	0	5	-.002	3	-.018	4	1.062e-5	12	NC	1	1360.639	4
259		16	max	0	1	0	2	0	12	2.438e-4	4	NC	1	NC	1
260			min	0	5	-.001	3	-.011	4	1.062e-5	12	NC	1	2287.404	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	2.438e-4	4	NC	1	NC	1
262			min	0	5	0	3	-.005	4	1.062e-5	12	NC	1	4719.573	4
263		18	max	0	1	0	2	0	12	2.438e-4	4	NC	1	NC	1
264			min	0	5	0	3	-.002	4	1.062e-5	12	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.438e-4	4	NC	1	NC	1
266			min	0	1	0	1	0	1	1.062e-5	12	NC	1	NC	1
267	M6	1	max	.021	2	.029	2	0	1	1.873e-3	4	NC	3	NC	1
268			min	-.026	3	-.041	3	-.834	4	0	1	2649.683	2	92.325	4
269		2	max	.02	2	.026	2	0	1	1.987e-3	4	NC	3	NC	1
270			min	-.025	3	-.038	3	-.767	4	0	1	2920.389	2	100.4	4
271		3	max	.019	2	.024	2	0	1	2.102e-3	4	NC	3	NC	1
272			min	-.023	3	-.036	3	-.7	4	0	1	3249.371	2	109.965	4
273		4	max	.017	2	.021	2	0	1	2.216e-3	4	NC	3	NC	1
274			min	-.022	3	-.034	3	-.634	4	0	1	3653.624	2	121.404	4
275		5	max	.016	2	.019	2	0	1	2.33e-3	4	NC	3	NC	1
276			min	-.021	3	-.032	3	-.569	4	0	1	4157.043	2	135.235	4
277		6	max	.015	2	.016	2	0	1	2.444e-3	4	NC	1	NC	1
278			min	-.019	3	-.03	3	-.506	4	0	1	4794.081	2	152.174	4
279		7	max	.014	2	.014	2	0	1	2.558e-3	4	NC	1	NC	1
280			min	-.018	3	-.027	3	-.445	4	0	1	5615.886	2	173.232	4
281		8	max	.013	2	.011	2	0	1	2.673e-3	4	NC	1	NC	1
282			min	-.016	3	-.025	3	-.385	4	0	1	6701.092	2	199.871	4
283		9	max	.012	2	.009	2	0	1	2.787e-3	4	NC	1	NC	1
284			min	-.015	3	-.023	3	-.329	4	0	1	8175.768	2	234.281	4
285		10	max	.01	2	.008	2	0	1	2.901e-3	4	NC	1	NC	1
286			min	-.013	3	-.021	3	-.275	4	0	1	NC	1	279.855	4
287		11	max	.009	2	.006	2	0	1	3.015e-3	4	NC	1	NC	1
288			min	-.012	3	-.018	3	-.225	4	0	1	NC	1	342.089	4
289		12	max	.008	2	.004	2	0	1	3.129e-3	4	NC	1	NC	1
290			min	-.01	3	-.016	3	-.179	4	0	1	NC	1	430.38	4
291		13	max	.007	2	.003	2	0	1	3.243e-3	4	NC	1	NC	1
292			min	-.009	3	-.014	3	-.137	4	0	1	NC	1	561.913	4
293		14	max	.006	2	.002	2	0	1	3.358e-3	4	NC	1	NC	1
294			min	-.007	3	-.011	3	-.1	4	0	1	NC	1	770.995	4
295		15	max	.005	2	0	2	0	1	3.472e-3	4	NC	1	NC	1
296			min	-.006	3	-.009	3	-.068	4	0	1	NC	1	1134.752	4
297		16	max	.003	2	0	2	0	1	3.586e-3	4	NC	1	NC	1
298			min	-.004	3	-.007	3	-.041	4	0	1	NC	1	1858.968	4
299		17	max	.002	2	0	2	0	1	3.7e-3	4	NC	1	NC	1
300			min	-.003	3	-.005	3	-.021	4	0	1	NC	1	3666.135	4
301		18	max	.001	2	0	2	0	1	3.814e-3	4	NC	1	NC	1
302			min	-.001	3	-.002	3	-.007	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.928e-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	-1.015e-3	4	NC	1	NC	1
307		2	max	.001	3	0	15	.018	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-2.66e-4	4	NC	1	NC	1
309		3	max	.002	3	0	15	.035	4	4.831e-4	4	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	9093.846	4
311		4	max	.003	3	-.001	15	.05	4	1.232e-3	4	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	7219.329	4
313		5	max	.005	3	-.002	15	.064	4	1.981e-3	4	NC	1	NC	1
314			min	-.005	2	-.009	3	0	1	0	1	NC	1	6587.379	4
315		6	max	.006	3	-.002	15	.077	4	2.731e-3	4	NC	1	NC	1
316			min	-.006	2	-.011	3	0	1	0	1	9447.207	4	6590.517	4
317		7	max	.007	3	-.003	15	.089	4	3.48e-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	-.013	3	0	1	0	1	8157.036	4	7126.929	4
319		8	max	.008	3	-.003	15	.099	4	4.229e-3	4	NC	1	NC	1
320			min	-.008	2	-.014	3	0	1	0	1	7362.557	4	8356.541	4
321		9	max	.009	3	-.003	15	.11	4	4.978e-3	4	NC	1	NC	1
322			min	-.009	2	-.015	3	0	1	0	1	6897.696	4	NC	1
323		10	max	.01	3	-.003	15	.119	4	5.727e-3	4	NC	1	NC	1
324			min	-.01	2	-.015	3	0	1	0	1	6682.352	4	NC	1
325		11	max	.012	3	-.003	15	.129	4	6.476e-3	4	NC	1	NC	1
326			min	-.011	2	-.016	3	0	1	0	1	6685.048	4	NC	1
327		12	max	.013	3	-.003	15	.139	4	7.225e-3	4	NC	1	NC	1
328			min	-.013	2	-.015	3	0	1	0	1	6910.863	4	NC	1
329		13	max	.014	3	-.003	15	.148	4	7.974e-3	4	NC	1	NC	1
330			min	-.014	2	-.015	3	0	1	0	1	7404.944	4	NC	1
331		14	max	.015	3	-.003	15	.159	4	8.724e-3	4	NC	1	NC	1
332			min	-.015	2	-.014	3	0	1	0	1	8275.465	4	NC	1
333		15	max	.016	3	-.002	15	.17	4	9.473e-3	4	NC	1	NC	1
334			min	-.016	2	-.013	3	0	1	0	1	9760.472	4	NC	1
335		16	max	.017	3	-.002	15	.182	4	1.022e-2	4	NC	1	NC	1
336			min	-.017	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.019	3	-.001	15	.196	4	1.097e-2	4	NC	1	NC	1
338			min	-.018	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.02	3	0	10	.211	4	1.172e-2	4	NC	1	NC	1
340			min	-.019	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.021	3	.001	10	.228	4	1.247e-2	4	NC	1	NC	1
342			min	-.021	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.02	2	0	1	5.65e-5	5	NC	1	NC	1
344			min	0	15	-.022	3	-.228	4	0	1	NC	1	108.808	4
345		2	max	.005	1	.019	2	0	1	5.65e-5	5	NC	1	NC	1
346			min	0	15	-.021	3	-.21	4	0	1	NC	1	118.178	4
347		3	max	.005	1	.018	2	0	1	5.65e-5	5	NC	1	NC	1
348			min	0	15	-.02	3	-.192	4	0	1	NC	1	129.338	4
349		4	max	.005	1	.017	2	0	1	5.65e-5	5	NC	1	NC	1
350			min	0	15	-.018	3	-.174	4	0	1	NC	1	142.75	4
351		5	max	.004	1	.016	2	0	1	5.65e-5	5	NC	1	NC	1
352			min	0	15	-.017	3	-.156	4	0	1	NC	1	159.045	4
353		6	max	.004	1	.015	2	0	1	5.65e-5	5	NC	1	NC	1
354			min	0	15	-.016	3	-.138	4	0	1	NC	1	179.096	4
355		7	max	.004	1	.013	2	0	1	5.65e-5	5	NC	1	NC	1
356			min	0	15	-.015	3	-.121	4	0	1	NC	1	204.143	4
357		8	max	.003	1	.012	2	0	1	5.65e-5	5	NC	1	NC	1
358			min	0	15	-.013	3	-.105	4	0	1	NC	1	235.994	4
359		9	max	.003	1	.011	2	0	1	5.65e-5	5	NC	1	NC	1
360			min	0	15	-.012	3	-.089	4	0	1	NC	1	277.37	4
361		10	max	.003	1	.01	2	0	1	5.65e-5	5	NC	1	NC	1
362			min	0	15	-.011	3	-.075	4	0	1	NC	1	332.525	4
363		11	max	.003	1	.009	2	0	1	5.65e-5	5	NC	1	NC	1
364			min	0	15	-.01	3	-.061	4	0	1	NC	1	408.414	4
365		12	max	.002	1	.008	2	0	1	5.65e-5	5	NC	1	NC	1
366			min	0	15	-.009	3	-.048	4	0	1	NC	1	517.07	4
367		13	max	.002	1	.007	2	0	1	5.65e-5	5	NC	1	NC	1
368			min	0	15	-.007	3	-.036	4	0	1	NC	1	680.816	4
369		14	max	.002	1	.006	2	0	1	5.65e-5	5	NC	1	NC	1
370			min	0	15	-.006	3	-.026	4	0	1	NC	1	945.058	4
371		15	max	.001	1	.004	2	0	1	5.65e-5	5	NC	1	NC	1
372			min	0	15	-.005	3	-.018	4	0	1	NC	1	1414.419	4
373		16	max	0	1	.003	2	0	1	5.65e-5	5	NC	1	NC	1
374			min	0	15	-.004	3	-.01	4	0	1	NC	1	2377.984	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	5.65e-5	5	NC	1	NC	1
376			min	0	15	-.002	3	-.005	4	0	1	NC	1	4906.87	4
377		18	max	0	1	.001	2	0	1	5.65e-5	5	NC	1	NC	1
378			min	0	15	-.001	3	-.002	4	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	5.65e-5	5	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	2	.007	2	0	12	1.901e-3	4	NC	1	NC	2
382			min	-.008	3	-.013	3	-.833	4	2.208e-5	12	NC	1	92.388	4
383		2	max	.006	2	.006	2	0	12	2.013e-3	4	NC	1	NC	2
384			min	-.008	3	-.012	3	-.766	4	2.089e-5	12	NC	1	100.469	4
385		3	max	.006	2	.005	2	0	12	2.124e-3	4	NC	1	NC	2
386			min	-.007	3	-.012	3	-.7	4	1.97e-5	12	NC	1	110.042	4
387		4	max	.005	2	.004	2	0	12	2.235e-3	4	NC	1	NC	2
388			min	-.007	3	-.012	3	-.634	4	1.85e-5	12	NC	1	121.49	4
389		5	max	.005	2	.003	2	0	12	2.347e-3	4	NC	1	NC	1
390			min	-.006	3	-.011	3	-.569	4	1.731e-5	12	NC	1	135.333	4
391		6	max	.005	2	.002	2	0	12	2.458e-3	4	NC	1	NC	1
392			min	-.006	3	-.011	3	-.506	4	1.612e-5	12	NC	1	152.287	4
393		7	max	.004	2	0	2	0	12	2.57e-3	4	NC	1	NC	1
394			min	-.005	3	-.011	3	-.444	4	1.493e-5	12	NC	1	173.363	4
395		8	max	.004	2	0	2	0	12	2.681e-3	4	NC	1	NC	1
396			min	-.005	3	-.01	3	-.385	4	1.373e-5	12	NC	1	200.028	4
397		9	max	.004	2	0	2	0	12	2.793e-3	4	NC	1	NC	1
398			min	-.004	3	-.01	3	-.328	4	1.254e-5	12	NC	1	234.471	4
399		10	max	.003	2	-.002	2	0	12	2.904e-3	4	NC	1	NC	1
400			min	-.004	3	-.009	3	-.275	4	1.135e-5	12	NC	1	280.092	4
401		11	max	.003	2	-.002	15	0	12	3.015e-3	4	NC	1	NC	1
402			min	-.004	3	-.008	3	-.225	4	1.016e-5	12	NC	1	342.394	4
403		12	max	.003	2	-.002	15	0	12	3.127e-3	4	NC	1	NC	1
404			min	-.003	3	-.007	3	-.179	4	8.964e-6	12	NC	1	430.787	4
405		13	max	.002	2	-.002	15	0	12	3.238e-3	4	NC	1	NC	1
406			min	-.003	3	-.007	3	-.137	4	7.771e-6	12	NC	1	562.483	4
407		14	max	.002	2	-.001	15	0	12	3.35e-3	4	NC	1	NC	1
408			min	-.002	3	-.006	4	-.1	4	6.578e-6	12	NC	1	771.853	4
409		15	max	.001	2	-.001	15	0	12	3.461e-3	4	NC	1	NC	1
410			min	-.002	3	-.005	4	-.068	4	5.386e-6	12	NC	1	1136.169	4
411		16	max	.001	2	-.001	15	0	12	3.573e-3	4	NC	1	NC	1
412			min	-.001	3	-.004	4	-.041	4	4.193e-6	12	NC	1	1861.677	4
413		17	max	0	2	0	15	0	12	3.684e-3	4	NC	1	NC	1
414			min	0	3	-.003	4	-.021	4	3.001e-6	12	NC	1	3672.771	4
415		18	max	0	2	0	15	0	12	3.795e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.007	4	1.808e-6	12	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.907e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	6.156e-7	12	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-9.877e-8	12	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.009e-3	4	NC	1	NC	1
421		2	max	0	3	0	15	.018	4	-1.853e-6	12	NC	1	NC	1
422			min	0	2	-.002	4	0	12	-2.576e-4	4	NC	1	NC	1
423		3	max	0	3	-.001	15	.035	4	5.005e-4	5	NC	1	NC	1
424			min	0	2	-.004	4	0	12	-5.968e-5	1	NC	1	9443.988	4
425		4	max	.001	3	-.002	15	.05	4	1.248e-3	5	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-8.889e-5	1	NC	1	7546.905	4
427		5	max	.001	3	-.002	15	.064	4	1.997e-3	4	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.181e-4	1	NC	1	6945.598	4
429		6	max	.002	3	-.003	15	.076	4	2.748e-3	4	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.473e-4	1	9131.001	4	7030.253	4
431		7	max	.002	3	-.003	15	.088	4	3.5e-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
432			min	-.002	2	-.012	4	0	1	-1.765e-4	1	7903.704	4	7730.751	4
433		8	max	.003	3	-.003	15	.099	4	4.251e-3	4	NC	2	NC	1
434			min	-.002	2	-.013	4	0	1	-2.058e-4	1	7148.75	4	9305.029	4
435		9	max	.003	3	-.003	15	.109	4	5.003e-3	4	NC	5	NC	1
436			min	-.002	2	-.014	4	-.001	1	-2.35e-4	1	6709.118	4	NC	1
437		10	max	.003	3	-.004	15	.119	4	5.754e-3	4	NC	5	NC	1
438			min	-.003	2	-.015	4	-.002	1	-2.642e-4	1	6509.296	4	NC	1
439		11	max	.004	3	-.004	15	.128	4	6.506e-3	4	NC	5	NC	1
440			min	-.003	2	-.015	4	-.002	1	-2.934e-4	1	6520.119	4	NC	1
441		12	max	.004	3	-.004	15	.138	4	7.257e-3	4	NC	3	NC	1
442			min	-.003	2	-.014	4	-.003	1	-3.226e-4	1	6747.564	4	NC	1
443		13	max	.004	3	-.003	15	.148	4	8.008e-3	4	NC	2	NC	1
444			min	-.004	2	-.013	4	-.003	1	-3.519e-4	1	7236.496	4	NC	1
445		14	max	.005	3	-.003	15	.159	4	8.76e-3	4	NC	1	NC	1
446			min	-.004	2	-.012	4	-.004	1	-3.811e-4	1	8093.314	4	NC	1
447		15	max	.005	3	-.003	15	.17	4	9.511e-3	4	NC	1	NC	1
448			min	-.004	2	-.011	4	-.005	1	-4.103e-4	1	9551.529	4	9993.513	5
449		16	max	.006	3	-.002	15	.183	4	1.026e-2	4	NC	1	NC	1
450			min	-.004	2	-.009	4	-.006	1	-4.395e-4	1	NC	1	9840.566	5
451		17	max	.006	3	-.002	15	.196	4	1.101e-2	4	NC	1	NC	1
452			min	-.005	2	-.006	4	-.008	1	-4.687e-4	1	NC	1	NC	1
453		18	max	.006	3	-.001	15	.212	4	1.177e-2	4	NC	1	NC	2
454			min	-.005	2	-.004	4	-.009	1	-4.979e-4	1	NC	1	9800.507	1
455		19	max	.007	3	0	10	.229	4	1.252e-2	4	NC	1	NC	2
456			min	-.005	2	-.002	1	-.011	1	-5.272e-4	1	NC	1	8366.174	1
457	M12	1	max	.002	1	.005	2	.011	1	1.701e-4	5	NC	1	NC	3
458			min	0	12	-.007	3	-.229	4	-1.726e-4	1	NC	1	108.124	4
459		2	max	.002	1	.005	2	.01	1	1.701e-4	5	NC	1	NC	3
460			min	0	12	-.007	3	-.211	4	-1.726e-4	1	NC	1	117.427	4
461		3	max	.002	1	.004	2	.009	1	1.701e-4	5	NC	1	NC	3
462			min	0	12	-.006	3	-.193	4	-1.726e-4	1	NC	1	128.507	4
463		4	max	.002	1	.004	2	.008	1	1.701e-4	5	NC	1	NC	3
464			min	0	12	-.006	3	-.175	4	-1.726e-4	1	NC	1	141.825	4
465		5	max	.002	1	.004	2	.007	1	1.701e-4	5	NC	1	NC	3
466			min	0	12	-.005	3	-.157	4	-1.726e-4	1	NC	1	158.006	4
467		6	max	.002	1	.004	2	.007	1	1.701e-4	5	NC	1	NC	3
468			min	0	12	-.005	3	-.139	4	-1.726e-4	1	NC	1	177.917	4
469		7	max	.002	1	.003	2	.006	1	1.701e-4	5	NC	1	NC	3
470			min	0	12	-.005	3	-.122	4	-1.726e-4	1	NC	1	202.789	4
471		8	max	.001	1	.003	2	.005	1	1.701e-4	5	NC	1	NC	2
472			min	0	12	-.004	3	-.106	4	-1.726e-4	1	NC	1	234.417	4
473		9	max	.001	1	.003	2	.004	1	1.701e-4	5	NC	1	NC	2
474			min	0	12	-.004	3	-.09	4	-1.726e-4	1	NC	1	275.504	4
475		10	max	.001	1	.003	2	.004	1	1.701e-4	5	NC	1	NC	2
476			min	0	12	-.003	3	-.075	4	-1.726e-4	1	NC	1	330.273	4
477		11	max	.001	1	.002	2	.003	1	1.701e-4	5	NC	1	NC	2
478			min	0	12	-.003	3	-.061	4	-1.726e-4	1	NC	1	405.632	4
479		12	max	0	1	.002	2	.002	1	1.701e-4	5	NC	1	NC	1
480			min	0	12	-.003	3	-.048	4	-1.726e-4	1	NC	1	513.527	4
481		13	max	0	1	.002	2	.002	1	1.701e-4	5	NC	1	NC	1
482			min	0	12	-.002	3	-.037	4	-1.726e-4	1	NC	1	676.125	4
483		14	max	0	1	.001	2	.001	1	1.701e-4	5	NC	1	NC	1
484			min	0	12	-.002	3	-.026	4	-1.726e-4	1	NC	1	938.509	4
485		15	max	0	1	.001	2	0	1	1.701e-4	5	NC	1	NC	1
486			min	0	12	-.002	3	-.018	4	-1.726e-4	1	NC	1	1404.563	4
487		16	max	0	1	0	2	0	1	1.701e-4	5	NC	1	NC	1
488			min	0	12	-.001	3	-.011	4	-1.726e-4	1	NC	1	2361.316	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	1.701e-4	5	NC	1	NC	1
490			min	0	12	0	3	-.005	4	-1.726e-4	1	NC	1	4872.245	4
491		18	max	0	1	0	2	0	1	1.701e-4	5	NC	1	NC	1
492			min	0	12	0	3	-.002	4	-1.726e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.701e-4	5	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.726e-4	1	NC	1	NC	1
495	M1	1	max	.008	3	.087	2	.888	4	1.624e-2	1	NC	1	NC	1
496			min	-.004	2	-.012	3	0	12	-2.77e-2	3	NC	1	NC	1
497		2	max	.008	3	.04	2	.857	4	9.215e-3	4	NC	4	NC	1
498			min	-.004	2	-.002	3	-.008	1	-1.371e-2	3	2461.613	2	9449.538	5
499		3	max	.008	3	.013	3	.825	4	1.474e-2	4	NC	5	NC	2
500			min	-.004	2	-.01	2	-.011	1	-2.439e-4	1	1184.998	2	5156.3	5
501		4	max	.008	3	.04	3	.793	4	1.29e-2	4	NC	5	NC	2
502			min	-.004	2	-.067	2	-.011	1	-4.841e-3	3	746.819	2	3718.964	5
503		5	max	.008	3	.073	3	.76	4	1.105e-2	4	NC	5	NC	1
504			min	-.004	2	-.127	2	-.007	1	-9.541e-3	3	538.252	2	3003.298	5
505		6	max	.008	3	.11	3	.727	4	1.301e-2	2	NC	15	NC	1
506			min	-.004	2	-.185	2	-.003	1	-1.424e-2	3	423.485	2	2575.157	5
507		7	max	.008	3	.145	3	.692	4	1.736e-2	2	NC	15	NC	1
508			min	-.004	2	-.237	2	0	12	-1.894e-2	3	355.806	2	2269.067	4
509		8	max	.007	3	.174	3	.657	4	2.171e-2	2	9307.947	15	NC	1
510			min	-.004	2	-.278	2	0	12	-2.364e-2	3	315.806	2	2046.809	4
511		9	max	.007	3	.193	3	.62	4	2.504e-2	2	8692.664	15	NC	1
512			min	-.003	2	-.304	2	0	1	-2.373e-2	3	294.997	2	1911.319	4
513		10	max	.007	3	.2	3	.58	4	2.769e-2	2	8505.47	15	NC	1
514			min	-.003	2	-.312	2	0	12	-2.076e-2	3	288.913	2	1873.443	4
515		11	max	.007	3	.195	3	.538	4	3.034e-2	2	8692.328	15	NC	1
516			min	-.003	2	-.303	2	0	12	-1.779e-2	3	296.089	2	1918.832	4
517		12	max	.007	3	.178	3	.493	4	2.961e-2	2	9307.192	15	NC	1
518			min	-.003	2	-.276	2	-.001	1	-1.482e-2	3	319.165	2	2061.13	4
519		13	max	.007	3	.152	3	.444	4	2.376e-2	2	NC	15	NC	1
520			min	-.003	2	-.233	2	0	1	-1.186e-2	3	364.056	2	2412.252	4
521		14	max	.006	3	.118	3	.392	4	1.792e-2	2	NC	15	NC	1
522			min	-.003	2	-.178	2	0	12	-8.899e-3	3	441.233	2	3127.493	4
523		15	max	.006	3	.08	3	.34	4	1.208e-2	2	NC	5	NC	1
524			min	-.003	2	-.119	2	0	12	-5.937e-3	3	575.028	2	4634.574	4
525		16	max	.006	3	.042	3	.287	4	9.961e-3	4	NC	5	NC	1
526			min	-.003	2	-.059	2	0	12	-2.976e-3	3	824.975	2	8492.462	4
527		17	max	.006	3	.005	3	.238	4	1.114e-2	4	NC	5	NC	2
528			min	-.003	2	-.005	2	0	12	-1.383e-5	3	1363.879	2	9403.568	1
529		18	max	.006	3	.039	2	.193	4	1.246e-2	2	NC	4	NC	1
530			min	-.003	2	-.028	3	0	12	-5.243e-3	3	2920.047	2	NC	1
531		19	max	.006	3	.077	2	.151	4	2.495e-2	2	NC	1	NC	1
532			min	-.003	2	-.058	3	-.002	1	-1.066e-2	3	NC	1	NC	1
533	M5	1	max	.026	3	.217	2	.887	4	0	1	NC	1	NC	1
534			min	-.017	2	-.018	3	0	1	-5.422e-6	4	NC	1	NC	1
535		2	max	.026	3	.098	2	.863	4	7.591e-3	4	NC	5	NC	1
536			min	-.018	2	.002	3	0	1	0	1	971.711	2	6986.514	4
537		3	max	.026	3	.042	3	.833	4	1.495e-2	4	NC	5	NC	1
538			min	-.018	2	-.034	2	0	1	0	1	459.876	2	4096.103	4
539		4	max	.025	3	.12	3	.801	4	1.218e-2	4	9484.442	15	NC	1
540			min	-.017	2	-.19	2	0	1	0	1	283.689	2	3179.747	4
541		5	max	.025	3	.222	3	.765	4	9.411e-3	4	6645.129	15	NC	1
542			min	-.017	2	-.357	2	0	1	0	1	200.935	2	2749.581	4
543		6	max	.024	3	.335	3	.729	4	6.641e-3	4	5120.354	15	NC	1
544			min	-.017	2	-.522	2	0	1	0	1	156.041	2	2492.66	4
545		7	max	.024	3	.444	3	.692	4	3.871e-3	4	4238.926	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	-.016	2	-.671	2	0	1	0	1	129.878	2	2291.081	4
547		8	max	.023	3	.535	3	.656	4	1.102e-3	4	3726.037	15	NC	1
548			min	-.016	2	-.79	2	0	1	0	1	114.565	2	2086.601	4
549		9	max	.023	3	.593	3	.62	4	0	1	3462.868	15	NC	1
550			min	-.016	2	-.865	2	0	1	-3.935e-6	5	106.672	2	1906.553	4
551		10	max	.022	3	.613	3	.58	4	0	1	3383.571	15	NC	1
552			min	-.015	2	-.891	2	0	1	-3.825e-6	5	104.368	2	1884.551	4
553		11	max	.022	3	.597	3	.538	4	0	1	3462.971	15	NC	1
554			min	-.015	2	-.865	2	0	1	-3.714e-6	5	107.078	2	1940.589	4
555		12	max	.021	3	.546	3	.495	4	7.823e-4	4	3726.288	15	NC	1
556			min	-.015	2	-.786	2	0	1	0	1	115.884	2	2022.395	4
557		13	max	.02	3	.463	3	.445	4	2.751e-3	4	4239.46	15	NC	1
558			min	-.015	2	-.659	2	0	1	0	1	133.275	2	2380.998	4
559		14	max	.02	3	.359	3	.391	4	4.72e-3	4	5121.432	15	NC	1
560			min	-.014	2	-.502	2	0	1	0	1	163.644	2	3318.605	4
561		15	max	.019	3	.243	3	.335	4	6.689e-3	4	6647.306	15	NC	1
562			min	-.014	2	-.332	2	0	1	0	1	217.37	2	6023.915	4
563		16	max	.019	3	.125	3	.28	4	8.658e-3	4	9489.06	15	NC	1
564			min	-.014	2	-.165	2	0	1	0	1	320.436	2	NC	1
565		17	max	.018	3	.014	3	.229	4	1.063e-2	4	NC	5	NC	1
566			min	-.014	2	-.018	2	0	1	0	1	549.265	2	NC	1
567		18	max	.018	3	.094	1	.186	4	5.395e-3	4	NC	5	NC	1
568			min	-.014	2	-.08	3	0	1	0	1	1211.555	2	NC	1
569		19	max	.018	3	.186	2	.152	4	0	1	NC	1	NC	1
570			min	-.014	2	-.166	3	0	1	-3.346e-6	4	NC	1	NC	1
571	M9	1	max	.008	3	.087	2	.887	4	2.77e-2	3	NC	1	NC	1
572			min	-.004	2	-.012	3	-.002	1	-1.624e-2	1	NC	1	NC	1
573		2	max	.008	3	.04	2	.862	4	1.371e-2	3	NC	4	NC	1
574			min	-.004	2	-.002	3	0	12	-7.941e-3	2	2461.613	2	7051.232	4
575		3	max	.008	3	.013	3	.833	4	1.493e-2	4	NC	5	NC	2
576			min	-.004	2	-.01	2	0	12	-4.895e-6	10	1184.998	2	4107.515	4
577		4	max	.008	3	.04	3	.8	4	1.169e-2	5	NC	5	NC	2
578			min	-.004	2	-.067	2	0	12	-4.305e-3	2	746.819	2	3167.064	4
579		5	max	.008	3	.073	3	.765	4	9.541e-3	3	NC	5	NC	1
580			min	-.004	2	-.127	2	0	12	-8.657e-3	2	538.252	2	2722.766	4
581		6	max	.008	3	.11	3	.729	4	1.424e-2	3	NC	15	NC	1
582			min	-.004	2	-.185	2	0	12	-1.301e-2	2	423.485	2	2459.899	4
583		7	max	.008	3	.145	3	.692	4	1.894e-2	3	NC	15	NC	1
584			min	-.004	2	-.237	2	0	1	-1.736e-2	2	355.806	2	2262.076	4
585		8	max	.007	3	.174	3	.656	4	2.364e-2	3	9284.749	15	NC	1
586			min	-.004	2	-.278	2	-.001	1	-2.171e-2	2	315.806	2	2071.915	4
587		9	max	.007	3	.193	3	.62	4	2.373e-2	3	8671.308	15	NC	1
588			min	-.003	2	-.304	2	0	12	-2.504e-2	2	294.997	2	1904.736	4
589		10	max	.007	3	.2	3	.58	4	2.076e-2	3	8484.661	15	NC	1
590			min	-.003	2	-.312	2	0	1	-2.769e-2	2	288.913	2	1874.977	4
591		11	max	.007	3	.195	3	.538	4	1.779e-2	3	8671.007	15	NC	1
592			min	-.003	2	-.303	2	0	1	-3.034e-2	2	296.089	2	1928.108	4
593		12	max	.007	3	.178	3	.494	4	1.482e-2	3	9284.189	15	NC	1
594			min	-.003	2	-.276	2	0	12	-2.961e-2	2	319.165	2	2036.979	4
595		13	max	.007	3	.152	3	.444	4	1.186e-2	3	NC	15	NC	1
596			min	-.003	2	-.233	2	0	12	-2.376e-2	2	364.056	2	2416.308	4
597		14	max	.006	3	.118	3	.39	4	8.899e-3	3	NC	15	NC	1
598			min	-.003	2	-.178	2	-.003	1	-1.792e-2	2	441.233	2	3288.668	5
599		15	max	.006	3	.08	3	.335	4	6.29e-3	5	NC	5	NC	1
600			min	-.003	2	-.119	2	-.007	1	-1.208e-2	2	575.028	2	5389.004	5
601		16	max	.006	3	.042	3	.281	4	8.497e-3	5	NC	5	NC	1
602			min	-.003	2	-.059	2	-.01	1	-6.232e-3	2	824.975	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	.006	3	.005	3	.23	4	1.071e-2	4	NC	5	NC	2
604			min	-.003	2	-.005	2	-.011	1	-7.001e-4	1	1363.879	2	9403.568	1
605		18	max	.006	3	.039	2	.188	4	5.243e-3	3	NC	4	NC	1
606			min	-.003	2	-.028	3	-.007	1	-1.246e-2	2	2920.047	2	NC	1
607		19	max	.006	3	.077	2	.152	4	1.066e-2	3	NC	1	NC	1
608			min	-.003	2	-.058	3	0	12	-2.495e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

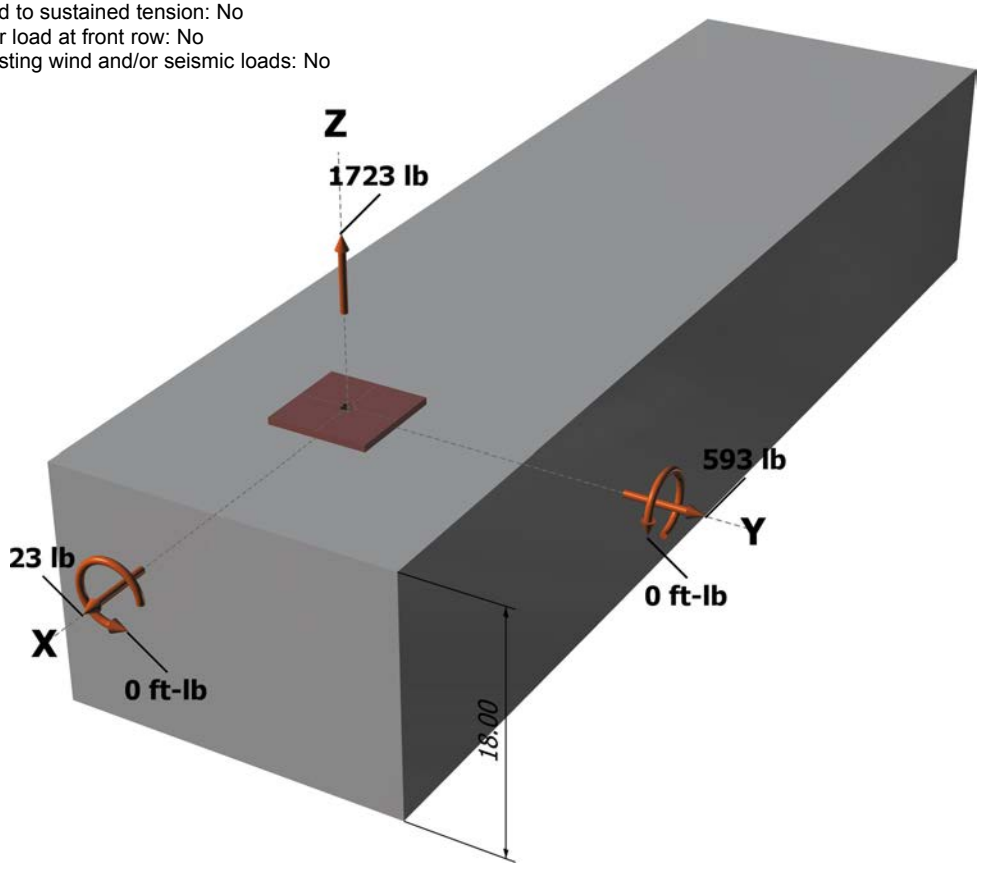
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

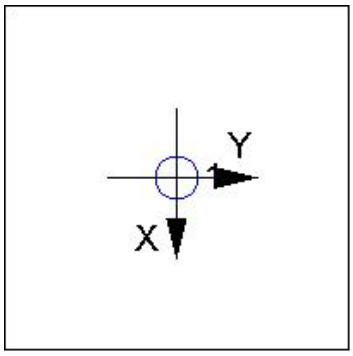
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

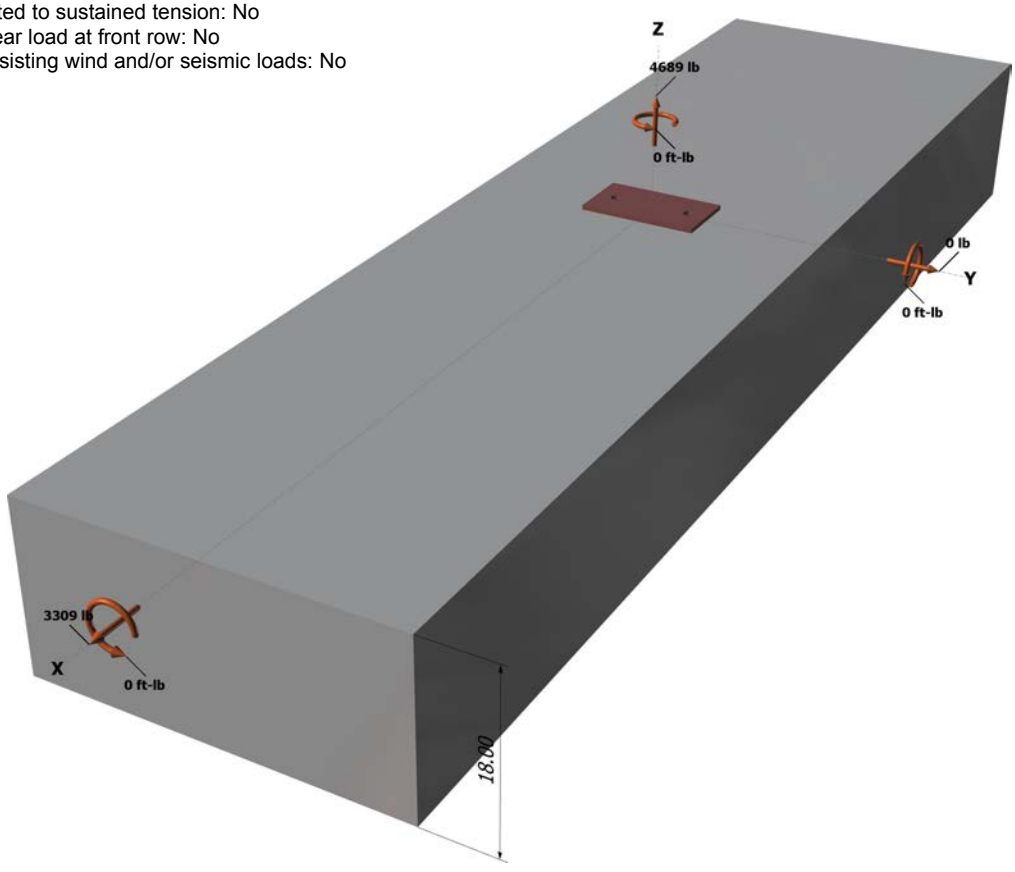
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

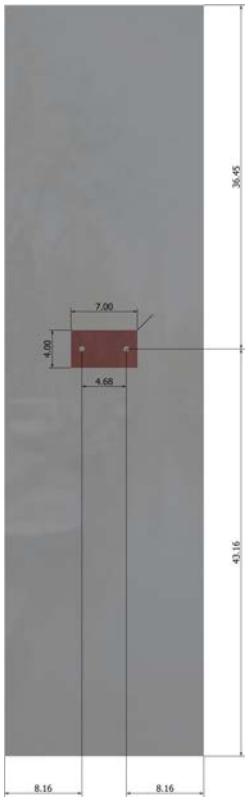
<Figure 1>

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

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



<Figure 2>



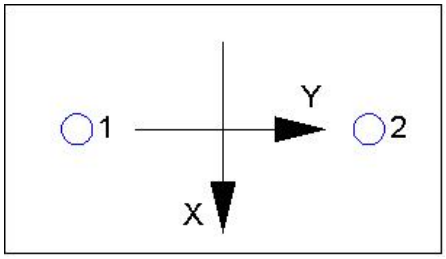
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

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

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

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

Sec. D.7.3	0.58	0.62	120.1 %	1.2	Pass

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

12. Warnings

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

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

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