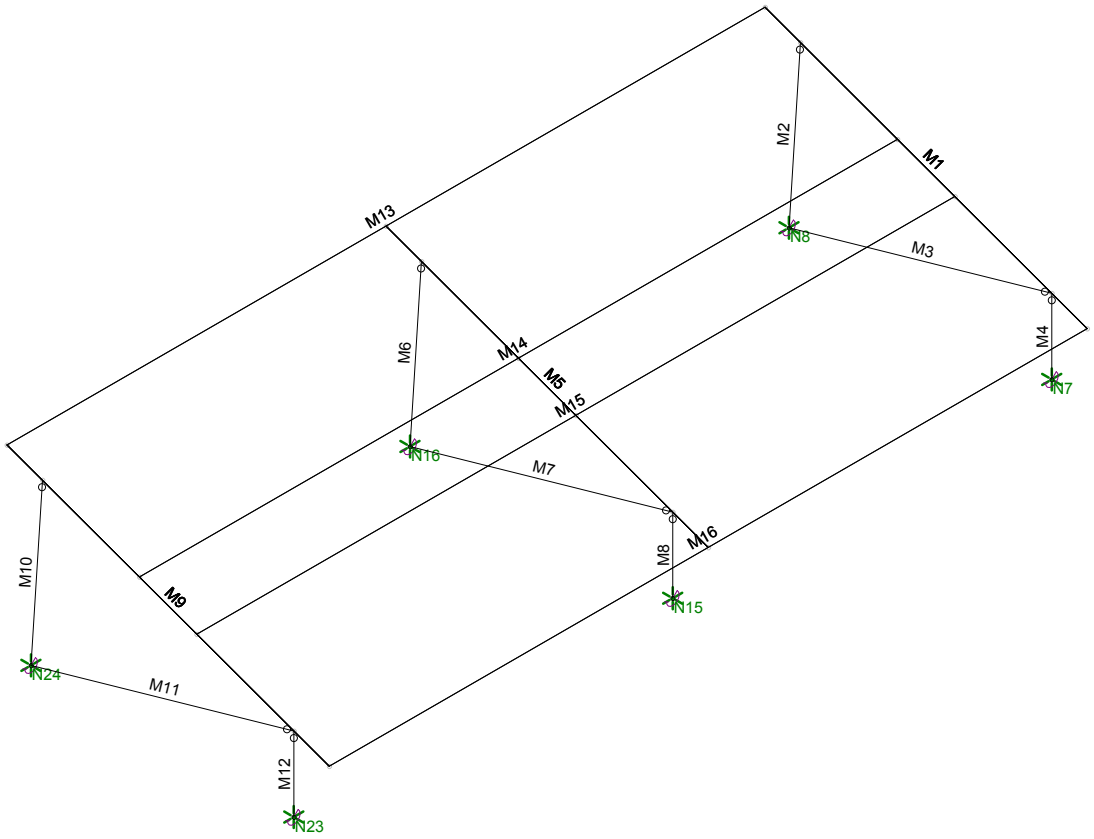


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

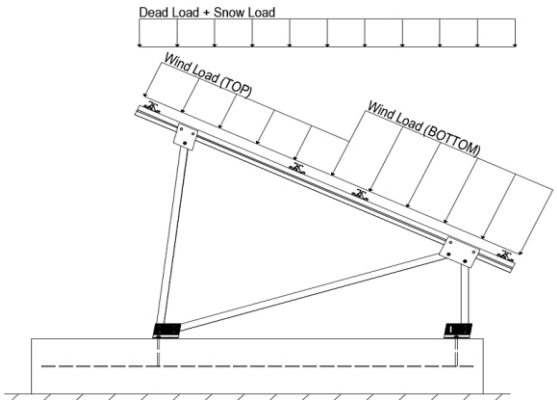
1.2 Construction

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

PV modules are required to meet the following specifications:

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	20.62	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.91		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	160	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	40.19	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

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

S_S =	2.50	R =	1.25	*ASCE 7, Section 12.8.1.3: A maximum S_s of 1.5 may be used to calculate the base shear, C_s, of structures under five stories and with a period, T, of 0.5 or less. Therefore, a S_{ds} of 1.0 was used to calculate C_s.*
S_{DS} =	1.67	C_S =	0.8	
S_1 =	1.00	ρ =	1.3	
S_{D1} =	1.00	Ω =	1.25	
T_a =	0.05	C_d =	1.25	

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

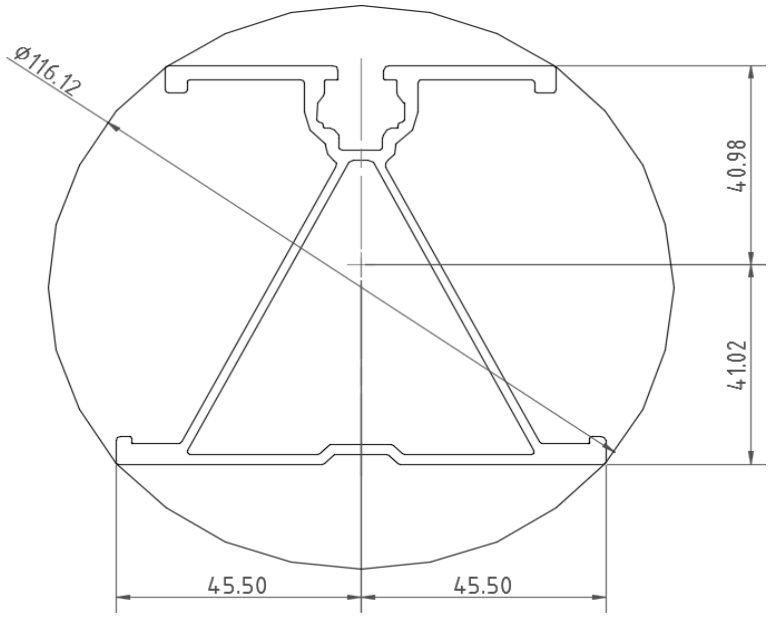
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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 =	102	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 =	-2.379	k-ft
M_z =	0.004	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	86%	

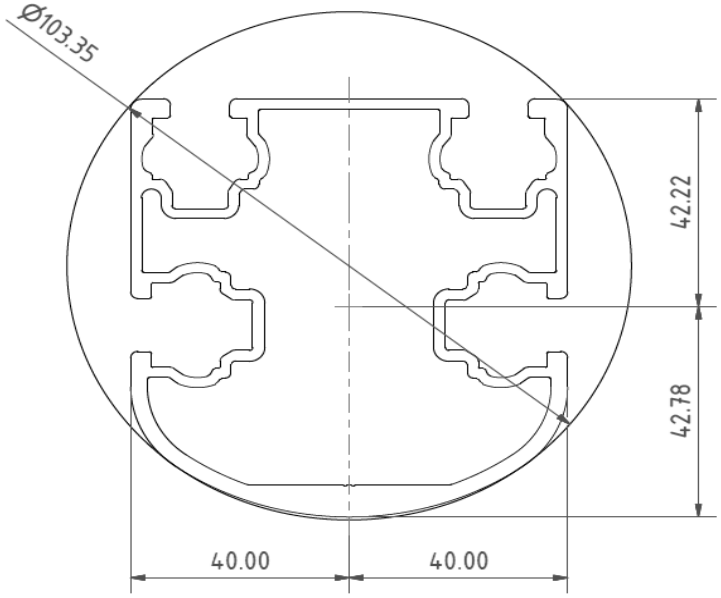


DETAIL VIEW

4.2 Girder Design

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

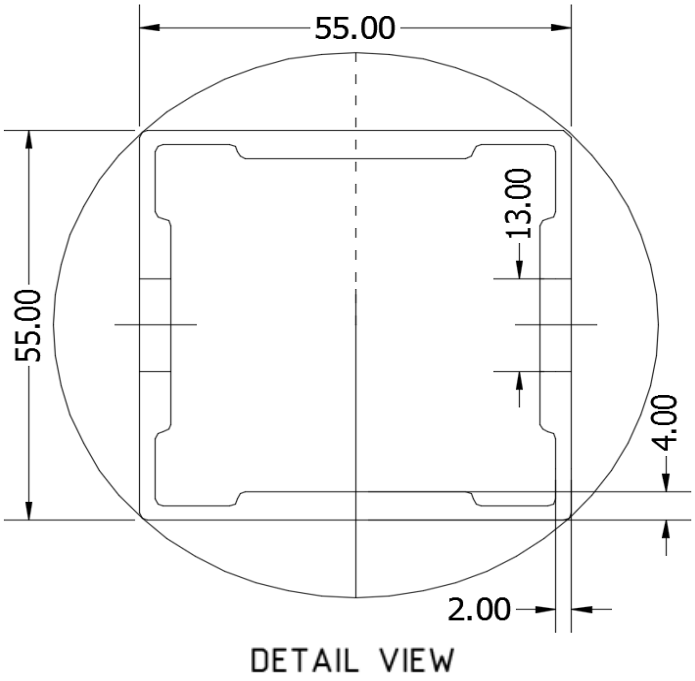
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.380	k-ft
M_z =	0.000	k-ft
P_n =	-0.739	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



4.3 Front Strut Design

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

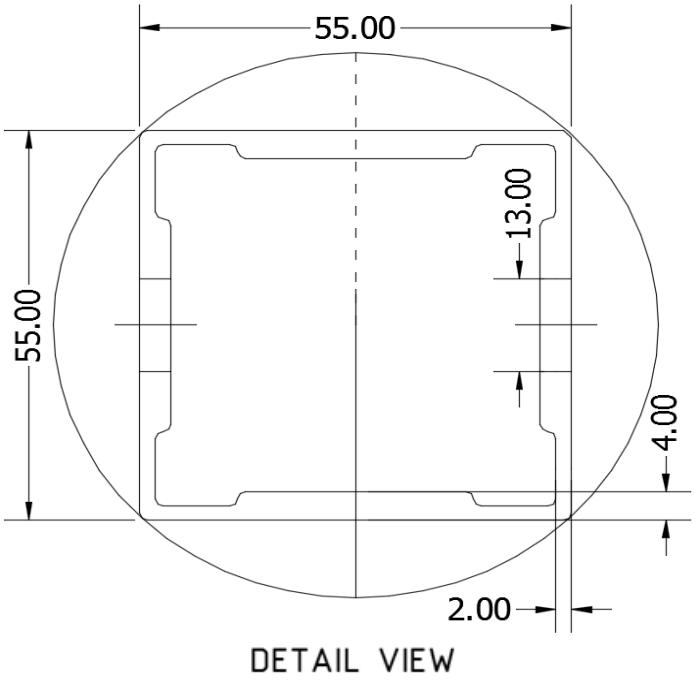
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.440	k-ft
P_n =	0.558	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	33%	



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).

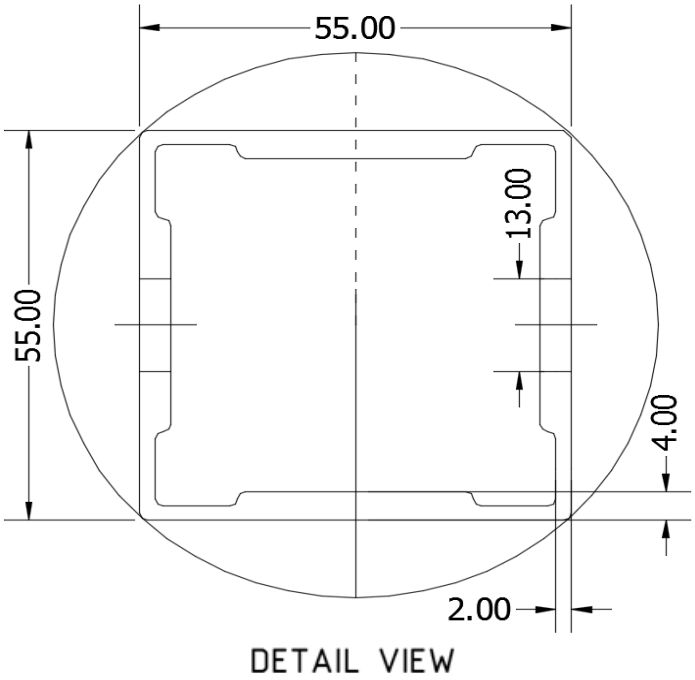
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.083	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	29%	



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 =	3.553	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	23%	



5. FOUNDATION DESIGN CALCULATIONS

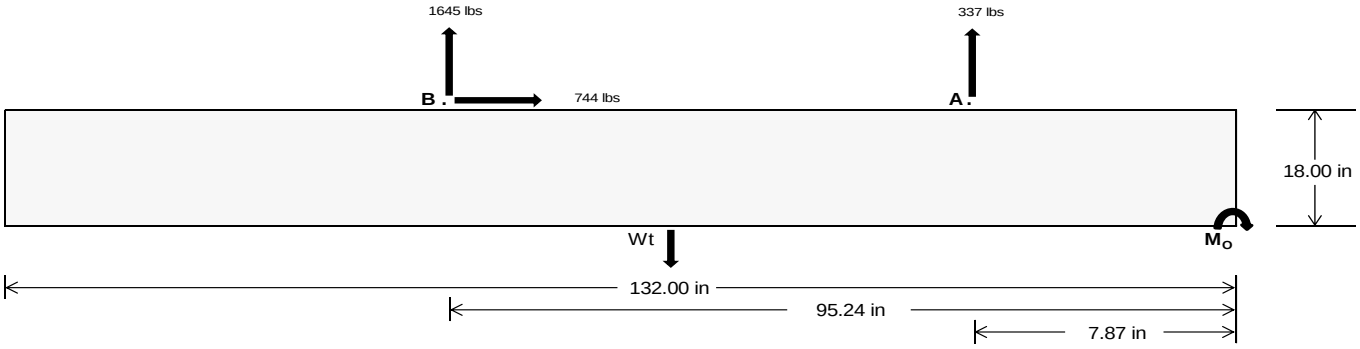
5.1 Helical Pile Foundations

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 =	1478.66	7144.22	k
Compressive Load =	4515.45	5355.74	k
Lateral Load =	295.09	3224.97	k
Moment (Weak Axis) =	0.59	0.30	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	172687.8 in-lbs
Resisting Force Required =	2616.48 lbs
S.F. =	1.67
Weight Required =	4360.80 lbs
Minimum Width =	38 in
Weight Provided =	7576.25 lbs

Sliding

Force =	744.05 lbs
Friction =	0.4
Weight Required =	1860.13 lbs
Resisting Weight =	7576.25 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	744.05 lbs
Cohesion =	130 psf
Area =	34.83 ft^2
Resisting =	3788.13 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 38in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 38in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 38in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	38 in	39 in	40 in	41 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.17 ft) =	7576 lbs	7776 lbs	7975 lbs	8174 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in
F_A	1320 lbs	1320 lbs	1320 lbs	1320 lbs	1816 lbs	1816 lbs	1816 lbs	1816 lbs	2242 lbs	2242 lbs	2242 lbs	2242 lbs	-674 lbs	-674 lbs	-674 lbs	-674 lbs
F_B	1340 lbs	1340 lbs	1340 lbs	1340 lbs	2199 lbs	2199 lbs	2199 lbs	2199 lbs	2543 lbs	2543 lbs	2543 lbs	2543 lbs	-3290 lbs	-3290 lbs	-3290 lbs	-3290 lbs
F_V	143 lbs	143 lbs	143 lbs	143 lbs	1316 lbs	1316 lbs	1316 lbs	1316 lbs	1084 lbs	1084 lbs	1084 lbs	1084 lbs	-1488 lbs	-1488 lbs	-1488 lbs	-1488 lbs
P_{total}	10236 lbs	10436 lbs	10635 lbs	10834 lbs	11591 lbs	11790 lbs	11990 lbs	12189 lbs	12361 lbs	12560 lbs	12759 lbs	12959 lbs	582 lbs	702 lbs	822 lbs	941 lbs
M	3342 lbs-ft	3342 lbs-ft	3342 lbs-ft	3342 lbs-ft	5416 lbs-ft	5416 lbs-ft	5416 lbs-ft	5416 lbs-ft	6289 lbs-ft	6289 lbs-ft	6289 lbs-ft	6289 lbs-ft	2518 lbs-ft	2518 lbs-ft	2518 lbs-ft	2518 lbs-ft
e	0.33 ft	0.32 ft	0.31 ft	0.31 ft	0.47 ft	0.46 ft	0.45 ft	0.44 ft	0.51 ft	0.50 ft	0.49 ft	0.49 ft	4.32 ft	3.59 ft	3.06 ft	2.68 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}	241.5 psf	240.9 psf	240.3 psf	239.8 psf	247.9 psf	247.2 psf	246.4 psf	245.7 psf	256.4 psf	255.4 psf	254.4 psf	253.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	346.2 psf	342.9 psf	339.8 psf	336.8 psf	417.6 psf	412.4 psf	407.6 psf	402.9 psf	453.3 psf	447.3 psf	441.5 psf	436.1 psf	104.3 psf	75.3 psf	67.5 psf	65.0 psf

Maximum Bearing Pressure = 453 psf
Allowable Bearing Pressure = 1500 psf

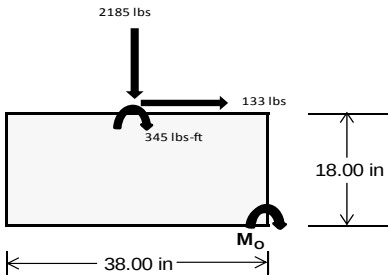
Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	2915.5 ft-lbs
Resisting Force Required =	1841.37 lbs
S.F. =	1.67
Weight Required =	3068.95 lbs
Minimum Width =	38 in in
Weight Provided =	7576.25 lbs

A minimum 132in long x 38in 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	38 in			38 in			38 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	239 lbs	550 lbs	188 lbs	770 lbs	2185 lbs	730 lbs	88 lbs	161 lbs	37 lbs
F_V	184 lbs	181 lbs	186 lbs	137 lbs	133 lbs	144 lbs	185 lbs	182 lbs	185 lbs
P_{total}	9618 lbs	9929 lbs	9567 lbs	9698 lbs	11114 lbs	9659 lbs	2830 lbs	2903 lbs	2780 lbs
M	728 lbs-ft	720 lbs-ft	732 lbs-ft	547 lbs-ft	545 lbs-ft	569 lbs-ft	726 lbs-ft	718 lbs-ft	727 lbs-ft
e	0.08 ft	0.07 ft	0.08 ft	0.06 ft	0.05 ft	0.06 ft	0.26 ft	0.25 ft	0.26 ft
L/6	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft
f_{min}	236.5 psf	245.9 psf	234.8 psf	248.6 psf	289.4 psf	246.3 psf	41.8 psf	44.3 psf	40.3 psf
f_{max}	315.7 psf	324.2 psf	314.5 psf	308.2 psf	348.7 psf	308.3 psf	120.7 psf	122.4 psf	119.3 psf

Maximum Bearing Pressure = 349 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 38in 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.

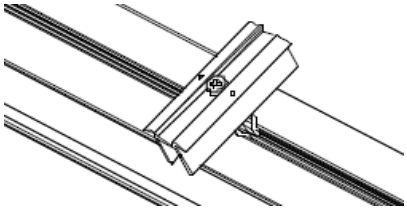
6. DESIGN OF JOINTS AND CONNECTIONS

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.

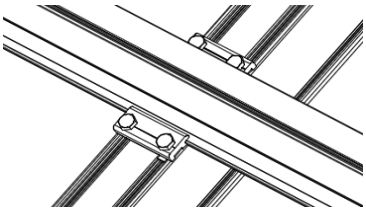
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.912 k
Allowable Uplift	=	1.214 k
Utilization	=	75%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	2.771 k
Allowable Uplift	=	4.357 k
Utilization	=	64%



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	=	3.473 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	47%

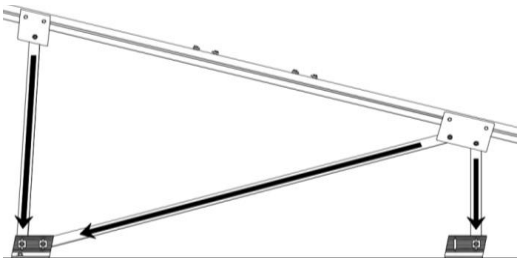
Rear Strut

Maximum Axial Load	=	4.908 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	66%

Diagonal Strut

Maximum Axial Load	=	2.228 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	30%

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



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

7. SEISMIC DESIGN

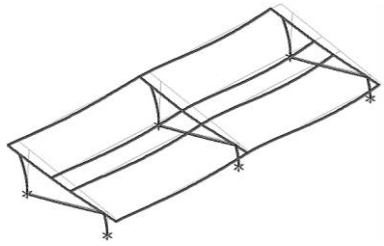
7.1 Seismic Drift

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

Mean Height, h_{sx}	=	40.12 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.802 in
Max Drift, Δ_{MAX}	=	0.442 in

0.442 ≤ 0.802, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	102 in	L_b =	102
J =	0.432	J =	0.432
	282.18		179.449
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	27.9 ksi	φF_L=	29.0
3.4.16		**3.4.16**	
b/t =	32.195	b/t =	37.0588
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$	
S1 =	12.2	S1 =	12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$		$S2 = \frac{k_1 Bp}{1.6Dp}$	
S2 =	46.7	S2 =	46.7
φF_L=	φb[Bp-1.6Dp*b/t]	φF_L=	φb[Bp-1.6Dp*b/t]
φF_L=	25.1 ksi	φF_L=	23.1 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =		N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L=	1.17φyFcy		
φF_L=	38.9 ksi		
3.4.18		**3.4.18**	
h/t =	37.0588	h/t =	32.195
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	40.985	C_0 =	45.5
Cc =	41.015	Cc =	45.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.2	S2 =	77.3
φF_L=	φb[Bbr-mDbr*h/t]	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	25.1 ksi	φF_LWk=	23.1 ksi
Ix =	897074 mm^4	Iy =	446476 mm^4
	2.155 in^4		1.073 in^4
y =	41.015 mm	x =	45.5 mm
Sx =	1.335 in^3	Sy =	0.599 in^3
M_{max}St =	2.788 k-ft	M_{max}Wk =	1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L = φc[Bp-1.6Dp*b/t]
φF_L = 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L = (φck2*√(BpE))/(1.6b/t)
φF_L = 21.9 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L = 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.87952

φF_L = φcc(Bc-Dc*λ)

φF_L = 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L = 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

$\varphi F_L Wk$= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 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			.8			8		

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-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	-117.695	-117.695	0	0
2	M14	y	-117.695	-117.695	0	0
3	M15	y	-184.95	-184.95	0	0
4	M16	y	-184.95	-184.95	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	269.018	269.018	0	0
2	M14	y	206.247	206.247	0	0
3	M15	y	112.091	112.091	0	0
4	M16	y	112.091	112.091	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	0	0

Load Combinations

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	638.246	2	1290.407	2	.622	1	.003	1	0	1	0	1
2		min	-792.507	3	-1702.993	3	-51.713	5	-.229	4	0	1	0	1
3	N7	max	.026	9	1175.424	1	-.381	12	0	12	0	1	0	1
4		min	-.207	2	-332.29	3	-226.995	4	-.451	4	0	1	0	1
5	N15	max	.022	9	3473.421	2	0	2	0	2	0	1	0	1
6		min	-2.317	2	-1137.428	3	-218.694	4	-.44	4	0	1	0	1
7	N16	max	2245.602	2	4119.8	2	0	11	0	11	0	1	0	1
8		min	-2480.748	3	-5495.551	3	-51.676	5	-.231	4	0	1	0	1
9	N23	max	.029	14	1175.424	1	6.675	1	.014	1	0	1	0	1
10		min	-.207	2	-332.29	3	-222.394	4	-.444	4	0	1	0	1
11	N24	max	638.246	2	1290.407	2	-.045	12	0	12	0	1	0	1
12		min	-792.507	3	-1702.993	3	-52.182	5	-.231	4	0	1	0	1
13	Totals:	max	3519.363	2	12452.587	2	0	2						
14		min	-4066.824	3	-10703.546	3	-820.025	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	69.537	1	482.587	2	-6.003	12	0	15	.165	1	0	4
2			min	4.289	12	-842.088	3	-136.133	1	-.016	2	.01	12	0	3
3		2	max	69.537	1	336.943	2	-4.849	12	0	15	.077	4	.678	3
4			min	4.289	12	-592.772	3	-104.382	1	-.016	2	.003	10	-.387	2
5		3	max	69.537	1	191.299	2	-3.695	12	0	15	.043	5	1.12	3
6			min	4.289	12	-343.455	3	-72.632	1	-.016	2	-.032	1	-.636	2
7		4	max	69.537	1	45.842	1	-2.541	12	0	15	.024	5	1.326	3
8			min	4.289	12	-94.138	3	-40.881	1	-.016	2	-.086	1	-.748	2
9		5	max	69.537	1	155.179	3	-.234	10	0	15	.005	5	1.297	3
10			min	4.289	12	-99.989	2	-20.628	4	-.016	2	-.109	1	-.723	2
11		6	max	69.537	1	404.495	3	22.621	1	0	15	-.004	12	1.033	3
12			min	2.622	15	-245.633	2	-16.502	5	-.016	2	-.103	1	-.559	2
13		7	max	69.537	1	653.812	3	54.371	1	0	15	-.004	12	.533	3
14			min	-5.624	5	-391.276	2	-14.717	5	-.016	2	-.066	1	-.26	1
15		8	max	69.537	1	903.129	3	86.122	1	0	15	.003	2	.18	2
16			min	-15.319	5	-536.92	2	-12.932	5	-.016	2	-.04	4	-.202	3
17		9	max	69.537	1	1152.446	3	117.873	1	0	15	.096	1	.755	2
18			min	-25.013	5	-682.564	2	-11.146	5	-.016	2	-.05	5	-1.172	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
19		10	max	69.537	1	1401.762	3	149.624	1	.016	2	.223	1	1.469	2
20			min	4.289	12	-828.208	2	-88.364	14	0	12	.003	12	-2.379	3
21		11	max	69.537	1	682.564	2	-3.229	12	.016	2	.096	1	.755	2
22			min	4.289	12	-1152.446	3	-117.873	1	0	15	0	3	-1.172	3
23		12	max	69.537	1	536.92	2	-2.075	12	.016	2	.039	4	.18	2
24			min	4.289	12	-903.129	3	-86.122	1	0	15	-.005	3	-.202	3
25		13	max	69.537	1	391.276	2	-.921	12	.016	2	.018	5	.533	3
26			min	4.289	12	-653.812	3	-54.371	1	0	15	-.066	1	-.26	1
27		14	max	69.537	1	245.633	2	.519	3	.016	2	0	15	1.033	3
28			min	2.48	15	-404.495	3	-23.867	4	0	15	-.103	1	-.559	2
29		15	max	69.537	1	99.989	2	9.13	1	.016	2	-.004	12	1.297	3
30			min	-5.895	5	-155.179	3	-17.191	5	0	15	-.109	1	-.723	2
31		16	max	69.537	1	94.138	3	40.881	1	.016	2	-.002	12	1.326	3
32			min	-15.59	5	-45.842	1	-15.405	5	0	15	-.086	1	-.748	2
33		17	max	69.537	1	343.455	3	72.632	1	.016	2	.002	3	1.12	3
34			min	-25.285	5	-191.299	2	-13.62	5	0	15	-.054	4	-.636	2
35		18	max	69.537	1	592.772	3	104.382	1	.016	2	.052	1	.678	3
36			min	-34.98	5	-336.943	2	-11.835	5	0	15	-.059	5	-.387	2
37		19	max	69.537	1	842.088	3	136.133	1	.016	2	.165	1	0	1
38			min	-44.675	5	-482.587	2	-10.049	5	0	15	-.069	5	0	3
39	M14	1	max	47.511	4	530.587	2	-6.181	12	.012	3	.192	1	0	1
40			min	1.894	12	-670.426	3	-140.945	1	-.014	2	.011	12	0	3
41		2	max	37.816	4	384.943	2	-5.027	12	.012	3	.114	4	.543	3
42			min	1.894	12	-480.393	3	-109.194	1	-.014	2	.005	10	-.432	2
43		3	max	35.785	1	239.299	2	-3.873	12	.012	3	.066	5	.907	3
44			min	1.894	12	-290.36	3	-77.444	1	-.014	2	-.014	1	-.727	2
45		4	max	35.785	1	93.656	2	-2.719	12	.012	3	.036	5	1.092	3
46			min	1.894	12	-100.327	3	-45.693	1	-.014	2	-.072	1	-.884	2
47		5	max	35.785	1	89.706	3	-.696	10	.012	3	.008	5	1.097	3
48			min	.773	15	-53.91	1	-32.005	4	-.014	2	-.1	1	-.904	2
49		6	max	35.785	1	279.739	3	17.809	1	.012	3	-.004	12	.922	3
50			min	-8.509	5	-197.632	2	-26.686	5	-.014	2	-.098	1	-.786	2
51		7	max	35.785	1	469.772	3	49.56	1	.012	3	-.004	12	.569	3
52			min	-18.204	5	-343.276	2	-24.901	5	-.014	2	-.067	1	-.531	2
53		8	max	35.785	1	659.805	3	81.31	1	.012	3	.001	10	.035	3
54			min	-27.898	5	-488.92	2	-23.116	5	-.014	2	-.067	4	-.138	2
55		9	max	35.785	1	849.838	3	113.061	1	.012	3	.087	1	.407	1
56			min	-37.593	5	-634.564	2	-21.33	5	-.014	2	-.086	5	-.678	3
57		10	max	58.688	4	1039.871	3	144.812	1	.014	2	.209	1	1.065	1
58			min	1.894	12	-780.208	2	-91.015	14	-.012	3	.003	12	-1.57	3
59		11	max	48.993	4	634.564	2	-3.051	12	.014	2	.114	4	.407	1
60			min	1.894	12	-849.838	3	-113.061	1	-.012	3	-.001	3	-.678	3
61		12	max	39.298	4	488.92	2	-1.897	12	.014	2	.064	5	.035	3
62			min	1.894	12	-659.805	3	-81.31	1	-.012	3	-.005	1	-.138	2
63		13	max	35.785	1	343.276	2	-.743	12	.014	2	.034	5	.569	3
64			min	1.894	12	-469.772	3	-49.56	1	-.012	3	-.067	1	-.531	2
65		14	max	35.785	1	197.632	2	.787	3	.014	2	.006	5	.922	3
66			min	1.894	12	-279.739	3	-32.689	4	-.012	3	-.098	1	-.786	2
67		15	max	35.785	1	53.91	1	13.942	1	.014	2	-.003	12	1.097	3
68			min	1.755	15	-89.706	3	-26.832	5	-.012	3	-.1	1	-.904	2
69		16	max	35.785	1	100.327	3	45.693	1	.014	2	-.001	12	1.092	3
70			min	-7.045	5	-93.656	2	-25.047	5	-.012	3	-.072	1	-.884	2
71		17	max	35.785	1	290.36	3	77.444	1	.014	2	.003	3	.907	3
72			min	-16.74	5	-239.299	2	-23.261	5	-.012	3	-.071	4	-.727	2
73		18	max	35.785	1	480.393	3	109.194	1	.014	2	.074	1	.543	3
74			min	-26.435	5	-384.943	2	-21.476	5	-.012	3	-.088	5	-.432	2
75		19	max	35.785	1	670.426	3	140.945	1	.014	2	.192	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
76			min	-36.13	5	-530.587	2	-19.691	5	-.012	3	-.108	5	0	3
77	M15	1	max	71.202	5	745.057	2	-6.101	12	.014	2	.218	4	0	2
78			min	-37.27	1	-370.763	3	-140.947	1	-.01	3	.011	12	0	3
79		2	max	61.507	5	535.895	2	-4.947	12	.014	2	.15	4	.302	3
80			min	-37.27	1	-269.656	3	-109.196	1	-.01	3	.005	10	-.605	2
81		3	max	51.813	5	326.732	2	-3.793	12	.014	2	.091	5	.509	3
82			min	-37.27	1	-168.548	3	-77.445	1	-.01	3	-.014	1	-1.012	2
83		4	max	42.118	5	117.57	2	-2.639	12	.014	2	.052	5	.621	3
84			min	-37.27	1	-67.44	3	-50.881	4	-.01	3	-.072	1	-1.222	2
85		5	max	32.423	5	33.668	3	-.735	10	.014	2	.014	5	.637	3
86			min	-37.27	1	-91.593	2	-42.48	4	-.01	3	-.1	1	-1.234	2
87		6	max	22.728	5	134.776	3	17.807	1	.014	2	-.004	12	.557	3
88			min	-37.27	1	-300.755	2	-37.146	5	-.01	3	-.098	1	-1.049	2
89		7	max	13.033	5	235.884	3	49.558	1	.014	2	-.004	12	.382	3
90			min	-37.27	1	-509.918	2	-35.361	5	-.01	3	-.071	4	-.666	2
91		8	max	3.338	5	336.992	3	81.309	1	.014	2	.001	10	.112	3
92			min	-37.27	1	-719.08	2	-33.575	5	-.01	3	-.091	4	-.089	1
93		9	max	-2.384	12	438.1	3	113.059	1	.014	2	.087	1	.692	2
94			min	-37.27	1	-928.243	2	-31.79	5	-.01	3	-.119	5	-.254	3
95		10	max	-2.384	12	539.208	3	144.81	1	.01	3	.217	4	1.667	2
96			min	-37.27	1	-1137.405	2	-96.336	14	-.014	2	.003	12	-.716	3
97		11	max	1.846	5	928.243	2	-3.131	12	.01	3	.148	4	.692	2
98			min	-37.27	1	-438.1	3	-113.059	1	-.014	2	0	3	-.254	3
99		12	max	-2.384	12	719.08	2	-1.977	12	.01	3	.088	5	.112	3
100			min	-37.27	1	-336.992	3	-81.309	1	-.014	2	-.005	1	-.089	1
101		13	max	-2.384	12	509.918	2	-.823	12	.01	3	.048	5	.382	3
102			min	-37.27	1	-235.884	3	-51.581	4	-.014	2	-.067	1	-.666	2
103		14	max	-2.384	12	300.755	2	.654	3	.01	3	.011	5	.557	3
104			min	-37.27	1	-134.776	3	-43.18	4	-.014	2	-.098	1	-1.049	2
105		15	max	-2.384	12	91.593	2	13.944	1	.01	3	-.003	12	.637	3
106			min	-45.271	4	-33.668	3	-37.294	5	-.014	2	-.1	1	-1.234	2
107		16	max	-2.384	12	67.44	3	45.694	1	.01	3	-.001	12	.621	3
108			min	-54.966	4	-117.57	2	-35.508	5	-.014	2	-.075	4	-1.222	2
109		17	max	-2.384	12	168.548	3	77.445	1	.01	3	.003	3	.509	3
110			min	-64.661	4	-326.732	2	-33.723	5	-.014	2	-.096	4	-1.012	2
111		18	max	-2.384	12	269.656	3	109.196	1	.01	3	.074	1	.302	3
112			min	-74.356	4	-535.895	2	-31.937	5	-.014	2	-.124	5	-.605	2
113		19	max	-2.384	12	370.763	3	140.947	1	.01	3	.192	1	0	2
114			min	-84.051	4	-745.057	2	-30.152	5	-.014	2	-.153	5	0	5
115	M16	1	max	69.881	5	699.049	2	-5.733	12	.011	1	.167	1	0	2
116			min	-74.105	1	-333.417	3	-136.416	1	-.013	3	.009	12	0	3
117		2	max	60.186	5	489.886	2	-4.579	12	.011	1	.109	4	.267	3
118			min	-74.105	1	-232.309	3	-104.666	1	-.013	3	.004	10	-.561	2
119		3	max	50.492	5	280.724	2	-3.425	12	.011	1	.067	5	.439	3
120			min	-74.105	1	-131.201	3	-72.915	1	-.013	3	-.031	1	-.925	2
121		4	max	40.797	5	71.562	2	-2.271	12	.011	1	.038	5	.515	3
122			min	-74.105	1	-30.094	3	-41.164	1	-.013	3	-.085	1	-1.092	2
123		5	max	31.102	5	71.014	3	-.398	10	.011	1	.011	5	.496	3
124			min	-74.105	1	-137.601	2	-29.957	4	-.013	3	-.109	1	-1.061	2
125		6	max	21.407	5	172.122	3	22.337	1	.011	1	-.004	12	.381	3
126			min	-74.105	1	-346.763	2	-25.736	5	-.013	3	-.103	1	-.832	2
127		7	max	11.712	5	273.23	3	54.088	1	.011	1	-.004	12	.171	3
128			min	-74.105	1	-555.926	2	-23.95	5	-.013	3	-.067	1	-.406	2
129		8	max	2.017	5	374.338	3	85.839	1	.011	1	.002	2	.218	2
130			min	-74.105	1	-765.088	2	-22.165	5	-.013	3	-.06	4	-.135	3
131		9	max	-4.135	12	475.446	3	117.59	1	.011	1	.095	1	1.04	2
132			min	-74.105	1	-974.251	2	-20.38	5	-.013	3	-.079	5	-.537	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
133		10	max	-4.135	12	576.554	3	149.34	1	.013	3	.222	1	2.059	2
134			min	-74.105	1	-1183.413	2	-93.006	14	-.011	1	.005	12	-1.033	3
135		11	max	-.347	15	974.251	2	-3.499	12	.013	3	.111	4	1.04	2
136			min	-74.105	1	-475.446	3	-117.59	1	-.011	1	0	3	-.537	3
137		12	max	-4.135	12	765.088	2	-2.345	12	.013	3	.059	4	.218	2
138			min	-74.105	1	-374.338	3	-85.839	1	-.011	1	-.003	3	-.135	3
139		13	max	-4.135	12	555.926	2	-1.191	12	.013	3	.03	5	.171	3
140			min	-74.105	1	-273.23	3	-54.088	1	-.011	1	-.067	1	-.406	2
141		14	max	-4.135	12	346.763	2	.07	3	.013	3	.002	5	.381	3
142			min	-74.105	1	-172.122	3	-33.117	4	-.011	1	-.103	1	-.832	2
143		15	max	-4.135	12	137.601	2	9.413	1	.013	3	-.004	12	.496	3
144			min	-74.105	1	-71.014	3	-26.412	5	-.011	1	-.109	1	-1.061	2
145		16	max	-4.135	12	30.094	3	41.164	1	.013	3	-.002	12	.515	3
146			min	-74.105	1	-71.562	2	-24.626	5	-.011	1	-.085	1	-1.092	2
147		17	max	-4.135	12	131.201	3	72.915	1	.013	3	.001	3	.439	3
148			min	-75.172	4	-280.724	2	-22.841	5	-.011	1	-.077	4	-.925	2
149		18	max	-4.135	12	232.309	3	104.666	1	.013	3	.053	1	.267	3
150			min	-84.867	4	-489.886	2	-21.056	5	-.011	1	-.091	5	-.561	2
151		19	max	-4.135	12	333.417	3	136.416	1	.013	3	.167	1	0	2
152			min	-94.562	4	-699.049	2	-19.27	5	-.011	1	-.11	5	0	5
153	M2	1	max	1120.731	2	2.076	4	.651	1	0	3	0	3	0	1
154			min	-1520.659	3	.509	15	-47.843	4	0	4	0	2	0	1
155		2	max	1121.111	2	2.043	4	.651	1	0	3	0	1	0	15
156			min	-1520.375	3	.501	15	-48.173	4	0	4	-.012	4	0	4
157		3	max	1121.49	2	2.009	4	.651	1	0	3	0	1	0	15
158			min	-1520.09	3	.493	15	-48.502	4	0	4	-.025	4	-.001	4
159		4	max	1121.869	2	1.976	4	.651	1	0	3	0	1	0	15
160			min	-1519.806	3	.486	15	-48.832	4	0	4	-.037	4	-.002	4
161		5	max	1122.248	2	1.943	4	.651	1	0	3	0	1	0	15
162			min	-1519.521	3	.476	12	-49.161	4	0	4	-.05	4	-.002	4
163		6	max	1122.628	2	1.909	4	.651	1	0	3	0	1	0	15
164			min	-1519.237	3	.463	12	-49.49	4	0	4	-.062	4	-.003	4
165		7	max	1123.007	2	1.876	4	.651	1	0	3	0	1	0	15
166			min	-1518.952	3	.45	12	-49.82	4	0	4	-.075	4	-.003	4
167		8	max	1123.386	2	1.842	4	.651	1	0	3	.001	1	0	15
168			min	-1518.668	3	.437	12	-50.149	4	0	4	-.088	4	-.004	4
169		9	max	1123.765	2	1.809	4	.651	1	0	3	.001	1	0	12
170			min	-1518.384	3	.424	12	-50.479	4	0	4	-.101	4	-.004	4
171		10	max	1124.145	2	1.776	4	.651	1	0	3	.001	1	-.001	12
172			min	-1518.099	3	.411	12	-50.808	4	0	4	-.114	4	-.004	4
173		11	max	1124.524	2	1.742	4	.651	1	0	3	.002	1	-.001	12
174			min	-1517.815	3	.398	12	-51.138	4	0	4	-.127	4	-.005	4
175		12	max	1124.903	2	1.709	4	.651	1	0	3	.002	1	-.001	12
176			min	-1517.53	3	.385	12	-51.467	4	0	4	-.14	4	-.005	4
177		13	max	1125.282	2	1.675	4	.651	1	0	3	.002	1	-.001	12
178			min	-1517.246	3	.372	12	-51.797	4	0	4	-.153	4	-.006	4
179		14	max	1125.662	2	1.642	4	.651	1	0	3	.002	1	-.001	12
180			min	-1516.961	3	.359	12	-52.126	4	0	4	-.167	4	-.006	4
181		15	max	1126.041	2	1.609	4	.651	1	0	3	.002	1	-.002	12
182			min	-1516.677	3	.346	12	-52.456	4	0	4	-.18	4	-.007	4
183		16	max	1126.42	2	1.575	4	.651	1	0	3	.002	1	-.002	12
184			min	-1516.392	3	.333	12	-52.785	4	0	4	-.193	4	-.007	4
185		17	max	1126.799	2	1.542	4	.651	1	0	3	.003	1	-.002	12
186			min	-1516.108	3	.32	12	-53.115	4	0	4	-.207	4	-.007	4
187		18	max	1127.179	2	1.509	4	.651	1	0	3	.003	1	-.002	12
188			min	-1515.824	3	.307	12	-53.444	4	0	4	-.221	4	-.008	4
189		19	max	1127.558	2	1.475	4	.651	1	0	3	.003	1	-.002	12

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-1515.539	3	.294	12	-53.773	4	0	4	-.234	4	-.008	4
191	M3	1	max	583.7	2	8.012	4	1.053	4	0	3	0	1	.008	4
192			min	-714.858	3	1.896	15	.004	12	0	4	-.017	4	.002	12
193		2	max	583.53	2	7.242	4	1.593	4	0	3	0	1	.005	2
194			min	-714.985	3	1.715	15	.004	12	0	4	-.016	4	0	12
195		3	max	583.36	2	6.472	4	2.134	4	0	3	0	1	.003	2
196			min	-715.113	3	1.534	15	.004	12	0	4	-.015	4	0	3
197		4	max	583.189	2	5.702	4	2.674	4	0	3	0	1	0	2
198			min	-715.241	3	1.353	15	.004	12	0	4	-.014	4	-.002	3
199		5	max	583.019	2	4.932	4	3.215	4	0	3	0	1	0	15
200			min	-715.369	3	1.172	15	.004	12	0	4	-.013	4	-.003	3
201		6	max	582.849	2	4.162	4	3.755	4	0	3	0	1	-.001	15
202			min	-715.497	3	.991	15	.004	12	0	4	-.012	4	-.005	6
203		7	max	582.678	2	3.392	4	4.296	4	0	3	0	1	-.001	15
204			min	-715.624	3	.81	15	.004	12	0	4	-.01	5	-.006	6
205		8	max	582.508	2	2.622	4	4.836	4	0	3	0	1	-.002	15
206			min	-715.752	3	.629	15	.004	12	0	4	-.008	5	-.007	6
207		9	max	582.338	2	1.852	4	5.377	4	0	3	0	1	-.002	15
208			min	-715.88	3	.448	15	.004	12	0	4	-.006	5	-.008	6
209		10	max	582.167	2	1.082	4	5.918	4	0	3	0	1	-.002	15
210			min	-716.008	3	.251	12	.004	12	0	4	-.004	5	-.009	6
211		11	max	581.997	2	.417	2	6.458	4	0	3	0	1	-.002	15
212			min	-716.135	3	-.101	3	.004	12	0	4	-.001	5	-.009	6
213		12	max	581.827	2	-.095	15	6.999	4	0	3	.002	4	-.002	15
214			min	-716.263	3	-.551	3	.004	12	0	4	0	12	-.009	6
215		13	max	581.656	2	-.276	15	7.539	4	0	3	.005	4	-.002	15
216			min	-716.391	3	-1.229	6	.004	12	0	4	0	12	-.009	6
217		14	max	581.486	2	-.457	15	8.08	4	0	3	.008	4	-.002	15
218			min	-716.519	3	-1.999	6	.004	12	0	4	0	12	-.008	6
219		15	max	581.316	2	-.638	15	8.62	4	0	3	.012	4	-.002	15
220			min	-716.646	3	-2.769	6	.004	12	0	4	0	12	-.007	6
221		16	max	581.145	2	-.819	15	9.161	4	0	3	.016	4	-.001	15
222			min	-716.774	3	-3.539	6	.004	12	0	4	0	12	-.006	6
223		17	max	580.975	2	-1	15	9.701	4	0	3	.019	4	0	15
224			min	-716.902	3	-4.309	6	.004	12	0	4	0	12	-.004	6
225		18	max	580.805	2	-1.181	15	10.242	4	0	3	.024	4	0	15
226			min	-717.03	3	-5.079	6	.004	12	0	4	0	12	-.002	6
227		19	max	580.634	2	-1.362	15	10.783	4	0	3	.028	4	0	1
228			min	-717.157	3	-5.849	6	.004	12	0	4	0	12	0	1
229	M4	1	max	1172.358	1	0	1	-.378	12	0	1	.018	4	0	1
230			min	-334.59	3	0	1	-225.379	4	0	1	0	10	0	1
231		2	max	1172.528	1	0	1	-.378	12	0	1	0	12	0	1
232			min	-334.462	3	0	1	-225.527	4	0	1	-.008	4	0	1
233		3	max	1172.699	1	0	1	-.378	12	0	1	0	12	0	1
234			min	-334.334	3	0	1	-225.675	4	0	1	-.034	4	0	1
235		4	max	1172.869	1	0	1	-.378	12	0	1	0	12	0	1
236			min	-334.206	3	0	1	-225.822	4	0	1	-.06	4	0	1
237		5	max	1173.039	1	0	1	-.378	12	0	1	0	12	0	1
238			min	-334.079	3	0	1	-225.97	4	0	1	-.086	4	0	1
239		6	max	1173.21	1	0	1	-.378	12	0	1	0	12	0	1
240			min	-333.951	3	0	1	-226.117	4	0	1	-.112	4	0	1
241		7	max	1173.38	1	0	1	-.378	12	0	1	0	12	0	1
242			min	-333.823	3	0	1	-226.265	4	0	1	-.138	4	0	1
243		8	max	1173.55	1	0	1	-.378	12	0	1	0	12	0	1
244			min	-333.695	3	0	1	-226.413	4	0	1	-.164	4	0	1
245		9	max	1173.721	1	0	1	-.378	12	0	1	0	12	0	1
246			min	-333.568	3	0	1	-226.56	4	0	1	-.19	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
247		10	max	1173.891	1	0	1	-.378	12	0	1	0	12	0	1
248			min	-333.44	3	0	1	-226.708	4	0	1	-.216	4	0	1
249		11	max	1174.061	1	0	1	-.378	12	0	1	0	12	0	1
250			min	-333.312	3	0	1	-226.856	4	0	1	-.242	4	0	1
251		12	max	1174.232	1	0	1	-.378	12	0	1	0	12	0	1
252			min	-333.184	3	0	1	-227.003	4	0	1	-.268	4	0	1
253		13	max	1174.402	1	0	1	-.378	12	0	1	0	12	0	1
254			min	-333.057	3	0	1	-227.151	4	0	1	-.294	4	0	1
255		14	max	1174.573	1	0	1	-.378	12	0	1	0	12	0	1
256			min	-332.929	3	0	1	-227.299	4	0	1	-.32	4	0	1
257		15	max	1174.743	1	0	1	-.378	12	0	1	0	12	0	1
258			min	-332.801	3	0	1	-227.446	4	0	1	-.346	4	0	1
259		16	max	1174.913	1	0	1	-.378	12	0	1	0	12	0	1
260			min	-332.673	3	0	1	-227.594	4	0	1	-.373	4	0	1
261		17	max	1175.084	1	0	1	-.378	12	0	1	0	12	0	1
262			min	-332.546	3	0	1	-227.741	4	0	1	-.399	4	0	1
263		18	max	1175.254	1	0	1	-.378	12	0	1	0	12	0	1
264			min	-332.418	3	0	1	-227.889	4	0	1	-.425	4	0	1
265		19	max	1175.424	1	0	1	-.378	12	0	1	0	12	0	1
266			min	-332.29	3	0	1	-228.037	4	0	1	-.451	4	0	1
267	M6	1	max	3545.989	2	2.692	2	0	1	0	1	0	4	0	1
268			min	-4908.388	3	-.199	3	-48.283	4	0	4	0	1	0	1
269		2	max	3546.368	2	2.666	2	0	1	0	1	0	1	0	3
270			min	-4908.104	3	-.218	3	-48.612	4	0	4	-.012	4	0	2
271		3	max	3546.747	2	2.64	2	0	1	0	1	0	1	0	3
272			min	-4907.819	3	-.238	3	-48.942	4	0	4	-.025	4	-.001	2
273		4	max	3547.127	2	2.614	2	0	1	0	1	0	1	0	3
274			min	-4907.535	3	-.257	3	-49.271	4	0	4	-.037	4	-.002	2
275		5	max	3547.506	2	2.588	2	0	1	0	1	0	1	0	3
276			min	-4907.251	3	-.277	3	-49.601	4	0	4	-.05	4	-.003	2
277		6	max	3547.885	2	2.562	2	0	1	0	1	0	1	0	3
278			min	-4906.966	3	-.296	3	-49.93	4	0	4	-.063	4	-.003	2
279		7	max	3548.264	2	2.536	2	0	1	0	1	0	1	0	3
280			min	-4906.682	3	-.316	3	-50.26	4	0	4	-.076	4	-.004	2
281		8	max	3548.644	2	2.51	2	0	1	0	1	0	1	0	3
282			min	-4906.397	3	-.335	3	-50.589	4	0	4	-.089	4	-.005	2
283		9	max	3549.023	2	2.484	2	0	1	0	1	0	1	0	3
284			min	-4906.113	3	-.355	3	-50.919	4	0	4	-.102	4	-.005	2
285		10	max	3549.402	2	2.458	2	0	1	0	1	0	1	0	3
286			min	-4905.828	3	-.374	3	-51.248	4	0	4	-.115	4	-.006	2
287		11	max	3549.781	2	2.432	2	0	1	0	1	0	1	0	3
288			min	-4905.544	3	-.394	3	-51.577	4	0	4	-.128	4	-.007	2
289		12	max	3550.161	2	2.406	2	0	1	0	1	0	1	0	3
290			min	-4905.259	3	-.413	3	-51.907	4	0	4	-.141	4	-.007	2
291		13	max	3550.54	2	2.38	2	0	1	0	1	0	1	0	3
292			min	-4904.975	3	-.433	3	-52.236	4	0	4	-.155	4	-.008	2
293		14	max	3550.919	2	2.354	2	0	1	0	1	0	1	.001	3
294			min	-4904.691	3	-.452	3	-52.566	4	0	4	-.168	4	-.008	2
295		15	max	3551.299	2	2.328	2	0	1	0	1	0	1	.001	3
296			min	-4904.406	3	-.472	3	-52.895	4	0	4	-.181	4	-.009	2
297		16	max	3551.678	2	2.302	2	0	1	0	1	0	1	.001	3
298			min	-4904.122	3	-.491	3	-53.225	4	0	4	-.195	4	-.01	2
299		17	max	3552.057	2	2.276	2	0	1	0	1	0	1	.001	3
300			min	-4903.837	3	-.511	3	-53.554	4	0	4	-.209	4	-.01	2
301		18	max	3552.436	2	2.25	2	0	1	0	1	0	1	.002	3
302			min	-4903.553	3	-.53	3	-53.884	4	0	4	-.223	4	-.011	2
303		19	max	3552.816	2	2.224	2	0	1	0	1	0	1	.002	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
304			min	-4903.268	3	-.55	3	-54.213	4	0	4	-.236	4	-.011	2
305	M7	1	max	2082.665	2	8.014	6	.924	4	0	1	0	1	.011	2
306			min	-2225.257	3	1.881	15	0	1	0	4	-.017	4	-.002	3
307		2	max	2082.495	2	7.244	6	1.464	4	0	1	0	1	.009	2
308			min	-2225.385	3	1.7	15	0	1	0	4	-.016	4	-.003	3
309		3	max	2082.325	2	6.474	6	2.005	4	0	1	0	1	.006	2
310			min	-2225.512	3	1.519	15	0	1	0	4	-.016	4	-.005	3
311		4	max	2082.154	2	5.704	6	2.545	4	0	1	0	1	.004	2
312			min	-2225.64	3	1.338	15	0	1	0	4	-.015	4	-.006	3
313		5	max	2081.984	2	4.934	6	3.086	4	0	1	0	1	.002	2
314			min	-2225.768	3	1.157	15	0	1	0	4	-.013	4	-.007	3
315		6	max	2081.814	2	4.164	6	3.626	4	0	1	0	1	0	2
316			min	-2225.896	3	.976	15	0	1	0	4	-.012	4	-.007	3
317		7	max	2081.643	2	3.394	6	4.167	4	0	1	0	1	-.001	15
318			min	-2226.023	3	.795	15	0	1	0	4	-.01	4	-.008	3
319		8	max	2081.473	2	2.698	2	4.708	4	0	1	0	1	-.002	15
320			min	-2226.151	3	.504	12	0	1	0	4	-.009	4	-.008	3
321		9	max	2081.303	2	2.098	2	5.248	4	0	1	0	1	-.002	15
322			min	-2226.279	3	.204	12	0	1	0	4	-.006	4	-.009	3
323		10	max	2081.132	2	1.498	2	5.789	4	0	1	0	1	-.002	15
324			min	-2226.407	3	-.228	3	0	1	0	4	-.004	5	-.009	4
325		11	max	2080.962	2	.898	2	6.329	4	0	1	0	1	-.002	15
326			min	-2226.534	3	-.678	3	0	1	0	4	-.002	5	-.009	4
327		12	max	2080.791	2	.298	2	6.87	4	0	1	.001	4	-.002	15
328			min	-2226.662	3	-1.128	3	0	1	0	4	0	1	-.009	4
329		13	max	2080.621	2	-.291	15	7.41	4	0	1	.004	4	-.002	15
330			min	-2226.79	3	-1.578	3	0	1	0	4	0	1	-.009	4
331		14	max	2080.451	2	-.472	15	7.951	4	0	1	.007	4	-.002	15
332			min	-2226.918	3	-2.028	3	0	1	0	4	0	1	-.008	4
333		15	max	2080.28	2	-.653	15	8.491	4	0	1	.011	4	-.002	15
334			min	-2227.045	3	-2.765	4	0	1	0	4	0	1	-.007	4
335		16	max	2080.11	2	-.834	15	9.032	4	0	1	.015	4	-.001	15
336			min	-2227.173	3	-3.535	4	0	1	0	4	0	1	-.006	4
337		17	max	2079.94	2	-1.015	15	9.573	4	0	1	.018	4	-.001	15
338			min	-2227.301	3	-4.305	4	0	1	0	4	0	1	-.004	4
339		18	max	2079.769	2	-1.196	15	10.113	4	0	1	.023	4	0	15
340			min	-2227.429	3	-5.075	4	0	1	0	4	0	1	-.002	4
341		19	max	2079.599	2	-1.377	15	10.654	4	0	1	.027	4	0	1
342			min	-2227.556	3	-5.845	4	0	1	0	4	0	1	0	1
343	M8	1	max	3470.355	2	0	1	0	1	0	1	.017	4	0	1
344			min	-1139.728	3	0	1	-219.692	4	0	1	0	1	0	1
345		2	max	3470.525	2	0	1	0	1	0	1	0	1	0	1
346			min	-1139.6	3	0	1	-219.84	4	0	1	-.008	4	0	1
347		3	max	3470.696	2	0	1	0	1	0	1	0	1	0	1
348			min	-1139.472	3	0	1	-219.987	4	0	1	-.034	4	0	1
349		4	max	3470.866	2	0	1	0	1	0	1	0	1	0	1
350			min	-1139.344	3	0	1	-220.135	4	0	1	-.059	4	0	1
351		5	max	3471.036	2	0	1	0	1	0	1	0	1	0	1
352			min	-1139.217	3	0	1	-220.283	4	0	1	-.084	4	0	1
353		6	max	3471.207	2	0	1	0	1	0	1	0	1	0	1
354			min	-1139.089	3	0	1	-220.43	4	0	1	-.11	4	0	1
355		7	max	3471.377	2	0	1	0	1	0	1	0	1	0	1
356			min	-1138.961	3	0	1	-220.578	4	0	1	-.135	4	0	1
357		8	max	3471.547	2	0	1	0	1	0	1	0	1	0	1
358			min	-1138.833	3	0	1	-220.726	4	0	1	-.16	4	0	1
359		9	max	3471.718	2	0	1	0	1	0	1	0	1	0	1
360			min	-1138.706	3	0	1	-220.873	4	0	1	-.186	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
361		10	max	3471.888	2	0	1	0	1	0	1	0	1	0	1
362			min	-1138.578	3	0	1	-221.021	4	0	1	-.211	4	0	1
363		11	max	3472.058	2	0	1	0	1	0	1	0	1	0	1
364			min	-1138.45	3	0	1	-221.168	4	0	1	-.236	4	0	1
365		12	max	3472.229	2	0	1	0	1	0	1	0	1	0	1
366			min	-1138.322	3	0	1	-221.316	4	0	1	-.262	4	0	1
367		13	max	3472.399	2	0	1	0	1	0	1	0	1	0	1
368			min	-1138.195	3	0	1	-221.464	4	0	1	-.287	4	0	1
369		14	max	3472.569	2	0	1	0	1	0	1	0	1	0	1
370			min	-1138.067	3	0	1	-221.611	4	0	1	-.313	4	0	1
371		15	max	3472.74	2	0	1	0	1	0	1	0	1	0	1
372			min	-1137.939	3	0	1	-221.759	4	0	1	-.338	4	0	1
373		16	max	3472.91	2	0	1	0	1	0	1	0	1	0	1
374			min	-1137.811	3	0	1	-221.907	4	0	1	-.363	4	0	1
375		17	max	3473.08	2	0	1	0	1	0	1	0	1	0	1
376			min	-1137.683	3	0	1	-222.054	4	0	1	-.389	4	0	1
377		18	max	3473.251	2	0	1	0	1	0	1	0	1	0	1
378			min	-1137.556	3	0	1	-222.202	4	0	1	-.414	4	0	1
379		19	max	3473.421	2	0	1	0	1	0	1	0	1	0	1
380			min	-1137.428	3	0	1	-222.35	4	0	1	-.44	4	0	1
381	M10	1	max	1120.731	2	1.983	6	-.037	12	0	1	0	2	0	1
382			min	-1520.659	3	.446	15	-48.192	4	0	5	0	3	0	1
383		2	max	1121.111	2	1.949	6	-.037	12	0	1	0	10	0	15
384			min	-1520.375	3	.438	15	-48.522	4	0	5	-.012	4	0	6
385		3	max	1121.49	2	1.916	6	-.037	12	0	1	0	10	0	15
386			min	-1520.09	3	.43	15	-48.851	4	0	5	-.025	4	0	6
387		4	max	1121.869	2	1.883	6	-.037	12	0	1	0	10	0	15
388			min	-1519.806	3	.423	15	-49.181	4	0	5	-.037	4	-.001	6
389		5	max	1122.248	2	1.849	6	-.037	12	0	1	0	12	0	15
390			min	-1519.521	3	.415	15	-49.51	4	0	5	-.05	4	-.002	6
391		6	max	1122.628	2	1.816	6	-.037	12	0	1	0	12	0	15
392			min	-1519.237	3	.407	15	-49.84	4	0	5	-.063	4	-.002	6
393		7	max	1123.007	2	1.782	6	-.037	12	0	1	0	12	0	15
394			min	-1518.952	3	.399	15	-50.169	4	0	5	-.076	4	-.003	6
395		8	max	1123.386	2	1.749	6	-.037	12	0	1	0	12	0	15
396			min	-1518.668	3	.391	15	-50.498	4	0	5	-.089	4	-.003	6
397		9	max	1123.765	2	1.716	6	-.037	12	0	1	0	12	0	15
398			min	-1518.384	3	.383	15	-50.828	4	0	5	-.101	4	-.004	6
399		10	max	1124.145	2	1.682	6	-.037	12	0	1	0	12	0	15
400			min	-1518.099	3	.376	15	-51.157	4	0	5	-.115	4	-.004	6
401		11	max	1124.524	2	1.649	6	-.037	12	0	1	0	12	-.001	15
402			min	-1517.815	3	.368	15	-51.487	4	0	5	-.128	4	-.005	6
403		12	max	1124.903	2	1.617	2	-.037	12	0	1	0	12	-.001	15
404			min	-1517.53	3	.36	15	-51.816	4	0	5	-.141	4	-.005	6
405		13	max	1125.282	2	1.591	2	-.037	12	0	1	0	12	-.001	15
406			min	-1517.246	3	.352	15	-52.146	4	0	5	-.154	4	-.005	6
407		14	max	1125.662	2	1.565	2	-.037	12	0	1	0	12	-.001	15
408			min	-1516.961	3	.344	15	-52.475	4	0	5	-.168	4	-.006	6
409		15	max	1126.041	2	1.539	2	-.037	12	0	1	0	12	-.001	15
410			min	-1516.677	3	.336	15	-52.805	4	0	5	-.181	4	-.006	6
411		16	max	1126.42	2	1.513	2	-.037	12	0	1	0	12	-.001	15
412			min	-1516.392	3	.328	15	-53.134	4	0	5	-.195	4	-.007	6
413		17	max	1126.799	2	1.487	2	-.037	12	0	1	0	12	-.002	15
414			min	-1516.108	3	.32	12	-53.464	4	0	5	-.208	4	-.007	6
415		18	max	1127.179	2	1.461	2	-.037	12	0	1	0	12	-.002	15
416			min	-1515.824	3	.307	12	-53.793	4	0	5	-.222	4	-.007	6
417		19	max	1127.558	2	1.435	2	-.037	12	0	1	0	12	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-1515.539	3	.294	12	-54.123	4	0	5	-.236	4	-.008	6
419	M11	1	max	583.7	2	7.955	6	1.017	4	0	1	0	12	.008	6
420			min	-714.858	3	1.858	15	-.066	1	0	4	-.017	4	.002	15
421		2	max	583.53	2	7.185	6	1.558	4	0	1	0	12	.005	2
422			min	-714.985	3	1.677	15	-.066	1	0	4	-.016	4	0	12
423		3	max	583.36	2	6.415	6	2.099	4	0	1	0	12	.003	2
424			min	-715.113	3	1.496	15	-.066	1	0	4	-.015	4	0	3
425		4	max	583.189	2	5.645	6	2.639	4	0	1	0	12	0	2
426			min	-715.241	3	1.315	15	-.066	1	0	4	-.014	4	-.002	3
427		5	max	583.019	2	4.875	6	3.18	4	0	1	0	12	0	15
428			min	-715.369	3	1.134	15	-.066	1	0	4	-.013	4	-.003	3
429		6	max	582.849	2	4.105	6	3.72	4	0	1	0	12	-.001	15
430			min	-715.497	3	.953	15	-.066	1	0	4	-.012	4	-.005	4
431		7	max	582.678	2	3.335	6	4.261	4	0	1	0	12	-.002	15
432			min	-715.624	3	.772	15	-.066	1	0	4	-.01	4	-.006	4
433		8	max	582.508	2	2.565	6	4.801	4	0	1	0	12	-.002	15
434			min	-715.752	3	.591	15	-.066	1	0	4	-.008	4	-.008	4
435		9	max	582.338	2	1.795	6	5.342	4	0	1	0	12	-.002	15
436			min	-715.88	3	.41	15	-.066	1	0	4	-.006	4	-.009	4
437		10	max	582.167	2	1.025	6	5.882	4	0	1	0	12	-.002	15
438			min	-716.008	3	.229	15	-.066	1	0	4	-.004	4	-.009	4
439		11	max	581.997	2	.417	2	6.423	4	0	1	0	12	-.002	15
440			min	-716.135	3	-.101	3	-.066	1	0	4	-.001	4	-.01	4
441		12	max	581.827	2	-.133	15	6.963	4	0	1	.002	5	-.002	15
442			min	-716.263	3	-.551	3	-.066	1	0	4	0	1	-.009	4
443		13	max	581.656	2	-.314	15	7.504	4	0	1	.005	4	-.002	15
444			min	-716.391	3	-1.286	4	-.066	1	0	4	0	1	-.009	4
445		14	max	581.486	2	-.495	15	8.045	4	0	1	.008	4	-.002	15
446			min	-716.519	3	-2.056	4	-.066	1	0	4	0	1	-.008	4
447		15	max	581.316	2	-.676	15	8.585	4	0	1	.011	4	-.002	15
448			min	-716.646	3	-2.826	4	-.066	1	0	4	0	1	-.007	4
449		16	max	581.145	2	-.857	15	9.126	4	0	1	.015	4	-.001	15
450			min	-716.774	3	-3.596	4	-.066	1	0	4	0	1	-.006	4
451		17	max	580.975	2	-1.038	15	9.666	4	0	1	.019	4	-.001	15
452			min	-716.902	3	-4.366	4	-.066	1	0	4	0	1	-.004	4
453		18	max	580.805	2	-1.219	15	10.207	4	0	1	.023	4	0	15
454			min	-717.03	3	-5.136	4	-.066	1	0	4	0	1	-.002	4
455		19	max	580.634	2	-1.4	15	10.747	4	0	1	.028	4	0	1
456			min	-717.157	3	-5.906	4	-.066	1	0	4	0	1	0	1
457	M12	1	max	1172.358	1	0	1	6.92	1	0	1	.017	4	0	1
458			min	-334.59	3	0	1	-221.664	4	0	1	0	1	0	1
459		2	max	1172.528	1	0	1	6.92	1	0	1	0	1	0	1
460			min	-334.462	3	0	1	-221.812	4	0	1	-.008	4	0	1
461		3	max	1172.699	1	0	1	6.92	1	0	1	.001	1	0	1
462			min	-334.334	3	0	1	-221.959	4	0	1	-.034	4	0	1
463		4	max	1172.869	1	0	1	6.92	1	0	1	.002	1	0	1
464			min	-334.206	3	0	1	-222.107	4	0	1	-.059	4	0	1
465		5	max	1173.039	1	0	1	6.92	1	0	1	.003	1	0	1
466			min	-334.079	3	0	1	-222.255	4	0	1	-.085	4	0	1
467		6	max	1173.21	1	0	1	6.92	1	0	1	.004	1	0	1
468			min	-333.951	3	0	1	-222.402	4	0	1	-.11	4	0	1
469		7	max	1173.38	1	0	1	6.92	1	0	1	.004	1	0	1
470			min	-333.823	3	0	1	-222.55	4	0	1	-.136	4	0	1
471		8	max	1173.55	1	0	1	6.92	1	0	1	.005	1	0	1
472			min	-333.695	3	0	1	-222.697	4	0	1	-.161	4	0	1
473		9	max	1173.721	1	0	1	6.92	1	0	1	.006	1	0	1
474			min	-333.568	3	0	1	-222.845	4	0	1	-.187	4	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
475		10	max	1173.891	1	0	1	6.92	1	0	1	.007	1	0	1
476			min	-333.44	3	0	1	-222.993	4	0	1	-.212	4	0	1
477		11	max	1174.061	1	0	1	6.92	1	0	1	.008	1	0	1
478			min	-333.312	3	0	1	-223.14	4	0	1	-.238	4	0	1
479		12	max	1174.232	1	0	1	6.92	1	0	1	.008	1	0	1
480			min	-333.184	3	0	1	-223.288	4	0	1	-.264	4	0	1
481		13	max	1174.402	1	0	1	6.92	1	0	1	.009	1	0	1
482			min	-333.057	3	0	1	-223.436	4	0	1	-.289	4	0	1
483		14	max	1174.573	1	0	1	6.92	1	0	1	.01	1	0	1
484			min	-332.929	3	0	1	-223.583	4	0	1	-.315	4	0	1
485		15	max	1174.743	1	0	1	6.92	1	0	1	.011	1	0	1
486			min	-332.801	3	0	1	-223.731	4	0	1	-.341	4	0	1
487		16	max	1174.913	1	0	1	6.92	1	0	1	.011	1	0	1
488			min	-332.673	3	0	1	-223.879	4	0	1	-.366	4	0	1
489		17	max	1175.084	1	0	1	6.92	1	0	1	.012	1	0	1
490			min	-332.546	3	0	1	-224.026	4	0	1	-.392	4	0	1
491		18	max	1175.254	1	0	1	6.92	1	0	1	.013	1	0	1
492			min	-332.418	3	0	1	-224.174	4	0	1	-.418	4	0	1
493		19	max	1175.424	1	0	1	6.92	1	0	1	.014	1	0	1
494			min	-332.29	3	0	1	-224.321	4	0	1	-.444	4	0	1
495	M1	1	max	136.138	1	842.057	3	44.657	5	0	1	.165	1	0	15
496			min	-10.049	5	-482.032	2	-69.472	1	0	3	-.069	5	-.016	2
497		2	max	136.628	1	841.048	3	45.898	5	0	1	.129	1	.239	2
498			min	-9.821	5	-483.378	2	-69.472	1	0	3	-.045	5	-.445	3
499		3	max	431.42	3	589.134	2	.19	5	0	3	.092	1	.481	2
500			min	-254.814	2	-624.315	3	-68.965	1	0	2	-.021	5	-.87	3
501		4	max	431.787	3	587.788	2	1.432	5	0	3	.056	1	.184	1
502			min	-254.324	2	-625.325	3	-68.965	1	0	2	-.021	5	-.541	3
503		5	max	432.154	3	586.442	2	2.673	5	0	3	.019	1	-.004	15
504			min	-253.834	2	-626.334	3	-68.965	1	0	2	-.02	5	-.21	3
505		6	max	432.522	3	585.096	2	3.915	5	0	3	0	12	.12	3
506			min	-253.344	2	-627.344	3	-68.965	1	0	2	-.022	4	-.448	2
507		7	max	432.889	3	583.75	2	5.156	5	0	3	-.003	12	.452	3
508			min	-252.854	2	-628.354	3	-68.965	1	0	2	-.054	1	-.757	2
509		8	max	433.257	3	582.404	2	6.397	5	0	3	-.005	12	.783	3
510			min	-252.364	2	-629.363	3	-68.965	1	0	2	-.09	1	-1.064	2
511		9	max	443.066	3	53.513	2	43.703	5	0	9	.055	1	.914	3
512			min	-197.182	2	.406	15	-104.775	1	0	3	-.105	5	-1.217	2
513		10	max	443.433	3	52.167	2	44.944	5	0	9	0	10	.891	3
514			min	-196.692	2	-.001	5	-104.775	1	0	3	-.082	4	-1.245	2
515		11	max	443.801	3	50.821	2	46.186	5	0	9	-.003	12	.869	3
516			min	-196.202	2	-1.692	4	-104.775	1	0	3	-.069	4	-1.273	2
517		12	max	453.478	3	414.767	3	122.984	5	0	2	.089	1	.759	3
518			min	-140.964	2	-694.034	2	-67.525	1	0	3	-.17	5	-1.128	2
519		13	max	453.845	3	413.757	3	124.226	5	0	2	.053	1	.54	3
520			min	-140.474	2	-695.38	2	-67.525	1	0	3	-.105	5	-.762	2
521		14	max	454.213	3	412.748	3	125.467	5	0	2	.018	1	.322	3
522			min	-139.984	2	-696.727	2	-67.525	1	0	3	-.039	5	-.395	2
523		15	max	454.58	3	411.738	3	126.709	5	0	2	.028	5	.105	3
524			min	-139.494	2	-698.073	2	-67.525	1	0	3	-.018	1	-.049	1
525		16	max	454.947	3	410.729	3	127.95	5	0	2	.095	5	.342	2
526			min	-139.004	2	-699.419	2	-67.525	1	0	3	-.054	1	-.112	3
527		17	max	455.315	3	409.719	3	129.192	5	0	2	.163	5	.712	2
528			min	-138.514	2	-700.765	2	-67.525	1	0	3	-.089	1	-.329	3
529		18	max	19.041	5	700.877	2	-4.135	12	0	5	.151	5	.358	2
530			min	-136.903	1	-332.47	3	-95.832	4	0	2	-.127	1	-.162	3
531		19	max	19.27	5	699.531	2	-4.135	12	0	5	.11	5	.013	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
532			min	-136.413	1	-333.48	3	-94.591	4	0	2	-.167	1	-.011	1
533	M5	1	max	299.238	1	2803.463	3	77.316	5	0	1	0	1	.032	2
534			min	8.767	12	-1653.396	2	0	1	0	4	-.147	4	0	15
535		2	max	299.728	1	2802.453	3	78.557	5	0	1	0	1	.905	2
536			min	9.012	12	-1654.742	2	0	1	0	4	-.106	4	-1.478	3
537		3	max	1369.719	3	1723.31	2	35.044	4	0	4	0	1	1.738	2
538			min	-859.383	2	-1944.066	3	0	1	0	1	-.065	4	-2.9	3
539		4	max	1370.087	3	1721.964	2	36.285	4	0	4	0	1	.84	1
540			min	-858.893	2	-1945.076	3	0	1	0	1	-.046	4	-1.873	3
541		5	max	1370.454	3	1720.618	2	37.526	4	0	4	0	1	.02	9
542			min	-858.403	2	-1946.085	3	0	1	0	1	-.027	4	-.847	3
543		6	max	1370.822	3	1719.272	2	38.768	4	0	4	0	1	.18	3
544			min	-857.913	2	-1947.095	3	0	1	0	1	-.007	5	-.987	2
545		7	max	1371.189	3	1717.926	2	40.009	4	0	4	.014	4	1.208	3
546			min	-857.423	2	-1948.104	3	0	1	0	1	0	1	-1.894	2
547		8	max	1371.557	3	1716.58	2	41.251	4	0	4	.036	4	2.236	3
548			min	-856.933	2	-1949.114	3	0	1	0	1	0	1	-2.8	2
549		9	max	1384.198	3	180.022	2	141.11	4	0	1	0	1	2.573	3
550			min	-739.885	2	.405	15	0	1	0	1	-.148	4	-3.192	2
551		10	max	1384.566	3	178.676	2	142.351	4	0	1	0	1	2.491	3
552			min	-739.395	2	0	15	0	1	0	1	-.073	5	-3.286	2
553		11	max	1384.933	3	177.33	2	143.592	4	0	1	.002	4	2.409	3
554			min	-738.905	2	-1.59	6	0	1	0	1	0	1	-3.38	2
555		12	max	1397.839	3	1263.736	3	171.905	4	0	1	0	1	2.114	3
556			min	-621.968	2	-2080.155	2	0	1	0	4	-.241	4	-3.026	2
557		13	max	1398.206	3	1262.726	3	173.147	4	0	1	0	1	1.447	3
558			min	-621.478	2	-2081.501	2	0	1	0	4	-.15	4	-1.928	2
559		14	max	1398.574	3	1261.717	3	174.388	4	0	1	0	1	.781	3
560			min	-620.988	2	-2082.847	2	0	1	0	4	-.058	4	-.83	2
561		15	max	1398.941	3	1260.707	3	175.629	4	0	1	.034	4	.27	2
562			min	-620.498	2	-2084.193	2	0	1	0	4	0	1	-.002	13
563		16	max	1399.309	3	1259.698	3	176.871	4	0	1	.127	4	1.37	2
564			min	-620.008	2	-2085.539	2	0	1	0	4	0	1	-.549	3
565		17	max	1399.676	3	1258.688	3	178.112	4	0	1	.221	4	2.471	2
566			min	-619.518	2	-2086.885	2	0	1	0	4	0	1	-1.214	3
567		18	max	-9.549	12	2370.599	2	0	1	0	4	.237	4	1.273	2
568			min	-299.178	1	-1152.377	3	-27.621	5	0	1	0	1	-.635	3
569		19	max	-9.304	12	2369.253	2	0	1	0	4	.223	4	.023	1
570			min	-298.688	1	-1153.387	3	-26.379	5	0	1	0	1	-.027	3
571	M9	1	max	136.138	1	842.057	3	69.472	1	0	3	-.01	12	0	15
572			min	6.002	12	-482.032	2	4.289	12	0	4	-.165	1	-.016	2
573		2	max	136.628	1	841.048	3	69.472	1	0	3	-.008	12	.239	2
574			min	6.247	12	-483.378	2	4.289	12	0	4	-.129	1	-.445	3
575		3	max	431.42	3	589.134	2	68.965	1	0	2	-.006	12	.481	2
576			min	-254.814	2	-624.315	3	4.25	12	0	3	-.092	1	-.87	3
577		4	max	431.787	3	587.788	2	68.965	1	0	2	-.004	12	.184	1
578			min	-254.324	2	-625.325	3	4.25	12	0	3	-.056	1	-.541	3
579		5	max	432.154	3	586.442	2	68.965	1	0	2	-.001	12	-.004	15
580			min	-253.834	2	-626.334	3	4.25	12	0	3	-.026	4	-.21	3
581		6	max	432.522	3	585.096	2	68.965	1	0	2	.017	1	.12	3
582			min	-253.344	2	-627.344	3	4.25	12	0	3	-.016	5	-.448	2
583		7	max	432.889	3	583.75	2	68.965	1	0	2	.054	1	.452	3
584			min	-252.854	2	-628.354	3	4.25	12	0	3	-.009	5	-.757	2
585		8	max	433.257	3	582.404	2	68.965	1	0	2	.09	1	.783	3
586			min	-252.364	2	-629.363	3	4.25	12	0	3	-.002	5	-1.064	2
587		9	max	443.066	3	53.513	2	104.775	1	0	3	-.003	12	.914	3
588			min	-197.182	2	.412	15	6.141	12	0	9	-.124	4	-1.217	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
589		10	max	443.433	3	52.167	2	104.775	1	0	3	0	1	.891	3
590			min	-196.692	2	.006	15	6.141	12	0	9	-.082	4	-1.245	2
591		11	max	443.801	3	50.821	2	104.775	1	0	3	.056	1	.869	3
592			min	-196.202	2	-1.645	6	6.141	12	0	9	-.051	5	-1.273	2
593		12	max	453.478	3	414.767	3	146.375	4	0	3	-.005	12	.759	3
594			min	-140.964	2	-694.034	2	3.759	12	0	2	-.2	4	-1.128	2
595		13	max	453.845	3	413.757	3	147.617	4	0	3	-.003	12	.54	3
596			min	-140.474	2	-695.38	2	3.759	12	0	2	-.123	4	-.762	2
597		14	max	454.213	3	412.748	3	148.858	4	0	3	-.001	12	.322	3
598			min	-139.984	2	-696.727	2	3.759	12	0	2	-.045	4	-.395	2
599		15	max	454.58	3	411.738	3	150.1	4	0	3	.034	4	.105	3
600			min	-139.494	2	-698.073	2	3.759	12	0	2	0	12	-.049	1
601		16	max	454.947	3	410.729	3	151.341	4	0	3	.114	4	.342	2
602			min	-139.004	2	-699.419	2	3.759	12	0	2	.003	12	-.112	3
603		17	max	455.315	3	409.719	3	152.583	4	0	3	.194	4	.712	2
604			min	-138.514	2	-700.765	2	3.759	12	0	2	.005	12	-.329	3
605		18	max	-5.979	12	700.877	2	74.168	1	0	2	.195	4	.358	2
606			min	-136.903	1	-332.47	3	-71.223	5	0	3	.007	12	-.162	3
607		19	max	-5.734	12	699.531	2	74.168	1	0	2	.167	1	.013	3
608			min	-136.413	1	-333.48	3	-69.982	5	0	3	.009	12	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.132	2	.008	3	1.071e-2	2	NC	1	NC	1
2			min	-.459	4	-.03	3	-.004	2	-2.427e-3	3	NC	1	NC	1
3		2	max	0	1	.216	3	.02	1	1.204e-2	2	NC	4	NC	1
4			min	-.459	4	-.007	9	-.01	5	-2.391e-3	3	830.929	3	NC	1
5		3	max	0	1	.415	3	.047	1	1.338e-2	2	NC	5	NC	2
6			min	-.459	4	-.095	1	-.013	5	-2.354e-3	3	458.998	3	4327.056	1
7		4	max	0	1	.536	3	.071	1	1.471e-2	2	NC	5	NC	3
8			min	-.459	4	-.144	1	-.01	5	-2.317e-3	3	360.73	3	2898.16	1
9		5	max	0	1	.564	3	.082	1	1.605e-2	2	NC	5	NC	3
10			min	-.459	4	-.142	1	-.003	5	-2.281e-3	3	343.375	3	2493.026	1
11		6	max	0	1	.503	3	.078	1	1.739e-2	2	NC	5	NC	3
12			min	-.459	4	-.09	1	.001	10	-2.244e-3	3	383.289	3	2611.944	1
13		7	max	0	1	.369	3	.06	1	1.872e-2	2	NC	5	NC	2
14			min	-.459	4	-.011	9	-.002	10	-2.208e-3	3	511.759	3	3393.274	1
15		8	max	0	1	.199	3	.033	1	2.006e-2	2	NC	1	NC	2
16			min	-.459	4	.002	15	-.005	10	-2.171e-3	3	892.209	3	6172.888	1
17		9	max	0	1	.237	2	.024	3	2.139e-2	2	NC	4	NC	1
18			min	-.459	4	.005	15	-.011	2	-2.134e-3	3	1929.409	2	NC	1
19		10	max	0	1	.281	2	.024	3	2.273e-2	2	NC	3	NC	1
20			min	-.459	4	-.025	3	-.016	2	-2.098e-3	3	1366.293	2	NC	1
21		11	max	0	12	.237	2	.024	3	2.139e-2	2	NC	4	NC	1
22			min	-.459	4	.004	15	-.011	2	-2.134e-3	3	1929.409	2	NC	1
23		12	max	0	12	.199	3	.033	1	2.006e-2	2	NC	1	NC	2
24			min	-.459	4	.002	15	-.009	5	-2.171e-3	3	892.209	3	6172.888	1
25		13	max	0	12	.369	3	.06	1	1.872e-2	2	NC	5	NC	2
26			min	-.459	4	-.011	9	-.003	5	-2.208e-3	3	511.759	3	3393.274	1
27		14	max	0	12	.503	3	.078	1	1.739e-2	2	NC	5	NC	3
28			min	-.459	4	-.09	1	.001	10	-2.244e-3	3	383.289	3	2611.944	1
29		15	max	0	12	.564	3	.082	1	1.605e-2	2	NC	5	NC	3
30			min	-.459	4	-.142	1	.002	10	-2.281e-3	3	343.375	3	2493.026	1
31		16	max	0	12	.536	3	.071	1	1.471e-2	2	NC	5	NC	3
32			min	-.459	4	-.144	1	.002	10	-2.317e-3	3	360.73	3	2898.16	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
33		17	max	0	12	.415	3	.047	1	1.338e-2	2	NC	5	NC	2
34			min	-.459	4	-.095	1	0	10	-2.354e-3	3	458.998	3	4327.056	1
35		18	max	0	12	.216	3	.02	1	1.204e-2	2	NC	4	NC	1
36			min	-.459	4	-.007	9	-.001	10	-2.391e-3	3	830.929	3	NC	1
37		19	max	0	12	.132	2	.008	3	1.071e-2	2	NC	1	NC	1
38			min	-.459	4	-.03	3	-.004	2	-2.427e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.274	3	.007	3	6.175e-3	2	NC	1	NC	1
40			min	-.36	4	-.407	2	-.004	2	-4.865e-3	3	NC	1	NC	1
41		2	max	0	1	.538	3	.014	1	7.299e-3	2	NC	5	NC	1
42			min	-.36	4	-.655	2	-.016	5	-5.835e-3	3	772.021	3	NC	1
43		3	max	0	1	.765	3	.037	1	8.422e-3	2	NC	5	NC	2
44			min	-.36	4	-.873	2	-.019	5	-6.805e-3	3	415.414	3	5532.861	1
45		4	max	0	1	.928	3	.06	1	9.545e-3	2	NC	5	NC	3
46			min	-.36	4	-1.04	2	-.014	5	-7.775e-3	3	311.574	3	3448.599	1
47		5	max	0	1	1.016	3	.072	1	1.067e-2	2	NC	15	NC	3
48			min	-.36	4	-1.146	2	-.003	5	-8.745e-3	3	274.867	3	2850.929	1
49		6	max	0	1	1.027	3	.071	1	1.179e-2	2	NC	15	NC	3
50			min	-.36	4	-1.188	2	0	10	-9.716e-3	3	261.228	2	2911.418	1
51		7	max	0	1	.973	3	.055	1	1.291e-2	2	NC	15	NC	2
52			min	-.36	4	-1.176	2	-.002	10	-1.069e-2	3	265.47	2	3712.188	1
53		8	max	0	1	.881	3	.032	4	1.404e-2	2	NC	15	NC	2
54			min	-.36	4	-1.127	2	-.005	10	-1.166e-2	3	283.644	2	6394.942	4
55		9	max	0	1	.787	3	.021	3	1.516e-2	2	NC	5	NC	1
56			min	-.36	4	-1.068	2	-.01	2	-1.263e-2	3	308.604	2	9515.603	4
57		10	max	0	1	.742	3	.021	3	1.628e-2	2	NC	5	NC	1
58			min	-.36	4	-1.039	2	-.015	2	-1.36e-2	3	323.049	2	NC	1
59		11	max	0	12	.787	3	.021	3	1.516e-2	2	NC	5	NC	1
60			min	-.36	4	-1.068	2	-.016	5	-1.263e-2	3	308.604	2	NC	1
61		12	max	0	12	.881	3	.031	1	1.404e-2	2	NC	15	NC	2
62			min	-.36	4	-1.127	2	-.019	5	-1.166e-2	3	283.644	2	6637.229	1
63		13	max	0	12	.973	3	.055	1	1.291e-2	2	NC	15	NC	2
64			min	-.36	4	-1.176	2	-.012	5	-1.069e-2	3	265.47	2	3712.188	1
65		14	max	0	12	1.027	3	.071	1	1.179e-2	2	NC	15	NC	3
66			min	-.36	4	-1.188	2	0	5	-9.716e-3	3	261.228	2	2911.418	1
67		15	max	0	12	1.016	3	.072	1	1.067e-2	2	NC	15	NC	3
68			min	-.36	4	-1.146	2	.002	10	-8.745e-3	3	274.867	3	2850.929	1
69		16	max	0	12	.928	3	.06	1	9.545e-3	2	NC	5	NC	3
70			min	-.36	4	-1.04	2	.002	10	-7.775e-3	3	311.574	3	3448.599	1
71		17	max	0	12	.765	3	.037	1	8.422e-3	2	NC	5	NC	2
72			min	-.36	4	-.873	2	0	10	-6.805e-3	3	415.414	3	5532.861	1
73		18	max	0	12	.538	3	.022	4	7.299e-3	2	NC	5	NC	1
74			min	-.36	4	-.655	2	-.002	10	-5.835e-3	3	772.021	3	9328.813	4
75		19	max	0	12	.274	3	.007	3	6.175e-3	2	NC	1	NC	1
76			min	-.36	4	-.407	2	-.004	2	-4.865e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.28	3	.006	3	4.14e-3	3	NC	1	NC	1
78			min	-.302	4	-.407	2	-.004	2	-6.4e-3	2	NC	1	NC	1
79		2	max	0	12	.458	3	.014	1	4.965e-3	3	NC	5	NC	1
80			min	-.302	4	-.717	2	-.023	5	-7.568e-3	2	657.811	2	8432.226	5
81		3	max	0	12	.616	3	.038	1	5.79e-3	3	NC	5	NC	2
82			min	-.302	4	-.985	2	-.028	5	-8.735e-3	2	352.582	2	5512.484	1
83		4	max	0	12	.738	3	.06	1	6.615e-3	3	NC	5	NC	3
84			min	-.302	4	-1.183	2	-.021	5	-9.902e-3	2	262.692	2	3437.402	1
85		5	max	0	12	.817	3	.072	1	7.44e-3	3	NC	15	NC	3
86			min	-.302	4	-1.296	2	-.006	5	-1.107e-2	2	229.413	2	2841.361	1
87		6	max	0	12	.851	3	.071	1	8.265e-3	3	NC	15	NC	3
88			min	-.302	4	-1.322	2	.001	10	-1.224e-2	2	222.786	2	2899.792	1
89		7	max	0	12	.847	3	.056	1	9.09e-3	3	NC	15	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
90			min	-.302	4	-1.276	2	-.001	10	-1.34e-2	2	234.743	2	3691.205	1
91		8	max	0	12	.816	3	.039	4	9.915e-3	3	NC	15	NC	2
92			min	-.302	4	-1.183	2	-.004	10	-1.457e-2	2	262.749	2	5197.112	4
93		9	max	0	12	.777	3	.027	4	1.074e-2	3	NC	5	NC	1
94			min	-.302	4	-1.086	2	-.009	2	-1.574e-2	2	300.503	2	7416.869	4
95		10	max	0	1	.757	3	.02	3	1.157e-2	3	NC	5	NC	1
96			min	-.302	4	-1.038	2	-.014	2	-1.691e-2	2	323.057	2	NC	1
97		11	max	0	1	.777	3	.02	3	1.074e-2	3	NC	5	NC	1
98			min	-.302	4	-1.086	2	-.022	5	-1.574e-2	2	300.503	2	9189.871	5
99		12	max	0	1	.816	3	.032	1	9.915e-3	3	NC	15	NC	2
100			min	-.302	4	-1.183	2	-.026	5	-1.457e-2	2	262.749	2	6565.646	1
101		13	max	0	1	.847	3	.056	1	9.09e-3	3	NC	15	NC	2
102			min	-.302	4	-1.276	2	-.018	5	-1.34e-2	2	234.743	2	3691.205	1
103		14	max	0	1	.851	3	.071	1	8.265e-3	3	NC	15	NC	3
104			min	-.302	4	-1.322	2	-.002	5	-1.224e-2	2	222.786	2	2899.792	1
105		15	max	0	1	.817	3	.072	1	7.44e-3	3	NC	15	NC	3
106			min	-.302	4	-1.296	2	.002	10	-1.107e-2	2	229.413	2	2841.361	1
107		16	max	0	1	.738	3	.06	1	6.615e-3	3	NC	5	NC	3
108			min	-.302	4	-1.183	2	.002	10	-9.902e-3	2	262.692	2	3437.402	1
109		17	max	0	1	.616	3	.042	4	5.79e-3	3	NC	5	NC	2
110			min	-.302	4	-.985	2	0	10	-8.735e-3	2	352.582	2	4813.96	4
111		18	max	0	1	.458	3	.029	4	4.965e-3	3	NC	5	NC	1
112			min	-.302	4	-.717	2	-.001	10	-7.568e-3	2	657.811	2	7053.59	4
113		19	max	0	1	.28	3	.006	3	4.14e-3	3	NC	1	NC	1
114			min	-.302	4	-.407	2	-.004	2	-6.4e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.116	2	.006	3	7.503e-3	3	NC	1	NC	1
116			min	-.129	4	-.094	3	-.003	2	-8.963e-3	2	NC	1	NC	1
117		2	max	0	12	.002	13	.02	1	8.61e-3	3	NC	4	NC	1
118			min	-.129	4	-.07	2	-.017	5	-9.897e-3	2	1097.027	2	NC	1
119		3	max	0	12	.043	3	.048	1	9.717e-3	3	NC	5	NC	2
120			min	-.129	4	-.217	2	-.022	5	-1.083e-2	2	611.988	2	4327.942	1
121		4	max	0	12	.072	3	.071	1	1.082e-2	3	NC	5	NC	3
122			min	-.129	4	-.3	2	-.017	5	-1.176e-2	2	489.924	2	2890.954	1
123		5	max	0	12	.065	3	.083	1	1.193e-2	3	NC	5	NC	3
124			min	-.129	4	-.307	2	-.007	5	-1.27e-2	2	481.889	2	2479.797	1
125		6	max	0	12	.023	3	.079	1	1.304e-2	3	NC	5	NC	3
126			min	-.129	4	-.24	2	.003	10	-1.363e-2	2	572.426	2	2587.577	1
127		7	max	0	12	.001	13	.062	1	1.415e-2	3	NC	4	NC	2
128			min	-.129	4	-.116	2	0	10	-1.457e-2	2	880.405	2	3335.878	1
129		8	max	0	12	.061	1	.035	1	1.525e-2	3	NC	4	NC	2
130			min	-.129	4	-.124	3	-.003	10	-1.55e-2	2	2565.796	2	5940.096	1
131		9	max	0	12	.176	1	.019	4	1.636e-2	3	NC	4	NC	1
132			min	-.129	4	-.193	3	-.007	2	-1.643e-2	2	2061.174	3	NC	1
133		10	max	0	1	.233	2	.017	3	1.747e-2	3	NC	4	NC	1
134			min	-.129	4	-.224	3	-.013	2	-1.737e-2	2	1572.955	3	NC	1
135		11	max	0	1	.176	1	.018	3	1.636e-2	3	NC	4	NC	1
136			min	-.129	4	-.193	3	-.014	5	-1.643e-2	2	2061.174	3	NC	1
137		12	max	0	1	.061	1	.035	1	1.525e-2	3	NC	4	NC	2
138			min	-.129	4	-.124	3	-.014	5	-1.55e-2	2	2565.796	2	5940.096	1
139		13	max	0	1	.001	13	.062	1	1.415e-2	3	NC	4	NC	2
140			min	-.129	4	-.116	2	-.007	5	-1.457e-2	2	880.405	2	3335.878	1
141		14	max	0	1	.023	3	.079	1	1.304e-2	3	NC	5	NC	3
142			min	-.129	4	-.24	2	.003	10	-1.363e-2	2	572.426	2	2587.577	1
143		15	max	0	1	.065	3	.083	1	1.193e-2	3	NC	5	NC	3
144			min	-.129	4	-.307	2	.004	10	-1.27e-2	2	481.889	2	2479.797	1
145		16	max	0	1	.072	3	.071	1	1.082e-2	3	NC	5	NC	3
146			min	-.129	4	-.3	2	.003	10	-1.176e-2	2	489.924	2	2890.954	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
147		17	max	0	1	.043	3	.048	1	9.717e-3	3	NC	5	NC	2
148			min	-.129	4	-.217	2	.002	10	-1.083e-2	2	611.988	2	4327.942	1
149		18	max	0	1	.001	13	.025	4	8.61e-3	3	NC	4	NC	1
150			min	-.129	4	-.07	2	0	10	-9.897e-3	2	1097.027	2	8106.353	4
151		19	max	0	1	.116	2	.006	3	7.503e-3	3	NC	1	NC	1
152			min	-.129	4	-.094	3	-.003	2	-8.963e-3	2	NC	1	NC	1
153	M2	1	max	.006	2	.006	2	.005	1	1.236e-3	5	NC	1	NC	1
154			min	-.008	3	-.01	3	-.434	4	-1.384e-4	1	9024.487	2	127.467	4
155		2	max	.006	2	.005	2	.005	1	1.306e-3	5	NC	1	NC	1
156			min	-.008	3	-.01	3	-.399	4	-1.292e-4	1	NC	1	138.828	4
157		3	max	.005	2	.005	2	.004	1	1.376e-3	5	NC	1	NC	1
158			min	-.007	3	-.009	3	-.363	4	-1.2e-4	1	NC	1	152.325	4
159		4	max	.005	2	.004	2	.004	1	1.446e-3	5	NC	1	NC	1
160			min	-.007	3	-.009	3	-.328	4	-1.108e-4	1	NC	1	168.517	4
161		5	max	.005	2	.003	2	.004	1	1.516e-3	5	NC	1	NC	1
162			min	-.006	3	-.009	3	-.294	4	-1.015e-4	1	NC	1	188.16	4
163		6	max	.004	2	.003	2	.003	1	1.586e-3	5	NC	1	NC	1
164			min	-.006	3	-.008	3	-.261	4	-9.229e-5	1	NC	1	212.307	4
165		7	max	.004	2	.002	2	.003	1	1.656e-3	5	NC	1	NC	1
166			min	-.005	3	-.008	3	-.228	4	-8.306e-5	1	NC	1	242.448	4
167		8	max	.004	2	.001	2	.002	1	1.726e-3	5	NC	1	NC	1
168			min	-.005	3	-.007	3	-.197	4	-7.383e-5	1	NC	1	280.759	4
169		9	max	.003	2	0	2	.002	1	1.799e-3	4	NC	1	NC	1
170			min	-.004	3	-.007	3	-.167	4	-6.46e-5	1	NC	1	330.515	4
171		10	max	.003	2	0	2	.002	1	1.873e-3	4	NC	1	NC	1
172			min	-.004	3	-.006	3	-.139	4	-5.536e-5	1	NC	1	396.838	4
173		11	max	.003	2	0	2	.001	1	1.946e-3	4	NC	1	NC	1
174			min	-.004	3	-.006	3	-.113	4	-4.613e-5	1	NC	1	488.11	4
175		12	max	.002	2	0	2	.001	1	2.019e-3	4	NC	1	NC	1
176			min	-.003	3	-.005	3	-.089	4	-3.69e-5	1	NC	1	618.836	4
177		13	max	.002	2	0	15	0	1	2.092e-3	4	NC	1	NC	1
178			min	-.003	3	-.004	3	-.068	4	-2.767e-5	1	NC	1	815.955	4
179		14	max	.002	2	0	15	0	1	2.165e-3	4	NC	1	NC	1
180			min	-.002	3	-.004	3	-.049	4	-1.844e-5	1	NC	1	1134.313	4
181		15	max	.001	2	0	15	0	1	2.239e-3	4	NC	1	NC	1
182			min	-.002	3	-.003	3	-.033	4	-9.208e-6	1	NC	1	1700.481	4
183		16	max	0	2	0	15	0	1	2.312e-3	4	NC	1	NC	1
184			min	-.001	3	-.002	3	-.019	4	-7.796e-7	3	NC	1	2864.913	4
185		17	max	0	2	0	15	0	1	2.385e-3	4	NC	1	NC	1
186			min	0	3	-.002	3	-.009	4	1.141e-7	12	NC	1	5930.426	4
187		18	max	0	2	0	15	0	1	2.458e-3	4	NC	1	NC	1
188			min	0	3	0	3	-.003	4	6.975e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.531e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.281e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.261e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-5.961e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.012	4	7.504e-6	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-4.209e-5	5	NC	1	NC	1
195		3	max	0	3	0	15	.023	4	5.164e-4	4	NC	1	NC	1
196			min	0	2	-.003	6	0	12	1.304e-6	12	NC	1	NC	1
197		4	max	.001	3	-.001	15	.034	4	1.073e-3	4	NC	1	NC	1
198			min	0	2	-.005	6	0	12	2.17e-6	12	NC	1	NC	1
199		5	max	.001	3	-.001	15	.044	4	1.629e-3	4	NC	1	NC	1
200			min	-.001	2	-.007	6	0	12	3.035e-6	12	NC	1	NC	1
201		6	max	.002	3	-.002	15	.054	4	2.185e-3	4	NC	1	NC	1
202			min	-.001	2	-.009	6	0	12	3.9e-6	12	NC	1	NC	1
203		7	max	.002	3	-.002	15	.063	4	2.741e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
204			min	-.002	2	-.01	6	0	12	4.765e-6	12	9105.278	6	NC	1
205		8	max	.002	3	-.002	15	.071	4	3.298e-3	4	NC	1	NC	1
206			min	-.002	2	-.011	6	0	12	5.631e-6	12	8134.444	6	NC	1
207		9	max	.003	3	-.003	15	.079	4	3.854e-3	4	NC	1	NC	1
208			min	-.002	2	-.012	6	0	12	6.496e-6	12	7555.994	6	NC	1
209		10	max	.003	3	-.003	15	.087	4	4.41e-3	4	NC	2	NC	1
210			min	-.003	2	-.013	6	0	12	7.361e-6	12	7267.823	6	NC	1
211		11	max	.003	3	-.003	15	.095	4	4.966e-3	4	NC	2	NC	1
212			min	-.003	2	-.013	6	0	12	8.226e-6	12	7226.989	6	NC	1
213		12	max	.004	3	-.003	15	.102	4	5.523e-3	4	NC	2	NC	1
214			min	-.003	2	-.012	6	0	12	9.092e-6	12	7433.173	6	NC	1
215		13	max	.004	3	-.002	15	.11	4	6.079e-3	4	NC	1	NC	1
216			min	-.003	2	-.012	6	0	12	9.957e-6	12	7930.607	6	NC	1
217		14	max	.005	3	-.002	15	.118	4	6.635e-3	4	NC	1	NC	1
218			min	-.004	2	-.01	6	0	12	1.082e-5	12	8831.453	6	NC	1
219		15	max	.005	3	-.002	15	.127	4	7.191e-3	4	NC	1	NC	1
220			min	-.004	2	-.009	6	0	12	1.169e-5	12	NC	1	NC	1
221		16	max	.005	3	-.001	15	.135	4	7.748e-3	4	NC	1	NC	1
222			min	-.004	2	-.007	1	0	12	1.255e-5	12	NC	1	NC	1
223		17	max	.006	3	0	15	.145	4	8.304e-3	4	NC	1	NC	1
224			min	-.005	2	-.006	1	0	12	1.342e-5	12	NC	1	NC	1
225		18	max	.006	3	0	15	.156	4	8.86e-3	4	NC	1	NC	1
226			min	-.005	2	-.004	1	0	12	1.428e-5	12	NC	1	NC	1
227		19	max	.006	3	0	5	.167	4	9.416e-3	4	NC	1	NC	1
228			min	-.005	2	-.003	1	0	12	1.515e-5	12	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	12	1.924e-5	1	NC	1	NC	2
230			min	0	3	-.006	3	-.167	4	-2.589e-4	5	NC	1	148.484	4
231		2	max	.003	1	.004	2	0	12	1.924e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.154	4	-2.589e-4	5	NC	1	161.521	4
233		3	max	.002	1	.004	2	0	12	1.924e-5	1	NC	1	NC	2
234			min	0	3	-.006	3	-.14	4	-2.589e-4	5	NC	1	177.034	4
235		4	max	.002	1	.004	2	0	12	1.924e-5	1	NC	1	NC	2
236			min	0	3	-.005	3	-.127	4	-2.589e-4	5	NC	1	195.664	4
237		5	max	.002	1	.004	2	0	12	1.924e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.114	4	-2.589e-4	5	NC	1	218.286	4
239		6	max	.002	1	.003	2	0	12	1.924e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.101	4	-2.589e-4	5	NC	1	246.112	4
241		7	max	.002	1	.003	2	0	12	1.924e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.088	4	-2.589e-4	5	NC	1	280.865	4
243		8	max	.002	1	.003	2	0	12	1.924e-5	1	NC	1	NC	1
244			min	0	3	-.004	3	-.076	4	-2.589e-4	5	NC	1	325.053	4
245		9	max	.002	1	.003	2	0	12	1.924e-5	1	NC	1	NC	1
246			min	0	3	-.003	3	-.065	4	-2.589e-4	5	NC	1	382.456	4
247		10	max	.001	1	.002	2	0	12	1.924e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.054	4	-2.589e-4	5	NC	1	458.981	4
249		11	max	.001	1	.002	2	0	12	1.924e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.044	4	-2.589e-4	5	NC	1	564.292	4
251		12	max	.001	1	.002	2	0	12	1.924e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.035	4	-2.589e-4	5	NC	1	715.105	4
253		13	max	0	1	.002	2	0	12	1.924e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.026	4	-2.589e-4	5	NC	1	942.449	4
255		14	max	0	1	.001	2	0	12	1.924e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	-.019	4	-2.589e-4	5	NC	1	1309.448	4
257		15	max	0	1	.001	2	0	12	1.924e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	-.013	4	-2.589e-4	5	NC	1	1961.615	4
259		16	max	0	1	0	2	0	12	1.924e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	-.008	4	-2.589e-4	5	NC	1	3301.202	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
261		17	max	0	1	0	2	0	12	1.924e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.004	4	-2.589e-4	5	NC	1	6819.662	4
263		18	max	0	1	0	2	0	12	1.924e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-2.589e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.924e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.589e-4	5	NC	1	NC	1
267	M6	1	max	.019	2	.022	2	0	1	1.29e-3	4	NC	4	NC	1
268			min	-.026	3	-.032	3	-.438	4	0	1	1712.415	3	126.392	4
269		2	max	.018	2	.02	2	0	1	1.359e-3	4	NC	4	NC	1
270			min	-.025	3	-.03	3	-.402	4	0	1	1817.093	3	137.658	4
271		3	max	.017	2	.019	2	0	1	1.427e-3	4	NC	4	NC	1
272			min	-.023	3	-.029	3	-.366	4	0	1	1935.341	3	151.043	4
273		4	max	.016	2	.017	2	0	1	1.496e-3	4	NC	4	NC	1
274			min	-.022	3	-.027	3	-.331	4	0	1	2069.904	3	167.101	4
275		5	max	.015	2	.015	2	0	1	1.564e-3	4	NC	4	NC	1
276			min	-.02	3	-.025	3	-.297	4	0	1	2224.314	3	186.583	4
277		6	max	.014	2	.013	2	0	1	1.633e-3	4	NC	4	NC	1
278			min	-.019	3	-.023	3	-.263	4	0	1	2403.191	3	210.531	4
279		7	max	.013	2	.012	2	0	1	1.701e-3	4	NC	1	NC	1
280			min	-.017	3	-.021	3	-.23	4	0	1	2612.699	3	240.426	4
281		8	max	.012	2	.01	2	0	1	1.77e-3	4	NC	1	NC	1
282			min	-.016	3	-.019	3	-.199	4	0	1	2861.242	3	278.424	4
283		9	max	.011	2	.009	2	0	1	1.838e-3	4	NC	1	NC	1
284			min	-.015	3	-.018	3	-.169	4	0	1	3160.594	3	327.777	4
285		10	max	.009	2	.007	2	0	1	1.907e-3	4	NC	1	NC	1
286			min	-.013	3	-.016	3	-.141	4	0	1	3527.761	3	393.565	4
287		11	max	.008	2	.006	2	0	1	1.976e-3	4	NC	1	NC	1
288			min	-.012	3	-.014	3	-.114	4	0	1	3988.26	3	484.105	4
289		12	max	.007	2	.005	2	0	1	2.044e-3	4	NC	1	NC	1
290			min	-.01	3	-.012	3	-.09	4	0	1	4582.198	3	613.792	4
291		13	max	.006	2	.003	2	0	1	2.113e-3	4	NC	1	NC	1
292			min	-.009	3	-.01	3	-.068	4	0	1	5376.423	3	809.361	4
293		14	max	.005	2	.003	2	0	1	2.181e-3	4	NC	1	NC	1
294			min	-.007	3	-.009	3	-.049	4	0	1	6491.277	3	1125.252	4
295		15	max	.004	2	.002	2	0	1	2.25e-3	4	NC	1	NC	1
296			min	-.006	3	-.007	3	-.033	4	0	1	8167.458	3	1687.124	4
297		16	max	.003	2	.001	2	0	1	2.318e-3	4	NC	1	NC	1
298			min	-.004	3	-.005	3	-.019	4	0	1	NC	1	2842.997	4
299		17	max	.002	2	0	2	0	1	2.387e-3	4	NC	1	NC	1
300			min	-.003	3	-.003	3	-.009	4	0	1	NC	1	5887.243	4
301		18	max	.001	2	0	2	0	1	2.455e-3	4	NC	1	NC	1
302			min	-.001	3	-.002	3	-.003	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	2.524e-3	4	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	-5.933e-4	4	NC	1	NC	1
307		2	max	.001	3	0	2	.012	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-4.932e-5	5	NC	1	NC	1
309		3	max	.002	3	0	2	.023	4	4.955e-4	4	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	.034	4	1.04e-3	4	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	.044	4	1.584e-3	4	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	.053	4	2.129e-3	4	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	8689.371	3	NC	1
317		7	max	.006	3	-.002	15	.062	4	2.673e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
318			min	-.006	2	-.013	3	0	1	0	1	7759.186	3	NC	1
319		8	max	.008	3	-.003	15	.071	4	3.217e-3	4	NC	1	NC	1
320			min	-.007	2	-.014	3	0	1	0	1	7208.44	3	NC	1
321		9	max	.009	3	-.003	15	.079	4	3.762e-3	4	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	6923.482	3	NC	1
323		10	max	.01	3	-.003	15	.086	4	4.306e-3	4	NC	1	NC	1
324			min	-.009	2	-.015	3	0	1	0	1	6853.291	3	NC	1
325		11	max	.011	3	-.003	15	.094	4	4.85e-3	4	NC	1	NC	1
326			min	-.01	2	-.015	3	0	1	0	1	6984.956	3	NC	1
327		12	max	.012	3	-.003	15	.101	4	5.395e-3	4	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7337.874	3	NC	1
329		13	max	.013	3	-.003	15	.109	4	5.939e-3	4	NC	1	NC	1
330			min	-.012	2	-.013	3	0	1	0	1	7943.31	4	NC	1
331		14	max	.014	3	-.003	15	.116	4	6.483e-3	4	NC	1	NC	1
332			min	-.013	2	-.012	3	0	1	0	1	8845.08	4	NC	1
333		15	max	.015	3	-.002	15	.124	4	7.028e-3	4	NC	1	NC	1
334			min	-.014	2	-.011	3	0	1	0	1	NC	1	NC	1
335		16	max	.016	3	-.002	15	.133	4	7.572e-3	4	NC	1	NC	1
336			min	-.015	2	-.009	3	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	.142	4	8.117e-3	4	NC	1	NC	1
338			min	-.016	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	0	15	.152	4	8.661e-3	4	NC	1	NC	1
340			min	-.017	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	15	.163	4	9.205e-3	4	NC	1	NC	1
342			min	-.018	2	-.006	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	-.019	3	-.163	4	-3.02e-4	4	NC	1	152.177	4
345		2	max	.008	2	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.003	3	-.018	3	-.15	4	-3.02e-4	4	NC	1	165.543	4
347		3	max	.007	2	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.017	3	-.137	4	-3.02e-4	4	NC	1	181.445	4
349		4	max	.007	2	.014	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.016	3	-.124	4	-3.02e-4	4	NC	1	200.544	4
351		5	max	.006	2	.013	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.015	3	-.111	4	-3.02e-4	4	NC	1	223.734	4
353		6	max	.006	2	.012	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.014	3	-.098	4	-3.02e-4	4	NC	1	252.26	4
355		7	max	.006	2	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.013	3	-.086	4	-3.02e-4	4	NC	1	287.886	4
357		8	max	.005	2	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.002	3	-.012	3	-.074	4	-3.02e-4	4	NC	1	333.184	4
359		9	max	.005	2	.009	2	0	1	0	1	NC	1	NC	1
360			min	-.002	3	-.011	3	-.063	4	-3.02e-4	4	NC	1	392.029	4
361		10	max	.004	2	.008	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.01	3	-.053	4	-3.02e-4	4	NC	1	470.477	4
363		11	max	.004	2	.007	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.009	3	-.043	4	-3.02e-4	4	NC	1	578.433	4
365		12	max	.003	2	.006	2	0	1	0	1	NC	1	NC	1
366			min	-.001	3	-.008	3	-.034	4	-3.02e-4	4	NC	1	733.036	4
367		13	max	.003	2	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	-.026	4	-3.02e-4	4	NC	1	966.093	4
369		14	max	.002	2	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	-.018	4	-3.02e-4	4	NC	1	1342.316	4
371		15	max	.002	2	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	-.012	4	-3.02e-4	4	NC	1	2010.879	4
373		16	max	.001	2	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	-.007	4	-3.02e-4	4	NC	1	3384.157	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	-.004	4	-3.02e-4	4	NC	1	6991.144	4
377		18	max	0	2	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	-.001	4	-3.02e-4	4	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	-3.02e-4	4	NC	1	NC	1
381	M10	1	max	.006	2	.006	2	0	12	1.288e-3	4	NC	1	NC	1
382			min	-.008	3	-.01	3	-.437	4	9.221e-6	12	9024.487	2	126.624	4
383		2	max	.006	2	.005	2	0	12	1.356e-3	4	NC	1	NC	1
384			min	-.008	3	-.01	3	-.401	4	8.637e-6	12	NC	1	137.911	4
385		3	max	.005	2	.005	2	0	12	1.425e-3	4	NC	1	NC	1
386			min	-.007	3	-.009	3	-.366	4	8.054e-6	12	NC	1	151.32	4
387		4	max	.005	2	.004	2	0	12	1.493e-3	4	NC	1	NC	1
388			min	-.007	3	-.009	3	-.331	4	7.47e-6	12	NC	1	167.407	4
389		5	max	.005	2	.003	2	0	12	1.561e-3	4	NC	1	NC	1
390			min	-.006	3	-.009	3	-.296	4	6.887e-6	12	NC	1	186.925	4
391		6	max	.004	2	.003	2	0	12	1.629e-3	4	NC	1	NC	1
392			min	-.006	3	-.008	3	-.262	4	6.303e-6	12	NC	1	210.917	4
393		7	max	.004	2	.002	2	0	12	1.698e-3	4	NC	1	NC	1
394			min	-.005	3	-.008	3	-.23	4	5.72e-6	12	NC	1	240.866	4
395		8	max	.004	2	.001	2	0	12	1.766e-3	4	NC	1	NC	1
396			min	-.005	3	-.007	3	-.198	4	5.137e-6	12	NC	1	278.935	4
397		9	max	.003	2	0	2	0	12	1.834e-3	4	NC	1	NC	1
398			min	-.004	3	-.007	3	-.169	4	4.553e-6	12	NC	1	328.378	4
399		10	max	.003	2	0	2	0	12	1.902e-3	4	NC	1	NC	1
400			min	-.004	3	-.006	3	-.14	4	3.97e-6	12	NC	1	394.287	4
401		11	max	.003	2	0	2	0	12	1.971e-3	4	NC	1	NC	1
402			min	-.004	3	-.006	3	-.114	4	3.386e-6	12	NC	1	484.995	4
403		12	max	.002	2	0	2	0	12	2.039e-3	4	NC	1	NC	1
404			min	-.003	3	-.005	3	-.09	4	2.803e-6	12	NC	1	614.922	4
405		13	max	.002	2	0	2	0	12	2.107e-3	4	NC	1	NC	1
406			min	-.003	3	-.004	3	-.068	4	2.079e-6	10	NC	1	810.855	4
407		14	max	.002	2	0	2	0	12	2.175e-3	4	NC	1	NC	1
408			min	-.002	3	-.004	3	-.049	4	1.314e-6	10	NC	1	1127.337	4
409		15	max	.001	2	0	15	0	12	2.243e-3	4	NC	1	NC	1
410			min	-.002	3	-.003	3	-.033	4	5.49e-7	10	NC	1	1690.268	4
411		16	max	0	2	0	15	0	12	2.312e-3	4	NC	1	NC	1
412			min	-.001	3	-.002	3	-.019	4	-3.362e-7	2	NC	1	2848.349	4
413		17	max	0	2	0	15	0	12	2.38e-3	4	NC	1	NC	1
414			min	0	3	-.002	3	-.009	4	-9.255e-6	1	NC	1	5898.533	4
415		18	max	0	2	0	15	0	12	2.448e-3	4	NC	1	NC	1
416			min	0	3	0	4	-.003	4	-1.849e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	2.516e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.772e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	8.824e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-5.914e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.012	4	-4.391e-7	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-4.39e-5	4	NC	1	NC	1
423		3	max	0	3	0	15	.023	4	5.036e-4	4	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-2.383e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	.034	4	1.051e-3	4	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-4.016e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	.044	4	1.599e-3	4	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-5.649e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	.053	4	2.146e-3	4	NC	1	NC	1
430			min	-.001	2	-.009	4	0	1	-7.282e-5	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	.062	4	2.694e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
432			min	-.002	2	-.011	4	-.001	1	-8.914e-5	1	8763.482	4	NC	1
433		8	max	.002	3	-.003	15	.07	4	3.241e-3	4	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.055e-4	1	7851.618	4	NC	1
435		9	max	.003	3	-.003	15	.078	4	3.789e-3	4	NC	1	NC	1
436			min	-.002	2	-.013	4	-.001	1	-1.218e-4	1	7310.615	4	NC	1
437		10	max	.003	3	-.003	15	.086	4	4.336e-3	4	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-1.381e-4	1	7045.736	4	NC	1
439		11	max	.003	3	-.003	15	.094	4	4.884e-3	4	NC	2	NC	1
440			min	-.003	2	-.014	4	-.002	1	-1.545e-4	1	7017.788	4	NC	1
441		12	max	.004	3	-.003	15	.101	4	5.431e-3	4	NC	2	NC	1
442			min	-.003	2	-.013	4	-.002	1	-1.708e-4	1	7228.07	4	NC	1
443		13	max	.004	3	-.003	15	.109	4	5.978e-3	4	NC	1	NC	1
444			min	-.003	2	-.012	4	-.003	1	-1.871e-4	1	7720.783	4	NC	1
445		14	max	.005	3	-.003	15	.117	4	6.526e-3	4	NC	1	NC	1
446			min	-.004	2	-.011	4	-.003	1	-2.034e-4	1	8606.12	4	NC	1
447		15	max	.005	3	-.002	15	.125	4	7.073e-3	4	NC	1	NC	1
448			min	-.004	2	-.01	4	-.003	1	-2.198e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	.133	4	7.621e-3	4	NC	1	NC	1
450			min	-.004	2	-.008	4	-.004	1	-2.361e-4	1	NC	1	NC	1
451		17	max	.006	3	-.002	15	.143	4	8.168e-3	4	NC	1	NC	1
452			min	-.005	2	-.006	4	-.004	1	-2.524e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	.153	4	8.716e-3	4	NC	1	NC	1
454			min	-.005	2	-.004	1	-.005	1	-2.688e-4	1	NC	1	NC	1
455		19	max	.006	3	0	15	.164	4	9.263e-3	4	NC	1	NC	1
456			min	-.005	2	-.003	1	-.005	1	-2.851e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.005	1	-1.361e-6	12	NC	1	NC	2
458			min	0	3	-.006	3	-.164	4	-2.654e-4	4	NC	1	150.989	4
459		2	max	.003	1	.004	2	.005	1	-1.361e-6	12	NC	1	NC	2
460			min	0	3	-.006	3	-.151	4	-2.654e-4	4	NC	1	164.245	4
461		3	max	.002	1	.004	2	.004	1	-1.361e-6	12	NC	1	NC	2
462			min	0	3	-.006	3	-.138	4	-2.654e-4	4	NC	1	180.018	4
463		4	max	.002	1	.004	2	.004	1	-1.361e-6	12	NC	1	NC	2
464			min	0	3	-.005	3	-.125	4	-2.654e-4	4	NC	1	198.961	4
465		5	max	.002	1	.004	2	.004	1	-1.361e-6	12	NC	1	NC	2
466			min	0	3	-.005	3	-.112	4	-2.654e-4	4	NC	1	221.963	4
467		6	max	.002	1	.003	2	.003	1	-1.361e-6	12	NC	1	NC	2
468			min	0	3	-.005	3	-.099	4	-2.654e-4	4	NC	1	250.257	4
469		7	max	.002	1	.003	2	.003	1	-1.361e-6	12	NC	1	NC	2
470			min	0	3	-.004	3	-.087	4	-2.654e-4	4	NC	1	285.594	4
471		8	max	.002	1	.003	2	.002	1	-1.361e-6	12	NC	1	NC	1
472			min	0	3	-.004	3	-.075	4	-2.654e-4	4	NC	1	330.524	4
473		9	max	.002	1	.003	2	.002	1	-1.361e-6	12	NC	1	NC	1
474			min	0	3	-.003	3	-.064	4	-2.654e-4	4	NC	1	388.891	4
475		10	max	.001	1	.002	2	.002	1	-1.361e-6	12	NC	1	NC	1
476			min	0	3	-.003	3	-.053	4	-2.654e-4	4	NC	1	466.701	4
477		11	max	.001	1	.002	2	.001	1	-1.361e-6	12	NC	1	NC	1
478			min	0	3	-.003	3	-.043	4	-2.654e-4	4	NC	1	573.781	4
479		12	max	.001	1	.002	2	.001	1	-1.361e-6	12	NC	1	NC	1
480			min	0	3	-.002	3	-.034	4	-2.654e-4	4	NC	1	727.126	4
481		13	max	0	1	.002	2	0	1	-1.361e-6	12	NC	1	NC	1
482			min	0	3	-.002	3	-.026	4	-2.654e-4	4	NC	1	958.288	4
483		14	max	0	1	.001	2	0	1	-1.361e-6	12	NC	1	NC	1
484			min	0	3	-.002	3	-.019	4	-2.654e-4	4	NC	1	1331.448	4
485		15	max	0	1	.001	2	0	1	-1.361e-6	12	NC	1	NC	1
486			min	0	3	-.001	3	-.012	4	-2.654e-4	4	NC	1	1994.562	4
487		16	max	0	1	0	2	0	1	-1.361e-6	12	NC	1	NC	1
488			min	0	3	-.001	3	-.007	4	-2.654e-4	4	NC	1	3356.632	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
489		17	max	0	1	0	2	0	1	-1.361e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.004	4	-2.654e-4	4	NC	1	6934.13	4
491		18	max	0	1	0	2	0	1	-1.361e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-2.654e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-1.361e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.654e-4	4	NC	1	NC	1
495	M1	1	max	.008	3	.132	2	.459	4	1.095e-2	1	NC	1	NC	1
496			min	-.004	2	-.03	3	0	12	-2.249e-2	3	NC	1	NC	1
497		2	max	.008	3	.064	2	.447	4	6.68e-3	4	NC	4	NC	1
498			min	-.004	2	-.014	3	-.004	1	-1.112e-2	3	1696.353	2	NC	1
499		3	max	.008	3	.011	3	.434	4	1.14e-2	4	NC	5	NC	1
500			min	-.004	2	-.009	2	-.005	1	-1.191e-4	3	818.966	2	9012.412	5
501		4	max	.008	3	.053	3	.421	4	9.905e-3	4	NC	5	NC	1
502			min	-.004	2	-.091	2	-.005	1	-4.536e-3	3	518.254	2	6337.459	5
503		5	max	.007	3	.105	3	.408	4	8.405e-3	4	NC	5	NC	1
504			min	-.004	2	-.176	2	-.003	1	-8.953e-3	3	374.814	2	4982.297	5
505		6	max	.007	3	.161	3	.394	4	1.244e-2	2	NC	15	NC	1
506			min	-.004	2	-.258	2	-.001	1	-1.337e-2	3	295.678	2	4167.997	5
507		7	max	.007	3	.215	3	.38	4	1.658e-2	2	NC	15	NC	1
508			min	-.004	2	-.331	2	0	3	-1.779e-2	3	248.907	2	3615.398	4
509		8	max	.007	3	.26	3	.366	4	2.072e-2	2	9712.576	15	NC	1
510			min	-.004	2	-.39	2	0	12	-2.22e-2	3	221.216	2	3220.193	4
511		9	max	.007	3	.289	3	.351	4	2.345e-2	2	9085.535	15	NC	1
512			min	-.004	2	-.426	2	0	1	-2.249e-2	3	206.791	2	2973.433	4
513		10	max	.007	3	.299	3	.333	4	2.523e-2	2	8894.249	15	NC	1
514			min	-.004	2	-.439	2	0	12	-2.004e-2	3	202.56	2	2896.099	4
515		11	max	.007	3	.292	3	.314	4	2.701e-2	2	9085.222	15	NC	1
516			min	-.004	2	-.426	2	0	12	-1.759e-2	3	207.489	2	2951.548	4
517		12	max	.006	3	.268	3	.293	4	2.603e-2	2	9711.853	15	NC	1
518			min	-.004	2	-.388	2	0	1	-1.492e-2	3	223.323	2	3151.146	4
519		13	max	.006	3	.228	3	.27	4	2.087e-2	2	NC	15	NC	1
520			min	-.004	2	-.328	2	0	1	-1.195e-2	3	253.999	2	3691.071	4
521		14	max	.006	3	.177	3	.244	4	1.571e-2	2	NC	15	NC	1
522			min	-.003	2	-.252	2	0	12	-8.971e-3	3	306.495	2	4836.746	4
523		15	max	.006	3	.12	3	.218	4	1.055e-2	2	NC	5	NC	1
524			min	-.003	2	-.168	2	0	12	-5.996e-3	3	396.946	2	7355.205	4
525		16	max	.006	3	.061	3	.192	4	7.961e-3	4	NC	5	NC	1
526			min	-.003	2	-.083	2	0	12	-3.02e-3	3	564.618	2	NC	1
527		17	max	.006	3	.004	3	.168	4	9.019e-3	4	NC	5	NC	1
528			min	-.003	2	-.006	2	0	12	-4.359e-5	3	923.363	2	NC	1
529		18	max	.006	3	.059	2	.147	4	8.504e-3	2	NC	4	NC	1
530			min	-.003	2	-.047	3	0	12	-3.541e-3	3	1960.948	2	NC	1
531		19	max	.006	3	.116	2	.129	4	1.709e-2	2	NC	1	NC	1
532			min	-.003	2	-.094	3	0	1	-7.189e-3	3	NC	1	NC	1
533	M5	1	max	.024	3	.281	2	.459	4	0	1	NC	1	NC	1
534			min	-.016	2	-.025	3	0	1	-4.168e-6	4	NC	1	NC	1
535		2	max	.024	3	.135	2	.449	4	5.842e-3	4	NC	5	NC	1
536			min	-.016	2	-.01	3	0	1	0	1	797.105	2	NC	1
537		3	max	.024	3	.036	3	.438	4	1.151e-2	4	NC	5	NC	1
538			min	-.016	2	-.028	2	0	1	0	1	374.759	2	7468.305	4
539		4	max	.023	3	.135	3	.424	4	9.375e-3	4	NC	15	NC	1
540			min	-.016	2	-.224	2	0	1	0	1	229.168	2	5609.644	4
541		5	max	.023	3	.272	3	.41	4	7.243e-3	4	8075.219	15	NC	1
542			min	-.016	2	-.437	2	0	1	0	1	161.181	2	4674.421	4
543		6	max	.022	3	.426	3	.395	4	5.112e-3	4	6209.253	15	NC	1
544			min	-.015	2	-.648	2	0	1	0	1	124.52	2	4088.723	4
545		7	max	.022	3	.577	3	.38	4	2.98e-3	4	5133.239	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
546			min	-.015	2	-.839	2	0	1	0	1	103.257	2	3649.822	4
547		8	max	.022	3	.703	3	.366	4	8.482e-4	4	4508.279	15	NC	1
548			min	-.015	2	-.992	2	0	1	0	1	90.857	2	3267.13	4
549		9	max	.021	3	.784	3	.351	4	0	1	4188.046	15	NC	1
550			min	-.014	2	-1.089	2	0	1	-2.682e-6	5	84.485	2	2970.136	4
551		10	max	.021	3	.813	3	.333	4	0	1	4091.602	15	NC	1
552			min	-.014	2	-1.123	2	0	1	-2.57e-6	5	82.621	2	2917.691	4
553		11	max	.02	3	.793	3	.314	4	0	1	4188.185	15	NC	1
554			min	-.014	2	-1.09	2	0	1	-2.459e-6	5	84.785	2	2985.276	4
555		12	max	.02	3	.724	3	.294	4	6.464e-4	4	4508.602	15	NC	1
556			min	-.014	2	-.989	2	0	1	0	1	91.844	2	3099.232	4
557		13	max	.019	3	.613	3	.27	4	2.271e-3	4	5133.882	15	NC	1
558			min	-.014	2	-.828	2	0	1	0	1	105.829	2	3622.788	4
559		14	max	.019	3	.473	3	.244	4	3.896e-3	4	6210.487	15	NC	1
560			min	-.013	2	-.628	2	0	1	0	1	130.336	2	4969.911	4
561		15	max	.018	3	.317	3	.216	4	5.521e-3	4	8077.624	15	NC	1
562			min	-.013	2	-.412	2	0	1	0	1	173.904	2	8659.761	4
563		16	max	.018	3	.159	3	.188	4	7.146e-3	4	NC	15	NC	1
564			min	-.013	2	-.201	2	0	1	0	1	258.042	2	NC	1
565		17	max	.017	3	.012	3	.164	4	8.771e-3	4	NC	5	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	446.307	2	NC	1
567		18	max	.017	3	.121	2	.144	4	4.454e-3	4	NC	5	NC	1
568			min	-.013	2	-.112	3	0	1	0	1	991.783	2	NC	1
569		19	max	.017	3	.233	2	.129	4	0	1	NC	1	NC	1
570			min	-.013	2	-.224	3	0	1	-2.07e-6	4	NC	1	NC	1
571	M9	1	max	.008	3	.132	2	.459	4	2.249e-2	3	NC	1	NC	1
572			min	-.004	2	-.03	3	0	1	-1.095e-2	1	NC	1	NC	1
573		2	max	.008	3	.064	2	.449	4	1.112e-2	3	NC	4	NC	1
574			min	-.004	2	-.014	3	0	12	-5.357e-3	2	1696.353	2	NC	1
575		3	max	.008	3	.011	3	.437	4	1.147e-2	4	NC	5	NC	1
576			min	-.004	2	-.009	2	0	12	-3.496e-5	10	818.966	2	7784.031	4
577		4	max	.008	3	.053	3	.424	4	9.062e-3	5	NC	5	NC	1
578			min	-.004	2	-.091	2	0	12	-4.167e-3	2	518.254	2	5741.502	4
579		5	max	.007	3	.105	3	.41	4	8.953e-3	3	NC	5	NC	1
580			min	-.004	2	-.176	2	0	12	-8.306e-3	2	374.814	2	4707.505	4
581		6	max	.007	3	.161	3	.395	4	1.337e-2	3	NC	15	NC	1
582			min	-.004	2	-.258	2	0	12	-1.244e-2	2	295.678	2	4069.114	4
583		7	max	.007	3	.215	3	.38	4	1.779e-2	3	NC	15	NC	1
584			min	-.004	2	-.331	2	0	1	-1.658e-2	2	248.907	2	3613.009	4
585		8	max	.007	3	.26	3	.366	4	2.22e-2	3	9694.894	15	NC	1
586			min	-.004	2	-.39	2	0	1	-2.072e-2	2	221.216	2	3244.078	4
587		9	max	.007	3	.289	3	.351	4	2.249e-2	3	9069.172	15	NC	1
588			min	-.004	2	-.426	2	0	12	-2.345e-2	2	206.791	2	2966.329	4
589		10	max	.007	3	.299	3	.333	4	2.004e-2	3	8878.26	15	NC	1
590			min	-.004	2	-.439	2	0	1	-2.523e-2	2	202.56	2	2897.044	4
591		11	max	.007	3	.292	3	.314	4	1.759e-2	3	9068.832	15	NC	1
592			min	-.004	2	-.426	2	0	1	-2.701e-2	2	207.489	2	2960.04	4
593		12	max	.006	3	.268	3	.294	4	1.492e-2	3	9694.215	15	NC	1
594			min	-.004	2	-.388	2	0	12	-2.603e-2	2	223.323	2	3128.484	4
595		13	max	.006	3	.228	3	.27	4	1.195e-2	3	NC	15	NC	1
596			min	-.004	2	-.328	2	0	10	-2.087e-2	2	253.999	2	3689.568	4
597		14	max	.006	3	.177	3	.243	4	8.971e-3	3	NC	15	NC	1
598			min	-.003	2	-.252	2	-.001	1	-1.571e-2	2	306.495	2	4953.797	5
599		15	max	.006	3	.12	3	.216	4	5.996e-3	3	NC	5	NC	1
600			min	-.003	2	-.168	2	-.003	1	-1.055e-2	2	396.946	2	7943.442	5
601		16	max	.006	3	.061	3	.189	4	7.031e-3	5	NC	5	NC	1
602			min	-.003	2	-.083	2	-.005	1	-5.387e-3	2	564.618	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
603		17	max	.006	3	.004	3	.165	4	8.836e-3	4	NC	5	NC	1
604			min	-.003	2	-.006	2	-.005	1	-3.902e-4	1	923.363	2	NC	1
605		18	max	.006	3	.059	2	.145	4	4.276e-3	5	NC	4	NC	1
606			min	-.003	2	-.047	3	-.004	1	-8.504e-3	2	1960.948	2	NC	1
607		19	max	.006	3	.116	2	.129	4	7.189e-3	3	NC	1	NC	1
608			min	-.003	2	-.094	3	0	12	-1.709e-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

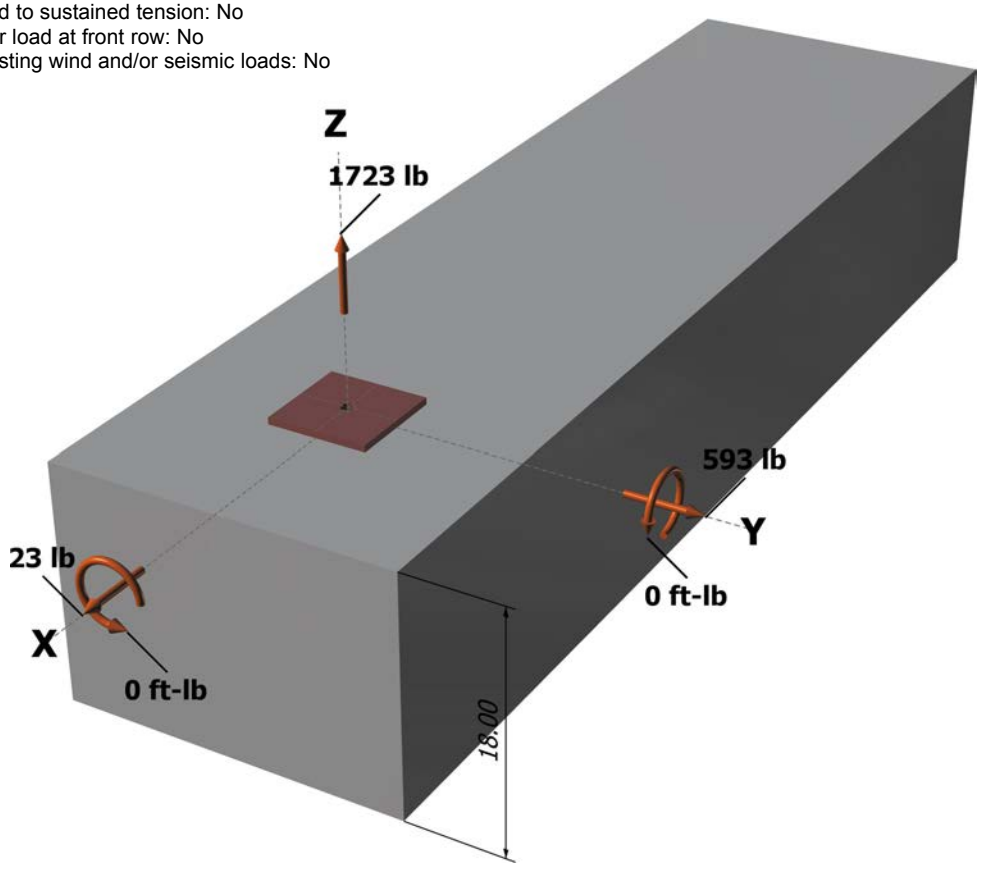
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

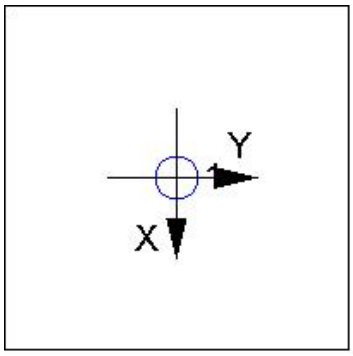
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

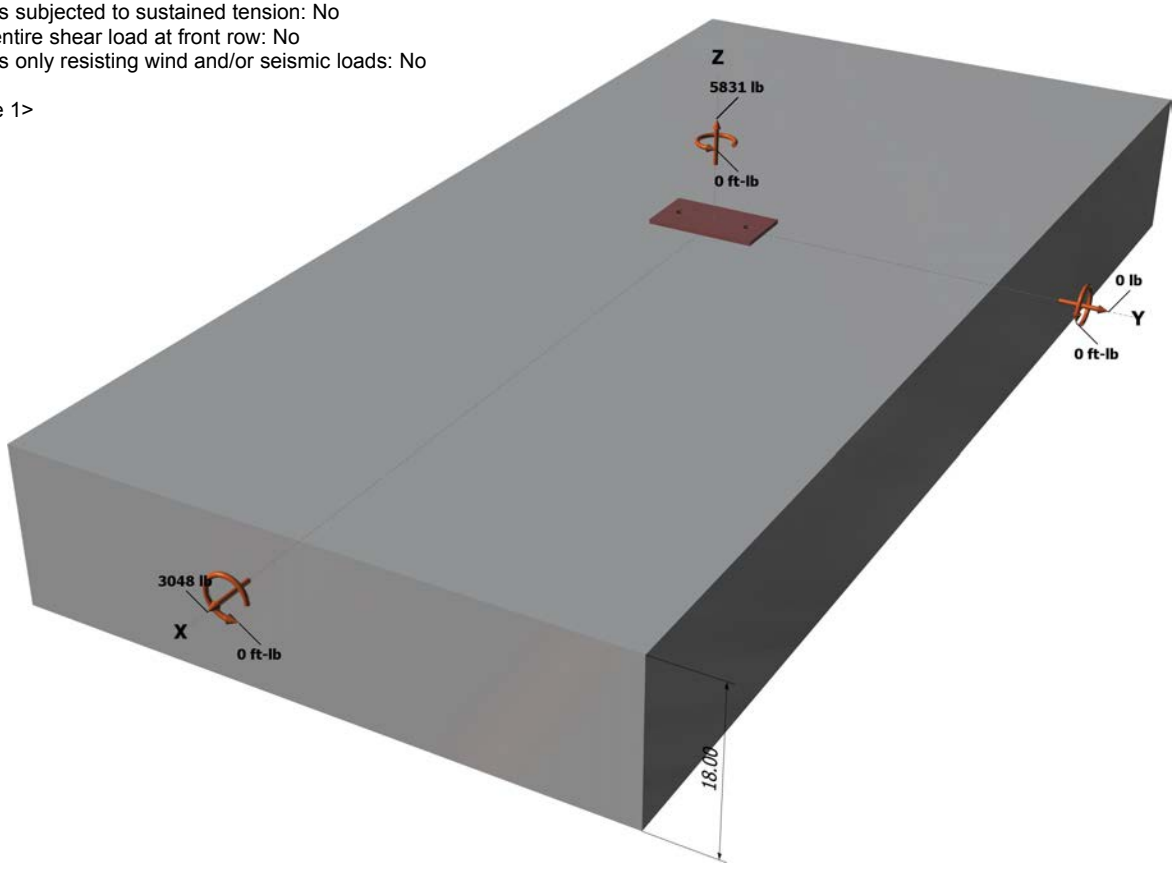
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

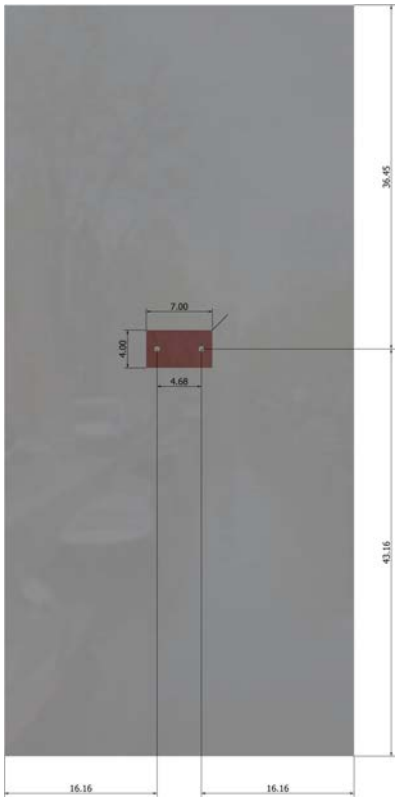
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



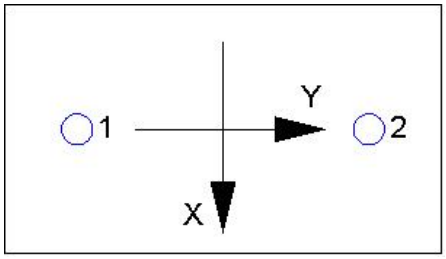
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.