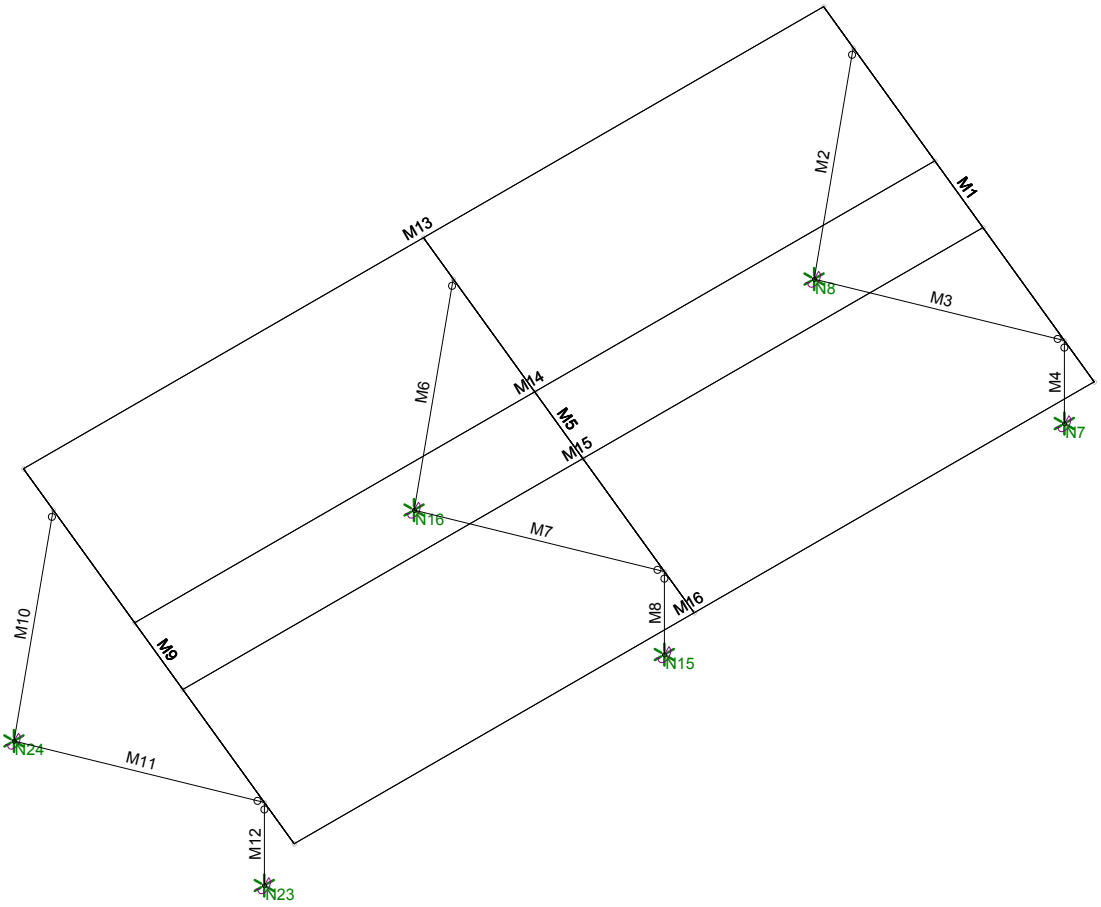


Schletter, Inc.		35° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

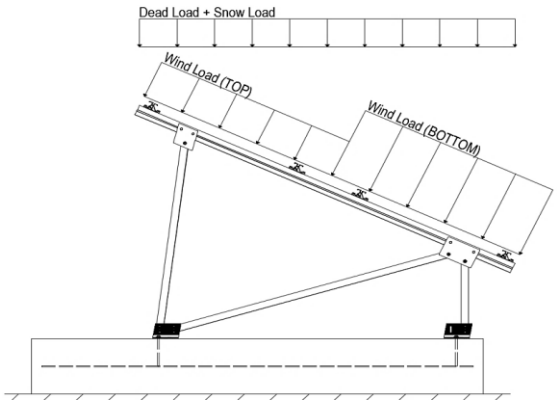
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum		Minimum	
Height =	1700	mm	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 - N/A

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

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

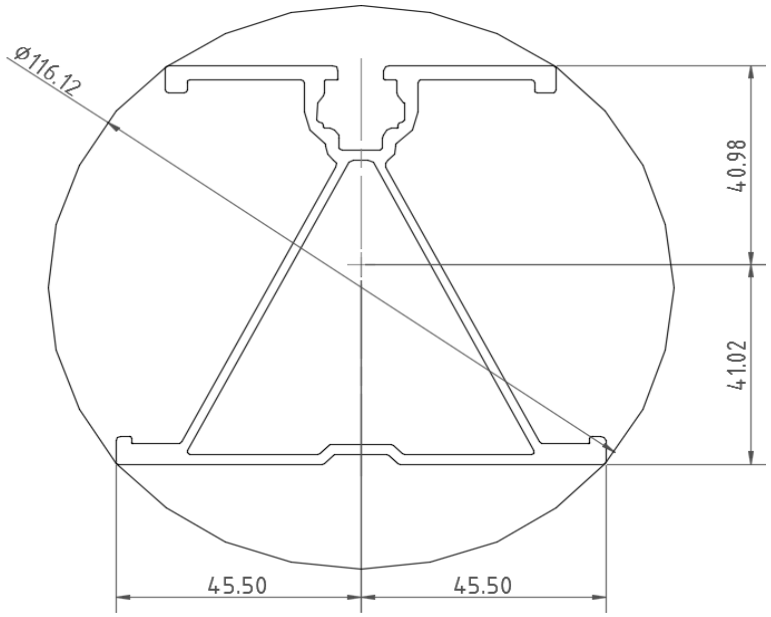
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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%	

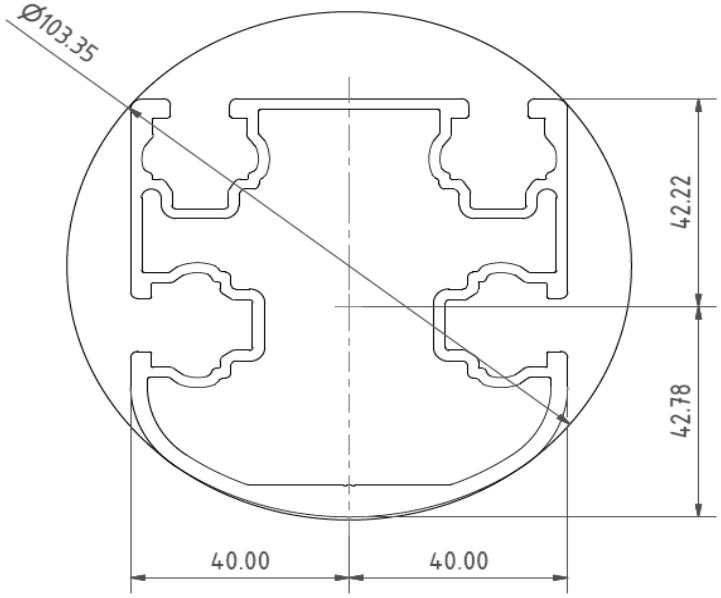


DETAIL VIEW

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).

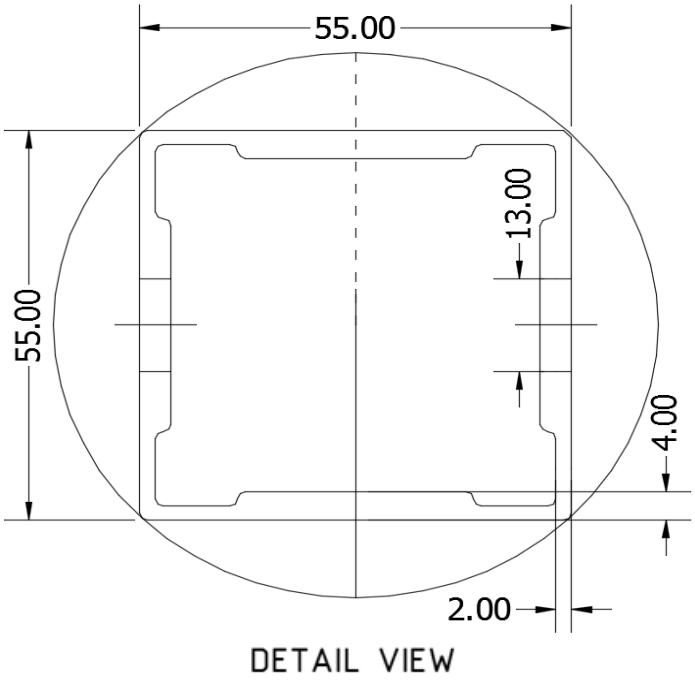
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	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).

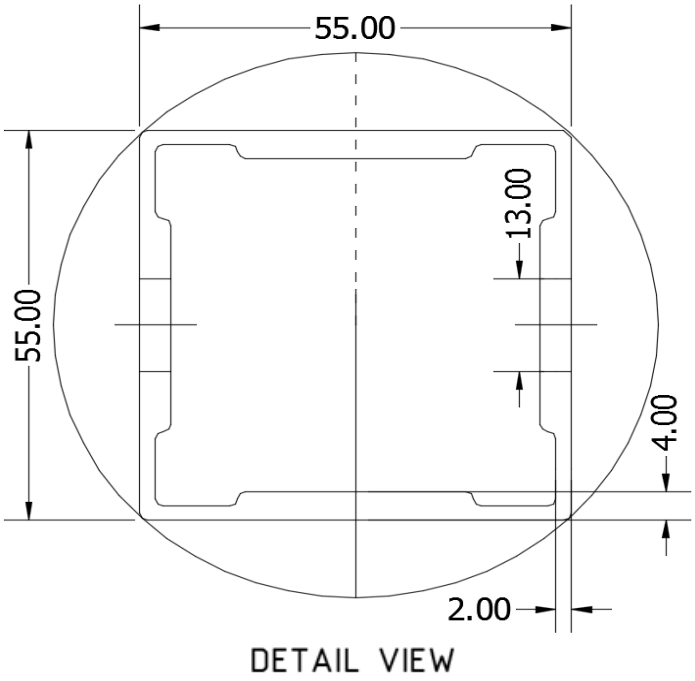
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.395	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	9%	



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).

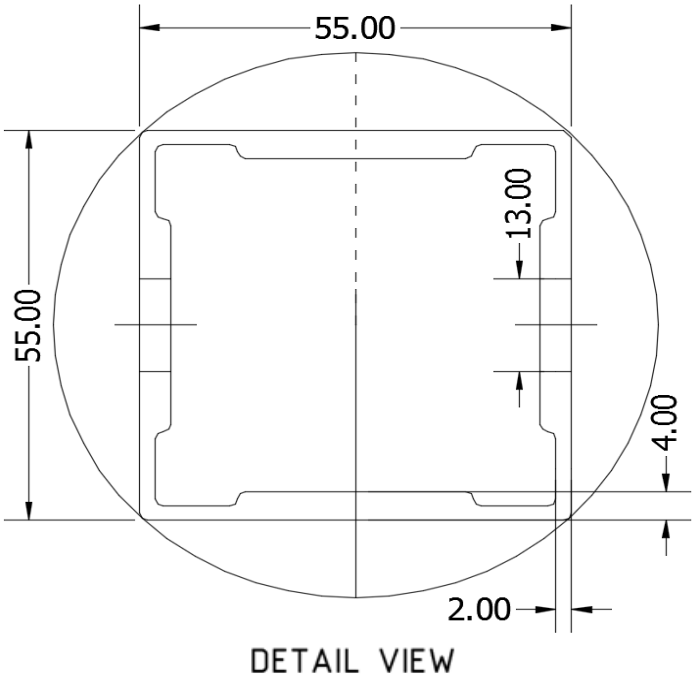
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.008	k-ft
M_z =	0.000	k-ft
P_n =	2.387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

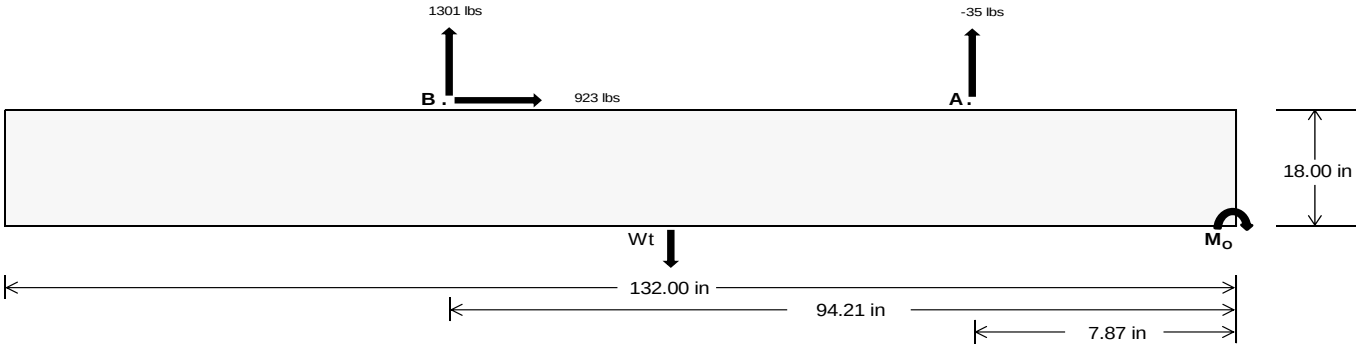
5.1 Helical Pile Foundations

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 =	104.17	5424.08	k
Compressive Load =	3113.65	4473.98	k
Lateral Load =	20.54	3841.39	k
Moment (Weak Axis) =	0.04	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	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

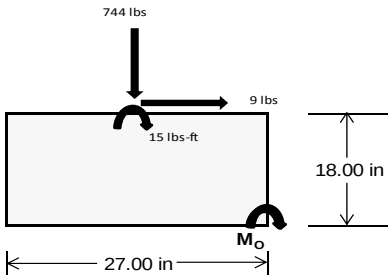
Use a 132in long x 27in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	809.4 ft-lbs
Resisting Force Required =	719.45 lbs
S.F. =	1.67
Weight Required =	1199.08 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	285 lbs	708 lbs	285 lbs	744 lbs	2003 lbs	744 lbs	83 lbs	207 lbs	83 lbs
F_V	3 lbs	0 lbs	3 lbs	9 lbs	0 lbs	9 lbs	1 lbs	0 lbs	1 lbs
P_{total}	6949 lbs	5383 lbs	6949 lbs	7088 lbs	5383 lbs	7088 lbs	2032 lbs	5383 lbs	2032 lbs
M	10 lbs-ft	0 lbs-ft	10 lbs-ft	28 lbs-ft	0 lbs-ft	28 lbs-ft	3 lbs-ft	0 lbs-ft	3 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft	0.38 ft
f_{min}	279.7 psf	217.5 psf	279.7 psf	283.4 psf	217.5 psf	283.4 psf	81.7 psf	217.5 psf	81.7 psf
f_{max}	281.9 psf	217.5 psf	281.9 psf	289.4 psf	217.5 psf	289.4 psf	82.5 psf	217.5 psf	82.5 psf

Maximum Bearing Pressure = 289 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.

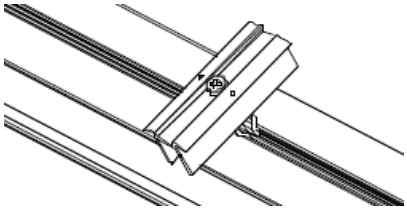
6. DESIGN OF JOINTS AND CONNECTIONS

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.

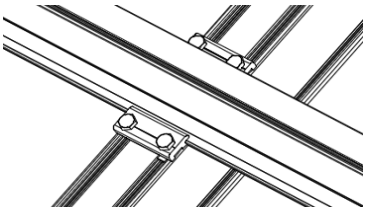
Fastening of Modules to Purlins

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%

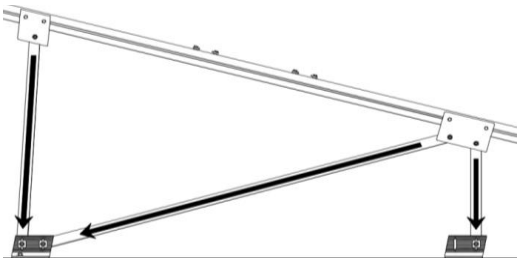
Rear Strut

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

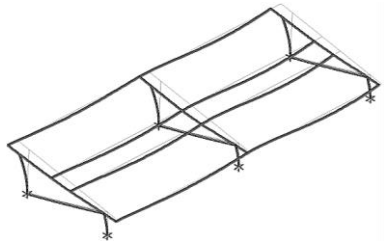
7.1 Seismic Drift - N/A

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

Mean Height, h_{sx}	=	53.78 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		1.076 in
Max Drift, Δ_{MAX}	=	0.103 in

N/A

The racking structure's reaction to seismic loads is shown to the right. The deflections have been magnified to provide a clear portrayal of potential story drift.



APPENDIX A

A.1 Design of Aluminum Purlins - Aluminum Design Manual, 2005 Edition

Purlin = **S1.5**

Strong Axis:		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

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

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								

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8																
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6																
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6														
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3														
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3														
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25														
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25														

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	744.893	2	1039.849	2	.802	1	.003	1	0	1	0	1
2		min	-926.545	3	-1267.936	3	.05	15	0	15	0	1	0	1
3	N7	max	.043	9	993.32	1	-.899	15	-.002	15	0	1	0	1
4		min	-.144	2	51.802	15	-15.802	1	-.03	1	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	108.374	15	0	3	0	10	0	1	0	1
7	N16	max	2785.592	2	3441.52	2	0	15	0	15	0	1	0	1
8		min	-2954.918	3	-4172.372	3	0	14	0	1	0	1	0	1
9	N23	max	.043	9	993.32	1	15.802	1	.03	1	0	1	0	1
10		min	-.144	2	51.802	15	.899	15	.002	15	0	1	0	1
11	N24	max	744.893	2	1039.849	2	-.05	15	0	15	0	1	0	1
12		min	-926.545	3	-1267.936	3	-.802	1	-.003	1	0	1	0	1
13	Totals:	max	4273.532	2	9142.89	1	0	1						
14		min	-4807.744	3	-6261.849	3	0	10						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	147.095	1	358.879	2	-11.393	15	.002	3	.352	1	0	1
2			min	8.173	15	-570.411	3	-205.668	1	-.011	2	.02	15	0	3
3		2	max	147.095	1	251.616	2	-8.774	15	.002	3	.12	1	.621	3
4			min	8.173	15	-401.393	3	-158.326	1	-.011	2	.007	15	-.39	2
5		3	max	147.095	1	144.353	2	-6.156	15	.002	3	-.001	12	1.026	3
6			min	8.173	15	-232.376	3	-110.983	1	-.011	2	-.052	1	-.643	2
7		4	max	147.095	1	37.144	1	-3.537	15	.002	3	-.008	12	1.215	3
8			min	8.173	15	-63.359	3	-63.64	1	-.011	2	-.164	1	-.759	2
9		5	max	147.095	1	105.658	3	-.918	15	.002	3	-.012	12	1.188	3
10			min	8.173	15	-70.173	2	-16.297	1	-.011	2	-.215	1	-.738	2
11		6	max	147.095	1	274.676	3	31.045	1	.002	3	-.011	15	.945	3
12			min	8.173	15	-177.437	2	1.215	12	-.011	2	-.205	1	-.58	2
13		7	max	147.095	1	443.693	3	78.388	1	.002	3	-.008	15	.486	3
14			min	8.173	15	-284.7	2	3.833	12	-.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	8.173	15	-391.963	2	6.451	12	-.011	2	-.005	1	-.189	3
17		9	max	147.095	1	781.728	3	173.074	1	.002	3	.186	1	.717	2
18			min	8.173	15	-499.226	2	9.07	12	-.011	2	.008	12	-1.08	3
19		10	max	147.095	1	606.489	2	-11.688	12	.002	3	.437	1	1.424	2
20			min	8.173	15	-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	8.173	15	-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	0	10	.148	2
24			min	8.173	15	-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	-.008	15	.486	3
26			min	8.173	15	-443.693	3	-78.388	1	-.002	3	-.135	1	-.285	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	147.095	1	177.437	2	-1.215	12	.011	2	-.011	15	.945	3
28			min	8.173	15	-274.676	3	-31.045	1	-.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	8.173	15	-105.658	3	.918	15	-.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	8.173	15	-37.144	1	3.537	15	-.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	8.173	15	-144.353	2	6.156	15	-.002	3	-.052	1	-.643	2
35		18	max	147.095	1	401.393	3	158.326	1	.011	2	.12	1	.621	3
36			min	8.173	15	-251.616	2	8.774	15	-.002	3	.007	15	-.39	2
37		19	max	147.095	1	570.411	3	205.668	1	.011	2	.352	1	0	1
38			min	8.173	15	-358.879	2	11.393	15	-.002	3	.02	15	0	3
39	M14	1	max	62.695	1	375.416	2	-11.707	15	.006	3	.396	1	0	1
40			min	3.491	15	-448.988	3	-211.347	1	-.008	2	.022	15	0	3
41		2	max	62.695	1	268.152	2	-9.088	15	.006	3	.156	1	.491	3
42			min	3.491	15	-318.777	3	-164.005	1	-.008	2	.009	15	-.411	2
43		3	max	62.695	1	160.889	2	-6.47	15	.006	3	0	3	.815	3
44			min	3.491	15	-188.565	3	-116.662	1	-.008	2	-.023	1	-.685	2
45		4	max	62.695	1	53.626	2	-3.851	15	.006	3	-.007	12	.972	3
46			min	3.491	15	-58.353	3	-69.319	1	-.008	2	-.142	1	-.822	2
47		5	max	62.695	1	71.858	3	-1.232	15	.006	3	-.011	12	.964	3
48			min	3.491	15	-54.311	1	-21.976	1	-.008	2	-.2	1	-.822	2
49		6	max	62.695	1	202.07	3	25.366	1	.006	3	-.011	15	.789	3
50			min	3.491	15	-160.9	2	.915	12	-.008	2	-.198	1	-.685	2
51		7	max	62.695	1	332.282	3	72.709	1	.006	3	-.008	15	.447	3
52			min	3.491	15	-268.164	2	3.533	12	-.008	2	-.136	1	-.411	2
53		8	max	62.695	1	462.493	3	120.052	1	.006	3	0	15	.01	1
54			min	3.491	15	-375.427	2	6.151	12	-.008	2	-.012	1	-.06	3
55		9	max	62.695	1	592.705	3	167.395	1	.006	3	.171	1	.555	1
56			min	3.491	15	-482.69	2	8.769	12	-.008	2	.007	12	-.735	3
57		10	max	62.695	1	589.953	2	-11.388	12	.006	3	.415	1	1.236	1
58			min	3.491	15	-722.917	3	-214.737	1	-.008	2	.02	12	-1.575	3
59		11	max	62.695	1	482.69	2	-8.769	12	.008	2	.171	1	.555	1
60			min	3.491	15	-592.705	3	-167.395	1	-.006	3	.007	12	-.735	3
61		12	max	62.695	1	375.427	2	-6.151	12	.008	2	0	15	.01	1
62			min	3.491	15	-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	-.008	15	.447	3
64			min	3.491	15	-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	-.011	15	.789	3
66			min	3.491	15	-202.07	3	-25.366	1	-.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	3.491	15	-71.858	3	1.232	15	-.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	3.491	15	-53.626	2	3.851	15	-.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	3.491	15	-160.889	2	6.47	15	-.006	3	-.023	1	-.685	2
73		18	max	62.695	1	318.777	3	164.005	1	.008	2	.156	1	.491	3
74			min	3.491	15	-268.152	2	9.088	15	-.006	3	.009	15	-.411	2
75		19	max	62.695	1	448.988	3	211.347	1	.008	2	.396	1	0	1
76			min	3.491	15	-375.416	2	11.707	15	-.006	3	.022	15	0	3
77	M15	1	max	-3.687	15	550.05	2	-11.704	15	.009	2	.396	1	0	2
78			min	-66.228	1	-252.605	3	-211.311	1	-.006	3	.022	15	0	3
79		2	max	-3.687	15	391.046	2	-9.085	15	.009	2	.156	1	.277	3
80			min	-66.228	1	-180.603	3	-163.968	1	-.006	3	.009	15	-.601	2
81		3	max	-3.687	15	232.042	2	-6.467	15	.009	2	0	3	.462	3
82			min	-66.228	1	-108.601	3	-116.626	1	-.006	3	-.023	1	-.999	2
83		4	max	-3.687	15	73.038	2	-3.848	15	.009	2	-.007	12	.554	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-66.228	1	-36.599	3	-69.283	1	-.006	3	-.142	1	-1.194	2
85		5	max	-3.687	15	35.404	3	-1.229	15	.009	2	-.011	12	.555	3
86			min	-66.228	1	-85.966	2	-21.94	1	-.006	3	-.201	1	-1.186	2
87		6	max	-3.687	15	107.406	3	25.403	1	.009	2	-.011	15	.464	3
88			min	-66.228	1	-244.97	2	.955	12	-.006	3	-.198	1	-.975	2
89		7	max	-3.687	15	179.408	3	72.745	1	.009	2	-.008	15	.281	3
90			min	-66.228	1	-403.974	2	3.573	12	-.006	3	-.136	1	-.56	2
91		8	max	-3.687	15	251.41	3	120.088	1	.009	2	0	15	.058	2
92			min	-66.228	1	-562.978	2	6.192	12	-.006	3	-.012	1	0	15
93		9	max	-3.687	15	323.413	3	167.431	1	.009	2	.171	1	.879	2
94			min	-66.228	1	-721.982	2	8.81	12	-.006	3	.007	12	-.362	3
95		10	max	-3.687	15	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	-3.687	15	721.982	2	-8.81	12	.006	3	.171	1	.879	2
98			min	-66.228	1	-323.413	3	-167.431	1	-.009	2	.007	12	-.362	3
99		12	max	-3.687	15	562.978	2	-6.192	12	.006	3	0	15	.058	2
100			min	-66.228	1	-251.41	3	-120.088	1	-.009	2	-.012	1	0	15
101		13	max	-3.687	15	403.974	2	-3.573	12	.006	3	-.008	15	.281	3
102			min	-66.228	1	-179.408	3	-72.745	1	-.009	2	-.136	1	-.56	2
103		14	max	-3.687	15	244.97	2	-.955	12	.006	3	-.011	15	.464	3
104			min	-66.228	1	-107.406	3	-25.403	1	-.009	2	-.198	1	-.975	2
105		15	max	-3.687	15	85.966	2	21.94	1	.006	3	-.011	12	.555	3
106			min	-66.228	1	-35.404	3	1.229	15	-.009	2	-.201	1	-1.186	2
107		16	max	-3.687	15	36.599	3	69.283	1	.006	3	-.007	12	.554	3
108			min	-66.228	1	-73.038	2	3.848	15	-.009	2	-.142	1	-1.194	2
109		17	max	-3.687	15	108.601	3	116.626	1	.006	3	0	3	.462	3
110			min	-66.228	1	-232.042	2	6.467	15	-.009	2	-.023	1	-.999	2
111		18	max	-3.687	15	180.603	3	163.968	1	.006	3	.156	1	.277	3
112			min	-66.228	1	-391.046	2	9.085	15	-.009	2	.009	15	-.601	2
113		19	max	-3.687	15	252.605	3	211.311	1	.006	3	.396	1	0	2
114			min	-66.228	1	-550.05	2	11.704	15	-.009	2	.022	15	0	3
115	M16	1	max	-8.826	15	534.069	2	-11.402	15	.008	1	.354	1	0	2
116			min	-158.562	1	-240.393	3	-205.898	1	-.009	3	.02	15	0	3
117		2	max	-8.826	15	375.065	2	-8.784	15	.008	1	.121	1	.261	3
118			min	-158.562	1	-168.391	3	-158.556	1	-.009	3	.007	15	-.581	2
119		3	max	-8.826	15	216.061	2	-6.165	15	.008	1	-.002	12	.43	3
120			min	-158.562	1	-96.389	3	-111.213	1	-.009	3	-.051	1	-.958	2
121		4	max	-8.826	15	57.057	2	-3.546	15	.008	1	-.008	12	.507	3
122			min	-158.562	1	-24.386	3	-63.87	1	-.009	3	-.163	1	-1.133	2
123		5	max	-8.826	15	47.616	3	-.928	15	.008	1	-.012	12	.493	3
124			min	-158.562	1	-101.947	2	-16.527	1	-.009	3	-.214	1	-1.104	2
125		6	max	-8.826	15	119.618	3	30.815	1	.008	1	-.011	15	.386	3
126			min	-158.562	1	-260.951	2	1.343	12	-.009	3	-.205	1	-.872	2
127		7	max	-8.826	15	191.62	3	78.158	1	.008	1	-.008	15	.187	3
128			min	-158.562	1	-419.955	2	3.961	12	-.009	3	-.136	1	-.437	2
129		8	max	-8.826	15	263.623	3	125.501	1	.008	1	0	10	.201	2
130			min	-158.562	1	-578.959	2	6.579	12	-.009	3	-.006	1	-.104	3
131		9	max	-8.826	15	335.625	3	172.844	1	.008	1	.185	1	1.042	2
132			min	-158.562	1	-737.963	2	9.198	12	-.009	3	.009	12	-.487	3
133		10	max	-8.826	15	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	-8.826	15	737.963	2	-9.198	12	.009	3	.185	1	1.042	2
136			min	-158.562	1	-335.625	3	-172.844	1	-.008	1	.009	12	-.487	3
137		12	max	-8.826	15	578.959	2	-6.579	12	.009	3	0	10	.201	2
138			min	-158.562	1	-263.623	3	-125.501	1	-.008	1	-.006	1	-.104	3
139		13	max	-8.826	15	419.955	2	-3.961	12	.009	3	-.008	15	.187	3
140			min	-158.562	1	-191.62	3	-78.158	1	-.008	1	-.136	1	-.437	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-8.826	15	260.951	2	-1.343	12	.009	3	-.011	15	.386	3
142			min	-158.562	1	-119.618	3	-30.815	1	-.008	1	-.205	1	-.872	2
143		15	max	-8.826	15	101.947	2	16.527	1	.009	3	-.012	12	.493	3
144			min	-158.562	1	-47.616	3	.928	15	-.008	1	-.214	1	-1.104	2
145		16	max	-8.826	15	24.386	3	63.87	1	.009	3	-.008	12	.507	3
146			min	-158.562	1	-57.057	2	3.546	15	-.008	1	-.163	1	-1.133	2
147		17	max	-8.826	15	96.389	3	111.213	1	.009	3	-.002	12	.43	3
148			min	-158.562	1	-216.061	2	6.165	15	-.008	1	-.051	1	-.958	2
149		18	max	-8.826	15	168.391	3	158.556	1	.009	3	.121	1	.261	3
150			min	-158.562	1	-375.065	2	8.784	15	-.008	1	.007	15	-.581	2
151		19	max	-8.826	15	240.393	3	205.898	1	.009	3	.354	1	0	2
152			min	-158.562	1	-534.069	2	11.402	15	-.008	1	.02	15	0	3
153	M2	1	max	867.812	2	2.016	4	.498	1	0	12	0	3	0	1
154			min	-1084.334	3	.474	15	.028	15	0	1	0	1	0	1
155		2	max	868.332	2	1.897	4	.498	1	0	12	0	1	0	15
156			min	-1083.943	3	.446	15	.028	15	0	1	0	15	0	4
157		3	max	868.853	2	1.779	4	.498	1	0	12	0	1	0	15
158			min	-1083.553	3	.418	15	.028	15	0	1	0	15	-.001	4
159		4	max	869.374	2	1.66	4	.498	1	0	12	0	1	0	15
160			min	-1083.162	3	.391	15	.028	15	0	1	0	15	-.002	4
161		5	max	869.894	2	1.541	4	.498	1	0	12	0	1	0	15
162			min	-1082.772	3	.363	15	.028	15	0	1	0	15	-.003	4
163		6	max	870.415	2	1.422	4	.498	1	0	12	0	1	0	15
164			min	-1082.381	3	.335	15	.028	15	0	1	0	15	-.003	4
165		7	max	870.936	2	1.303	4	.498	1	0	12	.001	1	0	15
166			min	-1081.991	3	.307	15	.028	15	0	1	0	15	-.004	4
167		8	max	871.456	2	1.184	4	.498	1	0	12	.001	1	0	15
168			min	-1081.6	3	.279	15	.028	15	0	1	0	15	-.004	4
169		9	max	871.977	2	1.065	4	.498	1	0	12	.001	1	-.001	15
170			min	-1081.209	3	.251	15	.028	15	0	1	0	15	-.004	4
171		10	max	872.498	2	.947	4	.498	1	0	12	.002	1	-.001	15
172			min	-1080.819	3	.223	15	.028	15	0	1	0	15	-.005	4
173		11	max	873.018	2	.828	4	.498	1	0	12	.002	1	-.001	15
174			min	-1080.428	3	.185	12	.028	15	0	1	0	15	-.005	4
175		12	max	873.539	2	.712	2	.498	1	0	12	.002	1	-.001	15
176			min	-1080.038	3	.139	12	.028	15	0	1	0	15	-.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	.028	15	0	1	0	15	-.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	.028	15	0	1	0	15	-.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	.028	15	0	1	0	15	-.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	.028	15	0	1	0	15	-.006	4
185		17	max	876.143	2	.249	2	.498	1	0	12	.003	1	-.001	15
186			min	-1078.085	3	-.153	3	.028	15	0	1	0	15	-.006	4
187		18	max	876.663	2	.156	2	.498	1	0	12	.003	1	-.001	15
188			min	-1077.695	3	-.223	3	.028	15	0	1	0	15	-.006	4
189		19	max	877.184	2	.064	2	.498	1	0	12	.003	1	-.001	15
190			min	-1077.304	3	-.292	3	.028	15	0	1	0	15	-.006	4
191	M3	1	max	616.964	2	7.66	4	.416	1	0	15	0	1	.006	4
192			min	-766.005	3	1.801	15	.023	15	0	1	0	15	.001	15
193		2	max	616.794	2	6.899	4	.416	1	0	15	0	1	.003	2
194			min	-766.133	3	1.622	15	.023	15	0	1	0	15	0	12
195		3	max	616.623	2	6.138	4	.416	1	0	15	0	1	.001	2
196			min	-766.261	3	1.443	15	.023	15	0	1	0	15	-.001	3
197		4	max	616.453	2	5.377	4	.416	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-766.389	3	1.264	15	.023	15	0	1	0	15	-.002	3
199		5	max	616.283	2	4.616	4	.416	1	0	15	.001	1	0	15
200			min	-766.516	3	1.085	15	.023	15	0	1	0	15	-.004	4
201		6	max	616.112	2	3.855	4	.416	1	0	15	.001	1	-.001	15
202			min	-766.644	3	.907	15	.023	15	0	1	0	15	-.006	4
203		7	max	615.942	2	3.094	4	.416	1	0	15	.002	1	-.002	15
204			min	-766.772	3	.728	15	.023	15	0	1	0	15	-.007	4
205		8	max	615.772	2	2.333	4	.416	1	0	15	.002	1	-.002	15
206			min	-766.9	3	.549	15	.023	15	0	1	0	15	-.008	4
207		9	max	615.601	2	1.572	4	.416	1	0	15	.002	1	-.002	15
208			min	-767.027	3	.37	15	.023	15	0	1	0	15	-.009	4
209		10	max	615.431	2	.811	4	.416	1	0	15	.002	1	-.002	15
210			min	-767.155	3	.191	15	.023	15	0	1	0	15	-.01	4
211		11	max	615.261	2	.176	2	.416	1	0	15	.002	1	-.002	15
212			min	-767.283	3	-.159	3	.023	15	0	1	0	15	-.01	4
213		12	max	615.09	2	-.167	15	.416	1	0	15	.002	1	-.002	15
214			min	-767.411	3	-.711	4	.023	15	0	1	0	15	-.01	4
215		13	max	614.92	2	-.346	15	.416	1	0	15	.003	1	-.002	15
216			min	-767.538	3	-1.472	4	.023	15	0	1	0	15	-.009	4
217		14	max	614.749	2	-.524	15	.416	1	0	15	.003	1	-.002	15
218			min	-767.666	3	-2.232	4	.023	15	0	1	0	15	-.009	4
219		15	max	614.579	2	-.703	15	.416	1	0	15	.003	1	-.002	15
220			min	-767.794	3	-2.993	4	.023	15	0	1	0	15	-.008	4
221		16	max	614.409	2	-.882	15	.416	1	0	15	.003	1	-.001	15
222			min	-767.922	3	-3.754	4	.023	15	0	1	0	15	-.006	4
223		17	max	614.238	2	-1.061	15	.416	1	0	15	.003	1	-.001	15
224			min	-768.049	3	-4.515	4	.023	15	0	1	0	15	-.004	4
225		18	max	614.068	2	-1.24	15	.416	1	0	15	.004	1	0	15
226			min	-768.177	3	-5.276	4	.023	15	0	1	0	15	-.002	4
227		19	max	613.898	2	-1.419	15	.416	1	0	15	.004	1	0	1
228			min	-768.305	3	-6.037	4	.023	15	0	1	0	15	0	1
229	M4	1	max	990.254	1	0	1	-.9	15	0	1	.003	1	0	1
230			min	50.877	15	0	1	-16.231	1	0	1	0	15	0	1
231		2	max	990.424	1	0	1	-.9	15	0	1	.002	1	0	1
232			min	50.928	15	0	1	-16.231	1	0	1	0	15	0	1
233		3	max	990.595	1	0	1	-.9	15	0	1	0	12	0	1
234			min	50.98	15	0	1	-16.231	1	0	1	0	1	0	1
235		4	max	990.765	1	0	1	-.9	15	0	1	0	15	0	1
236			min	51.031	15	0	1	-16.231	1	0	1	-.002	1	0	1
237		5	max	990.936	1	0	1	-.9	15	0	1	0	15	0	1
238			min	51.082	15	0	1	-16.231	1	0	1	-.004	1	0	1
239		6	max	991.106	1	0	1	-.9	15	0	1	0	15	0	1
240			min	51.134	15	0	1	-16.231	1	0	1	-.006	1	0	1
241		7	max	991.276	1	0	1	-.9	15	0	1	0	15	0	1
242			min	51.185	15	0	1	-16.231	1	0	1	-.008	1	0	1
243		8	max	991.447	1	0	1	-.9	15	0	1	0	15	0	1
244			min	51.237	15	0	1	-16.231	1	0	1	-.01	1	0	1
245		9	max	991.617	1	0	1	-.9	15	0	1	0	15	0	1
246			min	51.288	15	0	1	-16.231	1	0	1	-.011	1	0	1
247		10	max	991.787	1	0	1	-.9	15	0	1	0	15	0	1
248			min	51.339	15	0	1	-16.231	1	0	1	-.013	1	0	1
249		11	max	991.958	1	0	1	-.9	15	0	1	0	15	0	1
250			min	51.391	15	0	1	-16.231	1	0	1	-.015	1	0	1
251		12	max	992.128	1	0	1	-.9	15	0	1	0	15	0	1
252			min	51.442	15	0	1	-16.231	1	0	1	-.017	1	0	1
253		13	max	992.298	1	0	1	-.9	15	0	1	-.001	15	0	1
254			min	51.493	15	0	1	-16.231	1	0	1	-.019	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	992.469	1	0	1	-.9	15	0	1	-.001	15	0	1
256			min	51.545	15	0	1	-16.231	1	0	1	-.021	1	0	1
257		15	max	992.639	1	0	1	-.9	15	0	1	-.001	15	0	1
258			min	51.596	15	0	1	-16.231	1	0	1	-.023	1	0	1
259		16	max	992.809	1	0	1	-.9	15	0	1	-.001	15	0	1
260			min	51.648	15	0	1	-16.231	1	0	1	-.024	1	0	1
261		17	max	992.98	1	0	1	-.9	15	0	1	-.001	15	0	1
262			min	51.699	15	0	1	-16.231	1	0	1	-.026	1	0	1
263		18	max	993.15	1	0	1	-.9	15	0	1	-.002	15	0	1
264			min	51.75	15	0	1	-16.231	1	0	1	-.028	1	0	1
265		19	max	993.32	1	0	1	-.9	15	0	1	-.002	15	0	1
266			min	51.802	15	0	1	-16.231	1	0	1	-.03	1	0	1
267	M6	1	max	2810.319	2	2.151	2	0	1	0	1	0	1	0	1
268			min	-3570.279	3	.34	12	0	1	0	1	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	0	1	0	1	0	1	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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.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	0	1	0	1	0	1	-.008	2
303		19	max	2819.691	2	.484	2	0	1	0	1	0	1	.001	3
304			min	-3563.25	3	-.785	3	0	1	0	1	0	1	-.008	2
305	M7	1	max	2386.944	2	7.695	4	0	1	0	1	0	1	.008	2
306			min	-2421.286	3	1.807	15	0	1	0	1	0	1	-.001	3
307		2	max	2386.773	2	6.934	4	0	1	0	1	0	1	.006	2
308			min	-2421.413	3	1.628	15	0	1	0	1	0	1	-.003	3
309		3	max	2386.603	2	6.173	4	0	1	0	1	0	1	.004	2
310			min	-2421.541	3	1.449	15	0	1	0	1	0	1	-.004	3
311		4	max	2386.433	2	5.412	4	0	1	0	1	0	1	.001	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2421.669	3	1.27	15	0	1	0	1	0	1	-.005	3
313		5	max	2386.262	2	4.651	4	0	1	0	1	0	1	0	2
314			min	-2421.797	3	1.091	15	0	1	0	1	0	1	-.006	3
315		6	max	2386.092	2	3.89	4	0	1	0	1	0	1	-.001	15
316			min	-2421.924	3	.912	15	0	1	0	1	0	1	-.007	3
317		7	max	2385.922	2	3.129	4	0	1	0	1	0	1	-.002	15
318			min	-2422.052	3	.733	15	0	1	0	1	0	1	-.007	3
319		8	max	2385.751	2	2.368	4	0	1	0	1	0	1	-.002	15
320			min	-2422.18	3	.527	12	0	1	0	1	0	1	-.008	4
321		9	max	2385.581	2	1.722	2	0	1	0	1	0	1	-.002	15
322			min	-2422.308	3	.231	12	0	1	0	1	0	1	-.009	4
323		10	max	2385.411	2	1.129	2	0	1	0	1	0	1	-.002	15
324			min	-2422.435	3	-.137	3	0	1	0	1	0	1	-.01	4
325		11	max	2385.24	2	.536	2	0	1	0	1	0	1	-.002	15
326			min	-2422.563	3	-.582	3	0	1	0	1	0	1	-.01	4
327		12	max	2385.07	2	-.057	2	0	1	0	1	0	1	-.002	15
328			min	-2422.691	3	-1.027	3	0	1	0	1	0	1	-.01	4
329		13	max	2384.9	2	-.34	15	0	1	0	1	0	1	-.002	15
330			min	-2422.819	3	-1.471	3	0	1	0	1	0	1	-.009	4
331		14	max	2384.729	2	-.519	15	0	1	0	1	0	1	-.002	15
332			min	-2422.946	3	-2.198	4	0	1	0	1	0	1	-.009	4
333		15	max	2384.559	2	-.698	15	0	1	0	1	0	1	-.002	15
334			min	-2423.074	3	-2.959	4	0	1	0	1	0	1	-.007	4
335		16	max	2384.389	2	-.877	15	0	1	0	1	0	1	-.001	15
336			min	-2423.202	3	-3.72	4	0	1	0	1	0	1	-.006	4
337		17	max	2384.218	2	-1.055	15	0	1	0	1	0	1	-.001	15
338			min	-2423.33	3	-4.481	4	0	1	0	1	0	1	-.004	4
339		18	max	2384.048	2	-1.234	15	0	1	0	1	0	1	0	15
340			min	-2423.457	3	-5.242	4	0	1	0	1	0	1	-.002	4
341		19	max	2383.878	2	-1.413	15	0	1	0	1	0	1	0	1
342			min	-2423.585	3	-6.003	4	0	1	0	1	0	1	0	1
343	M8	1	max	2392.048	1	0	1	0	1	0	1	0	1	0	1
344			min	107.449	15	0	1	0	1	0	1	0	1	0	1
345		2	max	2392.218	1	0	1	0	1	0	1	0	1	0	1
346			min	107.501	15	0	1	0	1	0	1	0	1	0	1
347		3	max	2392.388	1	0	1	0	1	0	1	0	1	0	1
348			min	107.552	15	0	1	0	1	0	1	0	1	0	1
349		4	max	2392.559	1	0	1	0	1	0	1	0	1	0	1
350			min	107.604	15	0	1	0	1	0	1	0	1	0	1
351		5	max	2392.729	1	0	1	0	1	0	1	0	1	0	1
352			min	107.655	15	0	1	0	1	0	1	0	1	0	1
353		6	max	2392.899	1	0	1	0	1	0	1	0	1	0	1
354			min	107.706	15	0	1	0	1	0	1	0	1	0	1
355		7	max	2393.07	1	0	1	0	1	0	1	0	1	0	1
356			min	107.758	15	0	1	0	1	0	1	0	1	0	1
357		8	max	2393.24	1	0	1	0	1	0	1	0	1	0	1
358			min	107.809	15	0	1	0	1	0	1	0	1	0	1
359		9	max	2393.41	1	0	1	0	1	0	1	0	1	0	1
360			min	107.861	15	0	1	0	1	0	1	0	1	0	1
361		10	max	2393.581	1	0	1	0	1	0	1	0	1	0	1
362			min	107.912	15	0	1	0	1	0	1	0	1	0	1
363		11	max	2393.751	1	0	1	0	1	0	1	0	1	0	1
364			min	107.963	15	0	1	0	1	0	1	0	1	0	1
365		12	max	2393.921	1	0	1	0	1	0	1	0	1	0	1
366			min	108.015	15	0	1	0	1	0	1	0	1	0	1
367		13	max	2394.092	1	0	1	0	1	0	1	0	1	0	1
368			min	108.066	15	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	2394.262	1	0	1	0	1	0	1	0	1	0	1
370			min	108.118	15	0	1	0	1	0	1	0	1	0	1
371		15	max	2394.432	1	0	1	0	1	0	1	0	1	0	1
372			min	108.169	15	0	1	0	1	0	1	0	1	0	1
373		16	max	2394.603	1	0	1	0	1	0	1	0	1	0	1
374			min	108.22	15	0	1	0	1	0	1	0	1	0	1
375		17	max	2394.773	1	0	1	0	1	0	1	0	1	0	1
376			min	108.272	15	0	1	0	1	0	1	0	1	0	1
377		18	max	2394.943	1	0	1	0	1	0	1	0	1	0	1
378			min	108.323	15	0	1	0	1	0	1	0	1	0	1
379		19	max	2395.114	1	0	1	0	1	0	1	0	1	0	1
380			min	108.374	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	867.812	2	2.016	4	-.028	15	0	1	0	1	0	1
382			min	-1084.334	3	.474	15	-.498	1	0	12	0	3	0	1
383		2	max	868.332	2	1.897	4	-.028	15	0	1	0	15	0	15
384			min	-1083.943	3	.446	15	-.498	1	0	12	0	1	0	4
385		3	max	868.853	2	1.779	4	-.028	15	0	1	0	15	0	15
386			min	-1083.553	3	.418	15	-.498	1	0	12	0	1	-.001	4
387		4	max	869.374	2	1.66	4	-.028	15	0	1	0	15	0	15
388			min	-1083.162	3	.391	15	-.498	1	0	12	0	1	-.002	4
389		5	max	869.894	2	1.541	4	-.028	15	0	1	0	15	0	15
390			min	-1082.772	3	.363	15	-.498	1	0	12	0	1	-.003	4
391		6	max	870.415	2	1.422	4	-.028	15	0	1	0	15	0	15
392			min	-1082.381	3	.335	15	-.498	1	0	12	0	1	-.003	4
393		7	max	870.936	2	1.303	4	-.028	15	0	1	0	15	0	15
394			min	-1081.991	3	.307	15	-.498	1	0	12	-.001	1	-.004	4
395		8	max	871.456	2	1.184	4	-.028	15	0	1	0	15	0	15
396			min	-1081.6	3	.279	15	-.498	1	0	12	-.001	1	-.004	4
397		9	max	871.977	2	1.065	4	-.028	15	0	1	0	15	-.001	15
398			min	-1081.209	3	.251	15	-.498	1	0	12	-.001	1	-.004	4
399		10	max	872.498	2	.947	4	-.028	15	0	1	0	15	-.001	15
400			min	-1080.819	3	.223	15	-.498	1	0	12	-.002	1	-.005	4
401		11	max	873.018	2	.828	4	-.028	15	0	1	0	15	-.001	15
402			min	-1080.428	3	.185	12	-.498	1	0	12	-.002	1	-.005	4
403		12	max	873.539	2	.712	2	-.028	15	0	1	0	15	-.001	15
404			min	-1080.038	3	.139	12	-.498	1	0	12	-.002	1	-.005	4
405		13	max	874.06	2	.62	2	-.028	15	0	1	0	15	-.001	15
406			min	-1079.647	3	.092	12	-.498	1	0	12	-.002	1	-.006	4
407		14	max	874.581	2	.527	2	-.028	15	0	1	0	15	-.001	15
408			min	-1079.257	3	.046	12	-.498	1	0	12	-.002	1	-.006	4
409		15	max	875.101	2	.434	2	-.028	15	0	1	0	15	-.001	15
410			min	-1078.866	3	-.014	3	-.498	1	0	12	-.002	1	-.006	4
411		16	max	875.622	2	.342	2	-.028	15	0	1	0	15	-.001	15
412			min	-1078.476	3	-.084	3	-.498	1	0	12	-.003	1	-.006	4
413		17	max	876.143	2	.249	2	-.028	15	0	1	0	15	-.001	15
414			min	-1078.085	3	-.153	3	-.498	1	0	12	-.003	1	-.006	4
415		18	max	876.663	2	.156	2	-.028	15	0	1	0	15	-.001	15
416			min	-1077.695	3	-.223	3	-.498	1	0	12	-.003	1	-.006	4
417		19	max	877.184	2	.064	2	-.028	15	0	1	0	15	-.001	15
418			min	-1077.304	3	-.292	3	-.498	1	0	12	-.003	1	-.006	4
419	M11	1	max	616.964	2	7.66	4	-.023	15	0	1	0	15	.006	4
420			min	-766.005	3	1.801	15	-.416	1	0	15	0	1	.001	15
421		2	max	616.794	2	6.899	4	-.023	15	0	1	0	15	.003	2
422			min	-766.133	3	1.622	15	-.416	1	0	15	0	1	0	12
423		3	max	616.623	2	6.138	4	-.023	15	0	1	0	15	.001	2
424			min	-766.261	3	1.443	15	-.416	1	0	15	0	1	-.001	3
425		4	max	616.453	2	5.377	4	-.023	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-766.389	3	1.264	15	-.416	1	0	15	-.001	1	-.002	3
427		5	max	616.283	2	4.616	4	-.023	15	0	1	0	15	0	15
428			min	-766.516	3	1.085	15	-.416	1	0	15	-.001	1	-.004	4
429		6	max	616.112	2	3.855	4	-.023	15	0	1	0	15	-.001	15
430			min	-766.644	3	.907	15	-.416	1	0	15	-.001	1	-.006	4
431		7	max	615.942	2	3.094	4	-.023	15	0	1	0	15	-.002	15
432			min	-766.772	3	.728	15	-.416	1	0	15	-.002	1	-.007	4
433		8	max	615.772	2	2.333	4	-.023	15	0	1	0	15	-.002	15
434			min	-766.9	3	.549	15	-.416	1	0	15	-.002	1	-.008	4
435		9	max	615.601	2	1.572	4	-.023	15	0	1	0	15	-.002	15
436			min	-767.027	3	.37	15	-.416	1	0	15	-.002	1	-.009	4
437		10	max	615.431	2	.811	4	-.023	15	0	1	0	15	-.002	15
438			min	-767.155	3	.191	15	-.416	1	0	15	-.002	1	-.01	4
439		11	max	615.261	2	.176	2	-.023	15	0	1	0	15	-.002	15
440			min	-767.283	3	-.159	3	-.416	1	0	15	-.002	1	-.01	4
441		12	max	615.09	2	-.167	15	-.023	15	0	1	0	15	-.002	15
442			min	-767.411	3	-.711	4	-.416	1	0	15	-.002	1	-.01	4
443		13	max	614.92	2	-.346	15	-.023	15	0	1	0	15	-.002	15
444			min	-767.538	3	-1.472	4	-.416	1	0	15	-.003	1	-.009	4
445		14	max	614.749	2	-.524	15	-.023	15	0	1	0	15	-.002	15
446			min	-767.666	3	-2.232	4	-.416	1	0	15	-.003	1	-.009	4
447		15	max	614.579	2	-.703	15	-.023	15	0	1	0	15	-.002	15
448			min	-767.794	3	-2.993	4	-.416	1	0	15	-.003	1	-.008	4
449		16	max	614.409	2	-.882	15	-.023	15	0	1	0	15	-.001	15
450			min	-767.922	3	-3.754	4	-.416	1	0	15	-.003	1	-.006	4
451		17	max	614.238	2	-1.061	15	-.023	15	0	1	0	15	-.001	15
452			min	-768.049	3	-4.515	4	-.416	1	0	15	-.003	1	-.004	4
453		18	max	614.068	2	-1.24	15	-.023	15	0	1	0	15	0	15
454			min	-768.177	3	-5.276	4	-.416	1	0	15	-.004	1	-.002	4
455		19	max	613.898	2	-1.419	15	-.023	15	0	1	0	15	0	1
456			min	-768.305	3	-6.037	4	-.416	1	0	15	-.004	1	0	1
457	M12	1	max	990.254	1	0	1	16.231	1	0	1	0	15	0	1
458			min	50.877	15	0	1	.9	15	0	1	-.003	1	0	1
459		2	max	990.424	1	0	1	16.231	1	0	1	0	15	0	1
460			min	50.928	15	0	1	.9	15	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	50.98	15	0	1	.9	15	0	1	0	12	0	1
463		4	max	990.765	1	0	1	16.231	1	0	1	.002	1	0	1
464			min	51.031	15	0	1	.9	15	0	1	0	15	0	1
465		5	max	990.936	1	0	1	16.231	1	0	1	.004	1	0	1
466			min	51.082	15	0	1	.9	15	0	1	0	15	0	1
467		6	max	991.106	1	0	1	16.231	1	0	1	.006	1	0	1
468			min	51.134	15	0	1	.9	15	0	1	0	15	0	1
469		7	max	991.276	1	0	1	16.231	1	0	1	.008	1	0	1
470			min	51.185	15	0	1	.9	15	0	1	0	15	0	1
471		8	max	991.447	1	0	1	16.231	1	0	1	.01	1	0	1
472			min	51.237	15	0	1	.9	15	0	1	0	15	0	1
473		9	max	991.617	1	0	1	16.231	1	0	1	.011	1	0	1
474			min	51.288	15	0	1	.9	15	0	1	0	15	0	1
475		10	max	991.787	1	0	1	16.231	1	0	1	.013	1	0	1
476			min	51.339	15	0	1	.9	15	0	1	0	15	0	1
477		11	max	991.958	1	0	1	16.231	1	0	1	.015	1	0	1
478			min	51.391	15	0	1	.9	15	0	1	0	15	0	1
479		12	max	992.128	1	0	1	16.231	1	0	1	.017	1	0	1
480			min	51.442	15	0	1	.9	15	0	1	0	15	0	1
481		13	max	992.298	1	0	1	16.231	1	0	1	.019	1	0	1
482			min	51.493	15	0	1	.9	15	0	1	.001	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	992.469	1	0	1	16.231	1	0	1	.021	1	0	1
484			min	51.545	15	0	1	.9	15	0	1	.001	15	0	1
485		15	max	992.639	1	0	1	16.231	1	0	1	.023	1	0	1
486			min	51.596	15	0	1	.9	15	0	1	.001	15	0	1
487		16	max	992.809	1	0	1	16.231	1	0	1	.024	1	0	1
488			min	51.648	15	0	1	.9	15	0	1	.001	15	0	1
489		17	max	992.98	1	0	1	16.231	1	0	1	.026	1	0	1
490			min	51.699	15	0	1	.9	15	0	1	.001	15	0	1
491		18	max	993.15	1	0	1	16.231	1	0	1	.028	1	0	1
492			min	51.75	15	0	1	.9	15	0	1	.002	15	0	1
493		19	max	993.32	1	0	1	16.231	1	0	1	.03	1	0	1
494			min	51.802	15	0	1	.9	15	0	1	.002	15	0	1
495	M1	1	max	205.676	1	570.375	3	-8.172	15	0	1	.352	1	.002	3
496			min	11.393	15	-358.244	2	-146.882	1	0	3	.02	15	-.011	2
497		2	max	206.497	1	569.495	3	-8.172	15	0	1	.275	1	.178	2
498			min	11.641	15	-359.418	2	-146.882	1	0	3	.015	15	-.299	3
499		3	max	476.584	3	424.247	2	-8.146	15	0	3	.197	1	.359	2
500			min	-272.698	2	-416.828	3	-146.672	1	0	2	.011	15	-.588	3
501		4	max	477.2	3	423.073	2	-8.146	15	0	3	.12	1	.146	1
502			min	-271.877	2	-417.708	3	-146.672	1	0	2	.007	15	-.367	3
503		5	max	477.816	3	421.9	2	-8.146	15	0	3	.043	1	-.003	15
504			min	-271.055	2	-418.588	3	-146.672	1	0	2	.002	15	-.147	3
505		6	max	478.433	3	420.727	2	-8.146	15	0	3	-.002	15	.074	3
506			min	-270.233	2	-419.468	3	-146.672	1	0	2	-.035	1	-.31	2
507		7	max	479.049	3	419.553	2	-8.146	15	0	3	-.006	15	.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	-8.146	15	0	3	-.011	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	-11.637	15	0	9	.109	1	.604	3
512			min	-175.548	2	.359	15	-209.412	1	0	3	.006	15	-.863	2
513		10	max	499.209	3	42.946	2	-11.637	15	0	9	0	15	.589	3
514			min	-174.727	2	.005	15	-209.412	1	0	3	-.001	1	-.886	2
515		11	max	499.825	3	41.773	2	-11.637	15	0	9	-.006	15	.574	3
516			min	-173.905	2	-1.41	4	-209.412	1	0	3	-.112	1	-.908	2
517		12	max	518.69	3	281.995	3	-7.95	15	0	2	.187	1	.5	3
518			min	-99.524	10	-508.913	2	-143.285	1	0	3	.01	15	-.806	2
519		13	max	519.306	3	281.115	3	-7.95	15	0	2	.111	1	.352	3
520			min	-98.839	10	-510.086	2	-143.285	1	0	3	.006	15	-.537	2
521		14	max	519.922	3	280.235	3	-7.95	15	0	2	.036	1	.203	3
522			min	-98.154	10	-511.259	2	-143.285	1	0	3	.002	15	-.268	2
523		15	max	520.538	3	279.355	3	-7.95	15	0	2	-.002	15	.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	-7.95	15	0	2	-.006	15	.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	-7.95	15	0	2	-.011	15	.545	2
528			min	-96.1	10	-514.78	2	-143.285	1	0	3	-.191	1	-.238	3
529		18	max	-11.65	15	535.778	2	-8.827	15	0	3	-.015	15	.274	2
530			min	-206.714	1	-239.592	3	-158.768	1	0	2	-.27	1	-.118	3
531		19	max	-11.402	15	534.604	2	-8.827	15	0	3	-.02	15	.009	3
532			min	-205.892	1	-240.472	3	-158.768	1	0	2	-.354	1	-.008	1
533	M5	1	max	440.818	1	1901.32	3	0	1	0	1	0	1	.022	2
534			min	23.377	12	-1208.998	2	0	1	0	1	0	1	-.003	3
535		2	max	441.64	1	1900.44	3	0	1	0	1	0	1	.66	2
536			min	23.788	12	-1210.172	2	0	1	0	1	0	1	-1.006	3
537		3	max	1538.928	3	1311.249	2	0	1	0	1	0	1	1.269	2
538			min	-986.985	2	-1362.303	3	0	1	0	1	0	1	-1.969	3
539		4	max	1539.544	3	1310.075	2	0	1	0	1	0	1	.596	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-986.163	2	-1363.183	3	0	1	0	1	0	1	-1.25	3
541		5	max	1540.16	3	1308.902	2	0	1	0	1	0	1	0	9
542			min	-985.342	2	-1364.064	3	0	1	0	1	0	1	-.531	3
543		6	max	1540.776	3	1307.729	2	0	1	0	1	0	1	.189	3
544			min	-984.52	2	-1364.944	3	0	1	0	1	0	1	-.804	2
545		7	max	1541.393	3	1306.555	2	0	1	0	1	0	1	.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	0	1	0	1	0	1	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	0	1	0	1	0	1	1.873	3
550			min	-792.77	2	.357	15	0	1	0	1	0	1	-2.488	2
551		10	max	1577.312	3	145.803	2	0	1	0	1	0	1	1.82	3
552			min	-791.949	2	.003	15	0	1	0	1	0	1	-2.565	2
553		11	max	1577.928	3	144.629	2	0	1	0	1	0	1	1.768	3
554			min	-791.127	2	-1.219	4	0	1	0	1	0	1	-2.642	2
555		12	max	1612.742	3	916.085	3	0	1	0	1	0	1	1.555	3
556			min	-601.032	2	-1604.276	2	0	1	0	1	0	1	-2.367	2
557		13	max	1613.358	3	915.205	3	0	1	0	1	0	1	1.072	3
558			min	-600.21	2	-1605.45	2	0	1	0	1	0	1	-1.52	2
559		14	max	1613.974	3	914.325	3	0	1	0	1	0	1	.589	3
560			min	-599.389	2	-1606.623	2	0	1	0	1	0	1	-.673	2
561		15	max	1614.59	3	913.445	3	0	1	0	1	0	1	.175	2
562			min	-598.567	2	-1607.797	2	0	1	0	1	0	1	-.005	4
563		16	max	1615.207	3	912.565	3	0	1	0	1	0	1	1.024	2
564			min	-597.745	2	-1608.97	2	0	1	0	1	0	1	-.375	3
565		17	max	1615.823	3	911.685	3	0	1	0	1	0	1	1.873	2
566			min	-596.924	2	-1610.143	2	0	1	0	1	0	1	-.856	3
567		18	max	-24.042	12	1798.339	2	0	1	0	1	0	1	.965	2
568			min	-441.206	1	-814.909	3	0	1	0	1	0	1	-.447	3
569		19	max	-23.631	12	1797.166	2	0	1	0	1	0	1	.016	1
570			min	-440.385	1	-815.789	3	0	1	0	1	0	1	-.017	3
571	M9	1	max	205.676	1	570.375	3	146.882	1	0	3	-.02	15	.002	3
572			min	11.393	15	-358.244	2	8.172	15	0	1	-.352	1	-.011	2
573		2	max	206.497	1	569.495	3	146.882	1	0	3	-.015	15	.178	2
574			min	11.641	15	-359.418	2	8.172	15	0	1	-.275	1	-.299	3
575		3	max	476.584	3	424.247	2	146.672	1	0	2	-.011	15	.359	2
576			min	-272.698	2	-416.828	3	8.146	15	0	3	-.197	1	-.588	3
577		4	max	477.2	3	423.073	2	146.672	1	0	2	-.007	15	.146	1
578			min	-271.877	2	-417.708	3	8.146	15	0	3	-.12	1	-.367	3
579		5	max	477.816	3	421.9	2	146.672	1	0	2	-.002	15	-.003	15
580			min	-271.055	2	-418.588	3	8.146	15	0	3	-.043	1	-.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	8.146	15	0	3	.002	15	-.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	8.146	15	0	3	.006	15	-.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	8.146	15	0	3	.011	15	-.753	2
587		9	max	498.593	3	44.12	2	209.412	1	0	3	-.006	15	.604	3
588			min	-175.548	2	.359	15	11.637	15	0	9	-.109	1	-.863	2
589		10	max	499.209	3	42.946	2	209.412	1	0	3	.001	1	.589	3
590			min	-174.727	2	.005	15	11.637	15	0	9	0	15	-.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	-1.41	4	11.637	15	0	9	.006	15	-.908	2
593		12	max	518.69	3	281.995	3	143.285	1	0	3	-.01	15	.5	3
594			min	-99.524	10	-508.913	2	7.95	15	0	2	-.187	1	-.806	2
595		13	max	519.306	3	281.115	3	143.285	1	0	3	-.006	15	.352	3
596			min	-98.839	10	-510.086	2	7.95	15	0	2	-.111	1	-.537	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	519.922	3	280.235	3	143.285	1	0	3	-.002	15	.203	3
598			min	-98.154	10	-511.259	2	7.95	15	0	2	-.036	1	-.268	2
599		15	max	520.538	3	279.355	3	143.285	1	0	3	.04	1	.056	3
600			min	-97.47	10	-512.433	2	7.95	15	0	2	.002	15	-.019	9
601		16	max	521.154	3	278.475	3	143.285	1	0	3	.115	1	.273	2
602			min	-96.785	10	-513.606	2	7.95	15	0	2	.006	15	-.091	3
603		17	max	521.771	3	277.594	3	143.285	1	0	3	.191	1	.545	2
604			min	-96.1	10	-514.78	2	7.95	15	0	2	.011	15	-.238	3
605		18	max	-11.65	15	535.778	2	158.768	1	0	2	.27	1	.274	2
606			min	-206.714	1	-239.592	3	8.827	15	0	3	.015	15	-.118	3
607		19	max	-11.402	15	534.604	2	158.768	1	0	2	.354	1	.009	3
608			min	-205.892	1	-240.472	3	8.827	15	0	3	.02	15	-.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	0	15	-.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	0	15	-.161	1	.004	15	-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	0	15	-.352	1	.01	15	-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	0	15	-.462	1	.014	15	-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	0	15	-.475	1	.017	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	0	15	-.395	1	.017	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	5
14			min	0	15	-.241	1	.013	15	-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	0	15	-.052	1	.008	15	-2.598e-3	3	745.581	3	2065.298	1
17		9	max	0	1	.14	2	.04	1	1.735e-2	2	NC	4	NC	2
18			min	0	15	.004	15	-.004	10	-2.767e-3	3	2493.5	3	7154.807	1
19		10	max	0	1	.217	2	.026	3	1.86e-2	2	NC	3	NC	1
20			min	0	1	-.018	3	-.017	2	-2.936e-3	3	2127.458	2	NC	1
21		11	max	0	15	.14	2	.04	1	1.735e-2	2	NC	4	NC	2
22			min	0	1	.004	15	-.004	10	-2.767e-3	3	2493.5	3	7154.807	1
23		12	max	0	15	.358	3	.135	1	1.61e-2	2	NC	5	NC	3
24			min	0	1	-.052	1	.008	15	-2.598e-3	3	745.581	3	2065.298	1
25		13	max	0	15	.645	3	.23	1	1.485e-2	2	NC	5	NC	5
26			min	0	1	-.241	1	.013	15	-2.429e-3	3	420.4	3	1206.879	1
27		14	max	0	15	.87	3	.291	1	1.361e-2	2	NC	5	NC	5
28			min	0	1	-.395	1	.017	15	-2.26e-3	3	312.835	3	952.441	1
29		15	max	0	15	.976	3	.3	1	1.236e-2	2	NC	15	NC	5
30			min	0	1	-.475	1	.017	15	-2.091e-3	3	279.374	3	923.963	1
31		16	max	0	15	.93	3	.255	1	1.111e-2	2	NC	15	NC	3
32			min	-.001	1	-.462	1	.014	15	-1.922e-3	3	292.98	3	1090.775	1
33		17	max	0	15	.729	3	.168	1	9.864e-3	2	NC	5	NC	3
34			min	-.001	1	-.352	1	.01	15	-1.753e-3	3	372.414	3	1662.346	1
35		18	max	0	15	.398	3	.068	1	8.616e-3	2	NC	5	NC	3
36			min	-.001	1	-.161	1	.004	15	-1.584e-3	3	673.811	3	4134.473	1
37		19	max	0	15	.087	2	.008	3	7.369e-3	2	NC	1	NC	1
38			min	-.002	1	-.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	0	15	-.29	2	-.003	2	-3.159e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.563	3	.048	1	5.28e-3	2	NC	5	NC	2
42			min	0	15	-.64	2	.003	15	-3.89e-3	3	727.633	3	5901.585	1
43		3	max	0	1	.88	3	.137	1	6.197e-3	2	NC	15	NC	3
44			min	0	15	-.938	2	.008	15	-4.621e-3	3	396.057	3	2037.176	1
45		4	max	0	1	1.094	3	.221	1	7.114e-3	2	9742.331	15	NC	3
46			min	0	15	-1.148	2	.012	15	-5.351e-3	3	303.072	3	1257.622	1
47		5	max	0	1	1.184	3	.269	1	8.031e-3	2	8750.271	15	NC	5
48			min	0	15	-1.254	2	.015	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	8861.867	15	NC	5
50			min	0	15	-1.254	2	.015	15	-6.812e-3	3	285.47	3	1040.592	1
51		7	max	0	1	1.016	3	.214	1	9.864e-3	2	9938.407	15	NC	5
52			min	0	15	-1.167	2	.012	15	-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	0	15	-1.028	2	.008	15	-8.273e-3	3	373.983	2	2197.471	1
55		9	max	0	1	.646	3	.039	1	1.17e-2	2	NC	5	NC	2
56			min	0	15	-.891	2	-.004	10	-9.004e-3	3	459.418	2	7484.103	1
57		10	max	0	1	.563	3	.023	3	1.261e-2	2	NC	5	NC	1
58			min	0	1	-.826	2	-.016	2	-9.734e-3	3	514.89	2	NC	1
59		11	max	0	15	.646	3	.039	1	1.17e-2	2	NC	5	NC	2
60			min	0	1	-.891	2	-.004	10	-9.004e-3	3	459.418	2	7484.103	1
61		12	max	0	15	.826	3	.127	1	1.078e-2	2	NC	15	NC	3
62			min	0	1	-1.028	2	.008	15	-8.273e-3	3	373.983	2	2197.471	1
63		13	max	0	15	1.016	3	.214	1	9.864e-3	2	9938.407	15	NC	5
64			min	0	1	-1.167	2	.012	15	-7.543e-3	3	314.806	2	1299.408	1
65		14	max	0	15	1.15	3	.267	1	8.948e-3	2	8861.867	15	NC	5
66			min	0	1	-1.254	2	.015	15	-6.812e-3	3	285.47	3	1040.592	1
67		15	max	0	15	1.184	3	.269	1	8.031e-3	2	8750.271	15	NC	5
68			min	0	1	-1.254	2	.015	15	-6.082e-3	3	275.921	3	1030.72	1
69		16	max	0	15	1.094	3	.221	1	7.114e-3	2	9742.331	15	NC	3
70			min	0	1	-1.148	2	.012	15	-5.351e-3	3	303.072	3	1257.622	1
71		17	max	0	15	.88	3	.137	1	6.197e-3	2	NC	15	NC	3
72			min	0	1	-.938	2	.008	15	-4.621e-3	3	396.057	3	2037.176	1
73		18	max	0	15	.563	3	.048	1	5.28e-3	2	NC	5	NC	2
74			min	0	1	-.64	2	.003	15	-3.89e-3	3	727.633	3	5901.585	1
75		19	max	0	15	.184	3	.007	3	4.363e-3	2	NC	1	NC	1
76			min	0	1	-.29	2	-.003	2	-3.159e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.186	3	.007	3	2.788e-3	3	NC	1	NC	1
78			min	0	1	-.289	2	-.003	2	-4.584e-3	2	NC	1	NC	1
79		2	max	0	15	.425	3	.049	1	3.439e-3	3	NC	5	NC	2
80			min	0	1	-.764	2	.003	15	-5.551e-3	2	580.946	2	5875.937	1
81		3	max	0	15	.629	3	.137	1	4.091e-3	3	NC	15	NC	3
82			min	0	1	-1.164	2	.008	15	-6.519e-3	2	315.621	2	2032.089	1
83		4	max	0	15	.774	3	.222	1	4.743e-3	3	9756.137	15	NC	3
84			min	0	1	-1.436	2	.013	15	-7.487e-3	2	240.719	2	1255.237	1
85		5	max	0	15	.848	3	.27	1	5.394e-3	3	8764.68	15	NC	5
86			min	0	1	-1.555	2	.015	15	-8.454e-3	2	217.988	2	1028.991	1
87		6	max	0	15	.851	3	.267	1	6.046e-3	3	8879.616	15	NC	5
88			min	0	1	-1.524	2	.015	15	-9.422e-3	2	223.623	2	1038.831	1
89		7	max	0	15	.796	3	.214	1	6.697e-3	3	9963.858	15	NC	5
90			min	0	1	-1.368	2	.012	15	-1.039e-2	2	255.973	2	1296.792	1
91		8	max	0	15	.704	3	.128	1	7.349e-3	3	NC	15	NC	3
92			min	0	1	-1.141	2	.008	15	-1.136e-2	2	323.979	2	2190.521	1
93		9	max	0	15	.613	3	.039	1	8.001e-3	3	NC	5	NC	2
94			min	0	1	-.925	2	-.003	10	-1.232e-2	2	434.469	2	7409.44	1
95		10	max	0	1	.57	3	.021	3	8.652e-3	3	NC	5	NC	1
96			min	0	1	-.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

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.925	2	-.003	10	-1.232e-2	2	434.469	2	7409.44	1
99		12	max	0	1	.704	3	.128	1	7.349e-3	3	NC	15	NC	3
100			min	0	15	-1.141	2	.008	15	-1.136e-2	2	323.979	2	2190.521	1
101		13	max	0	1	.796	3	.214	1	6.697e-3	3	9963.858	15	NC	5
102			min	0	15	-1.368	2	.012	15	-1.039e-2	2	255.973	2	1296.792	1
103		14	max	0	1	.851	3	.267	1	6.046e-3	3	8879.616	15	NC	5
104			min	0	15	-1.524	2	.015	15	-9.422e-3	2	223.623	2	1038.831	1
105		15	max	0	1	.848	3	.27	1	5.394e-3	3	8764.68	15	NC	5
106			min	0	15	-1.555	2	.015	15	-8.454e-3	2	217.988	2	1028.991	1
107		16	max	0	1	.774	3	.222	1	4.743e-3	3	9756.137	15	NC	3
108			min	0	15	-1.436	2	.013	15	-7.487e-3	2	240.719	2	1255.237	1
109		17	max	0	1	.629	3	.137	1	4.091e-3	3	NC	15	NC	3
110			min	0	15	-1.164	2	.008	15	-6.519e-3	2	315.621	2	2032.089	1
111		18	max	0	1	.425	3	.049	1	3.439e-3	3	NC	5	NC	2
112			min	0	15	-.764	2	.003	15	-5.551e-3	2	580.946	2	5875.937	1
113		19	max	0	1	.186	3	.007	3	2.788e-3	3	NC	1	NC	1
114			min	0	15	-.289	2	-.003	2	-4.584e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.077	2	.006	3	4.761e-3	3	NC	1	NC	1
116			min	-.002	1	-.058	3	-.003	2	-6.016e-3	2	NC	1	NC	1
117		2	max	0	15	.099	3	.068	1	5.721e-3	3	NC	5	NC	3
118			min	-.002	1	-.291	2	.004	15	-6.938e-3	2	749.346	2	4164.768	1
119		3	max	0	15	.223	3	.167	1	6.681e-3	3	NC	5	NC	3
120			min	-.001	1	-.587	2	.009	15	-7.859e-3	2	415.924	2	1668.652	1
121		4	max	0	15	.293	3	.254	1	7.641e-3	3	NC	15	NC	3
122			min	-.001	1	-.76	2	.014	15	-8.781e-3	2	329.807	2	1092.944	1
123		5	max	0	15	.297	3	.3	1	8.602e-3	3	NC	15	NC	5
124			min	0	1	-.788	2	.017	15	-9.703e-3	2	318.883	2	924.538	1
125		6	max	0	15	.239	3	.291	1	9.562e-3	3	NC	5	NC	5
126			min	0	1	-.676	2	.016	15	-1.062e-2	2	366.383	2	951.638	1
127		7	max	0	15	.132	3	.231	1	1.052e-2	3	NC	5	NC	5
128			min	0	1	-.453	2	.013	15	-1.155e-2	2	520.506	2	1203.131	1
129		8	max	0	15	.004	12	.136	1	1.148e-2	3	NC	5	NC	3
130			min	0	1	-.176	2	.008	15	-1.247e-2	2	1092.137	2	2047.801	1
131		9	max	0	15	.092	1	.041	1	1.244e-2	3	NC	1	NC	2
132			min	0	1	-.114	3	-.002	10	-1.339e-2	2	4942.994	3	6894.612	1
133		10	max	0	1	.186	2	.018	3	1.34e-2	3	NC	4	NC	1
134			min	0	1	-.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	0	15	-.114	3	-.002	10	-1.339e-2	2	4942.994	3	6894.612	1
137		12	max	0	1	.004	12	.136	1	1.148e-2	3	NC	5	NC	3
138			min	0	15	-.176	2	.008	15	-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	0	15	-.453	2	.013	15	-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	0	15	-.676	2	.016	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	5
144			min	0	15	-.788	2	.017	15	-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	0	15	-.76	2	.014	15	-8.781e-3	2	329.807	2	1092.944	1
147		17	max	.001	1	.223	3	.167	1	6.681e-3	3	NC	5	NC	3
148			min	0	15	-.587	2	.009	15	-7.859e-3	2	415.924	2	1668.652	1
149		18	max	.002	1	.099	3	.068	1	5.721e-3	3	NC	5	NC	3
150			min	0	15	-.291	2	.004	15	-6.938e-3	2	749.346	2	4164.768	1
151		19	max	.002	1	.077	2	.006	3	4.761e-3	3	NC	1	NC	1
152			min	0	15	-.058	3	-.003	2	-6.016e-3	2	NC	1	NC	1
153	M2	1	max	.006	2	.007	2	.011	1	-1.882e-5	15	NC	1	NC	2
154			min	-.008	3	-.013	3	0	15	-3.391e-4	1	NC	1	6793.04	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	2	.006	2	.01	1	-1.78e-5	15	NC	1	NC	2
156			min	-.008	3	-.012	3	0	15	-3.208e-4	1	NC	1	7403.739	1
157		3	max	.006	2	.005	2	.009	1	-1.679e-5	15	NC	1	NC	2
158			min	-.007	3	-.012	3	0	15	-3.024e-4	1	NC	1	8130.611	1
159		4	max	.005	2	.004	2	.009	1	-1.577e-5	15	NC	1	NC	2
160			min	-.007	3	-.012	3	0	15	-2.841e-4	1	NC	1	9004.177	1
161		5	max	.005	2	.003	2	.008	1	-1.475e-5	15	NC	1	NC	1
162			min	-.006	3	-.011	3	0	15	-2.657e-4	1	NC	1	NC	1
163		6	max	.005	2	.002	2	.007	1	-1.373e-5	15	NC	1	NC	1
164			min	-.006	3	-.011	3	0	15	-2.473e-4	1	NC	1	NC	1
165		7	max	.004	2	0	2	.006	1	-1.271e-5	15	NC	1	NC	1
166			min	-.005	3	-.011	3	0	15	-2.29e-4	1	NC	1	NC	1
167		8	max	.004	2	0	2	.005	1	-1.169e-5	15	NC	1	NC	1
168			min	-.005	3	-.01	3	0	15	-2.106e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.004	1	-1.067e-5	15	NC	1	NC	1
170			min	-.004	3	-.01	3	0	15	-1.923e-4	1	NC	1	NC	1
171		10	max	.003	2	-.001	15	.004	1	-9.656e-6	15	NC	1	NC	1
172			min	-.004	3	-.009	3	0	15	-1.739e-4	1	NC	1	NC	1
173		11	max	.003	2	-.001	15	.003	1	-8.638e-6	15	NC	1	NC	1
174			min	-.004	3	-.008	3	0	15	-1.556e-4	1	NC	1	NC	1
175		12	max	.003	2	-.001	15	.002	1	-7.619e-6	15	NC	1	NC	1
176			min	-.003	3	-.007	3	0	15	-1.372e-4	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	.002	1	-6.601e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-1.189e-4	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	.001	1	-5.582e-6	15	NC	1	NC	1
180			min	-.002	3	-.006	3	0	15	-1.005e-4	1	NC	1	NC	1
181		15	max	.001	2	-.001	15	0	1	-4.564e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	4	0	15	-8.216e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-3.545e-6	15	NC	1	NC	1
184			min	-.001	3	-.004	4	0	15	-6.38e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-2.527e-6	15	NC	1	NC	1
186			min	0	3	-.003	4	0	15	-4.545e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-1.508e-6	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-2.71e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-4.9e-7	15	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	7.02e-8	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	3.046e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	1.689e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	15	5.968e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	3.308e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	8.889e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	3	4.927e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	1.181e-4	1	NC	1	NC	1
200			min	-.001	2	-.008	4	0	12	6.546e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.473e-4	1	NC	1	NC	1
202			min	-.001	2	-.01	4	0	12	8.164e-6	15	9241.259	4	NC	1
203		7	max	.002	3	-.003	15	0	1	1.765e-4	1	NC	1	NC	1
204			min	-.002	2	-.012	4	0	15	9.783e-6	15	7992.182	4	NC	1
205		8	max	.003	3	-.003	15	0	1	2.058e-4	1	NC	2	NC	1
206			min	-.002	2	-.013	4	0	15	1.14e-5	15	7223.525	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	2.35e-4	1	NC	5	NC	1
208			min	-.002	2	-.014	4	0	15	1.302e-5	15	6775.144	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.642e-4	1	NC	5	NC	1
210			min	-.003	2	-.014	4	0	15	1.464e-5	15	6569.946	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	2.934e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.014	4	0	15	1.626e-5	15	6577.968	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	3.226e-4	1	NC	3	NC	1
214			min	-.003	2	-.014	4	0	15	1.788e-5	15	6804.881	4	NC	1
215		13	max	.004	3	-.003	15	.003	1	3.519e-4	1	NC	2	NC	1
216			min	-.004	2	-.013	4	0	15	1.95e-5	15	7295.655	4	NC	1
217		14	max	.005	3	-.003	15	.004	1	3.811e-4	1	NC	1	NC	1
218			min	-.004	2	-.012	4	0	15	2.112e-5	15	8157.316	4	NC	1
219		15	max	.005	3	-.002	15	.005	1	4.103e-4	1	NC	1	NC	1
220			min	-.004	2	-.01	4	0	15	2.273e-5	15	9624.975	4	NC	1
221		16	max	.006	3	-.002	15	.006	1	4.395e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	2.435e-5	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.008	1	4.687e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	4	0	15	2.597e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.009	1	4.979e-4	1	NC	1	NC	2
226			min	-.005	2	-.004	1	0	15	2.759e-5	15	NC	1	9800.507	1
227		19	max	.007	3	0	10	.011	1	5.272e-4	1	NC	1	NC	2
228			min	-.005	2	-.002	1	0	15	2.921e-5	15	NC	1	8366.174	1
229	M4	1	max	.002	1	.005	2	0	15	1.726e-4	1	NC	1	NC	3
230			min	0	15	-.007	3	-.011	1	9.581e-6	15	NC	1	2309.985	1
231		2	max	.002	1	.005	2	0	15	1.726e-4	1	NC	1	NC	3
232			min	0	15	-.007	3	-.01	1	9.581e-6	15	NC	1	2504.69	1
233		3	max	.002	1	.004	2	0	15	1.726e-4	1	NC	1	NC	3
234			min	0	15	-.006	3	-.009	1	9.581e-6	15	NC	1	2736.884	1
235		4	max	.002	1	.004	2	0	15	1.726e-4	1	NC	1	NC	3
236			min	0	15	-.006	3	-.008	1	9.581e-6	15	NC	1	3016.225	1
237		5	max	.002	1	.004	2	0	15	1.726e-4	1	NC	1	NC	3
238			min	0	15	-.005	3	-.007	1	9.581e-6	15	NC	1	3355.843	1
239		6	max	.002	1	.004	2	0	15	1.726e-4	1	NC	1	NC	3
240			min	0	15	-.005	3	-.007	1	9.581e-6	15	NC	1	3773.948	1
241		7	max	.002	1	.003	2	0	15	1.726e-4	1	NC	1	NC	3
242			min	0	15	-.005	3	-.006	1	9.581e-6	15	NC	1	4296.389	1
243		8	max	.001	1	.003	2	0	15	1.726e-4	1	NC	1	NC	2
244			min	0	15	-.004	3	-.005	1	9.581e-6	15	NC	1	4960.859	1
245		9	max	.001	1	.003	2	0	15	1.726e-4	1	NC	1	NC	2
246			min	0	15	-.004	3	-.004	1	9.581e-6	15	NC	1	5824.088	1
247		10	max	.001	1	.003	2	0	15	1.726e-4	1	NC	1	NC	2
248			min	0	15	-.003	3	-.004	1	9.581e-6	15	NC	1	6974.728	1
249		11	max	.001	1	.002	2	0	15	1.726e-4	1	NC	1	NC	2
250			min	0	15	-.003	3	-.003	1	9.581e-6	15	NC	1	8557.746	1
251		12	max	0	1	.002	2	0	15	1.726e-4	1	NC	1	NC	1
252			min	0	15	-.003	3	-.002	1	9.581e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.726e-4	1	NC	1	NC	1
254			min	0	15	-.002	3	-.002	1	9.581e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.726e-4	1	NC	1	NC	1
256			min	0	15	-.002	3	-.001	1	9.581e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.726e-4	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	9.581e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.726e-4	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	9.581e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.726e-4	1	NC	1	NC	1
262			min	0	15	0	3	0	1	9.581e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.726e-4	1	NC	1	NC	1
264			min	0	15	0	3	0	1	9.581e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.726e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	9.581e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.029	2	0	1	0	1	NC	3	NC	1
268			min	-.026	3	-.041	3	0	1	0	1	2649.683	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.026	2	0	1	0	1	NC	3	NC	1
270			min	-.025	3	-.038	3	0	1	0	1	2920.389	2	NC	1
271		3	max	.019	2	.024	2	0	1	0	1	NC	3	NC	1
272			min	-.023	3	-.036	3	0	1	0	1	3249.371	2	NC	1
273		4	max	.017	2	.021	2	0	1	0	1	NC	3	NC	1
274			min	-.022	3	-.034	3	0	1	0	1	3653.624	2	NC	1
275		5	max	.016	2	.019	2	0	1	0	1	NC	3	NC	1
276			min	-.021	3	-.032	3	0	1	0	1	4157.043	2	NC	1
277		6	max	.015	2	.016	2	0	1	0	1	NC	1	NC	1
278			min	-.019	3	-.03	3	0	1	0	1	4794.081	2	NC	1
279		7	max	.014	2	.014	2	0	1	0	1	NC	1	NC	1
280			min	-.018	3	-.027	3	0	1	0	1	5615.886	2	NC	1
281		8	max	.013	2	.011	2	0	1	0	1	NC	1	NC	1
282			min	-.016	3	-.025	3	0	1	0	1	6701.092	2	NC	1
283		9	max	.012	2	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.015	3	-.023	3	0	1	0	1	8175.768	2	NC	1
285		10	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
286			min	-.013	3	-.021	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.012	3	-.018	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	2	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.016	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	2	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	2	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.011	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	2	0	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.009	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.011	3	0	1	0	1	9447.209	4	NC	1
317		7	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.013	3	0	1	0	1	8157.038	4	NC	1
319		8	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.014	3	0	1	0	1	7362.558	4	NC	1
321		9	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.009	2	-.015	3	0	1	0	1	6897.697	4	NC	1
323		10	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.01	2	-.015	3	0	1	0	1	6682.353	4	NC	1
325		11	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.011	2	-.016	3	0	1	0	1	6685.049	4	NC	1
327		12	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.013	2	-.015	3	0	1	0	1	6910.864	4	NC	1
329		13	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.014	2	-.015	3	0	1	0	1	7404.946	4	NC	1
331		14	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.015	2	-.014	3	0	1	0	1	8275.467	4	NC	1
333		15	max	.016	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.016	2	-.013	3	0	1	0	1	9760.473	4	NC	1
335		16	max	.017	3	-.002	15	0	1	0	1	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	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	0	1	NC	1	NC	1
344			min	0	15	-.022	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	1	.019	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.021	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	1	.018	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.017	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.018	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.017	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.015	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	1	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.012	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.011	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	15	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	2	.007	2	0	15	3.391e-4	1	NC	1	NC	2
382			min	-.008	3	-.013	3	-.011	1	1.882e-5	15	NC	1	6793.04	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	2	.006	2	0	15	3.208e-4	1	NC	1	NC	2
384			min	-.008	3	-.012	3	-.01	1	1.78e-5	15	NC	1	7403.739	1
385		3	max	.006	2	.005	2	0	15	3.024e-4	1	NC	1	NC	2
386			min	-.007	3	-.012	3	-.009	1	1.679e-5	15	NC	1	8130.611	1
387		4	max	.005	2	.004	2	0	15	2.841e-4	1	NC	1	NC	2
388			min	-.007	3	-.012	3	-.009	1	1.577e-5	15	NC	1	9004.177	1
389		5	max	.005	2	.003	2	0	15	2.657e-4	1	NC	1	NC	1
390			min	-.006	3	-.011	3	-.008	1	1.475e-5	15	NC	1	NC	1
391		6	max	.005	2	.002	2	0	15	2.473e-4	1	NC	1	NC	1
392			min	-.006	3	-.011	3	-.007	1	1.373e-5	15	NC	1	NC	1
393		7	max	.004	2	0	2	0	15	2.29e-4	1	NC	1	NC	1
394			min	-.005	3	-.011	3	-.006	1	1.271e-5	15	NC	1	NC	1
395		8	max	.004	2	0	2	0	15	2.106e-4	1	NC	1	NC	1
396			min	-.005	3	-.01	3	-.005	1	1.169e-5	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.923e-4	1	NC	1	NC	1
398			min	-.004	3	-.01	3	-.004	1	1.067e-5	15	NC	1	NC	1
399		10	max	.003	2	-.001	15	0	15	1.739e-4	1	NC	1	NC	1
400			min	-.004	3	-.009	3	-.004	1	9.656e-6	15	NC	1	NC	1
401		11	max	.003	2	-.001	15	0	15	1.556e-4	1	NC	1	NC	1
402			min	-.004	3	-.008	3	-.003	1	8.638e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	15	0	15	1.372e-4	1	NC	1	NC	1
404			min	-.003	3	-.007	3	-.002	1	7.619e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	1.189e-4	1	NC	1	NC	1
406			min	-.003	3	-.007	3	-.002	1	6.601e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	1.005e-4	1	NC	1	NC	1
408			min	-.002	3	-.006	3	-.001	1	5.582e-6	15	NC	1	NC	1
409		15	max	.001	2	-.001	15	0	15	8.216e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	4	0	1	4.564e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	6.38e-5	1	NC	1	NC	1
412			min	-.001	3	-.004	4	0	1	3.545e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	4.545e-5	1	NC	1	NC	1
414			min	0	3	-.003	4	0	1	2.527e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	2.71e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	1.508e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	8.743e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	4.9e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-7.02e-8	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.24e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.689e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-3.046e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-3.308e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	15	-5.968e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	3	-4.927e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-8.889e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	12	-6.546e-6	15	NC	1	NC	1
428			min	-.001	2	-.008	4	0	1	-1.181e-4	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	12	-8.164e-6	15	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.473e-4	1	9241.259	4	NC	1
431		7	max	.002	3	-.003	15	0	15	-9.783e-6	15	NC	1	NC	1
432			min	-.002	2	-.012	4	0	1	-1.765e-4	1	7992.182	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-1.14e-5	15	NC	2	NC	1
434			min	-.002	2	-.013	4	0	1	-2.058e-4	1	7223.525	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-1.302e-5	15	NC	5	NC	1
436			min	-.002	2	-.014	4	-.001	1	-2.35e-4	1	6775.144	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-1.464e-5	15	NC	5	NC	1
438			min	-.003	2	-.014	4	-.002	1	-2.642e-4	1	6569.946	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-1.626e-5	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.014	4	-.002	1	-2.934e-4	1	6577.968	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-1.788e-5	15	NC	3	NC	1
442			min	-.003	2	-.014	4	-.003	1	-3.226e-4	1	6804.881	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.95e-5	15	NC	2	NC	1
444			min	-.004	2	-.013	4	-.003	1	-3.519e-4	1	7295.655	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-2.112e-5	15	NC	1	NC	1
446			min	-.004	2	-.012	4	-.004	1	-3.811e-4	1	8157.316	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-2.273e-5	15	NC	1	NC	1
448			min	-.004	2	-.01	4	-.005	1	-4.103e-4	1	9624.975	4	NC	1
449		16	max	.006	3	-.002	15	0	15	-2.435e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.006	1	-4.395e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-2.597e-5	15	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	0	15	0	15	-2.759e-5	15	NC	1	NC	2
454			min	-.005	2	-.004	1	-.009	1	-4.979e-4	1	NC	1	9800.507	1
455		19	max	.007	3	0	10	0	15	-2.921e-5	15	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	-9.581e-6	15	NC	1	NC	3
458			min	0	15	-.007	3	0	15	-1.726e-4	1	NC	1	2309.985	1
459		2	max	.002	1	.005	2	.01	1	-9.581e-6	15	NC	1	NC	3
460			min	0	15	-.007	3	0	15	-1.726e-4	1	NC	1	2504.69	1
461		3	max	.002	1	.004	2	.009	1	-9.581e-6	15	NC	1	NC	3
462			min	0	15	-.006	3	0	15	-1.726e-4	1	NC	1	2736.884	1
463		4	max	.002	1	.004	2	.008	1	-9.581e-6	15	NC	1	NC	3
464			min	0	15	-.006	3	0	15	-1.726e-4	1	NC	1	3016.225	1
465		5	max	.002	1	.004	2	.007	1	-9.581e-6	15	NC	1	NC	3
466			min	0	15	-.005	3	0	15	-1.726e-4	1	NC	1	3355.843	1
467		6	max	.002	1	.004	2	.007	1	-9.581e-6	15	NC	1	NC	3
468			min	0	15	-.005	3	0	15	-1.726e-4	1	NC	1	3773.948	1
469		7	max	.002	1	.003	2	.006	1	-9.581e-6	15	NC	1	NC	3
470			min	0	15	-.005	3	0	15	-1.726e-4	1	NC	1	4296.389	1
471		8	max	.001	1	.003	2	.005	1	-9.581e-6	15	NC	1	NC	2
472			min	0	15	-.004	3	0	15	-1.726e-4	1	NC	1	4960.859	1
473		9	max	.001	1	.003	2	.004	1	-9.581e-6	15	NC	1	NC	2
474			min	0	15	-.004	3	0	15	-1.726e-4	1	NC	1	5824.088	1
475		10	max	.001	1	.003	2	.004	1	-9.581e-6	15	NC	1	NC	2
476			min	0	15	-.003	3	0	15	-1.726e-4	1	NC	1	6974.728	1
477		11	max	.001	1	.002	2	.003	1	-9.581e-6	15	NC	1	NC	2
478			min	0	15	-.003	3	0	15	-1.726e-4	1	NC	1	8557.746	1
479		12	max	0	1	.002	2	.002	1	-9.581e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-1.726e-4	1	NC	1	NC	1
481		13	max	0	1	.002	2	.002	1	-9.581e-6	15	NC	1	NC	1
482			min	0	15	-.002	3	0	15	-1.726e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-9.581e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-1.726e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-9.581e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-1.726e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-9.581e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-1.726e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-9.581e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-1.726e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-9.581e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-1.726e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-9.581e-6	15	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	.002	1	1.624e-2	1	NC	1	NC	1
496			min	-.004	2	-.012	3	0	15	-2.77e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.008	3	.04	2	0	15	7.941e-3	2	NC	4	NC	1
498			min	-.004	2	-.002	3	-.008	1	-1.371e-2	3	2461.613	2	NC	1
499		3	max	.008	3	.013	3	0	15	4.895e-6	10	NC	5	NC	2
500			min	-.004	2	-.01	2	-.011	1	-2.439e-4	1	1184.998	2	9048.764	1
501		4	max	.008	3	.04	3	0	15	4.305e-3	2	NC	5	NC	2
502			min	-.004	2	-.067	2	-.011	1	-4.841e-3	3	746.819	2	9735.565	1
503		5	max	.008	3	.073	3	0	15	8.657e-3	2	NC	5	NC	1
504			min	-.004	2	-.127	2	-.007	1	-9.541e-3	3	538.252	2	NC	1
505		6	max	.008	3	.11	3	0	15	1.301e-2	2	NC	15	NC	1
506			min	-.004	2	-.185	2	-.003	1	-1.424e-2	3	423.485	2	NC	1
507		7	max	.008	3	.145	3	0	1	1.736e-2	2	NC	15	NC	1
508			min	-.004	2	-.237	2	0	12	-1.894e-2	3	355.806	2	NC	1
509		8	max	.007	3	.174	3	.001	1	2.171e-2	2	9296.327	15	NC	1
510			min	-.004	2	-.278	2	0	15	-2.364e-2	3	315.806	2	NC	1
511		9	max	.007	3	.193	3	0	15	2.504e-2	2	8681.966	15	NC	1
512			min	-.003	2	-.304	2	0	1	-2.373e-2	3	294.997	2	NC	1
513		10	max	.007	3	.2	3	0	1	2.769e-2	2	8495.046	15	NC	1
514			min	-.003	2	-.312	2	0	12	-2.076e-2	3	288.913	2	NC	1
515		11	max	.007	3	.195	3	0	1	3.034e-2	2	8681.647	15	NC	1
516			min	-.003	2	-.303	2	0	15	-1.779e-2	3	296.089	2	NC	1
517		12	max	.007	3	.178	3	0	15	2.961e-2	2	9295.669	15	NC	1
518			min	-.003	2	-.276	2	-.001	1	-1.482e-2	3	319.165	2	NC	1
519		13	max	.007	3	.152	3	0	15	2.376e-2	2	NC	15	NC	1
520			min	-.003	2	-.233	2	0	1	-1.186e-2	3	364.056	2	NC	1
521		14	max	.006	3	.118	3	.003	1	1.792e-2	2	NC	15	NC	1
522			min	-.003	2	-.178	2	0	15	-8.899e-3	3	441.233	2	NC	1
523		15	max	.006	3	.08	3	.007	1	1.208e-2	2	NC	5	NC	1
524			min	-.003	2	-.119	2	0	15	-5.937e-3	3	575.028	2	NC	1
525		16	max	.006	3	.042	3	.01	1	6.232e-3	2	NC	5	NC	1
526			min	-.003	2	-.059	2	0	15	-2.976e-3	3	824.975	2	NC	1
527		17	max	.006	3	.005	3	.011	1	7.001e-4	1	NC	5	NC	2
528			min	-.003	2	-.005	2	0	15	-1.383e-5	3	1363.879	2	9403.568	1
529		18	max	.006	3	.039	2	.007	1	1.246e-2	2	NC	4	NC	1
530			min	-.003	2	-.028	3	0	15	-5.243e-3	3	2920.047	2	NC	1
531		19	max	.006	3	.077	2	0	15	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	0	1	0	1	NC	1	NC	1
534			min	-.017	2	-.018	3	0	1	0	1	NC	1	NC	1
535		2	max	.026	3	.098	2	0	1	0	1	NC	5	NC	1
536			min	-.018	2	.002	3	0	1	0	1	971.711	2	NC	1
537		3	max	.026	3	.042	3	0	1	0	1	NC	5	NC	1
538			min	-.018	2	-.034	2	0	1	0	1	459.876	2	NC	1
539		4	max	.025	3	.12	3	0	1	0	1	9484.435	15	NC	1
540			min	-.017	2	-.19	2	0	1	0	1	283.689	2	NC	1
541		5	max	.025	3	.222	3	0	1	0	1	6645.124	15	NC	1
542			min	-.017	2	-.357	2	0	1	0	1	200.935	2	NC	1
543		6	max	.024	3	.335	3	0	1	0	1	5120.351	15	NC	1
544			min	-.017	2	-.522	2	0	1	0	1	156.041	2	NC	1
545		7	max	.024	3	.444	3	0	1	0	1	4238.923	15	NC	1
546			min	-.016	2	-.671	2	0	1	0	1	129.878	2	NC	1
547		8	max	.023	3	.535	3	0	1	0	1	3726.034	15	NC	1
548			min	-.016	2	-.79	2	0	1	0	1	114.565	2	NC	1
549		9	max	.023	3	.593	3	0	1	0	1	3462.866	15	NC	1
550			min	-.016	2	-.865	2	0	1	0	1	106.672	2	NC	1
551		10	max	.022	3	.613	3	0	1	0	1	3383.569	15	NC	1
552			min	-.015	2	-.891	2	0	1	0	1	104.368	2	NC	1
553		11	max	.022	3	.597	3	0	1	0	1	3462.969	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.015	2	-.865	2	0	1	0	1	107.078	2	NC	1
555		12	max	.021	3	.546	3	0	1	0	1	3726.285	15	NC	1
556			min	-.015	2	-.786	2	0	1	0	1	115.884	2	NC	1
557		13	max	.02	3	.463	3	0	1	0	1	4239.457	15	NC	1
558			min	-.015	2	-.659	2	0	1	0	1	133.275	2	NC	1
559		14	max	.02	3	.359	3	0	1	0	1	5121.428	15	NC	1
560			min	-.014	2	-.502	2	0	1	0	1	163.644	2	NC	1
561		15	max	.019	3	.243	3	0	1	0	1	6647.298	15	NC	1
562			min	-.014	2	-.332	2	0	1	0	1	217.37	2	NC	1
563		16	max	.019	3	.125	3	0	1	0	1	9489.045	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	0	1	0	1	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	0	1	0	1	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	0	1	0	1	NC	1	NC	1
570			min	-.014	2	-.166	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.087	2	0	15	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	.008	1	1.371e-2	3	NC	4	NC	1
574			min	-.004	2	-.002	3	0	15	-7.941e-3	2	2461.613	2	NC	1
575		3	max	.008	3	.013	3	.011	1	2.439e-4	1	NC	5	NC	2
576			min	-.004	2	-.01	2	0	15	-4.895e-6	10	1184.998	2	9048.764	1
577		4	max	.008	3	.04	3	.011	1	4.841e-3	3	NC	5	NC	2
578			min	-.004	2	-.067	2	0	15	-4.305e-3	2	746.819	2	9735.565	1
579		5	max	.008	3	.073	3	.007	1	9.541e-3	3	NC	5	NC	1
580			min	-.004	2	-.127	2	0	15	-8.657e-3	2	538.252	2	NC	1
581		6	max	.008	3	.11	3	.003	1	1.424e-2	3	NC	15	NC	1
582			min	-.004	2	-.185	2	0	15	-1.301e-2	2	423.485	2	NC	1
583		7	max	.008	3	.145	3	0	12	1.894e-2	3	NC	15	NC	1
584			min	-.004	2	-.237	2	0	1	-1.736e-2	2	355.806	2	NC	1
585		8	max	.007	3	.174	3	0	15	2.364e-2	3	9296.327	15	NC	1
586			min	-.004	2	-.278	2	-.001	1	-2.171e-2	2	315.806	2	NC	1
587		9	max	.007	3	.193	3	0	1	2.373e-2	3	8681.966	15	NC	1
588			min	-.003	2	-.304	2	0	15	-2.504e-2	2	294.997	2	NC	1
589		10	max	.007	3	.2	3	0	12	2.076e-2	3	8495.046	15	NC	1
590			min	-.003	2	-.312	2	0	1	-2.769e-2	2	288.913	2	NC	1
591		11	max	.007	3	.195	3	0	15	1.779e-2	3	8681.647	15	NC	1
592			min	-.003	2	-.303	2	0	1	-3.034e-2	2	296.089	2	NC	1
593		12	max	.007	3	.178	3	.001	1	1.482e-2	3	9295.669	15	NC	1
594			min	-.003	2	-.276	2	0	15	-2.961e-2	2	319.165	2	NC	1
595		13	max	.007	3	.152	3	0	1	1.186e-2	3	NC	15	NC	1
596			min	-.003	2	-.233	2	0	15	-2.376e-2	2	364.056	2	NC	1
597		14	max	.006	3	.118	3	0	15	8.899e-3	3	NC	15	NC	1
598			min	-.003	2	-.178	2	-.003	1	-1.792e-2	2	441.233	2	NC	1
599		15	max	.006	3	.08	3	0	15	5.937e-3	3	NC	5	NC	1
600			min	-.003	2	-.119	2	-.007	1	-1.208e-2	2	575.028	2	NC	1
601		16	max	.006	3	.042	3	0	15	2.976e-3	3	NC	5	NC	1
602			min	-.003	2	-.059	2	-.01	1	-6.232e-3	2	824.975	2	NC	1
603		17	max	.006	3	.005	3	0	15	1.383e-5	3	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	0	15	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	.002	1	1.066e-2	3	NC	1	NC	1
608			min	-.003	2	-.058	3	0	15	-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

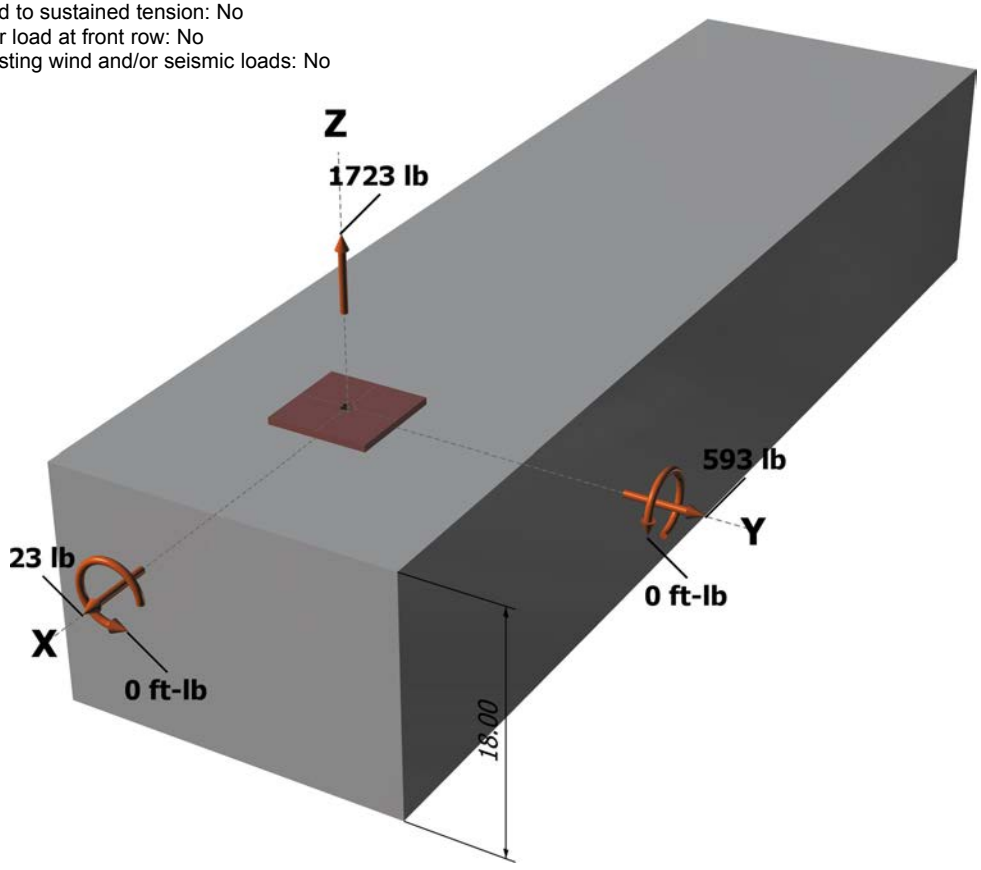
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

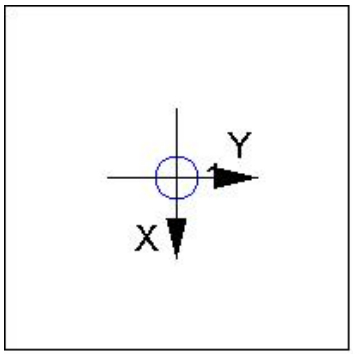
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

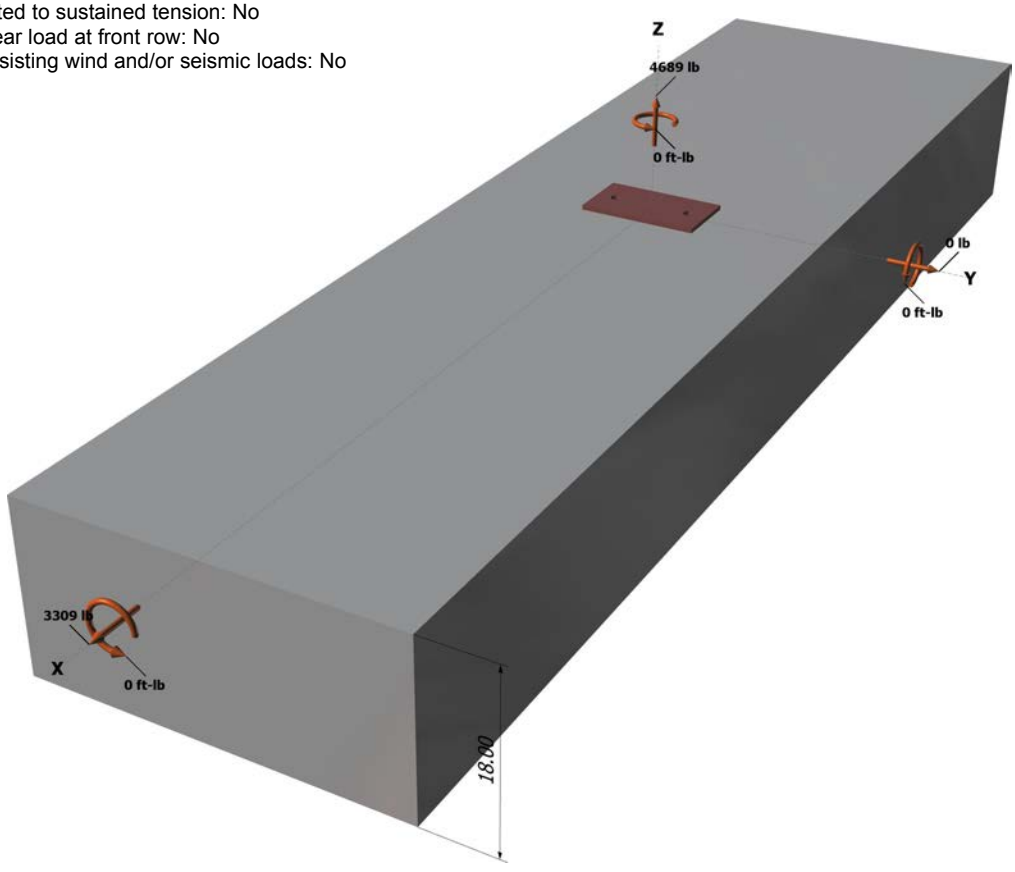
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

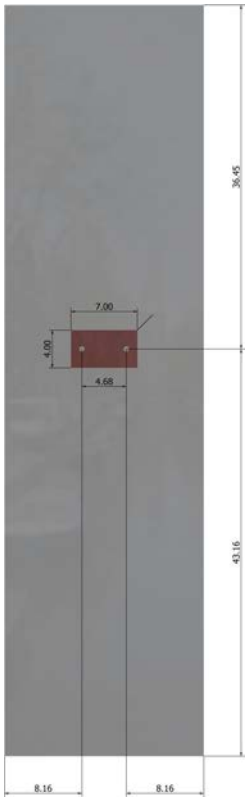
<Figure 1>

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>



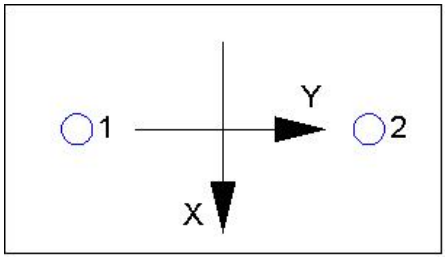
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.