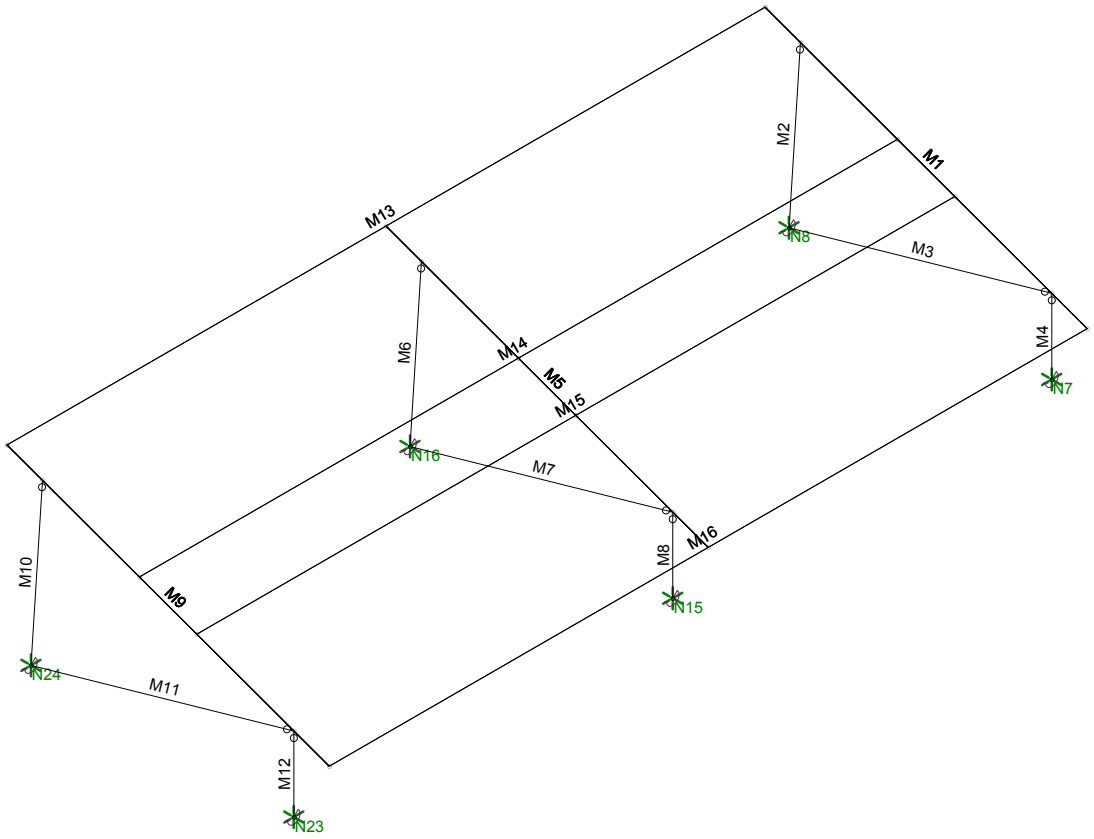


Schletter, Inc.		20° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

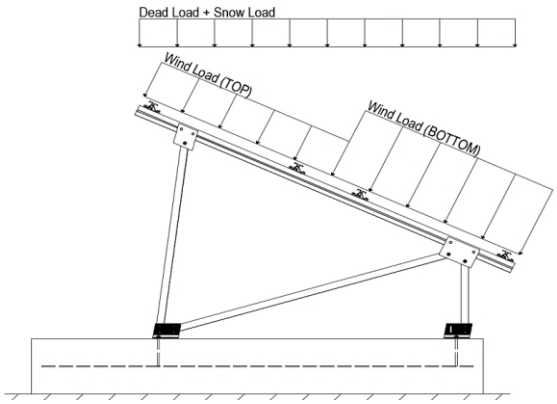
1.2 Construction

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 =	20°
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 =	20.62	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.91		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	130	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	26.53	psf	*Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.050	*(Pressure)*	*Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # 1127/0611-1e. Negative forces are applied away from the surface.*
$Cf+_{BOTTOM}$ =	1.650		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.400		
$Cf-_{TOP, INNER PURLIN}$ =	-1.840	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.000		

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
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

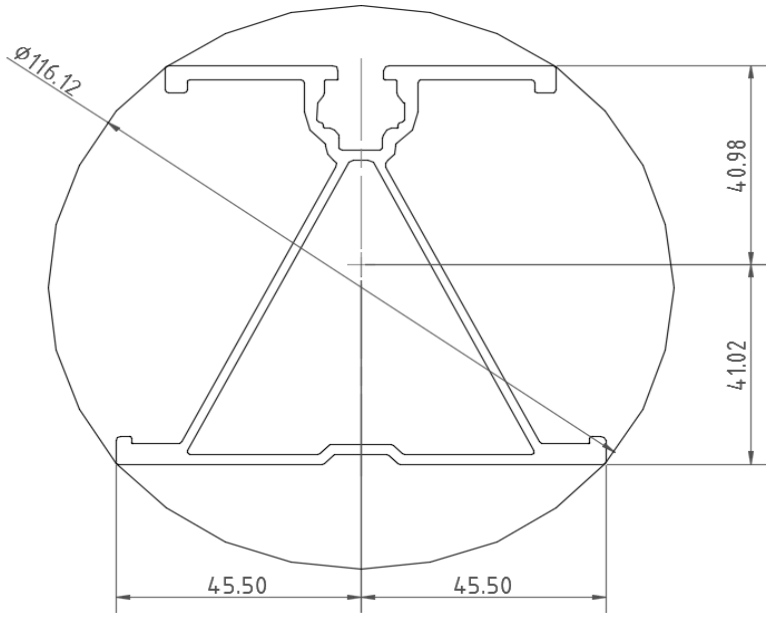
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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 =	99	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-2.367	k-ft
M_z =	0.003	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	85%	

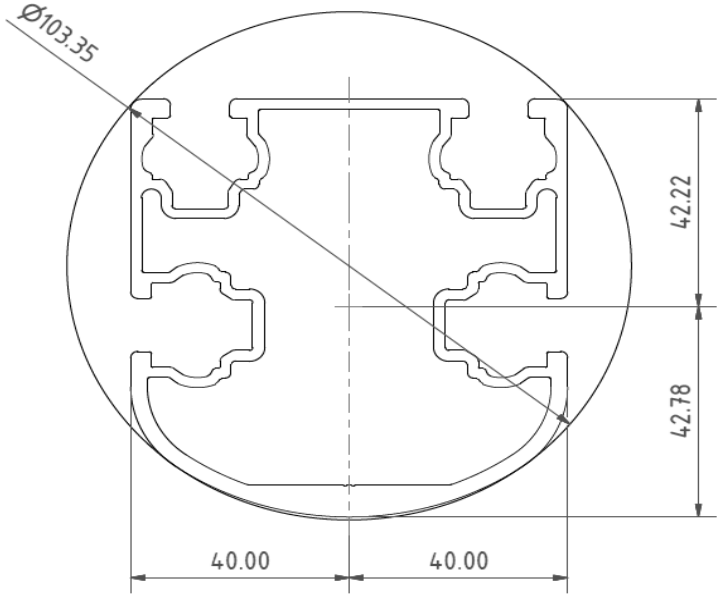


DETAIL VIEW

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).

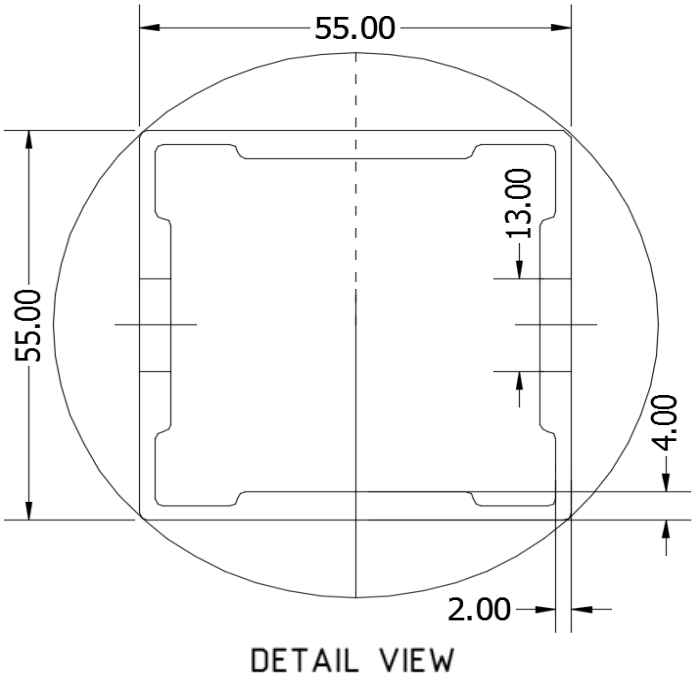
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.411	k-ft
M_z =	0.000	k-ft
P_n =	-0.756	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	100%	



4.3 Front Strut Design

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

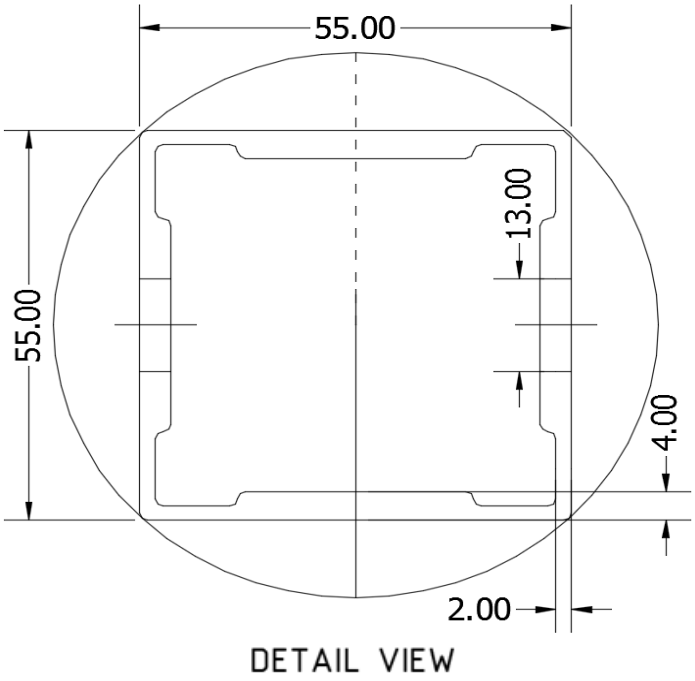
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.514	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	



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).

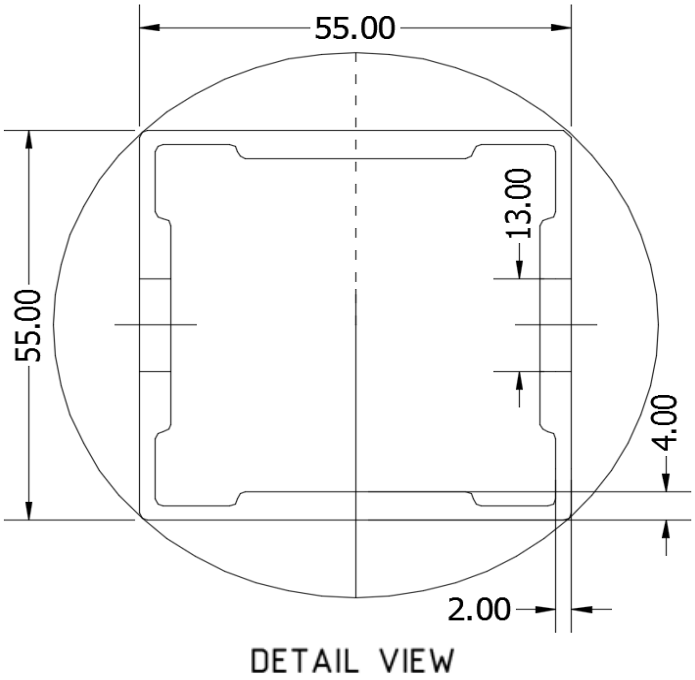
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.129	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	30%	



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 =	55.91	in
$\Phi F_{ty\ AXIAL}$ =	15.92	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.593	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	24%	



5. FOUNDATION DESIGN CALCULATIONS

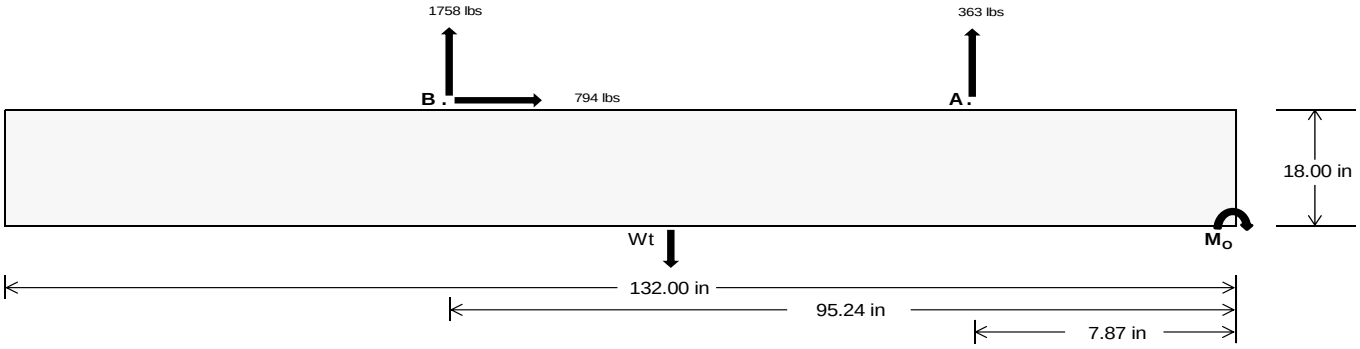
5.1 Helical Pile Foundations

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 =	1522.71	7323.81	k
Compressive Load =	4568.37	5424.69	k
Lateral Load =	8.14	3301.78	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	184606.2 in-lbs
Resisting Force Required =	2797.06 lbs
S.F. =	1.67
Weight Required =	4661.77 lbs
Minimum Width =	40 in
Weight Provided =	7975.00 lbs

Sliding

Force =	793.70 lbs
Friction =	0.4
Weight Required =	1984.24 lbs
Resisting Weight =	7975.00 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	793.70 lbs
Cohesion =	130 psf
Area =	36.67 ft^2
Resisting =	3987.50 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 (3) #5 rebar.

A minimum 132in long x 40in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 40in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 40in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	40 in	41 in	42 in	43 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.33 ft) =	7975 lbs	8174 lbs	8374 lbs	8573 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	40 in	41 in	42 in	43 in	40 in	41 in	42 in	43 in	40 in	41 in	42 in	43 in	40 in	41 in	42 in	43 in
F_A	1281 lbs	1281 lbs	1281 lbs	1281 lbs	1917 lbs	1917 lbs	1917 lbs	1917 lbs	2291 lbs	2291 lbs	2291 lbs	2291 lbs	-727 lbs	-727 lbs	-727 lbs	-727 lbs
F_B	1299 lbs	1299 lbs	1299 lbs	1299 lbs	2323 lbs	2323 lbs	2323 lbs	2323 lbs	2609 lbs	2609 lbs	2609 lbs	2609 lbs	-3517 lbs	-3517 lbs	-3517 lbs	-3517 lbs
F_V	137 lbs	137 lbs	137 lbs	137 lbs	1401 lbs	1401 lbs	1401 lbs	1401 lbs	1143 lbs	1143 lbs	1143 lbs	1143 lbs	-1587 lbs	-1587 lbs	-1587 lbs	-1587 lbs
P_{total}	10555 lbs	10755 lbs	10954 lbs	11153 lbs	12215 lbs	12415 lbs	12614 lbs	12813 lbs	12875 lbs	13074 lbs	13273 lbs	13473 lbs	541 lbs	661 lbs	781 lbs	900 lbs
M	3244 lbs-ft	3244 lbs-ft	3244 lbs-ft	3244 lbs-ft	5728 lbs-ft	5728 lbs-ft	5728 lbs-ft	5728 lbs-ft	6456 lbs-ft	6456 lbs-ft	6456 lbs-ft	6456 lbs-ft	2666 lbs-ft	2666 lbs-ft	2666 lbs-ft	2666 lbs-ft
e	0.31 ft	0.30 ft	0.30 ft	0.29 ft	0.47 ft	0.46 ft	0.45 ft	0.45 ft	0.50 ft	0.49 ft	0.49 ft	0.48 ft	4.92 ft	4.03 ft	3.41 ft	2.96 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}	239.6 psf	239.1 psf	238.6 psf	238.1 psf	247.9 psf	247.2 psf	246.5 psf	245.8 psf	255.1 psf	254.2 psf	253.3 psf	252.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	336.1 psf	333.2 psf	330.5 psf	327.8 psf	418.4 psf	413.5 psf	408.8 psf	404.3 psf	447.2 psf	441.6 psf	436.2 psf	431.1 psf	188.0 psf	87.9 psf	71.3 psf	66.0 psf

Maximum Bearing Pressure = 447 psf
Allowable Bearing Pressure = 1500 psf

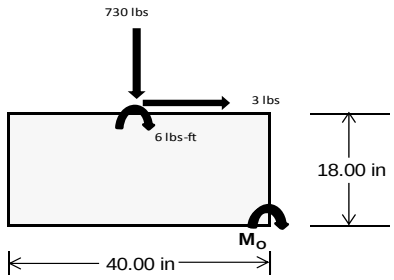
Use a 132in long x 40in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	1206.5 ft-lbs
Resisting Force Required =	723.91 lbs
S.F. =	1.67
Weight Required =	1206.52 lbs
Minimum Width =	40 in
Weight Provided =	7975.00 lbs

A minimum 132in long x 40in 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	40 in			40 in			40 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	209 lbs	534 lbs	209 lbs	730 lbs	2120 lbs	730 lbs	61 lbs	156 lbs	61 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	10082 lbs	7975 lbs	10082 lbs	10129 lbs	7975 lbs	10129 lbs	2948 lbs	7975 lbs	2948 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	11 lbs-ft	0 lbs-ft	11 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.56 ft	0.56 ft	0.56 ft	0.56 ft	0.56 ft	0.56 ft	0.56 ft	0.56 ft	0.56 ft
f_{min}	274.8 psf	217.5 psf	274.8 psf	275.7 psf	217.5 psf	275.7 psf	80.4 psf	217.5 psf	80.4 psf
f_{max}	275.1 psf	217.5 psf	275.1 psf	276.8 psf	217.5 psf	276.8 psf	80.4 psf	217.5 psf	80.4 psf

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

Use a 132in long x 40in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 40in wide x 18in tall ballast foundation and fiber reinforcing with (3) #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.

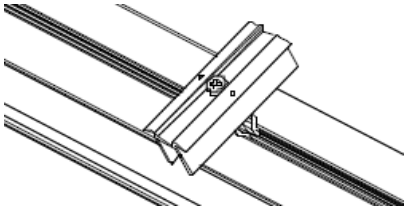
6. DESIGN OF JOINTS AND CONNECTIONS

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.

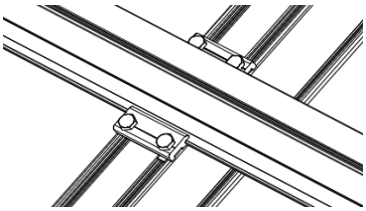
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.964 k
Allowable Uplift	=	1.214 k
Utilization	=	79%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	2.845 k
Allowable Uplift	=	4.357 k
Utilization	=	65%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	3.514 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	47%

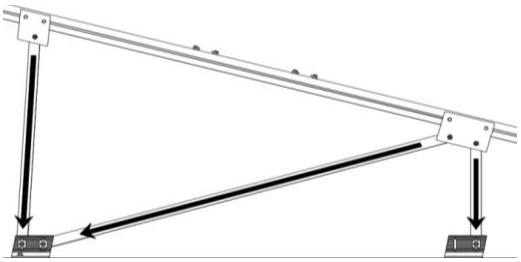
Rear Strut

Maximum Axial Load	=	5.033 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	68%

Diagonal Strut

Maximum Axial Load	=	2.280 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	31%

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)



Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

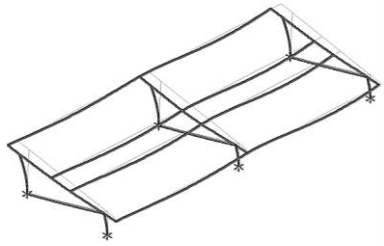
7.1 Seismic Drift - N/A

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}	=	40.12 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.802 in
Max Drift, Δ_{MAX}	=	0.021 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 = 99 in	L_b = 99
J = 0.432	J = 0.432
273.88	174.171
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$
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= 28.0 ksi	φF_L= 29.1
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 = 55.91 in
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.4 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

Weak Axis:

3.4.14

L_b = 55.91
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.4

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 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 = 1.29339

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76107

φF_L= (φccFcy)/(λ²)

φF_L= 15.9235 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 = 15.92 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 16.39 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	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	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	-77.697	-77.697	0	0
2	M14	y	-77.697	-77.697	0	0
3	M15	y	-122.096	-122.096	0	0
4	M16	y	-122.096	-122.096	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	177.594	177.594	0	0
2	M14	y	136.155	136.155	0	0
3	M15	y	73.997	73.997	0	0
4	M16	y	73.997	73.997	0	0

Load Combinations

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

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	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	658.979	2	1312.781	2	.585	1	.003	1	0	1	0	1
2		min	-814.142	3	-1751.425	3	.025	15	0	15	0	1	0	1
3	N7	max	.024	9	1165.237	1	-.239	15	0	15	0	1	0	1
4		min	-.218	2	-343.877	3	-6.264	1	-.013	1	0	1	0	1
5	N15	max	.021	9	3514.133	2	0	1	0	1	0	1	0	1
6		min	-2.4	2	-1171.318	3	0	3	0	3	0	1	0	1
7	N16	max	2292.871	2	4172.842	2	0	11	0	11	0	1	0	1
8		min	-2539.827	3	-5633.701	3	0	3	0	3	0	1	0	1
9	N23	max	.024	9	1165.237	1	6.264	1	.013	1	0	1	0	1
10		min	-.218	2	-343.877	3	.239	15	0	15	0	1	0	1
11	N24	max	658.979	2	1312.781	2	-.025	15	0	15	0	1	0	1
12		min	-814.142	3	-1751.425	3	-.585	1	-.003	1	0	1	0	1
13	Totals:	max	3607.995	2	12618.38	2	0	1						
14		min	-4169.231	3	-10995.623	3	0	3						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	65.069	1	487.934	2	-4.82	15	0	15	.155	1	0	2
2			min	2.407	15	-864.405	3	-131.898	1	-.016	2	.006	15	0	3
3		2	max	65.069	1	340.505	2	-3.7	15	0	15	.048	1	.675	3
4			min	2.407	15	-608.55	3	-101.082	1	-.016	2	.002	15	-.38	2
5		3	max	65.069	1	193.077	2	-2.579	15	0	15	.002	3	1.116	3
6			min	2.407	15	-352.695	3	-70.265	1	-.016	2	-.031	1	-.624	2
7		4	max	65.069	1	45.648	2	-1.459	15	0	15	-.002	12	1.322	3
8			min	2.407	15	-96.839	3	-39.448	1	-.016	2	-.081	1	-.734	2
9		5	max	65.069	1	159.016	3	-.072	10	0	15	-.003	12	1.293	3
10			min	2.407	15	-101.781	2	-8.631	1	-.016	2	-.103	1	-.708	2
11		6	max	65.069	1	414.871	3	22.186	1	0	15	-.004	15	1.03	3
12			min	2.407	15	-249.21	2	-.74	3	-.016	2	-.097	1	-.547	2
13		7	max	65.069	1	670.726	3	53.003	1	0	15	-.002	15	.533	3
14			min	2.407	15	-396.638	2	.705	12	-.016	2	-.062	1	-.251	2
15		8	max	65.069	1	926.582	3	83.82	1	0	15	.003	2	.18	2
16			min	2.407	15	-544.067	2	1.825	12	-.016	2	-.005	3	-.199	3
17		9	max	65.069	1	1182.437	3	114.637	1	0	15	.091	1	.746	2
18			min	2.407	15	-691.496	2	2.945	12	-.016	2	-.002	3	-1.166	3
19		10	max	65.069	1	838.925	2	-4.065	12	.016	2	.21	1	1.448	2
20			min	2.407	15	-1438.292	3	-145.454	1	0	3	.002	12	-2.367	3
21		11	max	65.069	1	691.496	2	-2.945	12	.016	2	.091	1	.746	2
22			min	2.407	15	-1182.437	3	-114.637	1	0	15	-.002	3	-1.166	3
23		12	max	65.069	1	544.067	2	-1.825	12	.016	2	.003	2	.18	2
24			min	2.407	15	-926.582	3	-83.82	1	0	15	-.005	3	-.199	3
25		13	max	65.069	1	396.638	2	-.705	12	.016	2	-.002	15	.533	3
26			min	2.407	15	-670.726	3	-53.003	1	0	15	-.062	1	-.251	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	65.069	1	249.21	2	.74	3	.016	2	-.004	15	1.03	3
28			min	2.407	15	-414.871	3	-22.186	1	0	15	-.097	1	-.547	2
29		15	max	65.069	1	101.781	2	8.631	1	.016	2	-.003	12	1.293	3
30			min	2.407	15	-159.016	3	.072	10	0	15	-.103	1	-.708	2
31		16	max	65.069	1	96.839	3	39.448	1	.016	2	-.002	12	1.322	3
32			min	2.407	15	-45.648	2	1.459	15	0	15	-.081	1	-.734	2
33		17	max	65.069	1	352.695	3	70.265	1	.016	2	.002	3	1.116	3
34			min	2.407	15	-193.077	2	2.579	15	0	15	-.031	1	-.624	2
35		18	max	65.069	1	608.55	3	101.082	1	.016	2	.048	1	.675	3
36			min	2.407	15	-340.505	2	3.7	15	0	15	.002	15	-.38	2
37		19	max	65.069	1	864.405	3	131.898	1	.016	2	.155	1	0	2
38			min	2.407	15	-487.934	2	4.82	15	0	15	.006	15	0	3
39	M14	1	max	34.132	1	540.176	2	-4.994	15	.012	3	.181	1	0	1
40			min	1.261	15	-690.556	3	-136.672	1	-.014	2	.007	15	0	3
41		2	max	34.132	1	392.747	2	-3.874	15	.012	3	.07	1	.544	3
42			min	1.261	15	-495.478	3	-105.855	1	-.014	2	.003	15	-.428	2
43		3	max	34.132	1	245.319	2	-2.754	15	.012	3	.004	3	.908	3
44			min	1.261	15	-300.4	3	-75.038	1	-.014	2	-.013	1	-.72	2
45		4	max	34.132	1	97.89	2	-1.633	15	.012	3	0	12	1.094	3
46			min	1.261	15	-105.322	3	-44.221	1	-.014	2	-.068	1	-.877	2
47		5	max	34.132	1	89.756	3	-.513	15	.012	3	-.003	12	1.101	3
48			min	1.261	15	-50.685	1	-13.404	1	-.014	2	-.094	1	-.899	2
49		6	max	34.132	1	284.834	3	17.413	1	.012	3	-.003	15	.93	3
50			min	1.261	15	-196.968	2	-1.012	3	-.014	2	-.093	1	-.787	2
51		7	max	34.132	1	479.912	3	48.229	1	.012	3	-.002	15	.579	3
52			min	1.261	15	-344.396	2	.524	12	-.014	2	-.063	1	-.538	2
53		8	max	34.132	1	674.99	3	79.046	1	.012	3	.001	10	.05	3
54			min	1.261	15	-491.825	2	1.644	12	-.014	2	-.005	3	-.155	2
55		9	max	34.132	1	870.069	3	109.863	1	.012	3	.082	1	.372	1
56			min	1.261	15	-639.254	2	2.764	12	-.014	2	-.002	3	-.658	3
57		10	max	34.132	1	786.683	2	-3.884	12	.014	2	.197	1	1.017	2
58			min	1.261	15	-1065.147	3	-140.68	1	-.012	3	.002	12	-1.545	3
59		11	max	34.132	1	639.254	2	-2.764	12	.014	2	.082	1	.372	1
60			min	1.261	15	-870.069	3	-109.863	1	-.012	3	-.002	3	-.658	3
61		12	max	34.132	1	491.825	2	-1.644	12	.014	2	.001	10	.05	3
62			min	1.261	15	-674.99	3	-79.046	1	-.012	3	-.005	3	-.155	2
63		13	max	34.132	1	344.396	2	-.524	12	.014	2	-.002	15	.579	3
64			min	1.261	15	-479.912	3	-48.229	1	-.012	3	-.063	1	-.538	2
65		14	max	34.132	1	196.968	2	1.012	3	.014	2	-.003	15	.93	3
66			min	1.261	15	-284.834	3	-17.413	1	-.012	3	-.093	1	-.787	2
67		15	max	34.132	1	50.685	1	13.404	1	.014	2	-.003	12	1.101	3
68			min	1.261	15	-89.756	3	.513	15	-.012	3	-.094	1	-.899	2
69		16	max	34.132	1	105.322	3	44.221	1	.014	2	0	12	1.094	3
70			min	1.261	15	-97.89	2	1.633	15	-.012	3	-.068	1	-.877	2
71		17	max	34.132	1	300.4	3	75.038	1	.014	2	.004	3	.908	3
72			min	1.261	15	-245.319	2	2.754	15	-.012	3	-.013	1	-.72	2
73		18	max	34.132	1	495.478	3	105.855	1	.014	2	.07	1	.544	3
74			min	1.261	15	-392.747	2	3.874	15	-.012	3	.003	15	-.428	2
75		19	max	34.132	1	690.556	3	136.672	1	.014	2	.181	1	0	1
76			min	1.261	15	-540.176	2	4.994	15	-.012	3	.007	15	0	3
77	M15	1	max	-1.317	15	760.058	2	-4.993	15	.014	2	.181	1	0	2
78			min	-35.486	1	-383.386	3	-136.679	1	-.01	3	.007	15	0	3
79		2	max	-1.317	15	547.511	2	-3.873	15	.014	2	.07	1	.304	3
80			min	-35.486	1	-279.473	3	-105.862	1	-.01	3	.003	15	-.599	2
81		3	max	-1.317	15	334.964	2	-2.752	15	.014	2	.003	3	.512	3
82			min	-35.486	1	-175.56	3	-75.045	1	-.01	3	-.013	1	-1.004	2
83		4	max	-1.317	15	122.416	2	-1.632	15	.014	2	0	12	.626	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	-35.486	1	-71.647	3	-44.228	1	-.01	3	-.068	1	-1.213	2
85		5	max	-1.317	15	32.266	3	-.512	15	.014	2	-.003	12	.644	3
86			min	-35.486	1	-90.131	2	-13.411	1	-.01	3	-.094	1	-1.228	2
87		6	max	-1.317	15	136.179	3	17.406	1	.014	2	-.003	15	.567	3
88			min	-35.486	1	-302.678	2	-.864	3	-.01	3	-.093	1	-1.048	2
89		7	max	-1.317	15	240.092	3	48.223	1	.014	2	-.002	15	.394	3
90			min	-35.486	1	-515.225	2	.617	12	-.01	3	-.063	1	-.673	2
91		8	max	-1.317	15	344.005	3	79.04	1	.014	2	.001	10	.126	3
92			min	-35.486	1	-727.773	2	1.737	12	-.01	3	-.004	3	-.104	2
93		9	max	-1.317	15	447.918	3	109.857	1	.014	2	.082	1	.661	2
94			min	-35.486	1	-940.32	2	2.857	12	-.01	3	-.001	3	-.237	3
95		10	max	-1.317	15	1152.867	2	-3.977	12	.01	3	.197	1	1.62	2
96			min	-35.486	1	-551.832	3	-140.674	1	-.014	2	.002	12	-.695	3
97		11	max	-1.317	15	940.32	2	-2.857	12	.01	3	.082	1	.661	2
98			min	-35.486	1	-447.918	3	-109.857	1	-.014	2	-.001	3	-.237	3
99		12	max	-1.317	15	727.773	2	-1.737	12	.01	3	.001	10	.126	3
100			min	-35.486	1	-344.005	3	-79.04	1	-.014	2	-.004	3	-.104	2
101		13	max	-1.317	15	515.225	2	-.617	12	.01	3	-.002	15	.394	3
102			min	-35.486	1	-240.092	3	-48.223	1	-.014	2	-.063	1	-.673	2
103		14	max	-1.317	15	302.678	2	.864	3	.01	3	-.003	15	.567	3
104			min	-35.486	1	-136.179	3	-17.406	1	-.014	2	-.093	1	-1.048	2
105		15	max	-1.317	15	90.131	2	13.411	1	.01	3	-.003	12	.644	3
106			min	-35.486	1	-32.266	3	.512	15	-.014	2	-.094	1	-1.228	2
107		16	max	-1.317	15	71.647	3	44.228	1	.01	3	0	12	.626	3
108			min	-35.486	1	-122.416	2	1.632	15	-.014	2	-.068	1	-1.213	2
109		17	max	-1.317	15	175.56	3	75.045	1	.01	3	.003	3	.512	3
110			min	-35.486	1	-334.964	2	2.752	15	-.014	2	-.013	1	-1.004	2
111		18	max	-1.317	15	279.473	3	105.862	1	.01	3	.07	1	.304	3
112			min	-35.486	1	-547.511	2	3.873	15	-.014	2	.003	15	-.599	2
113		19	max	-1.317	15	383.386	3	136.679	1	.01	3	.181	1	0	2
114			min	-35.486	1	-760.058	2	4.993	15	-.014	2	.007	15	0	3
115	M16	1	max	-2.565	15	710.047	2	-4.826	15	.011	2	.156	1	0	2
116			min	-69.393	1	-342.148	3	-132.195	1	-.014	3	.006	15	0	3
117		2	max	-2.565	15	497.5	2	-3.705	15	.011	2	.049	1	.266	3
118			min	-69.393	1	-238.235	3	-101.378	1	-.014	3	.002	15	-.553	2
119		3	max	-2.565	15	284.952	2	-2.585	15	.011	2	.001	3	.437	3
120			min	-69.393	1	-134.322	3	-70.561	1	-.014	3	-.03	1	-.912	2
121		4	max	-2.565	15	72.405	2	-1.465	15	.011	2	-.002	12	.512	3
122			min	-69.393	1	-30.409	3	-39.745	1	-.014	3	-.081	1	-1.076	2
123		5	max	-2.565	15	73.504	3	-.26	10	.011	2	-.004	12	.493	3
124			min	-69.393	1	-140.142	2	-8.928	1	-.014	3	-.103	1	-1.045	2
125		6	max	-2.565	15	177.417	3	21.889	1	.011	2	-.004	15	.378	3
126			min	-69.393	1	-352.69	2	-.239	3	-.014	3	-.097	1	-.819	2
127		7	max	-2.565	15	281.33	3	52.706	1	.011	2	-.002	15	.167	3
128			min	-69.393	1	-565.237	2	1.018	12	-.014	3	-.063	1	-.398	2
129		8	max	-2.565	15	385.243	3	83.523	1	.011	2	.002	2	.217	2
130			min	-69.393	1	-777.784	2	2.138	12	-.014	3	-.004	3	-.138	3
131		9	max	-2.565	15	489.156	3	114.34	1	.011	2	.09	1	1.028	2
132			min	-69.393	1	-990.331	2	3.258	12	-.014	3	0	3	-.539	3
133		10	max	-2.565	15	1202.879	2	-4.378	12	.014	3	.209	1	2.033	2
134			min	-69.393	1	-593.069	3	-145.157	1	-.011	2	.004	12	-1.035	3
135		11	max	-2.565	15	990.331	2	-3.258	12	.014	3	.09	1	1.028	2
136			min	-69.393	1	-489.156	3	-114.34	1	-.011	2	0	3	-.539	3
137		12	max	-2.565	15	777.784	2	-2.138	12	.014	3	.002	2	.217	2
138			min	-69.393	1	-385.243	3	-83.523	1	-.011	2	-.004	3	-.138	3
139		13	max	-2.565	15	565.237	2	-1.018	12	.014	3	-.002	15	.167	3
140			min	-69.393	1	-281.33	3	-52.706	1	-.011	2	-.063	1	-.398	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	-2.565	15	352.69	2	.239	3	.014	3	-.004	15	.378	3
142			min	-69.393	1	-177.417	3	-21.889	1	-.011	2	-.097	1	-.819	2
143		15	max	-2.565	15	140.142	2	8.928	1	.014	3	-.004	12	.493	3
144			min	-69.393	1	-73.504	3	.26	10	-.011	2	-.103	1	-1.045	2
145		16	max	-2.565	15	30.409	3	39.745	1	.014	3	-.002	12	.512	3
146			min	-69.393	1	-72.405	2	1.465	15	-.011	2	-.081	1	-1.076	2
147		17	max	-2.565	15	134.322	3	70.561	1	.014	3	.001	3	.437	3
148			min	-69.393	1	-284.952	2	2.585	15	-.011	2	-.03	1	-.912	2
149		18	max	-2.565	15	238.235	3	101.378	1	.014	3	.049	1	.266	3
150			min	-69.393	1	-497.5	2	3.705	15	-.011	2	.002	15	-.553	2
151		19	max	-2.565	15	342.148	3	132.195	1	.014	3	.156	1	0	2
152			min	-69.393	1	-710.047	2	4.826	15	-.011	2	.006	15	0	3
153	M2	1	max	1137.58	2	2.029	4	.61	1	0	3	0	3	0	1
154			min	-1563.892	3	.478	15	.022	15	0	1	0	2	0	1
155		2	max	1137.96	2	1.996	4	.61	1	0	3	0	1	0	15
156			min	-1563.608	3	.47	15	.022	15	0	1	0	15	0	4
157		3	max	1138.339	2	1.962	4	.61	1	0	3	0	1	0	15
158			min	-1563.323	3	.462	15	.022	15	0	1	0	15	-.001	4
159		4	max	1138.718	2	1.929	4	.61	1	0	3	0	1	0	15
160			min	-1563.039	3	.454	15	.022	15	0	1	0	15	-.002	4
161		5	max	1139.098	2	1.895	4	.61	1	0	3	0	1	0	15
162			min	-1562.754	3	.446	15	.022	15	0	1	0	15	-.002	4
163		6	max	1139.477	2	1.862	4	.61	1	0	3	0	1	0	15
164			min	-1562.47	3	.438	15	.022	15	0	1	0	15	-.002	4
165		7	max	1139.856	2	1.829	4	.61	1	0	3	0	1	0	15
166			min	-1562.185	3	.431	15	.022	15	0	1	0	15	-.003	4
167		8	max	1140.235	2	1.795	4	.61	1	0	3	.001	1	0	15
168			min	-1561.901	3	.419	12	.022	15	0	1	0	15	-.003	4
169		9	max	1140.615	2	1.762	4	.61	1	0	3	.001	1	0	15
170			min	-1561.617	3	.406	12	.022	15	0	1	0	15	-.004	4
171		10	max	1140.994	2	1.728	4	.61	1	0	3	.001	1	-.001	15
172			min	-1561.332	3	.393	12	.022	15	0	1	0	15	-.004	4
173		11	max	1141.373	2	1.695	4	.61	1	0	3	.002	1	-.001	15
174			min	-1561.048	3	.38	12	.022	15	0	1	0	15	-.005	4
175		12	max	1141.752	2	1.662	4	.61	1	0	3	.002	1	-.001	15
176			min	-1560.763	3	.367	12	.022	15	0	1	0	15	-.005	4
177		13	max	1142.132	2	1.628	4	.61	1	0	3	.002	1	-.001	15
178			min	-1560.479	3	.354	12	.022	15	0	1	0	15	-.006	4
179		14	max	1142.511	2	1.595	4	.61	1	0	3	.002	1	-.001	12
180			min	-1560.194	3	.341	12	.022	15	0	1	0	15	-.006	4
181		15	max	1142.89	2	1.561	4	.61	1	0	3	.002	1	-.002	12
182			min	-1559.91	3	.328	12	.022	15	0	1	0	15	-.006	4
183		16	max	1143.269	2	1.528	4	.61	1	0	3	.002	1	-.002	12
184			min	-1559.625	3	.315	12	.022	15	0	1	0	15	-.007	4
185		17	max	1143.649	2	1.497	2	.61	1	0	3	.002	1	-.002	12
186			min	-1559.341	3	.302	12	.022	15	0	1	0	15	-.007	4
187		18	max	1144.028	2	1.471	2	.61	1	0	3	.003	1	-.002	12
188			min	-1559.057	3	.289	12	.022	15	0	1	0	15	-.008	4
189		19	max	1144.407	2	1.445	2	.61	1	0	3	.003	1	-.002	12
190			min	-1558.772	3	.276	12	.022	15	0	1	0	15	-.008	4
191	M3	1	max	604.052	2	7.983	4	.064	1	0	3	0	1	.008	4
192			min	-734.244	3	1.877	15	.002	15	0	1	0	15	.002	12
193		2	max	603.882	2	7.213	4	.064	1	0	3	0	1	.005	2
194			min	-734.372	3	1.696	15	.002	15	0	1	0	15	0	12
195		3	max	603.712	2	6.443	4	.064	1	0	3	0	1	.003	2
196			min	-734.499	3	1.515	15	.002	15	0	1	0	15	0	3
197		4	max	603.541	2	5.673	4	.064	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-734.627	3	1.334	15	.002	15	0	1	0	15	-.002	3
199		5	max	603.371	2	4.903	4	.064	1	0	3	0	1	0	15
200			min	-734.755	3	1.153	15	.002	15	0	1	0	15	-.003	3
201		6	max	603.201	2	4.133	4	.064	1	0	3	0	1	-.001	15
202			min	-734.883	3	.972	15	.002	15	0	1	0	15	-.005	4
203		7	max	603.03	2	3.363	4	.064	1	0	3	0	1	-.001	15
204			min	-735.011	3	.791	15	.002	15	0	1	0	15	-.006	4
205		8	max	602.86	2	2.593	4	.064	1	0	3	0	1	-.002	15
206			min	-735.138	3	.61	15	.002	15	0	1	0	15	-.008	4
207		9	max	602.69	2	1.823	4	.064	1	0	3	0	1	-.002	15
208			min	-735.266	3	.429	15	.002	15	0	1	0	15	-.009	4
209		10	max	602.519	2	1.053	4	.064	1	0	3	0	1	-.002	15
210			min	-735.394	3	.239	12	.002	15	0	1	0	15	-.009	4
211		11	max	602.349	2	.423	2	.064	1	0	3	0	1	-.002	15
212			min	-735.522	3	-.108	3	.002	15	0	1	0	15	-.009	4
213		12	max	602.178	2	-.114	15	.064	1	0	3	0	1	-.002	15
214			min	-735.649	3	-.558	3	.002	15	0	1	0	15	-.009	4
215		13	max	602.008	2	-.295	15	.064	1	0	3	0	1	-.002	15
216			min	-735.777	3	-1.257	4	.002	15	0	1	0	15	-.009	4
217		14	max	601.838	2	-.476	15	.064	1	0	3	0	1	-.002	15
218			min	-735.905	3	-2.027	4	.002	15	0	1	0	15	-.008	4
219		15	max	601.667	2	-.657	15	.064	1	0	3	0	1	-.002	15
220			min	-736.033	3	-2.796	4	.002	15	0	1	0	15	-.007	4
221		16	max	601.497	2	-.838	15	.064	1	0	3	0	1	-.001	15
222			min	-736.16	3	-3.566	4	.002	15	0	1	0	15	-.006	4
223		17	max	601.327	2	-1.019	15	.064	1	0	3	0	1	-.001	15
224			min	-736.288	3	-4.336	4	.002	15	0	1	0	15	-.004	4
225		18	max	601.156	2	-1.2	15	.064	1	0	3	0	1	0	15
226			min	-736.416	3	-5.106	4	.002	15	0	1	0	15	-.002	4
227		19	max	600.986	2	-1.381	15	.064	1	0	3	0	1	0	1
228			min	-736.544	3	-5.876	4	.002	15	0	1	0	15	0	1
229	M4	1	max	1162.171	1	0	1	-.239	15	0	1	0	1	0	1
230			min	-346.177	3	0	1	-6.491	1	0	1	0	15	0	1
231		2	max	1162.341	1	0	1	-.239	15	0	1	0	12	0	1
232			min	-346.049	3	0	1	-6.491	1	0	1	0	1	0	1
233		3	max	1162.512	1	0	1	-.239	15	0	1	0	15	0	1
234			min	-345.921	3	0	1	-6.491	1	0	1	-.001	1	0	1
235		4	max	1162.682	1	0	1	-.239	15	0	1	0	15	0	1
236			min	-345.793	3	0	1	-6.491	1	0	1	-.002	1	0	1
237		5	max	1162.852	1	0	1	-.239	15	0	1	0	15	0	1
238			min	-345.666	3	0	1	-6.491	1	0	1	-.003	1	0	1
239		6	max	1163.023	1	0	1	-.239	15	0	1	0	15	0	1
240			min	-345.538	3	0	1	-6.491	1	0	1	-.003	1	0	1
241		7	max	1163.193	1	0	1	-.239	15	0	1	0	15	0	1
242			min	-345.41	3	0	1	-6.491	1	0	1	-.004	1	0	1
243		8	max	1163.364	1	0	1	-.239	15	0	1	0	15	0	1
244			min	-345.282	3	0	1	-6.491	1	0	1	-.005	1	0	1
245		9	max	1163.534	1	0	1	-.239	15	0	1	0	15	0	1
246			min	-345.155	3	0	1	-6.491	1	0	1	-.006	1	0	1
247		10	max	1163.704	1	0	1	-.239	15	0	1	0	15	0	1
248			min	-345.027	3	0	1	-6.491	1	0	1	-.006	1	0	1
249		11	max	1163.875	1	0	1	-.239	15	0	1	0	15	0	1
250			min	-344.899	3	0	1	-6.491	1	0	1	-.007	1	0	1
251		12	max	1164.045	1	0	1	-.239	15	0	1	0	15	0	1
252			min	-344.771	3	0	1	-6.491	1	0	1	-.008	1	0	1
253		13	max	1164.215	1	0	1	-.239	15	0	1	0	15	0	1
254			min	-344.643	3	0	1	-6.491	1	0	1	-.009	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1164.386	1	0	1	-.239	15	0	1	0	15	0	1
256			min	-344.516	3	0	1	-6.491	1	0	1	-.009	1	0	1
257		15	max	1164.556	1	0	1	-.239	15	0	1	0	15	0	1
258			min	-344.388	3	0	1	-6.491	1	0	1	-.01	1	0	1
259		16	max	1164.726	1	0	1	-.239	15	0	1	0	15	0	1
260			min	-344.26	3	0	1	-6.491	1	0	1	-.011	1	0	1
261		17	max	1164.897	1	0	1	-.239	15	0	1	0	15	0	1
262			min	-344.132	3	0	1	-6.491	1	0	1	-.012	1	0	1
263		18	max	1165.067	1	0	1	-.239	15	0	1	0	15	0	1
264			min	-344.005	3	0	1	-6.491	1	0	1	-.012	1	0	1
265		19	max	1165.237	1	0	1	-.239	15	0	1	0	15	0	1
266			min	-343.877	3	0	1	-6.491	1	0	1	-.013	1	0	1
267	M6	1	max	3586.47	2	2.714	2	0	1	0	1	0	1	0	1
268			min	-5032.512	3	-.232	3	0	1	0	1	0	1	0	1
269		2	max	3586.85	2	2.688	2	0	1	0	1	0	1	0	3
270			min	-5032.228	3	-.251	3	0	1	0	1	0	1	0	2
271		3	max	3587.229	2	2.662	2	0	1	0	1	0	1	0	3
272			min	-5031.943	3	-.271	3	0	1	0	1	0	1	-.001	2
273		4	max	3587.608	2	2.636	2	0	1	0	1	0	1	0	3
274			min	-5031.659	3	-.29	3	0	1	0	1	0	1	-.002	2
275		5	max	3587.987	2	2.61	2	0	1	0	1	0	1	0	3
276			min	-5031.374	3	-.31	3	0	1	0	1	0	1	-.003	2
277		6	max	3588.367	2	2.584	2	0	1	0	1	0	1	0	3
278			min	-5031.09	3	-.329	3	0	1	0	1	0	1	-.003	2
279		7	max	3588.746	2	2.558	2	0	1	0	1	0	1	0	3
280			min	-5030.806	3	-.349	3	0	1	0	1	0	1	-.004	2
281		8	max	3589.125	2	2.532	2	0	1	0	1	0	1	0	3
282			min	-5030.521	3	-.369	3	0	1	0	1	0	1	-.005	2
283		9	max	3589.504	2	2.506	2	0	1	0	1	0	1	0	3
284			min	-5030.237	3	-.388	3	0	1	0	1	0	1	-.005	2
285		10	max	3589.884	2	2.48	2	0	1	0	1	0	1	0	3
286			min	-5029.952	3	-.408	3	0	1	0	1	0	1	-.006	2
287		11	max	3590.263	2	2.454	2	0	1	0	1	0	1	0	3
288			min	-5029.668	3	-.427	3	0	1	0	1	0	1	-.007	2
289		12	max	3590.642	2	2.428	2	0	1	0	1	0	1	0	3
290			min	-5029.383	3	-.447	3	0	1	0	1	0	1	-.007	2
291		13	max	3591.021	2	2.402	2	0	1	0	1	0	1	.001	3
292			min	-5029.099	3	-.466	3	0	1	0	1	0	1	-.008	2
293		14	max	3591.401	2	2.376	2	0	1	0	1	0	1	.001	3
294			min	-5028.814	3	-.486	3	0	1	0	1	0	1	-.008	2
295		15	max	3591.78	2	2.35	2	0	1	0	1	0	1	.001	3
296			min	-5028.53	3	-.505	3	0	1	0	1	0	1	-.009	2
297		16	max	3592.159	2	2.324	2	0	1	0	1	0	1	.001	3
298			min	-5028.246	3	-.525	3	0	1	0	1	0	1	-.01	2
299		17	max	3592.538	2	2.298	2	0	1	0	1	0	1	.002	3
300			min	-5027.961	3	-.544	3	0	1	0	1	0	1	-.01	2
301		18	max	3592.918	2	2.272	2	0	1	0	1	0	1	.002	3
302			min	-5027.677	3	-.564	3	0	1	0	1	0	1	-.011	2
303		19	max	3593.297	2	2.246	2	0	1	0	1	0	1	.002	3
304			min	-5027.392	3	-.583	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2128.953	2	8.014	4	0	1	0	1	0	1	.011	2
306			min	-2277.662	3	1.881	15	0	1	0	1	0	1	-.002	3
307		2	max	2128.783	2	7.244	4	0	1	0	1	0	1	.009	2
308			min	-2277.79	3	1.7	15	0	1	0	1	0	1	-.003	3
309		3	max	2128.612	2	6.474	4	0	1	0	1	0	1	.006	2
310			min	-2277.917	3	1.519	15	0	1	0	1	0	1	-.005	3
311		4	max	2128.442	2	5.704	4	0	1	0	1	0	1	.004	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	-2278.045	3	1.338	15	0	1	0	1	0	1	-.006	3
313		5	max	2128.272	2	4.934	4	0	1	0	1	0	1	.002	2
314			min	-2278.173	3	1.157	15	0	1	0	1	0	1	-.007	3
315		6	max	2128.101	2	4.164	4	0	1	0	1	0	1	0	2
316			min	-2278.301	3	.976	15	0	1	0	1	0	1	-.008	3
317		7	max	2127.931	2	3.394	4	0	1	0	1	0	1	-.001	2
318			min	-2278.428	3	.77	12	0	1	0	1	0	1	-.008	3
319		8	max	2127.761	2	2.711	2	0	1	0	1	0	1	-.002	15
320			min	-2278.556	3	.47	12	0	1	0	1	0	1	-.008	3
321		9	max	2127.59	2	2.111	2	0	1	0	1	0	1	-.002	15
322			min	-2278.684	3	.17	12	0	1	0	1	0	1	-.009	3
323		10	max	2127.42	2	1.511	2	0	1	0	1	0	1	-.002	15
324			min	-2278.812	3	-.248	3	0	1	0	1	0	1	-.009	4
325		11	max	2127.249	2	.911	2	0	1	0	1	0	1	-.002	15
326			min	-2278.939	3	-.698	3	0	1	0	1	0	1	-.009	4
327		12	max	2127.079	2	.311	2	0	1	0	1	0	1	-.002	15
328			min	-2279.067	3	-1.148	3	0	1	0	1	0	1	-.009	4
329		13	max	2126.909	2	-.289	2	0	1	0	1	0	1	-.002	15
330			min	-2279.195	3	-1.598	3	0	1	0	1	0	1	-.009	4
331		14	max	2126.738	2	-.472	15	0	1	0	1	0	1	-.002	15
332			min	-2279.323	3	-2.048	3	0	1	0	1	0	1	-.008	4
333		15	max	2126.568	2	-.653	15	0	1	0	1	0	1	-.002	15
334			min	-2279.451	3	-2.766	4	0	1	0	1	0	1	-.007	4
335		16	max	2126.398	2	-.834	15	0	1	0	1	0	1	-.001	15
336			min	-2279.578	3	-3.536	4	0	1	0	1	0	1	-.006	4
337		17	max	2126.227	2	-1.015	15	0	1	0	1	0	1	-.001	15
338			min	-2279.706	3	-4.306	4	0	1	0	1	0	1	-.004	4
339		18	max	2126.057	2	-1.196	15	0	1	0	1	0	1	0	15
340			min	-2279.834	3	-5.076	4	0	1	0	1	0	1	-.002	4
341		19	max	2125.887	2	-1.377	15	0	1	0	1	0	1	0	1
342			min	-2279.962	3	-5.846	4	0	1	0	1	0	1	0	1
343	M8	1	max	3511.067	2	0	1	0	1	0	1	0	1	0	1
344			min	-1173.618	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3511.238	2	0	1	0	1	0	1	0	1	0	1
346			min	-1173.49	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3511.408	2	0	1	0	1	0	1	0	1	0	1
348			min	-1173.362	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3511.578	2	0	1	0	1	0	1	0	1	0	1
350			min	-1173.235	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3511.749	2	0	1	0	1	0	1	0	1	0	1
352			min	-1173.107	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3511.919	2	0	1	0	1	0	1	0	1	0	1
354			min	-1172.979	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3512.089	2	0	1	0	1	0	1	0	1	0	1
356			min	-1172.851	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3512.26	2	0	1	0	1	0	1	0	1	0	1
358			min	-1172.724	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3512.43	2	0	1	0	1	0	1	0	1	0	1
360			min	-1172.596	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3512.6	2	0	1	0	1	0	1	0	1	0	1
362			min	-1172.468	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3512.771	2	0	1	0	1	0	1	0	1	0	1
364			min	-1172.34	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3512.941	2	0	1	0	1	0	1	0	1	0	1
366			min	-1172.212	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3513.111	2	0	1	0	1	0	1	0	1	0	1
368			min	-1172.085	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3513.282	2	0	1	0	1	0	1	0	1	0	1
370			min	-1171.957	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3513.452	2	0	1	0	1	0	1	0	1	0	1
372			min	-1171.829	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3513.622	2	0	1	0	1	0	1	0	1	0	1
374			min	-1171.701	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3513.793	2	0	1	0	1	0	1	0	1	0	1
376			min	-1171.574	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3513.963	2	0	1	0	1	0	1	0	1	0	1
378			min	-1171.446	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3514.133	2	0	1	0	1	0	1	0	1	0	1
380			min	-1171.318	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1137.58	2	2.029	4	-.022	15	0	1	0	2	0	1
382			min	-1563.892	3	.478	15	-.61	1	0	3	0	3	0	1
383		2	max	1137.96	2	1.996	4	-.022	15	0	1	0	15	0	15
384			min	-1563.608	3	.47	15	-.61	1	0	3	0	1	0	4
385		3	max	1138.339	2	1.962	4	-.022	15	0	1	0	15	0	15
386			min	-1563.323	3	.462	15	-.61	1	0	3	0	1	-.001	4
387		4	max	1138.718	2	1.929	4	-.022	15	0	1	0	15	0	15
388			min	-1563.039	3	.454	15	-.61	1	0	3	0	1	-.002	4
389		5	max	1139.098	2	1.895	4	-.022	15	0	1	0	15	0	15
390			min	-1562.754	3	.446	15	-.61	1	0	3	0	1	-.002	4
391		6	max	1139.477	2	1.862	4	-.022	15	0	1	0	15	0	15
392			min	-1562.47	3	.438	15	-.61	1	0	3	0	1	-.002	4
393		7	max	1139.856	2	1.829	4	-.022	15	0	1	0	15	0	15
394			min	-1562.185	3	.431	15	-.61	1	0	3	0	1	-.003	4
395		8	max	1140.235	2	1.795	4	-.022	15	0	1	0	15	0	15
396			min	-1561.901	3	.419	12	-.61	1	0	3	-.001	1	-.003	4
397		9	max	1140.615	2	1.762	4	-.022	15	0	1	0	15	0	15
398			min	-1561.617	3	.406	12	-.61	1	0	3	-.001	1	-.004	4
399		10	max	1140.994	2	1.728	4	-.022	15	0	1	0	15	-.001	15
400			min	-1561.332	3	.393	12	-.61	1	0	3	-.001	1	-.004	4
401		11	max	1141.373	2	1.695	4	-.022	15	0	1	0	15	-.001	15
402			min	-1561.048	3	.38	12	-.61	1	0	3	-.002	1	-.005	4
403		12	max	1141.752	2	1.662	4	-.022	15	0	1	0	15	-.001	15
404			min	-1560.763	3	.367	12	-.61	1	0	3	-.002	1	-.005	4
405		13	max	1142.132	2	1.628	4	-.022	15	0	1	0	15	-.001	15
406			min	-1560.479	3	.354	12	-.61	1	0	3	-.002	1	-.006	4
407		14	max	1142.511	2	1.595	4	-.022	15	0	1	0	15	-.001	12
408			min	-1560.194	3	.341	12	-.61	1	0	3	-.002	1	-.006	4
409		15	max	1142.89	2	1.561	4	-.022	15	0	1	0	15	-.002	12
410			min	-1559.91	3	.328	12	-.61	1	0	3	-.002	1	-.006	4
411		16	max	1143.269	2	1.528	4	-.022	15	0	1	0	15	-.002	12
412			min	-1559.625	3	.315	12	-.61	1	0	3	-.002	1	-.007	4
413		17	max	1143.649	2	1.497	2	-.022	15	0	1	0	15	-.002	12
414			min	-1559.341	3	.302	12	-.61	1	0	3	-.002	1	-.007	4
415		18	max	1144.028	2	1.471	2	-.022	15	0	1	0	15	-.002	12
416			min	-1559.057	3	.289	12	-.61	1	0	3	-.003	1	-.008	4
417		19	max	1144.407	2	1.445	2	-.022	15	0	1	0	15	-.002	12
418			min	-1558.772	3	.276	12	-.61	1	0	3	-.003	1	-.008	4
419	M11	1	max	604.052	2	7.983	4	-.002	15	0	1	0	15	.008	4
420			min	-734.244	3	1.877	15	-.064	1	0	3	0	1	.002	12
421		2	max	603.882	2	7.213	4	-.002	15	0	1	0	15	.005	2
422			min	-734.372	3	1.696	15	-.064	1	0	3	0	1	0	12
423		3	max	603.712	2	6.443	4	-.002	15	0	1	0	15	.003	2
424			min	-734.499	3	1.515	15	-.064	1	0	3	0	1	0	3
425		4	max	603.541	2	5.673	4	-.002	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-734.627	3	1.334	15	-.064	1	0	3	0	1	-.002	3
427		5	max	603.371	2	4.903	4	-.002	15	0	1	0	15	0	15
428			min	-734.755	3	1.153	15	-.064	1	0	3	0	1	-.003	3
429		6	max	603.201	2	4.133	4	-.002	15	0	1	0	15	-.001	15
430			min	-734.883	3	.972	15	-.064	1	0	3	0	1	-.005	4
431		7	max	603.03	2	3.363	4	-.002	15	0	1	0	15	-.001	15
432			min	-735.011	3	.791	15	-.064	1	0	3	0	1	-.006	4
433		8	max	602.86	2	2.593	4	-.002	15	0	1	0	15	-.002	15
434			min	-735.138	3	.61	15	-.064	1	0	3	0	1	-.008	4
435		9	max	602.69	2	1.823	4	-.002	15	0	1	0	15	-.002	15
436			min	-735.266	3	.429	15	-.064	1	0	3	0	1	-.009	4
437		10	max	602.519	2	1.053	4	-.002	15	0	1	0	15	-.002	15
438			min	-735.394	3	.239	12	-.064	1	0	3	0	1	-.009	4
439		11	max	602.349	2	.423	2	-.002	15	0	1	0	15	-.002	15
440			min	-735.522	3	-.108	3	-.064	1	0	3	0	1	-.009	4
441		12	max	602.178	2	-.114	15	-.002	15	0	1	0	15	-.002	15
442			min	-735.649	3	-.558	3	-.064	1	0	3	0	1	-.009	4
443		13	max	602.008	2	-.295	15	-.002	15	0	1	0	15	-.002	15
444			min	-735.777	3	-1.257	4	-.064	1	0	3	0	1	-.009	4
445		14	max	601.838	2	-.476	15	-.002	15	0	1	0	15	-.002	15
446			min	-735.905	3	-2.027	4	-.064	1	0	3	0	1	-.008	4
447		15	max	601.667	2	-.657	15	-.002	15	0	1	0	15	-.002	15
448			min	-736.033	3	-2.796	4	-.064	1	0	3	0	1	-.007	4
449		16	max	601.497	2	-.838	15	-.002	15	0	1	0	15	-.001	15
450			min	-736.16	3	-3.566	4	-.064	1	0	3	0	1	-.006	4
451		17	max	601.327	2	-1.019	15	-.002	15	0	1	0	15	-.001	15
452			min	-736.288	3	-4.336	4	-.064	1	0	3	0	1	-.004	4
453		18	max	601.156	2	-1.2	15	-.002	15	0	1	0	15	0	15
454			min	-736.416	3	-5.106	4	-.064	1	0	3	0	1	-.002	4
455		19	max	600.986	2	-1.381	15	-.002	15	0	1	0	15	0	1
456			min	-736.544	3	-5.876	4	-.064	1	0	3	0	1	0	1
457	M12	1	max	1162.171	1	0	1	6.491	1	0	1	0	15	0	1
458			min	-346.177	3	0	1	.239	15	0	1	0	1	0	1
459		2	max	1162.341	1	0	1	6.491	1	0	1	0	1	0	1
460			min	-346.049	3	0	1	.239	15	0	1	0	12	0	1
461		3	max	1162.512	1	0	1	6.491	1	0	1	.001	1	0	1
462			min	-345.921	3	0	1	.239	15	0	1	0	15	0	1
463		4	max	1162.682	1	0	1	6.491	1	0	1	.002	1	0	1
464			min	-345.793	3	0	1	.239	15	0	1	0	15	0	1
465		5	max	1162.852	1	0	1	6.491	1	0	1	.003	1	0	1
466			min	-345.666	3	0	1	.239	15	0	1	0	15	0	1
467		6	max	1163.023	1	0	1	6.491	1	0	1	.003	1	0	1
468			min	-345.538	3	0	1	.239	15	0	1	0	15	0	1
469		7	max	1163.193	1	0	1	6.491	1	0	1	.004	1	0	1
470			min	-345.41	3	0	1	.239	15	0	1	0	15	0	1
471		8	max	1163.364	1	0	1	6.491	1	0	1	.005	1	0	1
472			min	-345.282	3	0	1	.239	15	0	1	0	15	0	1
473		9	max	1163.534	1	0	1	6.491	1	0	1	.006	1	0	1
474			min	-345.155	3	0	1	.239	15	0	1	0	15	0	1
475		10	max	1163.704	1	0	1	6.491	1	0	1	.006	1	0	1
476			min	-345.027	3	0	1	.239	15	0	1	0	15	0	1
477		11	max	1163.875	1	0	1	6.491	1	0	1	.007	1	0	1
478			min	-344.899	3	0	1	.239	15	0	1	0	15	0	1
479		12	max	1164.045	1	0	1	6.491	1	0	1	.008	1	0	1
480			min	-344.771	3	0	1	.239	15	0	1	0	15	0	1
481		13	max	1164.215	1	0	1	6.491	1	0	1	.009	1	0	1
482			min	-344.643	3	0	1	.239	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1164.386	1	0	1	6.491	1	0	1	.009	1	0	1
484			min	-344.516	3	0	1	.239	15	0	1	0	15	0	1
485		15	max	1164.556	1	0	1	6.491	1	0	1	.01	1	0	1
486			min	-344.388	3	0	1	.239	15	0	1	0	15	0	1
487		16	max	1164.726	1	0	1	6.491	1	0	1	.011	1	0	1
488			min	-344.26	3	0	1	.239	15	0	1	0	15	0	1
489		17	max	1164.897	1	0	1	6.491	1	0	1	.012	1	0	1
490			min	-344.132	3	0	1	.239	15	0	1	0	15	0	1
491		18	max	1165.067	1	0	1	6.491	1	0	1	.012	1	0	1
492			min	-344.005	3	0	1	.239	15	0	1	0	15	0	1
493		19	max	1165.237	1	0	1	6.491	1	0	1	.013	1	0	1
494			min	-343.877	3	0	1	.239	15	0	1	0	15	0	1
495	M1	1	max	131.903	1	864.372	3	-2.407	15	0	2	.155	1	0	15
496			min	4.82	15	-487.382	2	-65.01	1	0	3	.006	15	-.016	2
497		2	max	132.393	1	863.363	3	-2.407	15	0	2	.12	1	.241	2
498			min	4.968	15	-488.728	2	-65.01	1	0	3	.004	15	-.457	3
499		3	max	443.33	3	599.837	2	-2.385	15	0	3	.086	1	.486	2
500			min	-261.263	2	-643.769	3	-64.532	1	0	2	.003	15	-.894	3
501		4	max	443.698	3	598.491	2	-2.385	15	0	3	.052	1	.18	1
502			min	-260.773	2	-644.779	3	-64.532	1	0	2	.002	15	-.554	3
503		5	max	444.065	3	597.145	2	-2.385	15	0	3	.018	1	-.004	15
504			min	-260.283	2	-645.788	3	-64.532	1	0	2	0	15	-.213	3
505		6	max	444.433	3	595.799	2	-2.385	15	0	3	0	15	.128	3
506			min	-259.793	2	-646.798	3	-64.532	1	0	2	-.016	1	-.46	2
507		7	max	444.8	3	594.453	2	-2.385	15	0	3	-.002	15	.469	3
508			min	-259.303	2	-647.807	3	-64.532	1	0	2	-.05	1	-.774	2
509		8	max	445.167	3	593.107	2	-2.385	15	0	3	-.003	15	.811	3
510			min	-258.813	2	-648.817	3	-64.532	1	0	2	-.084	1	-1.087	2
511		9	max	454.947	3	54.768	2	-3.646	15	0	9	.052	1	.946	3
512			min	-205.439	2	.409	15	-98.69	1	0	3	.002	15	-1.244	2
513		10	max	455.314	3	53.422	2	-3.646	15	0	9	0	10	.923	3
514			min	-204.949	2	.003	15	-98.69	1	0	3	0	1	-1.272	2
515		11	max	455.682	3	52.076	2	-3.646	15	0	9	-.002	15	.901	3
516			min	-204.459	2	-1.67	4	-98.69	1	0	3	-.053	1	-1.3	2
517		12	max	465.314	3	428.522	3	-2.329	15	0	2	.083	1	.787	3
518			min	-151.021	2	-707.62	2	-63.22	1	0	3	.003	15	-1.153	2
519		13	max	465.682	3	427.512	3	-2.329	15	0	2	.05	1	.561	3
520			min	-150.531	2	-708.966	2	-63.22	1	0	3	.002	15	-.779	2
521		14	max	466.049	3	426.503	3	-2.329	15	0	2	.017	1	.336	3
522			min	-150.041	2	-710.312	2	-63.22	1	0	3	0	15	-.405	2
523		15	max	466.416	3	425.493	3	-2.329	15	0	2	0	15	.111	3
524			min	-149.551	2	-711.659	2	-63.22	1	0	3	-.017	1	-.051	1
525		16	max	466.784	3	424.483	3	-2.329	15	0	2	-.002	15	.346	2
526			min	-149.061	2	-713.005	2	-63.22	1	0	3	-.05	1	-.113	3
527		17	max	467.151	3	423.474	3	-2.329	15	0	2	-.003	15	.723	2
528			min	-148.571	2	-714.351	2	-63.22	1	0	3	-.083	1	-.337	3
529		18	max	-4.973	15	711.873	2	-2.565	15	0	3	-.004	15	.364	2
530			min	-132.682	1	-341.203	3	-69.45	1	0	2	-.119	1	-.167	3
531		19	max	-4.826	15	710.527	2	-2.565	15	0	3	-.006	15	.014	3
532			min	-132.192	1	-342.212	3	-69.45	1	0	2	-.156	1	-.011	2
533	M5	1	max	290.899	1	2876.527	3	0	1	0	1	0	1	.033	2
534			min	8.131	12	-1674.896	2	0	1	0	1	0	1	0	15
535		2	max	291.389	1	2875.517	3	0	1	0	1	0	1	.917	2
536			min	8.376	12	-1676.242	2	0	1	0	1	0	1	-1.516	3
537		3	max	1403.071	3	1740.15	2	0	1	0	1	0	1	1.76	2
538			min	-873.69	2	-1991.63	3	0	1	0	1	0	1	-2.975	3
539		4	max	1403.439	3	1738.804	2	0	1	0	1	0	1	.843	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-873.2	2	-1992.64	3	0	1	0	1	0	1	-1.923	3
541		5	max	1403.806	3	1737.458	2	0	1	0	1	0	1	.021	9
542			min	-872.71	2	-1993.649	3	0	1	0	1	0	1	-.872	3
543		6	max	1404.173	3	1736.112	2	0	1	0	1	0	1	.181	3
544			min	-872.22	2	-1994.659	3	0	1	0	1	0	1	-.991	2
545		7	max	1404.541	3	1734.765	2	0	1	0	1	0	1	1.233	3
546			min	-871.73	2	-1995.668	3	0	1	0	1	0	1	-1.907	2
547		8	max	1404.908	3	1733.419	2	0	1	0	1	0	1	2.287	3
548			min	-871.24	2	-1996.678	3	0	1	0	1	0	1	-2.822	2
549		9	max	1416.693	3	184.529	2	0	1	0	1	0	1	2.631	3
550			min	-757.221	2	.405	15	0	1	0	1	0	1	-3.217	2
551		10	max	1417.06	3	183.183	2	0	1	0	1	0	1	2.547	3
552			min	-756.731	2	-.001	15	0	1	0	1	0	1	-3.314	2
553		11	max	1417.427	3	181.837	2	0	1	0	1	0	1	2.463	3
554			min	-756.241	2	-1.601	4	0	1	0	1	0	1	-3.411	2
555		12	max	1429.506	3	1294.632	3	0	1	0	1	0	1	2.16	3
556			min	-642.35	2	-2105.825	2	0	1	0	1	0	1	-3.054	2
557		13	max	1429.874	3	1293.622	3	0	1	0	1	0	1	1.477	3
558			min	-641.86	2	-2107.171	2	0	1	0	1	0	1	-1.942	2
559		14	max	1430.241	3	1292.613	3	0	1	0	1	0	1	.795	3
560			min	-641.37	2	-2108.517	2	0	1	0	1	0	1	-.83	2
561		15	max	1430.609	3	1291.603	3	0	1	0	1	0	1	.283	2
562			min	-640.88	2	-2109.863	2	0	1	0	1	0	1	-.002	13
563		16	max	1430.976	3	1290.594	3	0	1	0	1	0	1	1.396	2
564			min	-640.39	2	-2111.209	2	0	1	0	1	0	1	-.568	3
565		17	max	1431.344	3	1289.584	3	0	1	0	1	0	1	2.511	2
566			min	-639.9	2	-2112.555	2	0	1	0	1	0	1	-1.249	3
567		18	max	-9	12	2409.463	2	0	1	0	1	0	1	1.293	2
568			min	-290.811	1	-1185.398	3	0	1	0	1	0	1	-.653	3
569		19	max	-8.755	12	2408.117	2	0	1	0	1	0	1	.022	2
570			min	-290.321	1	-1186.408	3	0	1	0	1	0	1	-.027	3
571	M9	1	max	131.903	1	864.372	3	65.01	1	0	3	-.006	15	0	15
572			min	4.82	15	-487.382	2	2.407	15	0	2	-.155	1	-.016	2
573		2	max	132.393	1	863.363	3	65.01	1	0	3	-.004	15	.241	2
574			min	4.968	15	-488.728	2	2.407	15	0	2	-.12	1	-.457	3
575		3	max	443.33	3	599.837	2	64.532	1	0	2	-.003	15	.486	2
576			min	-261.263	2	-643.769	3	2.385	15	0	3	-.086	1	-.894	3
577		4	max	443.698	3	598.491	2	64.532	1	0	2	-.002	15	.18	1
578			min	-260.773	2	-644.779	3	2.385	15	0	3	-.052	1	-.554	3
579		5	max	444.065	3	597.145	2	64.532	1	0	2	0	15	-.004	15
580			min	-260.283	2	-645.788	3	2.385	15	0	3	-.018	1	-.213	3
581		6	max	444.433	3	595.799	2	64.532	1	0	2	.016	1	.128	3
582			min	-259.793	2	-646.798	3	2.385	15	0	3	0	15	-.46	2
583		7	max	444.8	3	594.453	2	64.532	1	0	2	.05	1	.469	3
584			min	-259.303	2	-647.807	3	2.385	15	0	3	.002	15	-.774	2
585		8	max	445.167	3	593.107	2	64.532	1	0	2	.084	1	.811	3
586			min	-258.813	2	-648.817	3	2.385	15	0	3	.003	15	-1.087	2
587		9	max	454.947	3	54.768	2	98.69	1	0	3	-.002	15	.946	3
588			min	-205.439	2	.409	15	3.646	15	0	9	-.052	1	-1.244	2
589		10	max	455.314	3	53.422	2	98.69	1	0	3	0	1	.923	3
590			min	-204.949	2	.003	15	3.646	15	0	9	0	10	-1.272	2
591		11	max	455.682	3	52.076	2	98.69	1	0	3	.053	1	.901	3
592			min	-204.459	2	-1.67	4	3.646	15	0	9	.002	15	-1.3	2
593		12	max	465.314	3	428.522	3	63.22	1	0	3	-.003	15	.787	3
594			min	-151.021	2	-707.62	2	2.329	15	0	2	-.083	1	-1.153	2
595		13	max	465.682	3	427.512	3	63.22	1	0	3	-.002	15	.561	3
596			min	-150.531	2	-708.966	2	2.329	15	0	2	-.05	1	-.779	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	466.049	3	426.503	3	63.22	1	0	3	0	15	.336	3
598			min	-150.041	2	-710.312	2	2.329	15	0	2	-.017	1	-.405	2
599		15	max	466.416	3	425.493	3	63.22	1	0	3	.017	1	.111	3
600			min	-149.551	2	-711.659	2	2.329	15	0	2	0	15	-.051	1
601		16	max	466.784	3	424.483	3	63.22	1	0	3	.05	1	.346	2
602			min	-149.061	2	-713.005	2	2.329	15	0	2	.002	15	-.113	3
603		17	max	467.151	3	423.474	3	63.22	1	0	3	.083	1	.723	2
604			min	-148.571	2	-714.351	2	2.329	15	0	2	.003	15	-.337	3
605		18	max	-4.973	15	711.873	2	69.45	1	0	2	.119	1	.364	2
606			min	-132.682	1	-341.203	3	2.565	15	0	3	.004	15	-.167	3
607		19	max	-4.826	15	710.527	2	69.45	1	0	2	.156	1	.014	3
608			min	-132.192	1	-342.212	3	2.565	15	0	3	.006	15	-.011	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.135	2	.008	3	1.099e-2	2	NC	1	NC	1
2			min	0	15	-.032	3	-.004	2	-2.596e-3	3	NC	1	NC	1
3		2	max	0	1	.199	3	.018	1	1.231e-2	2	NC	4	NC	1
4			min	0	15	-.002	9	-.002	10	-2.534e-3	3	857.519	3	NC	1
5		3	max	0	1	.386	3	.042	1	1.362e-2	2	NC	5	NC	2
6			min	0	15	-.072	1	0	10	-2.472e-3	3	473.588	3	4715.094	1
7		4	max	0	1	.5	3	.063	1	1.493e-2	2	NC	5	NC	3
8			min	0	15	-.116	1	.001	10	-2.411e-3	3	372.053	3	3165.862	1
9		5	max	0	1	.528	3	.073	1	1.625e-2	2	NC	5	NC	3
10			min	0	15	-.113	1	.001	10	-2.349e-3	3	353.918	3	2729.19	1
11		6	max	0	1	.47	3	.069	1	1.756e-2	2	NC	5	NC	3
12			min	0	15	-.065	1	0	10	-2.287e-3	3	394.584	3	2867.04	1
13		7	max	0	1	.345	3	.053	1	1.887e-2	2	NC	4	NC	2
14			min	0	15	-.004	9	-.003	10	-2.225e-3	3	525.551	3	3742.208	1
15		8	max	0	1	.186	3	.029	1	2.019e-2	2	NC	1	NC	2
16			min	0	15	.003	15	-.006	10	-2.163e-3	3	910.385	3	6895.663	1
17		9	max	0	1	.242	2	.024	3	2.15e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.012	2	-2.101e-3	3	1862.214	2	NC	1
19		10	max	0	1	.282	2	.024	3	2.281e-2	2	NC	3	NC	1
20			min	0	1	-.025	3	-.017	2	-2.039e-3	3	1348.476	2	NC	1
21		11	max	0	15	.242	2	.024	3	2.15e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.012	2	-2.101e-3	3	1862.214	2	NC	1
23		12	max	0	15	.186	3	.029	1	2.019e-2	2	NC	1	NC	2
24			min	0	1	.003	15	-.006	10	-2.163e-3	3	910.385	3	6895.663	1
25		13	max	0	15	.345	3	.053	1	1.887e-2	2	NC	4	NC	2
26			min	0	1	-.004	9	-.003	10	-2.225e-3	3	525.551	3	3742.208	1
27		14	max	0	15	.47	3	.069	1	1.756e-2	2	NC	5	NC	3
28			min	0	1	-.065	1	0	10	-2.287e-3	3	394.584	3	2867.04	1
29		15	max	0	15	.528	3	.073	1	1.625e-2	2	NC	5	NC	3
30			min	0	1	-.113	1	.001	10	-2.349e-3	3	353.918	3	2729.19	1
31		16	max	0	15	.5	3	.063	1	1.493e-2	2	NC	5	NC	3
32			min	0	1	-.116	1	.001	10	-2.411e-3	3	372.053	3	3165.862	1
33		17	max	0	15	.386	3	.042	1	1.362e-2	2	NC	5	NC	2
34			min	0	1	-.072	1	0	10	-2.472e-3	3	473.588	3	4715.094	1
35		18	max	0	15	.199	3	.018	1	1.231e-2	2	NC	4	NC	1
36			min	0	1	-.002	9	-.002	10	-2.534e-3	3	857.519	3	NC	1
37		19	max	0	15	.135	2	.008	3	1.099e-2	2	NC	1	NC	1
38			min	0	1	-.032	3	-.004	2	-2.596e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.284	3	.007	3	6.307e-3	2	NC	1	NC	1
40			min	0	15	-.416	2	-.004	2	-5.036e-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	.538	3	.012	1	7.431e-3	2	NC	5	NC	1
42			min	0	15	-.653	2	-.002	10	-6.021e-3	3	780.304	3	NC	1
43		3	max	0	1	.756	3	.033	1	8.555e-3	2	NC	5	NC	2
44			min	0	15	-.862	2	0	10	-7.006e-3	3	419.277	3	6055.204	1
45		4	max	0	1	.915	3	.053	1	9.679e-3	2	NC	5	NC	2
46			min	0	15	-1.024	2	0	10	-7.991e-3	3	313.709	3	3779.483	1
47		5	max	0	1	1.002	3	.064	1	1.08e-2	2	NC	15	NC	3
48			min	0	15	-1.129	2	0	10	-8.976e-3	3	275.727	3	3129.096	1
49		6	max	0	1	1.016	3	.062	1	1.193e-2	2	NC	15	NC	2
50			min	0	15	-1.173	2	0	10	-9.961e-3	3	261.558	2	3202.471	1
51		7	max	0	1	.97	3	.049	1	1.305e-2	2	NC	15	NC	2
52			min	0	15	-1.167	2	-.003	10	-1.095e-2	3	263.922	2	4100.664	1
53		8	max	0	1	.886	3	.027	1	1.417e-2	2	NC	15	NC	2
54			min	0	15	-1.125	2	-.006	10	-1.193e-2	3	279.547	2	7421.056	1
55		9	max	0	1	.799	3	.022	3	1.53e-2	2	NC	5	NC	1
56			min	0	15	-1.073	2	-.011	2	-1.292e-2	3	301.477	2	NC	1
57		10	max	0	1	.758	3	.022	3	1.642e-2	2	NC	5	NC	1
58			min	0	1	-1.047	2	-.015	2	-1.39e-2	3	314.177	2	NC	1
59		11	max	0	15	.799	3	.022	3	1.53e-2	2	NC	5	NC	1
60			min	0	1	-1.073	2	-.011	2	-1.292e-2	3	301.477	2	NC	1
61		12	max	0	15	.886	3	.027	1	1.417e-2	2	NC	15	NC	2
62			min	0	1	-1.125	2	-.006	10	-1.193e-2	3	279.547	2	7421.056	1
63		13	max	0	15	.97	3	.049	1	1.305e-2	2	NC	15	NC	2
64			min	0	1	-1.167	2	-.003	10	-1.095e-2	3	263.922	2	4100.664	1
65		14	max	0	15	1.016	3	.062	1	1.193e-2	2	NC	15	NC	2
66			min	0	1	-1.173	2	0	10	-9.961e-3	3	261.558	2	3202.471	1
67		15	max	0	15	1.002	3	.064	1	1.08e-2	2	NC	15	NC	3
68			min	0	1	-1.129	2	0	10	-8.976e-3	3	275.727	3	3129.096	1
69		16	max	0	15	.915	3	.053	1	9.679e-3	2	NC	5	NC	2
70			min	0	1	-1.024	2	0	10	-7.991e-3	3	313.709	3	3779.483	1
71		17	max	0	15	.756	3	.033	1	8.555e-3	2	NC	5	NC	2
72			min	0	1	-.862	2	0	10	-7.006e-3	3	419.277	3	6055.204	1
73		18	max	0	15	.538	3	.012	1	7.431e-3	2	NC	5	NC	1
74			min	0	1	-.653	2	-.002	10	-6.021e-3	3	780.304	3	NC	1
75		19	max	0	15	.284	3	.007	3	6.307e-3	2	NC	1	NC	1
76			min	0	1	-.416	2	-.004	2	-5.036e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.29	3	.007	3	4.29e-3	3	NC	1	NC	1
78			min	0	1	-.416	2	-.004	2	-6.538e-3	2	NC	1	NC	1
79		2	max	0	15	.464	3	.012	1	5.127e-3	3	NC	5	NC	1
80			min	0	1	-.711	2	-.002	10	-7.707e-3	2	670.323	2	NC	1
81		3	max	0	15	.617	3	.033	1	5.964e-3	3	NC	5	NC	2
82			min	0	1	-.968	2	0	10	-8.875e-3	2	358.772	2	6031.8	1
83		4	max	0	15	.738	3	.053	1	6.802e-3	3	NC	5	NC	2
84			min	0	1	-1.158	2	0	10	-1.004e-2	2	266.654	2	3766.363	1
85		5	max	0	15	.817	3	.064	1	7.639e-3	3	NC	15	NC	3
86			min	0	1	-1.269	2	.001	10	-1.121e-2	2	232.023	2	3117.675	1
87		6	max	0	15	.853	3	.062	1	8.476e-3	3	NC	15	NC	2
88			min	0	1	-1.299	2	0	10	-1.238e-2	2	224.14	2	3188.342	1
89		7	max	0	15	.852	3	.049	1	9.313e-3	3	NC	15	NC	2
90			min	0	1	-1.26	2	-.002	10	-1.355e-2	2	234.436	2	4074.654	1
91		8	max	0	15	.826	3	.027	1	1.015e-2	3	NC	5	NC	2
92			min	0	1	-1.178	2	-.005	10	-1.472e-2	2	259.852	2	7329.388	1
93		9	max	0	15	.792	3	.02	3	1.099e-2	3	NC	5	NC	1
94			min	0	1	-1.089	2	-.01	2	-1.588e-2	2	293.968	2	NC	1
95		10	max	0	1	.774	3	.02	3	1.183e-2	3	NC	5	NC	1
96			min	0	1	-1.046	2	-.014	2	-1.705e-2	2	314.152	2	NC	1
97		11	max	0	1	.792	3	.02	3	1.099e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.089	2	-.01	2	-1.588e-2	2	293.968	2	NC	1
99		12	max	0	1	.826	3	.027	1	1.015e-2	3	NC	5	NC	2
100			min	0	15	-1.178	2	-.005	10	-1.472e-2	2	259.852	2	7329.388	1
101		13	max	0	1	.852	3	.049	1	9.313e-3	3	NC	15	NC	2
102			min	0	15	-1.26	2	-.002	10	-1.355e-2	2	234.436	2	4074.654	1
103		14	max	0	1	.853	3	.062	1	8.476e-3	3	NC	15	NC	2
104			min	0	15	-1.299	2	0	10	-1.238e-2	2	224.14	2	3188.342	1
105		15	max	0	1	.817	3	.064	1	7.639e-3	3	NC	15	NC	3
106			min	0	15	-1.269	2	.001	10	-1.121e-2	2	232.023	2	3117.675	1
107		16	max	0	1	.738	3	.053	1	6.802e-3	3	NC	5	NC	2
108			min	0	15	-1.158	2	0	10	-1.004e-2	2	266.654	2	3766.363	1
109		17	max	0	1	.617	3	.033	1	5.964e-3	3	NC	5	NC	2
110			min	0	15	-.968	2	0	10	-8.875e-3	2	358.772	2	6031.8	1
111		18	max	0	1	.464	3	.012	1	5.127e-3	3	NC	5	NC	1
112			min	0	15	-.711	2	-.002	10	-7.707e-3	2	670.323	2	NC	1
113		19	max	0	1	.29	3	.007	3	4.29e-3	3	NC	1	NC	1
114			min	0	15	-.416	2	-.004	2	-6.538e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.119	2	.006	3	7.814e-3	3	NC	1	NC	1
116			min	0	1	-.098	3	-.003	2	-9.2e-3	2	NC	1	NC	1
117		2	max	0	15	.003	4	.018	1	8.92e-3	3	NC	4	NC	1
118			min	0	1	-.053	2	-.001	10	-1.01e-2	2	1151.368	2	NC	1
119		3	max	0	15	.028	3	.042	1	1.003e-2	3	NC	5	NC	2
120			min	0	1	-.189	2	0	10	-1.101e-2	2	642.613	2	4713.013	1
121		4	max	0	15	.054	3	.063	1	1.113e-2	3	NC	5	NC	3
122			min	0	1	-.266	2	.002	10	-1.191e-2	2	514.914	2	3155.401	1
123		5	max	0	15	.046	3	.073	1	1.224e-2	3	NC	5	NC	3
124			min	0	1	-.271	2	.002	10	-1.281e-2	2	507.318	2	2711.725	1
125		6	max	0	15	.006	12	.07	1	1.334e-2	3	NC	5	NC	3
126			min	0	1	-.208	2	.001	10	-1.371e-2	2	604.655	2	2835.76	1
127		7	max	0	15	.003	4	.054	1	1.445e-2	3	NC	4	NC	2
128			min	0	1	-.092	2	-.001	10	-1.462e-2	2	937.912	2	3669.086	1
129		8	max	0	15	.071	1	.03	1	1.556e-2	3	NC	4	NC	2
130			min	0	1	-.134	3	-.004	10	-1.552e-2	2	2857.788	2	6595.043	1
131		9	max	0	15	.176	2	.018	3	1.666e-2	3	NC	4	NC	1
132			min	0	1	-.199	3	-.008	2	-1.642e-2	2	1965.696	3	NC	1
133		10	max	0	1	.233	2	.018	3	1.777e-2	3	NC	4	NC	1
134			min	0	1	-.228	3	-.013	2	-1.732e-2	2	1526.007	3	NC	1
135		11	max	0	1	.176	2	.018	3	1.666e-2	3	NC	4	NC	1
136			min	0	15	-.199	3	-.008	2	-1.642e-2	2	1965.696	3	NC	1
137		12	max	0	1	.071	1	.03	1	1.556e-2	3	NC	4	NC	2
138			min	0	15	-.134	3	-.004	10	-1.552e-2	2	2857.788	2	6595.043	1
139		13	max	0	1	.003	4	.054	1	1.445e-2	3	NC	4	NC	2
140			min	0	15	-.092	2	-.001	10	-1.462e-2	2	937.912	2	3669.086	1
141		14	max	0	1	.006	12	.07	1	1.334e-2	3	NC	5	NC	3
142			min	0	15	-.208	2	.001	10	-1.371e-2	2	604.655	2	2835.76	1
143		15	max	0	1	.046	3	.073	1	1.224e-2	3	NC	5	NC	3
144			min	0	15	-.271	2	.002	10	-1.281e-2	2	507.318	2	2711.725	1
145		16	max	0	1	.054	3	.063	1	1.113e-2	3	NC	5	NC	3
146			min	0	15	-.266	2	.002	10	-1.191e-2	2	514.914	2	3155.401	1
147		17	max	0	1	.028	3	.042	1	1.003e-2	3	NC	5	NC	2
148			min	0	15	-.189	2	0	10	-1.101e-2	2	642.613	2	4713.013	1
149		18	max	0	1	.003	4	.018	1	8.92e-3	3	NC	4	NC	1
150			min	0	15	-.053	2	-.001	10	-1.01e-2	2	1151.368	2	NC	1
151		19	max	0	1	.119	2	.006	3	7.814e-3	3	NC	1	NC	1
152			min	0	15	-.098	3	-.003	2	-9.2e-3	2	NC	1	NC	1
153	M2	1	max	.006	2	.006	2	.005	1	-4.763e-6	15	NC	1	NC	1
154			min	-.008	3	-.011	3	0	15	-1.288e-4	1	8703.53	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	2	.006	2	.005	1	-4.447e-6	15	NC	1	NC	1
156			min	-.008	3	-.01	3	0	15	-1.202e-4	1	9900.208	2	NC	1
157		3	max	.005	2	.005	2	.004	1	-4.13e-6	15	NC	1	NC	1
158			min	-.007	3	-.01	3	0	15	-1.116e-4	1	NC	1	NC	1
159		4	max	.005	2	.004	2	.004	1	-3.813e-6	15	NC	1	NC	1
160			min	-.007	3	-.009	3	0	15	-1.03e-4	1	NC	1	NC	1
161		5	max	.005	2	.003	2	.003	1	-3.497e-6	15	NC	1	NC	1
162			min	-.006	3	-.009	3	0	15	-9.445e-5	1	NC	1	NC	1
163		6	max	.004	2	.003	2	.003	1	-3.18e-6	15	NC	1	NC	1
164			min	-.006	3	-.008	3	0	15	-8.588e-5	1	NC	1	NC	1
165		7	max	.004	2	.002	2	.003	1	-2.863e-6	15	NC	1	NC	1
166			min	-.006	3	-.008	3	0	15	-7.73e-5	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.002	1	-2.547e-6	15	NC	1	NC	1
168			min	-.005	3	-.007	3	0	15	-6.872e-5	1	NC	1	NC	1
169		9	max	.003	2	0	2	.002	1	-2.23e-6	15	NC	1	NC	1
170			min	-.005	3	-.007	3	0	15	-6.015e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-1.914e-6	15	NC	1	NC	1
172			min	-.004	3	-.006	3	0	15	-5.157e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-1.597e-6	15	NC	1	NC	1
174			min	-.004	3	-.006	3	0	15	-4.299e-5	1	NC	1	NC	1
175		12	max	.002	2	0	2	0	1	-1.28e-6	15	NC	1	NC	1
176			min	-.003	3	-.005	3	0	15	-3.442e-5	1	NC	1	NC	1
177		13	max	.002	2	0	2	0	1	-9.637e-7	15	NC	1	NC	1
178			min	-.003	3	-.005	3	0	15	-2.584e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-6.471e-7	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-1.726e-5	1	NC	1	NC	1
181		15	max	.001	2	0	15	0	1	-3.305e-7	15	NC	1	NC	1
182			min	-.002	3	-.003	3	0	15	-8.686e-6	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	3.127e-7	2	NC	1	NC	1
184			min	-.001	3	-.002	3	0	15	-8.525e-7	3	NC	1	NC	1
185		17	max	0	2	0	15	0	1	8.467e-6	1	NC	1	NC	1
186			min	0	3	-.002	3	0	15	5.323e-8	12	NC	1	NC	1
187		18	max	0	2	0	15	0	1	1.704e-5	1	NC	1	NC	1
188			min	0	3	0	3	0	15	6.194e-7	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.562e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	9.36e-7	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.99e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.171e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	7.109e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	2.624e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.239e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	8.238e-7	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	3.767e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.385e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	5.295e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	1.947e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	6.823e-5	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	2.508e-6	15	NC	1	NC	1
203		7	max	.002	3	-.002	15	0	1	8.351e-5	1	NC	1	NC	1
204			min	-.002	2	-.01	4	0	15	3.069e-6	15	8935.945	4	NC	1
205		8	max	.002	3	-.003	15	.001	1	9.879e-5	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	3.631e-6	15	7994.528	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	1.141e-4	1	NC	1	NC	1
208			min	-.002	2	-.013	4	0	15	4.192e-6	15	7434.749	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	1.293e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	4.754e-6	15	7158.197	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	1.446e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.013	4	0	15	5.315e-6	15	7123.811	4	NC	1
213		12	max	.004	3	-.003	15	.002	1	1.599e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	5.876e-6	15	7332.087	4	NC	1
215		13	max	.004	3	-.003	15	.002	1	1.752e-4	1	NC	1	NC	1
216			min	-.004	2	-.012	4	0	15	6.438e-6	15	7827.256	4	NC	1
217		14	max	.005	3	-.003	15	.003	1	1.905e-4	1	NC	1	NC	1
218			min	-.004	2	-.011	4	0	15	6.999e-6	15	8720.517	4	NC	1
219		15	max	.005	3	-.002	15	.003	1	2.057e-4	1	NC	1	NC	1
220			min	-.004	2	-.009	4	0	15	7.561e-6	15	NC	1	NC	1
221		16	max	.005	3	-.002	15	.004	1	2.21e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	8.122e-6	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.004	1	2.363e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	1	0	15	8.683e-6	15	NC	1	NC	1
225		18	max	.006	3	0	15	.004	1	2.516e-4	1	NC	1	NC	1
226			min	-.005	2	-.004	1	0	15	9.245e-6	15	NC	1	NC	1
227		19	max	.006	3	0	15	.005	1	2.669e-4	1	NC	1	NC	1
228			min	-.005	2	-.002	1	0	15	9.806e-6	15	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	15	1.879e-5	1	NC	1	NC	2
230			min	0	3	-.006	3	-.005	1	7.018e-7	15	NC	1	5124.983	1
231		2	max	.003	1	.004	2	0	15	1.879e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.004	1	7.018e-7	15	NC	1	5576.906	1
233		3	max	.002	1	.004	2	0	15	1.879e-5	1	NC	1	NC	2
234			min	0	3	-.006	3	-.004	1	7.018e-7	15	NC	1	6114.545	1
235		4	max	.002	1	.004	2	0	15	1.879e-5	1	NC	1	NC	2
236			min	0	3	-.005	3	-.004	1	7.018e-7	15	NC	1	6760.206	1
237		5	max	.002	1	.004	2	0	15	1.879e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.003	1	7.018e-7	15	NC	1	7544.202	1
239		6	max	.002	1	.003	2	0	15	1.879e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.003	1	7.018e-7	15	NC	1	8508.569	1
241		7	max	.002	1	.003	2	0	15	1.879e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.003	1	7.018e-7	15	NC	1	9712.979	1
243		8	max	.002	1	.003	2	0	15	1.879e-5	1	NC	1	NC	1
244			min	0	3	-.004	3	-.002	1	7.018e-7	15	NC	1	NC	1
245		9	max	.002	1	.003	2	0	15	1.879e-5	1	NC	1	NC	1
246			min	0	3	-.004	3	-.002	1	7.018e-7	15	NC	1	NC	1
247		10	max	.001	1	.002	2	0	15	1.879e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.002	1	7.018e-7	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	1.879e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.001	1	7.018e-7	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	1.879e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	7.018e-7	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.879e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	7.018e-7	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.879e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	7.018e-7	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.879e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	7.018e-7	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.879e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	7.018e-7	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.879e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	7.018e-7	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.879e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	7.018e-7	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.879e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.018e-7	15	NC	1	NC	1
267	M6	1	max	.019	2	.023	2	0	1	0	1	NC	4	NC	1
268			min	-.027	3	-.033	3	0	1	0	1	1672.927	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.018	2	.021	2	0	1	0	1	NC	4	NC	1
270			min	-.025	3	-.031	3	0	1	0	1	1775.541	3	NC	1
271		3	max	.017	2	.019	2	0	1	0	1	NC	4	NC	1
272			min	-.024	3	-.029	3	0	1	0	1	1891.497	3	NC	1
273		4	max	.016	2	.017	2	0	1	0	1	NC	4	NC	1
274			min	-.022	3	-.027	3	0	1	0	1	2023.497	3	NC	1
275		5	max	.015	2	.015	2	0	1	0	1	NC	4	NC	1
276			min	-.021	3	-.025	3	0	1	0	1	2175.014	3	NC	1
277		6	max	.014	2	.014	2	0	1	0	1	NC	4	NC	1
278			min	-.019	3	-.024	3	0	1	0	1	2350.592	3	NC	1
279		7	max	.013	2	.012	2	0	1	0	1	NC	1	NC	1
280			min	-.018	3	-.022	3	0	1	0	1	2556.295	3	NC	1
281		8	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.016	3	-.02	3	0	1	0	1	2800.39	3	NC	1
283		9	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.015	3	-.018	3	0	1	0	1	3094.458	3	NC	1
285		10	max	.01	2	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.013	3	-.016	3	0	1	0	1	3455.232	3	NC	1
287		11	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.012	3	-.014	3	0	1	0	1	3907.815	3	NC	1
289		12	max	.007	2	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.012	3	0	1	0	1	4491.662	3	NC	1
291		13	max	.006	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.01	3	0	1	0	1	5272.544	3	NC	1
293		14	max	.005	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.009	3	0	1	0	1	6368.857	3	NC	1
295		15	max	.004	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.007	3	0	1	0	1	8017.413	3	NC	1
297		16	max	.003	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.005	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	-.003	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	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	2	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	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.01	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	-.005	2	-.011	3	0	1	0	1	8583.185	3	NC	1
317		7	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.013	3	0	1	0	1	7668.377	3	NC	1
319		8	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.014	3	0	1	0	1	7127.379	3	NC	1
321		9	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	6848.438	3	NC	1
323		10	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	6781.474	3	NC	1
325		11	max	.011	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	-.01	2	-.015	3	0	1	0	1	6913.98	3	NC	1
327		12	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7265.361	3	NC	1
329		13	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.013	3	0	1	0	1	7894.635	3	NC	1
331		14	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.012	3	0	1	0	1	8841.199	4	NC	1
333		15	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.011	3	0	1	0	1	NC	1	NC	1
335		16	max	.017	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.009	3	0	1	0	1	NC	1	NC	1
337		17	max	.018	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.017	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.019	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.018	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.02	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.019	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	2	.017	2	0	1	0	1	NC	1	NC	1
344			min	-.003	3	-.02	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	2	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.003	3	-.019	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	2	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.018	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	2	.014	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.017	3	0	1	0	1	NC	1	NC	1
351		5	max	.007	2	.013	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	2	.012	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	2	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	2	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.002	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	2	.009	2	0	1	0	1	NC	1	NC	1
360			min	-.002	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	2	.008	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	2	.008	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.007	2	0	1	0	1	NC	1	NC	1
366			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	2	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	2	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.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	.006	2	0	15	1.288e-4	1	NC	1	NC	1
382			min	-.008	3	-.011	3	-.005	1	4.763e-6	15	8703.53	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	2	.006	2	0	15	1.202e-4	1	NC	1	NC	1
384			min	-.008	3	-.01	3	-.005	1	4.447e-6	15	9900.208	2	NC	1
385		3	max	.005	2	.005	2	0	15	1.116e-4	1	NC	1	NC	1
386			min	-.007	3	-.01	3	-.004	1	4.13e-6	15	NC	1	NC	1
387		4	max	.005	2	.004	2	0	15	1.03e-4	1	NC	1	NC	1
388			min	-.007	3	-.009	3	-.004	1	3.813e-6	15	NC	1	NC	1
389		5	max	.005	2	.003	2	0	15	9.445e-5	1	NC	1	NC	1
390			min	-.006	3	-.009	3	-.003	1	3.497e-6	15	NC	1	NC	1
391		6	max	.004	2	.003	2	0	15	8.588e-5	1	NC	1	NC	1
392			min	-.006	3	-.008	3	-.003	1	3.18e-6	15	NC	1	NC	1
393		7	max	.004	2	.002	2	0	15	7.73e-5	1	NC	1	NC	1
394			min	-.006	3	-.008	3	-.003	1	2.863e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	6.872e-5	1	NC	1	NC	1
396			min	-.005	3	-.007	3	-.002	1	2.547e-6	15	NC	1	NC	1
397		9	max	.003	2	0	2	0	15	6.015e-5	1	NC	1	NC	1
398			min	-.005	3	-.007	3	-.002	1	2.23e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	5.157e-5	1	NC	1	NC	1
400			min	-.004	3	-.006	3	-.002	1	1.914e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	4.299e-5	1	NC	1	NC	1
402			min	-.004	3	-.006	3	-.001	1	1.597e-6	15	NC	1	NC	1
403		12	max	.002	2	0	2	0	15	3.442e-5	1	NC	1	NC	1
404			min	-.003	3	-.005	3	0	1	1.28e-6	15	NC	1	NC	1
405		13	max	.002	2	0	2	0	15	2.584e-5	1	NC	1	NC	1
406			min	-.003	3	-.005	3	0	1	9.637e-7	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	1.726e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	6.471e-7	15	NC	1	NC	1
409		15	max	.001	2	0	15	0	15	8.686e-6	1	NC	1	NC	1
410			min	-.002	3	-.003	3	0	1	3.305e-7	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	8.525e-7	3	NC	1	NC	1
412			min	-.001	3	-.002	3	0	1	-3.127e-7	2	NC	1	NC	1
413		17	max	0	2	0	15	0	15	-5.323e-8	12	NC	1	NC	1
414			min	0	3	-.002	3	0	1	-8.467e-6	1	NC	1	NC	1
415		18	max	0	2	0	15	0	15	-6.194e-7	15	NC	1	NC	1
416			min	0	3	0	3	0	1	-1.704e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-9.36e-7	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.562e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	8.171e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.99e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-2.624e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-7.109e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-8.238e-7	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.239e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-1.385e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-3.767e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-1.947e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-5.295e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-2.508e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	0	1	-6.823e-5	1	NC	1	NC	1
431		7	max	.002	3	-.002	15	0	15	-3.069e-6	15	NC	1	NC	1
432			min	-.002	2	-.01	4	0	1	-8.351e-5	1	8935.945	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-3.631e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-9.879e-5	1	7994.528	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-4.192e-6	15	NC	1	NC	1
436			min	-.002	2	-.013	4	-.001	1	-1.141e-4	1	7434.749	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-4.754e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-1.293e-4	1	7158.197	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-5.315e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.013	4	-.002	1	-1.446e-4	1	7123.811	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-5.876e-6	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.002	1	-1.599e-4	1	7332.087	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-6.438e-6	15	NC	1	NC	1
444			min	-.004	2	-.012	4	-.002	1	-1.752e-4	1	7827.256	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-6.999e-6	15	NC	1	NC	1
446			min	-.004	2	-.011	4	-.003	1	-1.905e-4	1	8720.517	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-7.561e-6	15	NC	1	NC	1
448			min	-.004	2	-.009	4	-.003	1	-2.057e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	0	15	-8.122e-6	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.004	1	-2.21e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-8.683e-6	15	NC	1	NC	1
452			min	-.005	2	-.006	1	-.004	1	-2.363e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-9.245e-6	15	NC	1	NC	1
454			min	-.005	2	-.004	1	-.004	1	-2.516e-4	1	NC	1	NC	1
455		19	max	.006	3	0	15	0	15	-9.806e-6	15	NC	1	NC	1
456			min	-.005	2	-.002	1	-.005	1	-2.669e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.005	1	-7.018e-7	15	NC	1	NC	2
458			min	0	3	-.006	3	0	15	-1.879e-5	1	NC	1	5124.983	1
459		2	max	.003	1	.004	2	.004	1	-7.018e-7	15	NC	1	NC	2
460			min	0	3	-.006	3	0	15	-1.879e-5	1	NC	1	5576.906	1
461		3	max	.002	1	.004	2	.004	1	-7.018e-7	15	NC	1	NC	2
462			min	0	3	-.006	3	0	15	-1.879e-5	1	NC	1	6114.545	1
463		4	max	.002	1	.004	2	.004	1	-7.018e-7	15	NC	1	NC	2
464			min	0	3	-.005	3	0	15	-1.879e-5	1	NC	1	6760.206	1
465		5	max	.002	1	.004	2	.003	1	-7.018e-7	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-1.879e-5	1	NC	1	7544.202	1
467		6	max	.002	1	.003	2	.003	1	-7.018e-7	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-1.879e-5	1	NC	1	8508.569	1
469		7	max	.002	1	.003	2	.003	1	-7.018e-7	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-1.879e-5	1	NC	1	9712.979	1
471		8	max	.002	1	.003	2	.002	1	-7.018e-7	15	NC	1	NC	1
472			min	0	3	-.004	3	0	15	-1.879e-5	1	NC	1	NC	1
473		9	max	.002	1	.003	2	.002	1	-7.018e-7	15	NC	1	NC	1
474			min	0	3	-.004	3	0	15	-1.879e-5	1	NC	1	NC	1
475		10	max	.001	1	.002	2	.002	1	-7.018e-7	15	NC	1	NC	1
476			min	0	3	-.003	3	0	15	-1.879e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.001	1	-7.018e-7	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-1.879e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-7.018e-7	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-1.879e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-7.018e-7	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.879e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-7.018e-7	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.879e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-7.018e-7	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.879e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-7.018e-7	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.879e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.018e-7	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.879e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.018e-7	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.879e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.018e-7	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.879e-5	1	NC	1	NC	1
495	M1	1	max	.008	3	.135	2	0	1	1.027e-2	2	NC	1	NC	1
496			min	-.004	2	-.032	3	0	15	-2.179e-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	.065	2	0	15	5.046e-3	2	NC	4	NC	1
498			min	-.004	2	-.015	3	-.004	1	-1.078e-2	3	1652.422	2	NC	1
499		3	max	.008	3	.012	3	0	15	3.792e-5	10	NC	5	NC	1
500			min	-.004	2	-.009	2	-.005	1	-1.18e-4	3	798.176	2	NC	1
501		4	max	.008	3	.055	3	0	15	4.107e-3	2	NC	5	NC	1
502			min	-.004	2	-.093	2	-.005	1	-4.486e-3	3	505.484	2	NC	1
503		5	max	.008	3	.109	3	0	15	8.181e-3	2	NC	5	NC	1
504			min	-.004	2	-.18	2	-.003	1	-8.854e-3	3	365.817	2	NC	1
505		6	max	.007	3	.167	3	0	15	1.226e-2	2	NC	15	NC	1
506			min	-.004	2	-.264	2	-.001	1	-1.322e-2	3	288.727	2	NC	1
507		7	max	.007	3	.223	3	0	1	1.633e-2	2	NC	15	NC	1
508			min	-.004	2	-.339	2	0	3	-1.759e-2	3	243.147	2	NC	1
509		8	max	.007	3	.269	3	0	1	2.04e-2	2	9857.045	15	NC	1
510			min	-.004	2	-.398	2	0	15	-2.196e-2	3	216.152	2	NC	1
511		9	max	.007	3	.3	3	0	15	2.307e-2	2	9222.366	15	NC	1
512			min	-.004	2	-.436	2	0	1	-2.228e-2	3	202.087	2	NC	1
513		10	max	.007	3	.311	3	0	1	2.479e-2	2	9028.673	15	NC	1
514			min	-.004	2	-.449	2	0	15	-1.991e-2	3	197.963	2	NC	1
515		11	max	.007	3	.303	3	0	1	2.651e-2	2	9222.014	15	NC	1
516			min	-.004	2	-.436	2	0	15	-1.755e-2	3	202.775	2	NC	1
517		12	max	.007	3	.278	3	0	15	2.553e-2	2	9856.289	15	NC	1
518			min	-.004	2	-.397	2	0	1	-1.494e-2	3	218.224	2	NC	1
519		13	max	.006	3	.236	3	0	15	2.047e-2	2	NC	15	NC	1
520			min	-.004	2	-.335	2	0	1	-1.196e-2	3	248.146	2	NC	1
521		14	max	.006	3	.184	3	.001	1	1.54e-2	2	NC	15	NC	1
522			min	-.004	2	-.257	2	0	15	-8.979e-3	3	299.333	2	NC	1
523		15	max	.006	3	.125	3	.003	1	1.034e-2	2	NC	5	NC	1
524			min	-.004	2	-.172	2	0	15	-6.001e-3	3	387.487	2	NC	1
525		16	max	.006	3	.063	3	.004	1	5.28e-3	2	NC	5	NC	1
526			min	-.004	2	-.085	2	0	15	-3.022e-3	3	550.809	2	NC	1
527		17	max	.006	3	.004	3	.005	1	3.686e-4	1	NC	5	NC	1
528			min	-.003	2	-.006	2	0	15	-4.393e-5	3	900.055	2	NC	1
529		18	max	.006	3	.06	2	.003	1	8.105e-3	2	NC	4	NC	1
530			min	-.003	2	-.049	3	0	15	-3.37e-3	3	1910.346	2	NC	1
531		19	max	.006	3	.119	2	0	15	1.629e-2	2	NC	1	NC	1
532			min	-.003	2	-.098	3	0	1	-6.843e-3	3	NC	1	NC	1
533	M5	1	max	.024	3	.282	2	0	1	0	1	NC	1	NC	1
534			min	-.017	2	-.025	3	0	1	0	1	NC	1	NC	1
535		2	max	.024	3	.136	2	0	1	0	1	NC	5	NC	1
536			min	-.017	2	-.009	3	0	1	0	1	794.34	2	NC	1
537		3	max	.024	3	.037	3	0	1	0	1	NC	5	NC	1
538			min	-.017	2	-.029	2	0	1	0	1	373.248	2	NC	1
539		4	max	.024	3	.138	3	0	1	0	1	NC	15	NC	1
540			min	-.016	2	-.226	2	0	1	0	1	228.073	2	NC	1
541		5	max	.023	3	.278	3	0	1	0	1	8356.811	15	NC	1
542			min	-.016	2	-.44	2	0	1	0	1	160.315	2	NC	1
543		6	max	.023	3	.435	3	0	1	0	1	6423.903	15	NC	1
544			min	-.016	2	-.652	2	0	1	0	1	123.797	2	NC	1
545		7	max	.022	3	.589	3	0	1	0	1	5309.656	15	NC	1
546			min	-.015	2	-.845	2	0	1	0	1	102.626	2	NC	1
547		8	max	.022	3	.718	3	0	1	0	1	4662.65	15	NC	1
548			min	-.015	2	-1	2	0	1	0	1	90.282	2	NC	1
549		9	max	.022	3	.801	3	0	1	0	1	4331.18	15	NC	1
550			min	-.015	2	-1.098	2	0	1	0	1	83.941	2	NC	1
551		10	max	.021	3	.831	3	0	1	0	1	4231.362	15	NC	1
552			min	-.015	2	-1.131	2	0	1	0	1	82.087	2	NC	1
553		11	max	.021	3	.81	3	0	1	0	1	4331.336	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	-.014	2	-1.098	2	0	1	0	1	84.243	2	NC	1
555		12	max	.02	3	.74	3	0	1	0	1	4663.01	15	NC	1
556			min	-.014	2	-.997	2	0	1	0	1	91.278	2	NC	1
557		13	max	.02	3	.626	3	0	1	0	1	5310.367	15	NC	1
558			min	-.014	2	-.834	2	0	1	0	1	105.223	2	NC	1
559		14	max	.019	3	.483	3	0	1	0	1	6425.261	15	NC	1
560			min	-.014	2	-.633	2	0	1	0	1	129.682	2	NC	1
561		15	max	.019	3	.324	3	0	1	0	1	8359.452	15	NC	1
562			min	-.013	2	-.414	2	0	1	0	1	173.211	2	NC	1
563		16	max	.018	3	.163	3	0	1	0	1	NC	15	NC	1
564			min	-.013	2	-.202	2	0	1	0	1	257.407	2	NC	1
565		17	max	.018	3	.013	3	0	1	0	1	NC	5	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	446.152	2	NC	1
567		18	max	.018	3	.121	2	0	1	0	1	NC	5	NC	1
568			min	-.013	2	-.114	3	0	1	0	1	993.17	2	NC	1
569		19	max	.018	3	.233	2	0	1	0	1	NC	1	NC	1
570			min	-.013	2	-.228	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.135	2	0	15	2.179e-2	3	NC	1	NC	1
572			min	-.004	2	-.032	3	0	1	-1.027e-2	2	NC	1	NC	1
573		2	max	.008	3	.065	2	.004	1	1.078e-2	3	NC	4	NC	1
574			min	-.004	2	-.015	3	0	15	-5.046e-3	2	1652.422	2	NC	1
575		3	max	.008	3	.012	3	.005	1	1.18e-4	3	NC	5	NC	1
576			min	-.004	2	-.009	2	0	15	-3.792e-5	10	798.176	2	NC	1
577		4	max	.008	3	.055	3	.005	1	4.486e-3	3	NC	5	NC	1
578			min	-.004	2	-.093	2	0	15	-4.107e-3	2	505.484	2	NC	1
579		5	max	.008	3	.109	3	.003	1	8.854e-3	3	NC	5	NC	1
580			min	-.004	2	-.18	2	0	15	-8.181e-3	2	365.817	2	NC	1
581		6	max	.007	3	.167	3	.001	1	1.322e-2	3	NC	15	NC	1
582			min	-.004	2	-.264	2	0	15	-1.226e-2	2	288.727	2	NC	1
583		7	max	.007	3	.223	3	0	3	1.759e-2	3	NC	15	NC	1
584			min	-.004	2	-.339	2	0	1	-1.633e-2	2	243.147	2	NC	1
585		8	max	.007	3	.269	3	0	15	2.196e-2	3	9857.045	15	NC	1
586			min	-.004	2	-.398	2	0	1	-2.04e-2	2	216.152	2	NC	1
587		9	max	.007	3	.3	3	0	1	2.228e-2	3	9222.366	15	NC	1
588			min	-.004	2	-.436	2	0	15	-2.307e-2	2	202.087	2	NC	1
589		10	max	.007	3	.311	3	0	15	1.991e-2	3	9028.673	15	NC	1
590			min	-.004	2	-.449	2	0	1	-2.479e-2	2	197.963	2	NC	1
591		11	max	.007	3	.303	3	0	15	1.755e-2	3	9222.014	15	NC	1
592			min	-.004	2	-.436	2	0	1	-2.651e-2	2	202.775	2	NC	1
593		12	max	.007	3	.278	3	0	1	1.494e-2	3	9856.289	15	NC	1
594			min	-.004	2	-.397	2	0	15	-2.553e-2	2	218.224	2	NC	1
595		13	max	.006	3	.236	3	0	1	1.196e-2	3	NC	15	NC	1
596			min	-.004	2	-.335	2	0	15	-2.047e-2	2	248.146	2	NC	1
597		14	max	.006	3	.184	3	0	15	8.979e-3	3	NC	15	NC	1
598			min	-.004	2	-.257	2	-.001	1	-1.54e-2	2	299.333	2	NC	1
599		15	max	.006	3	.125	3	0	15	6.001e-3	3	NC	5	NC	1
600			min	-.004	2	-.172	2	-.003	1	-1.034e-2	2	387.487	2	NC	1
601		16	max	.006	3	.063	3	0	15	3.022e-3	3	NC	5	NC	1
602			min	-.004	2	-.085	2	-.004	1	-5.28e-3	2	550.809	2	NC	1
603		17	max	.006	3	.004	3	0	15	4.393e-5	3	NC	5	NC	1
604			min	-.003	2	-.006	2	-.005	1	-3.686e-4	1	900.055	2	NC	1
605		18	max	.006	3	.06	2	0	15	3.37e-3	3	NC	4	NC	1
606			min	-.003	2	-.049	3	-.003	1	-8.105e-3	2	1910.346	2	NC	1
607		19	max	.006	3	.119	2	0	1	6.843e-3	3	NC	1	NC	1
608			min	-.003	2	-.098	3	0	15	-1.629e-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

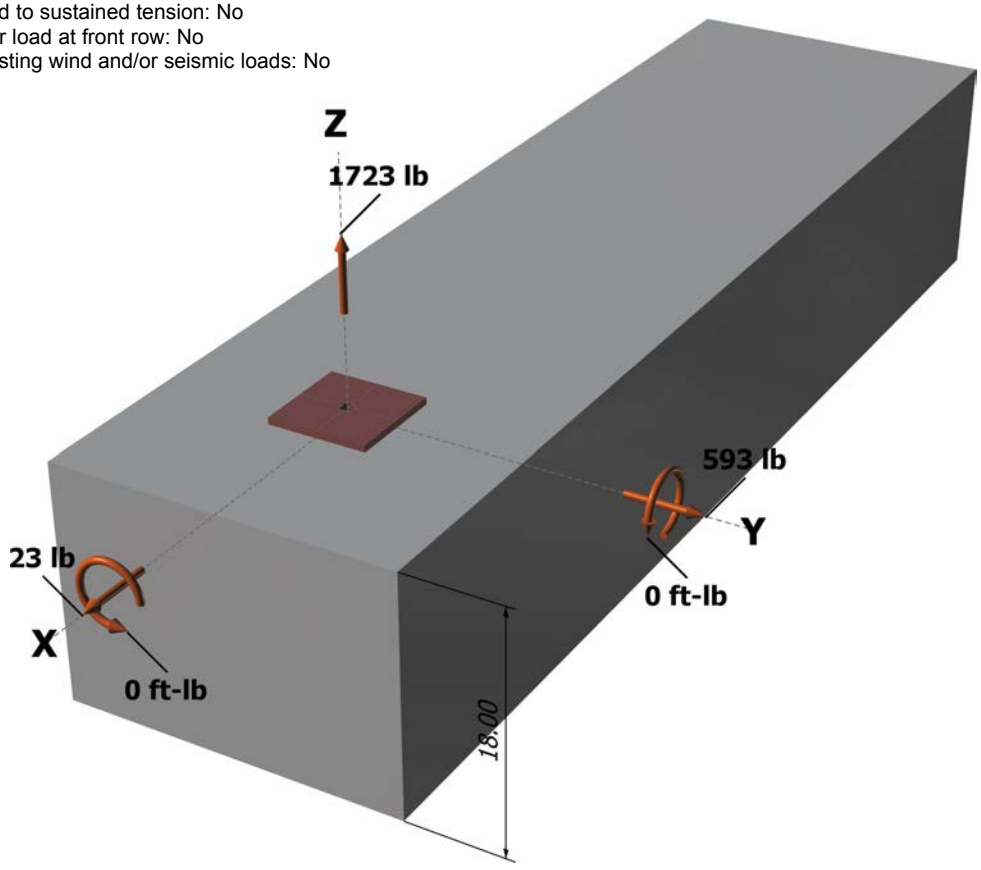
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

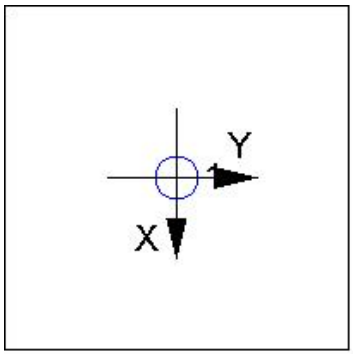
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

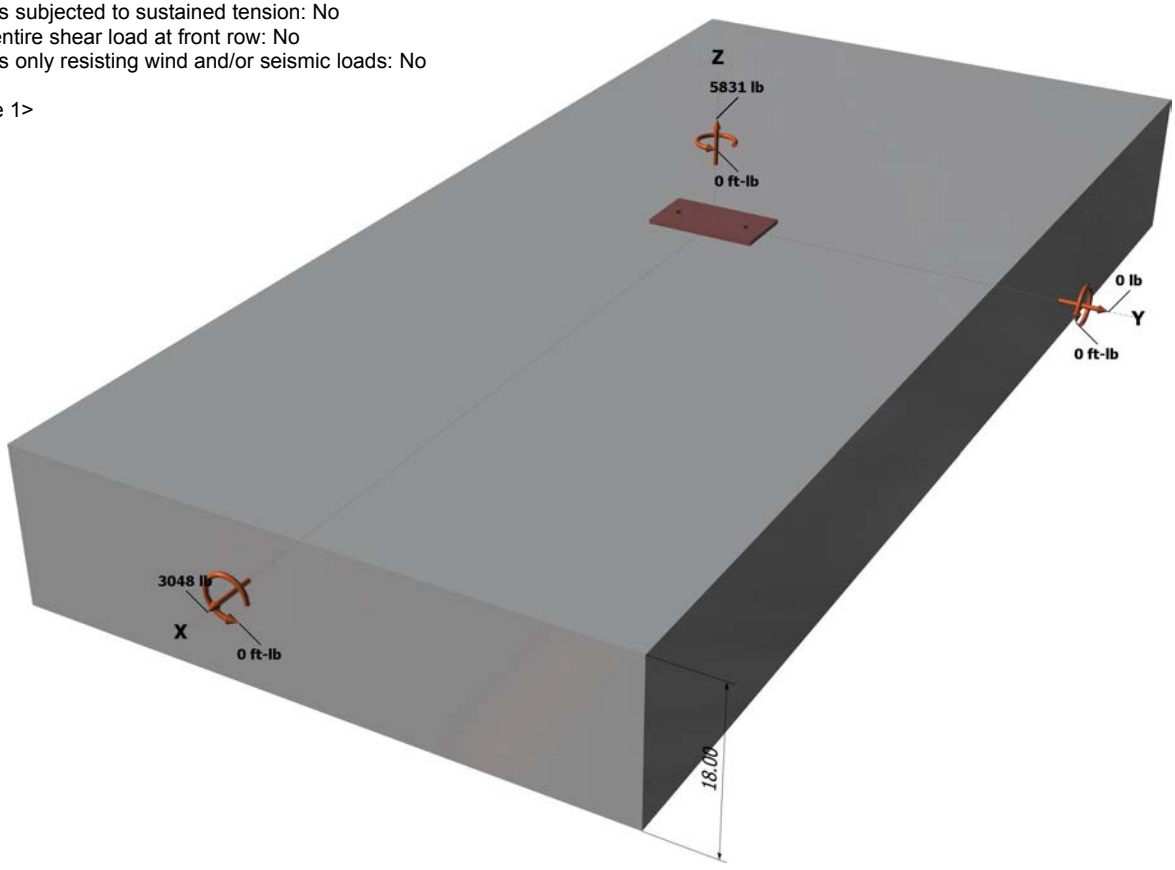
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

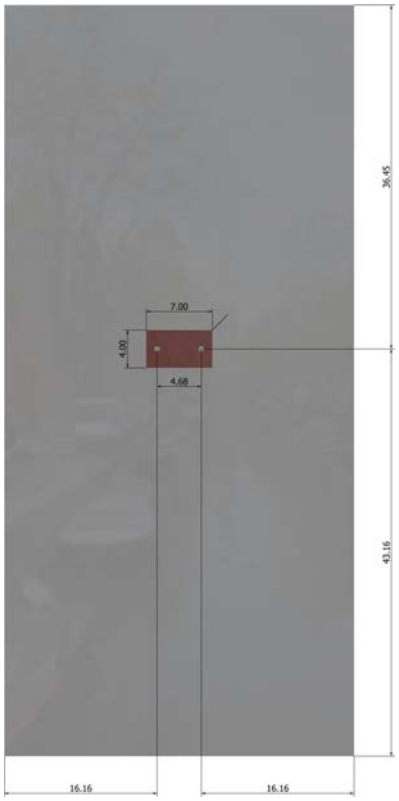
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



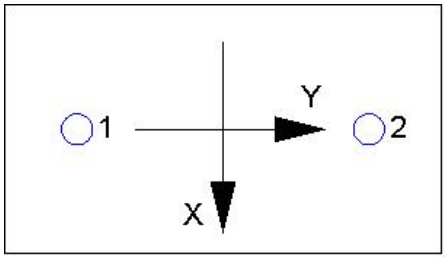
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2915.5	1524.0	0.0	1524.0
2	2915.5	1524.0	0.0	1524.0
Sum	5831.0	3048.0	0.0	3048.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5831
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)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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

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

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

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

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

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

A_{Na} (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)
666.00	648.00	1.000	0.969	1.000	1.000	15593	0.70	10875

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	16.16	24369

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
872.64	1175.16	1.000	1.000	1.000	24369	0.70	25334

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	2916	6071	0.48	Pass
Concrete breakout	5831	10231	0.57	Pass
Adhesive	**5831**	**8093**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1524**	**3156**	**0.48**	**Pass (Governs)**
T Concrete breakout x+	3048	10875	0.28	Pass
|| Concrete breakout y-	1524	25334	0.06	Pass
Pryout	3048	20601	0.15	Pass

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

Sec. D.7.3	0.72	0.48	120.3 %	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.