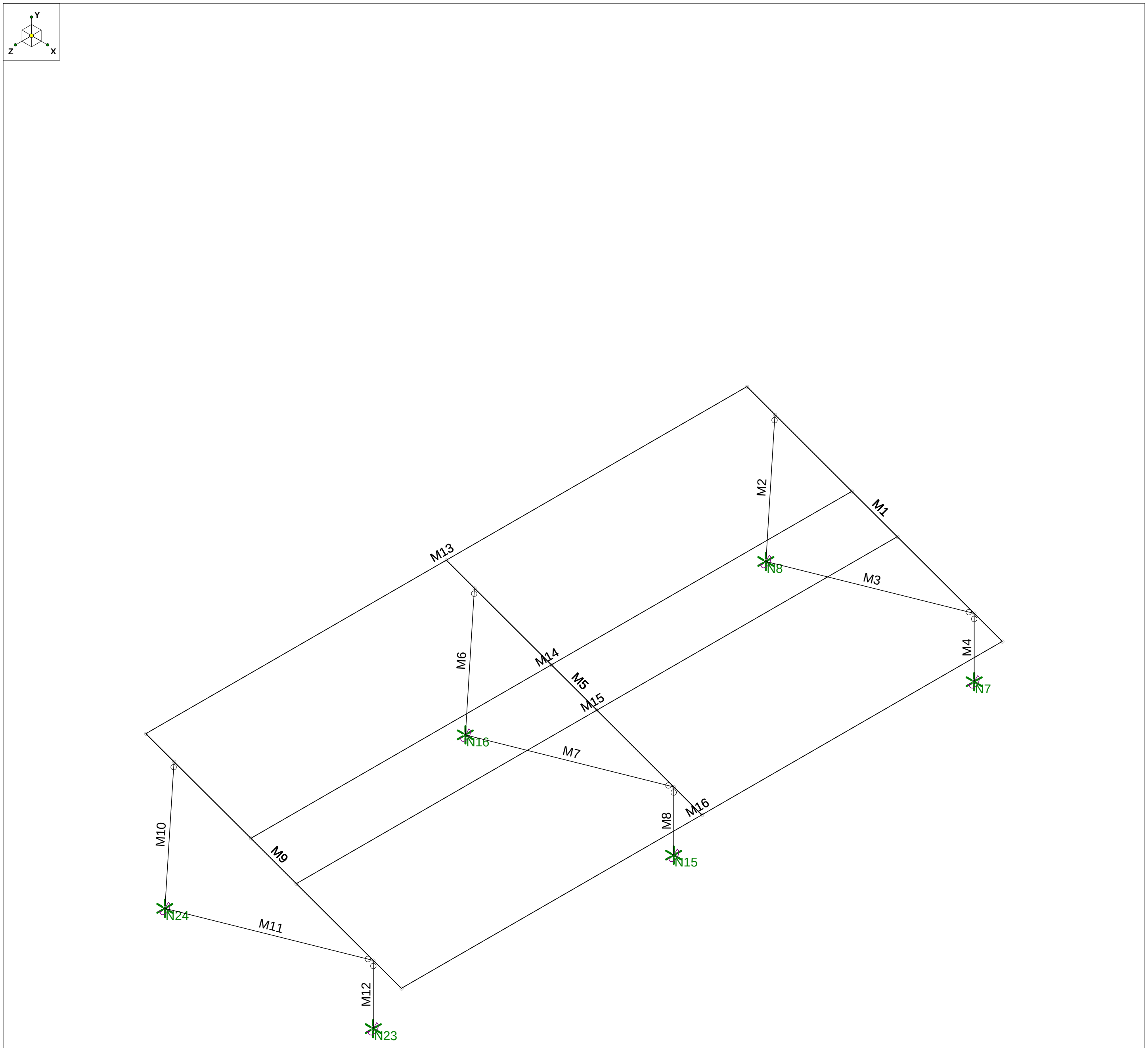


Schletter, Inc.		20ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

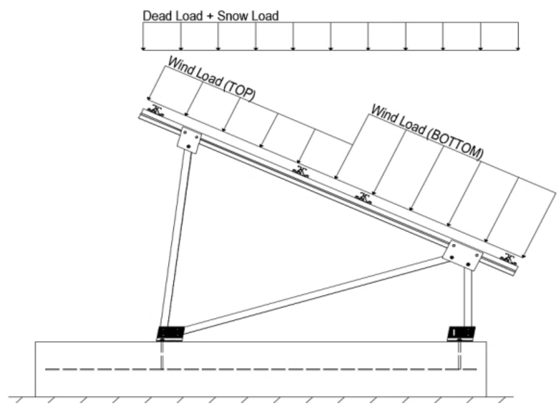
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

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 = 150 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ = 1.050
$Cf+_{BOTTOM}$ = 1.650 *(Pressure)*
$Cf-_{TOP, OUTER\ PURLIN}$ = -2.400
$Cf-_{TOP, INNER\ PURLIN}$ = -1.840 *(Suction)*
$Cf-_{BOTTOM}$ = -1.000

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.

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
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	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

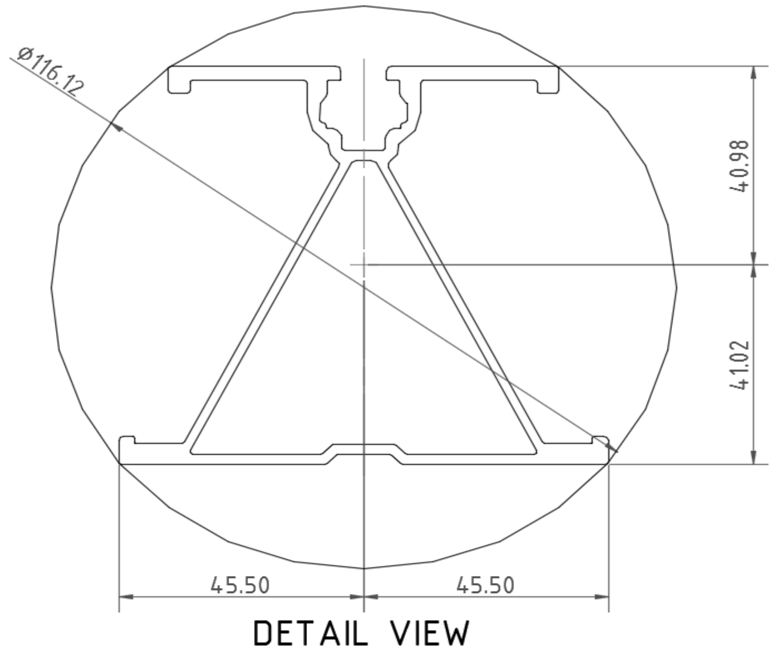
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

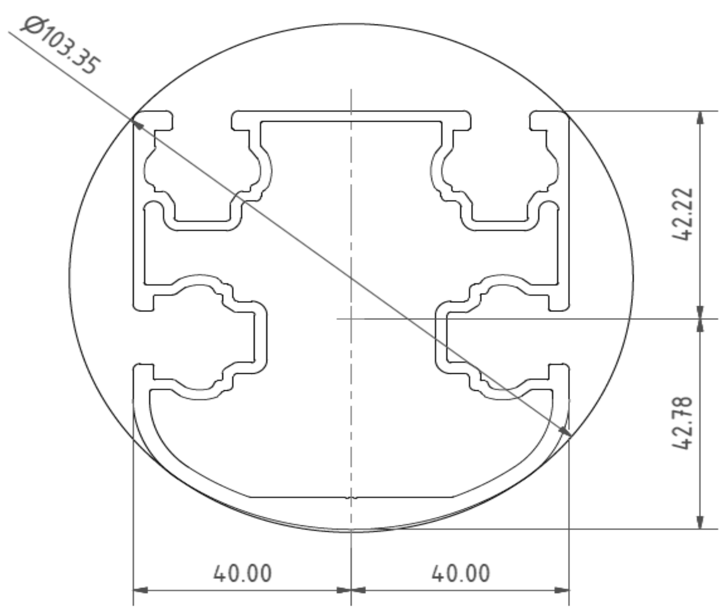
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	111	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.913	k-ft
M_z =	0.260	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	91%	



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).

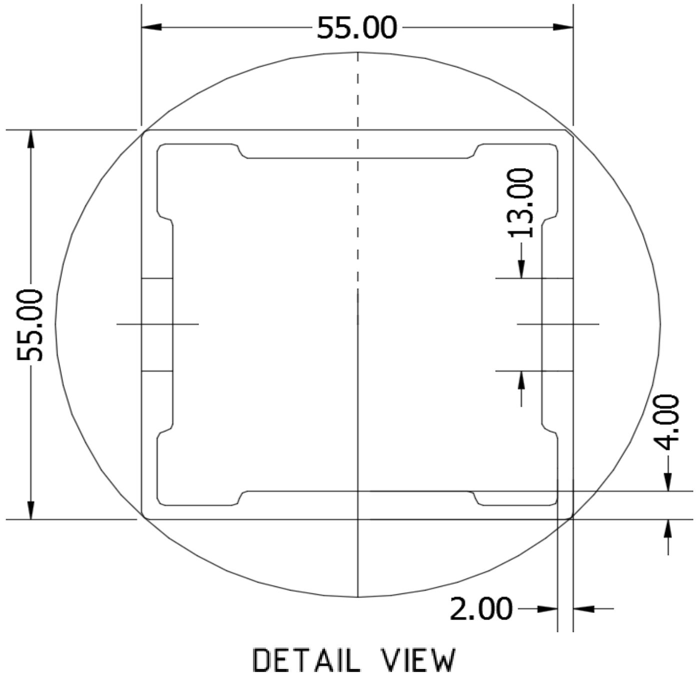
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.364	k-ft
M_z =	0.000	k-ft
P_n =	-0.710	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



4.3 Front Strut Design

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

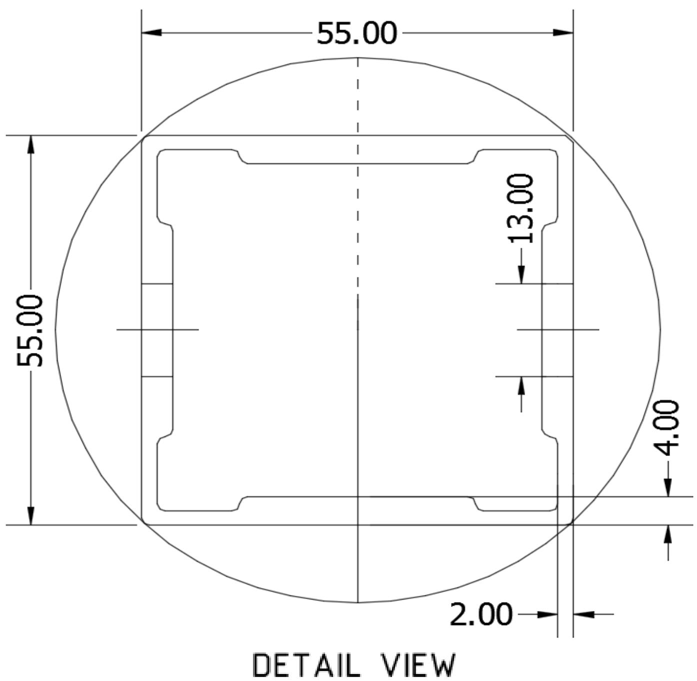
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.476	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	



4.4 Diagonal Strut Design

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

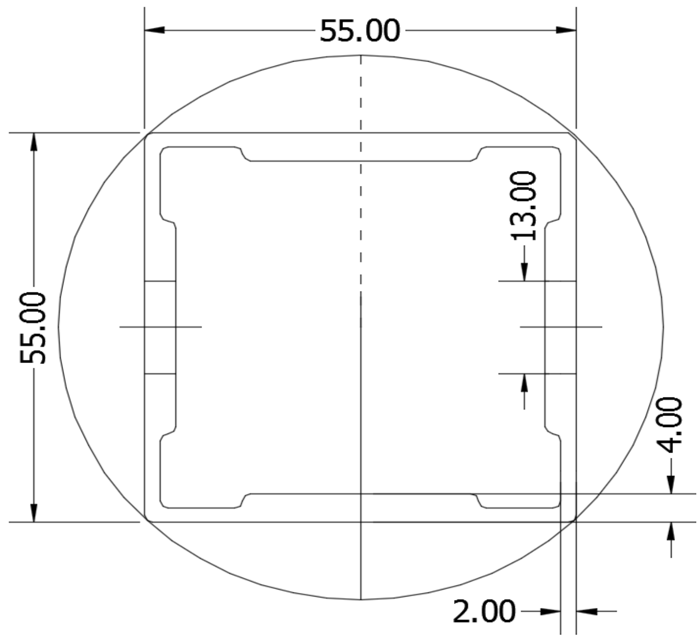
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.007	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	28%	



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 =	3.516	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	23%	



DETAIL VIEW

5. FOUNDATION DESIGN CALCULATIONS

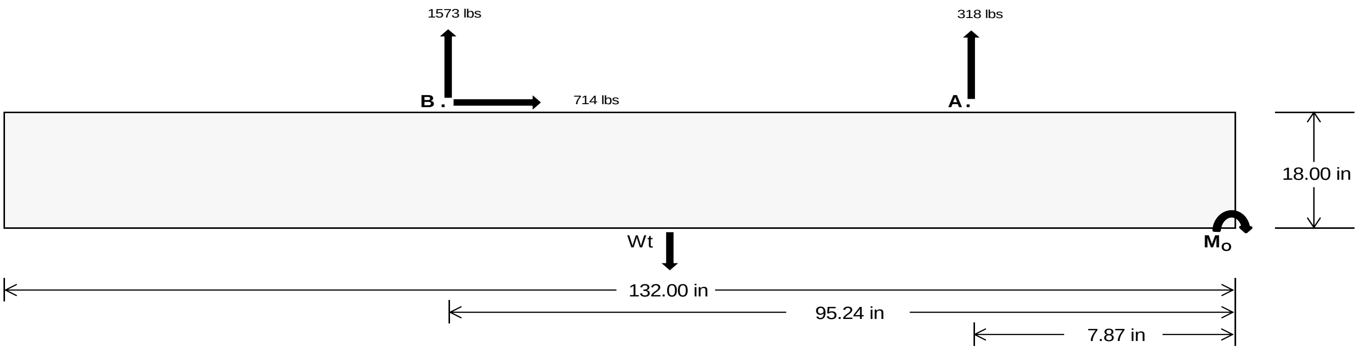
5.1 Helical Pile Foundations

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 =	1398.00	6833.10	k
Compressive Load =	4518.78	5281.16	k
Lateral Load =	10.36	3094.41	k
Moment (Weak Axis) =	0.02	0.01	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

Footing Reinforcement

Use fiber reinforcing with (3) #5 rebar.

Overturning Check

M_O = 165117.7 in-lbs
Resisting Force Required = 2501.78 lbs
S.F. = 1.67
Weight Required = 4169.64 lbs
Minimum Width = 36 in in
Weight Provided = 7177.50 lbs

A minimum 132in long x 36in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 713.84 lbs
Friction = 0.4
Weight Required = 1784.59 lbs
Resisting Weight = 7177.50 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 36in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 713.84 lbs
Cohesion = 130 psf
Area = 33.00 ft^2
Resisting = 3588.75 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 36in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	36 in	37 in	38 in	39 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3 ft) =	7178 lbs	7377 lbs	7576 lbs	7776 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in
F_A	1437 lbs	1437 lbs	1437 lbs	1437 lbs	1768 lbs	1768 lbs	1768 lbs	1768 lbs	2284 lbs	2284 lbs	2284 lbs	2284 lbs	-636 lbs	-636 lbs	-636 lbs	-636 lbs
F_B	1463 lbs	1463 lbs	1463 lbs	1463 lbs	2138 lbs	2138 lbs	2138 lbs	2138 lbs	2580 lbs	2580 lbs	2580 lbs	2580 lbs	-3145 lbs	-3145 lbs	-3145 lbs	-3145 lbs
F_V	160 lbs	160 lbs	160 lbs	160 lbs	1268 lbs	1268 lbs	1268 lbs	1268 lbs	1058 lbs	1058 lbs	1058 lbs	1058 lbs	-1428 lbs	-1428 lbs	-1428 lbs	-1428 lbs
P_{total}	10077 lbs	10276 lbs	10475 lbs	10675 lbs	11084 lbs	11284 lbs	11483 lbs	11682 lbs	12042 lbs	12241 lbs	12440 lbs	12640 lbs	525 lbs	645 lbs	765 lbs	884 lbs
M	3634 lbs-ft	3634 lbs-ft	3634 lbs-ft	3634 lbs-ft	5258 lbs-ft	5258 lbs-ft	5258 lbs-ft	5258 lbs-ft	6366 lbs-ft	6366 lbs-ft	6366 lbs-ft	6366 lbs-ft	2440 lbs-ft	2440 lbs-ft	2440 lbs-ft	2440 lbs-ft
e	0.36 ft	0.35 ft	0.35 ft	0.34 ft	0.47 ft	0.47 ft	0.46 ft	0.45 ft	0.53 ft	0.52 ft	0.51 ft	0.50 ft	4.65 ft	3.78 ft	3.19 ft	2.76 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}	245.3 psf	244.5 psf	243.8 psf	243.1 psf	249.0 psf	248.1 psf	247.3 psf	246.6 psf	259.7 psf	258.5 psf	257.4 psf	256.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	365.4 psf	361.4 psf	357.6 psf	354.0 psf	422.8 psf	417.2 psf	412.0 psf	407.0 psf	470.1 psf	463.3 psf	456.8 psf	450.7 psf	136.6 psf	81.2 psf	69.7 psf	66.2 psf

Maximum Bearing Pressure = 470 psf
Allowable Bearing Pressure = 1500 psf

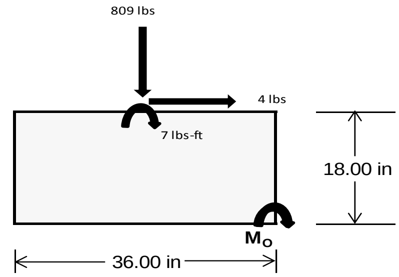
Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	1200.2 ft-lbs
Resisting Force Required =	800.16 lbs
S.F. =	1.67
Weight Required =	1333.60 lbs
Minimum Width =	36 in in
Weight Provided =	7177.50 lbs

A minimum 132in long x 36in 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	36 in			36 in			36 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	227 lbs	595 lbs	227 lbs	809 lbs	2381 lbs	809 lbs	66 lbs	174 lbs	66 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9113 lbs	7178 lbs	9113 lbs	9267 lbs	7178 lbs	9267 lbs	2665 lbs	7178 lbs	2665 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	13 lbs-ft	0 lbs-ft	13 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft
f_{min}	275.9 psf	217.5 psf	275.9 psf	280.0 psf	217.5 psf	280.0 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.4 psf	217.5 psf	276.4 psf	281.6 psf	217.5 psf	281.6 psf	80.8 psf	217.5 psf	80.8 psf

Maximum Bearing Pressure = 282 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 36in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

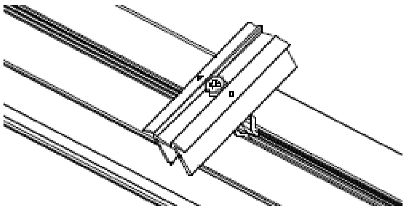
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

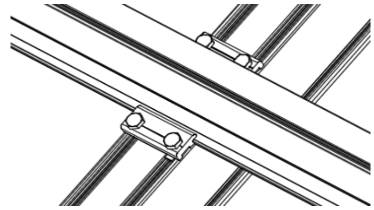
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.799	k
Allowable Uplift =	1.214	k
Utilization =	66%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.638	k
Allowable Uplift =	4.357	k
Utilization =	61%	



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 =	3.476	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	47%	

Rear Strut		
Maximum Axial Load =	4.693	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	63%	

Diagonal Strut		
Maximum Axial Load =	2.139	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	29%	

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

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

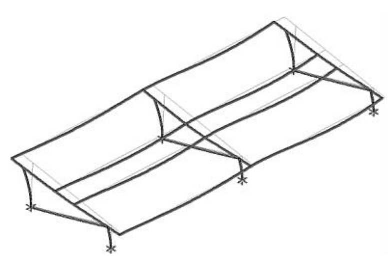
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	40.12	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.802	in
Max Drift, Δ_{MAX} =	0.032	in
N/A		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	111 in	L_b =	111
J =	0.432	J =	0.432
	307.078		195.283
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
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=	27.6 ksi	φF_L=	28.8
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

$\varphi F_L = \varphi b[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi c[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

$P_{max} =$ 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 15.92 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 16.39 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-103.443	-103.443	0	0
2	M14	y	-103.443	-103.443	0	0
3	M15	y	-162.554	-162.554	0	0
4	M16	y	-162.554	-162.554	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	236.442	236.442	0	0
2	M14	y	181.272	181.272	0	0
3	M15	y	98.517	98.517	0	0
4	M16	y	98.517	98.517	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												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	599.202	2	1258.242	2	.736	1	.004	1	0	1	0	1
2		min	-754.231	3	-1616.224	3	.031	15	0	15	0	1	0	1
3	N7	max	.031	9	1219.796	1	-.303	15	0	15	0	1	0	1
4		min	-.189	2	-310.397	3	-7.971	1	-.017	1	0	1	0	1
5	N15	max	.023	9	3475.985	1	0	2	0	2	0	1	0	1
6		min	-2.199	2	-1075.384	3	0	1	0	1	0	1	0	1
7	N16	max	2170.298	2	4062.432	2	0	2	0	2	0	1	0	1
8		min	-2380.316	3	-5256.231	3	0	9	0	9	0	1	0	1
9	N23	max	.031	9	1219.796	1	7.971	1	.017	1	0	1	0	1
10		min	-.189	2	-310.397	3	.303	15	0	15	0	1	0	1
11	N24	max	599.202	2	1258.242	2	-.031	15	0	15	0	1	0	1
12		min	-754.231	3	-1616.224	3	-.736	1	-.004	1	0	1	0	1
13	Totals:	max	3366.124	2	12264.724	2	0	11						
14		min	-3889.74	3	-10184.857	3	0	1						

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	83.742	1	493.154	1	-5.426	15	0	3	.199	1	0	1
2			min	3.077	15	-802.875	3	-148.79	1	-.016	2	.007	15	0	3
3		2	max	83.742	1	345.065	1	-4.17	15	0	3	.064	1	.703	3
4			min	3.077	15	-565.041	3	-114.238	1	-.016	2	.002	15	-.431	1
5		3	max	83.742	1	196.975	1	-2.914	15	0	3	.001	3	1.161	3
6			min	3.077	15	-327.206	3	-79.686	1	-.016	2	-.036	1	-.709	1
7		4	max	83.742	1	48.885	1	-1.658	15	0	3	-.003	12	1.376	3
8			min	3.077	15	-89.372	3	-45.133	1	-.016	2	-.1	1	-.836	1
9		5	max	83.742	1	148.463	3	-.402	15	0	3	-.004	12	1.345	3
10			min	3.077	15	-99.205	1	-10.581	1	-.016	2	-.128	1	-.81	1
11		6	max	83.742	1	386.297	3	23.971	1	0	3	-.004	15	1.07	3
12			min	3.077	15	-247.295	1	-.019	3	-.016	2	-.121	1	-.632	1
13		7	max	83.742	1	624.132	3	58.524	1	0	3	-.003	15	.551	3
14			min	3.077	15	-395.385	1	1.329	12	-.016	2	-.079	1	-.301	1
15		8	max	83.742	1	861.966	3	93.076	1	0	3	.002	2	.182	2
16			min	3.077	15	-543.475	1	2.584	12	-.016	2	-.004	3	-.213	3
17		9	max	83.742	1	1099.8	3	127.628	1	0	3	.112	1	.816	1
18			min	3.077	15	-691.564	1	3.84	12	-.016	2	.001	12	-1.221	3
19		10	max	83.742	1	1337.635	3	162.18	1	.016	2	.261	1	1.603	1
20			min	3.077	15	-839.654	1	5.096	12	0	3	.006	12	-2.473	3
21		11	max	83.742	1	691.564	1	-3.84	12	.016	2	.112	1	.816	1
22			min	3.077	15	-1099.8	3	-127.628	1	0	3	.001	12	-1.221	3
23		12	max	83.742	1	543.475	1	-2.584	12	.016	2	.002	2	.182	2
24			min	3.077	15	-861.966	3	-93.076	1	0	3	-.004	3	-.213	3
25		13	max	83.742	1	395.385	1	-1.329	12	.016	2	-.003	15	.551	3
26			min	3.077	15	-624.132	3	-58.524	1	0	3	-.079	1	-.301	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	83.742	1	247.295	1	.019	3	.016	2	-.004	15	1.07	3
28			min	3.077	15	-386.297	3	-23.971	1	0	3	-.121	1	-.632	1
29		15	max	83.742	1	99.205	1	10.581	1	.016	2	-.004	12	1.345	3
30			min	3.077	15	-148.463	3	.402	15	0	3	-.128	1	-.81	1
31		16	max	83.742	1	89.372	3	45.133	1	.016	2	-.003	12	1.376	3
32			min	3.077	15	-48.885	1	1.658	15	0	3	-.1	1	-.836	1
33		17	max	83.742	1	327.206	3	79.686	1	.016	2	.001	3	1.161	3
34			min	3.077	15	-196.975	1	2.914	15	0	3	-.036	1	-.709	1
35		18	max	83.742	1	565.041	3	114.238	1	.016	2	.064	1	.703	3
36			min	3.077	15	-345.065	1	4.17	15	0	3	.002	15	-.431	1
37		19	max	83.742	1	802.875	3	148.79	1	.016	2	.199	1	0	1
38			min	3.077	15	-493.154	1	5.426	15	0	3	.007	15	0	3
39	M14	1	max	40.86	1	529.204	1	-5.605	15	.011	3	.23	1	0	1
40			min	1.502	15	-633.617	3	-153.704	1	-.013	2	.008	15	0	3
41		2	max	40.86	1	381.114	1	-4.349	15	.011	3	.089	1	.558	3
42			min	1.502	15	-452.485	3	-119.152	1	-.013	2	.003	15	-.468	1
43		3	max	40.86	1	233.024	1	-3.093	15	.011	3	.003	3	.93	3
44			min	1.502	15	-271.353	3	-84.599	1	-.013	2	-.015	1	-.783	1
45		4	max	40.86	1	84.942	2	-1.837	15	.011	3	-.002	12	1.116	3
46			min	1.502	15	-90.221	3	-50.047	1	-.013	2	-.085	1	-.947	1
47		5	max	40.86	1	90.911	3	-.581	15	.011	3	-.004	12	1.116	3
48			min	1.502	15	-63.156	1	-15.495	1	-.013	2	-.118	1	-.958	1
49		6	max	40.86	1	272.043	3	19.057	1	.011	3	-.004	15	.929	3
50			min	1.502	15	-211.245	1	-.282	3	-.013	2	-.116	1	-.817	1
51		7	max	40.86	1	453.175	3	53.61	1	.011	3	-.003	15	.556	3
52			min	1.502	15	-359.335	1	1.153	12	-.013	2	-.079	1	-.524	2
53		8	max	40.86	1	634.307	3	88.162	1	.011	3	0	10	-.001	15
54			min	1.502	15	-507.425	1	2.409	12	-.013	2	-.006	1	-.094	2
55		9	max	40.86	1	815.438	3	122.714	1	.011	3	.102	1	.519	1
56			min	1.502	15	-655.515	1	3.665	12	-.013	2	0	3	-.747	3
57		10	max	40.86	1	996.57	3	157.267	1	.013	2	.246	1	1.269	1
58			min	1.502	15	-803.605	1	4.921	12	-.011	3	.005	12	-1.679	3
59		11	max	40.86	1	655.515	1	-3.665	12	.013	2	.102	1	.519	1
60			min	1.502	15	-815.438	3	-122.714	1	-.011	3	0	3	-.747	3
61		12	max	40.86	1	507.425	1	-2.409	12	.013	2	0	10	-.001	15
62			min	1.502	15	-634.307	3	-88.162	1	-.011	3	-.006	1	-.094	2
63		13	max	40.86	1	359.335	1	-1.153	12	.013	2	-.003	15	.556	3
64			min	1.502	15	-453.175	3	-53.61	1	-.011	3	-.079	1	-.524	2
65		14	max	40.86	1	211.245	1	.282	3	.013	2	-.004	15	.929	3
66			min	1.502	15	-272.043	3	-19.057	1	-.011	3	-.116	1	-.817	1
67		15	max	40.86	1	63.156	1	15.495	1	.013	2	-.004	12	1.116	3
68			min	1.502	15	-90.911	3	.581	15	-.011	3	-.118	1	-.958	1
69		16	max	40.86	1	90.221	3	50.047	1	.013	2	-.002	12	1.116	3
70			min	1.502	15	-84.942	2	1.837	15	-.011	3	-.085	1	-.947	1
71		17	max	40.86	1	271.353	3	84.599	1	.013	2	.003	3	.93	3
72			min	1.502	15	-233.024	1	3.093	15	-.011	3	-.015	1	-.783	1
73		18	max	40.86	1	452.485	3	119.152	1	.013	2	.089	1	.558	3
74			min	1.502	15	-381.114	1	4.349	15	-.011	3	.003	15	-.468	1
75		19	max	40.86	1	633.617	3	153.704	1	.013	2	.23	1	0	1
76			min	1.502	15	-529.204	1	5.605	15	-.011	3	.008	15	0	3
77	M15	1	max	-1.575	15	721.594	2	-5.603	15	.013	2	.229	1	0	2
78			min	-42.754	1	-346.907	3	-153.694	1	-.009	3	.008	15	0	3
79		2	max	-1.575	15	516.994	2	-4.347	15	.013	2	.089	1	.307	3
80			min	-42.754	1	-250.829	3	-119.142	1	-.009	3	.003	15	-.636	2
81		3	max	-1.575	15	312.394	2	-3.091	15	.013	2	.002	3	.516	3
82			min	-42.754	1	-154.75	3	-84.589	1	-.009	3	-.015	1	-1.063	2
83		4	max	-1.575	15	107.794	2	-1.835	15	.013	2	-.002	12	.625	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-42.754	1	-58.672	3	-50.037	1	-.009	3	-.085	1	-1.279	2
85		5	max	-1.575	15	37.406	3	-.579	15	.013	2	-.004	12	.636	3
86			min	-42.754	1	-96.806	2	-15.485	1	-.009	3	-.118	1	-1.284	2
87		6	max	-1.575	15	133.484	3	19.068	1	.013	2	-.004	15	.548	3
88			min	-42.754	1	-301.406	2	-.182	3	-.009	3	-.117	1	-1.08	2
89		7	max	-1.575	15	229.562	3	53.62	1	.013	2	-.003	15	.362	3
90			min	-42.754	1	-506.006	2	1.214	12	-.009	3	-.079	1	-.665	2
91		8	max	-1.575	15	325.64	3	88.172	1	.013	2	0	10	.076	3
92			min	-42.754	1	-710.605	2	2.469	12	-.009	3	-.006	1	-.051	1
93		9	max	-1.575	15	421.718	3	122.724	1	.013	2	.102	1	.796	2
94			min	-42.754	1	-915.205	2	3.725	12	-.009	3	.001	12	-.308	3
95		10	max	-1.575	15	517.797	3	157.277	1	.009	3	.246	1	1.842	2
96			min	-42.754	1	-1119.805	2	4.981	12	-.013	2	.006	12	-.79	3
97		11	max	-1.575	15	915.205	2	-3.725	12	.009	3	.102	1	.796	2
98			min	-42.754	1	-421.718	3	-122.724	1	-.013	2	.001	12	-.308	3
99		12	max	-1.575	15	710.605	2	-2.469	12	.009	3	0	10	.076	3
100			min	-42.754	1	-325.64	3	-88.172	1	-.013	2	-.006	1	-.051	1
101		13	max	-1.575	15	506.006	2	-1.214	12	.009	3	-.003	15	.362	3
102			min	-42.754	1	-229.562	3	-53.62	1	-.013	2	-.079	1	-.665	2
103		14	max	-1.575	15	301.406	2	.182	3	.009	3	-.004	15	.548	3
104			min	-42.754	1	-133.484	3	-19.068	1	-.013	2	-.117	1	-1.08	2
105		15	max	-1.575	15	96.806	2	15.485	1	.009	3	-.004	12	.636	3
106			min	-42.754	1	-37.406	3	.579	15	-.013	2	-.118	1	-1.284	2
107		16	max	-1.575	15	58.672	3	50.037	1	.009	3	-.002	12	.625	3
108			min	-42.754	1	-107.794	2	1.835	15	-.013	2	-.085	1	-1.279	2
109		17	max	-1.575	15	154.75	3	84.589	1	.009	3	.002	3	.516	3
110			min	-42.754	1	-312.394	2	3.091	15	-.013	2	-.015	1	-1.063	2
111		18	max	-1.575	15	250.829	3	119.142	1	.009	3	.089	1	.307	3
112			min	-42.754	1	-516.994	2	4.347	15	-.013	2	.003	15	-.636	2
113		19	max	-1.575	15	346.907	3	153.694	1	.009	3	.229	1	0	2
114			min	-42.754	1	-721.594	2	5.603	15	-.013	2	.008	15	0	3
115	M16	1	max	-3.275	15	684.713	2	-5.432	15	.012	1	.201	1	0	2
116			min	-89.083	1	-318.094	3	-149.043	1	-.012	3	.007	15	0	3
117		2	max	-3.275	15	480.113	2	-4.176	15	.012	1	.065	1	.278	3
118			min	-89.083	1	-222.016	3	-114.491	1	-.012	3	.002	15	-.599	2
119		3	max	-3.275	15	275.514	2	-2.92	15	.012	1	0	3	.456	3
120			min	-89.083	1	-125.937	3	-79.939	1	-.012	3	-.035	1	-.987	2
121		4	max	-3.275	15	70.914	2	-1.664	15	.012	1	-.003	12	.536	3
122			min	-89.083	1	-29.859	3	-45.386	1	-.012	3	-.099	1	-1.165	2
123		5	max	-3.275	15	66.219	3	-.408	15	.012	1	-.004	12	.518	3
124			min	-89.083	1	-133.686	2	-10.834	1	-.012	3	-.128	1	-1.133	2
125		6	max	-3.275	15	162.297	3	23.718	1	.012	1	-.004	15	.4	3
126			min	-89.083	1	-338.286	2	.275	12	-.012	3	-.121	1	-.89	2
127		7	max	-3.275	15	258.375	3	58.271	1	.012	1	-.003	15	.184	3
128			min	-89.083	1	-542.886	2	1.531	12	-.012	3	-.079	1	-.437	2
129		8	max	-3.275	15	354.453	3	92.823	1	.012	1	.001	2	.226	2
130			min	-89.083	1	-747.486	2	2.787	12	-.012	3	-.003	3	-.131	3
131		9	max	-3.275	15	450.531	3	127.375	1	.012	1	.112	1	1.099	2
132			min	-89.083	1	-952.086	2	4.043	12	-.012	3	.002	12	-.544	3
133		10	max	-3.275	15	546.61	3	161.927	1	.012	3	.26	1	2.183	2
134			min	-89.083	1	-1156.685	2	5.299	12	-.012	1	.007	12	-1.057	3
135		11	max	-3.275	15	952.086	2	-4.043	12	.012	3	.112	1	1.099	2
136			min	-89.083	1	-450.531	3	-127.375	1	-.012	1	.002	12	-.544	3
137		12	max	-3.275	15	747.486	2	-2.787	12	.012	3	.001	2	.226	2
138			min	-89.083	1	-354.453	3	-92.823	1	-.012	1	-.003	3	-.131	3
139		13	max	-3.275	15	542.886	2	-1.531	12	.012	3	-.003	15	.184	3
140			min	-89.083	1	-258.375	3	-58.271	1	-.012	1	-.079	1	-.437	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-3.275	15	338.286	2	-.275	12	.012	3	-.004	15	.4	3
142			min	-89.083	1	-162.297	3	-23.718	1	-.012	1	-.121	1	-.89	2
143		15	max	-3.275	15	133.686	2	10.834	1	.012	3	-.004	12	.518	3
144			min	-89.083	1	-66.219	3	.408	15	-.012	1	-.128	1	-1.133	2
145		16	max	-3.275	15	29.859	3	45.386	1	.012	3	-.003	12	.536	3
146			min	-89.083	1	-70.914	2	1.664	15	-.012	1	-.099	1	-1.165	2
147		17	max	-3.275	15	125.937	3	79.939	1	.012	3	0	3	.456	3
148			min	-89.083	1	-275.514	2	2.92	15	-.012	1	-.035	1	-.987	2
149		18	max	-3.275	15	222.016	3	114.491	1	.012	3	.065	1	.278	3
150			min	-89.083	1	-480.113	2	4.176	15	-.012	1	.002	15	-.599	2
151		19	max	-3.275	15	318.094	3	149.043	1	.012	3	.201	1	0	2
152			min	-89.083	1	-684.713	2	5.432	15	-.012	1	.007	15	0	3
153	M2	1	max	1102.926	1	2.027	4	.783	1	0	3	0	3	0	1
154			min	-1443.063	3	.478	15	.029	15	0	1	0	1	0	1
155		2	max	1103.306	1	1.994	4	.783	1	0	3	0	1	0	15
156			min	-1442.778	3	.47	15	.029	15	0	1	0	15	0	4
157		3	max	1103.685	1	1.961	4	.783	1	0	3	0	1	0	15
158			min	-1442.494	3	.462	15	.029	15	0	1	0	15	-.001	4
159		4	max	1104.064	1	1.927	4	.783	1	0	3	0	1	0	15
160			min	-1442.209	3	.454	15	.029	15	0	1	0	15	-.002	4
161		5	max	1104.443	1	1.894	4	.783	1	0	3	0	1	0	15
162			min	-1441.925	3	.446	15	.029	15	0	1	0	15	-.002	4
163		6	max	1104.823	1	1.86	4	.783	1	0	3	0	1	0	15
164			min	-1441.641	3	.438	15	.029	15	0	1	0	15	-.002	4
165		7	max	1105.202	1	1.827	4	.783	1	0	3	.001	1	0	15
166			min	-1441.356	3	.43	15	.029	15	0	1	0	15	-.003	4
167		8	max	1105.581	1	1.794	4	.783	1	0	3	.001	1	0	15
168			min	-1441.072	3	.423	15	.029	15	0	1	0	15	-.003	4
169		9	max	1105.961	1	1.76	4	.783	1	0	3	.002	1	0	15
170			min	-1440.787	3	.415	15	.029	15	0	1	0	15	-.004	4
171		10	max	1106.34	1	1.727	4	.783	1	0	3	.002	1	-.001	15
172			min	-1440.503	3	.407	15	.029	15	0	1	0	15	-.004	4
173		11	max	1106.719	1	1.693	4	.783	1	0	3	.002	1	-.001	15
174			min	-1440.218	3	.399	15	.029	15	0	1	0	15	-.005	4
175		12	max	1107.098	1	1.66	4	.783	1	0	3	.002	1	-.001	15
176			min	-1439.934	3	.391	15	.029	15	0	1	0	15	-.005	4
177		13	max	1107.478	1	1.627	4	.783	1	0	3	.002	1	-.001	15
178			min	-1439.649	3	.383	15	.029	15	0	1	0	15	-.006	4
179		14	max	1107.857	1	1.593	4	.783	1	0	3	.003	1	-.001	15
180			min	-1439.365	3	.372	12	.029	15	0	1	0	15	-.006	4
181		15	max	1108.236	1	1.56	4	.783	1	0	3	.003	1	-.002	15
182			min	-1439.081	3	.359	12	.029	15	0	1	0	15	-.006	4
183		16	max	1108.615	1	1.526	4	.783	1	0	3	.003	1	-.002	15
184			min	-1438.796	3	.346	12	.029	15	0	1	0	15	-.007	4
185		17	max	1108.995	1	1.493	4	.783	1	0	3	.003	1	-.002	15
186			min	-1438.512	3	.333	12	.029	15	0	1	0	15	-.007	4
187		18	max	1109.374	1	1.46	4	.783	1	0	3	.003	1	-.002	15
188			min	-1438.227	3	.32	12	.029	15	0	1	0	15	-.008	4
189		19	max	1109.753	1	1.426	4	.783	1	0	3	.004	1	-.002	15
190			min	-1437.943	3	.307	12	.029	15	0	1	0	15	-.008	4
191	M3	1	max	544.65	2	7.982	4	.073	1	0	3	0	1	.008	4
192			min	-680.637	3	1.877	15	.003	15	0	1	0	15	.002	15
193		2	max	544.48	2	7.212	4	.073	1	0	3	0	1	.005	2
194			min	-680.765	3	1.696	15	.003	15	0	1	0	15	0	12
195		3	max	544.309	2	6.442	4	.073	1	0	3	0	1	.003	2
196			min	-680.893	3	1.515	15	.003	15	0	1	0	15	0	3
197		4	max	544.139	2	5.672	4	.073	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-681.021	3	1.334	15	.003	15	0	1	0	15	-.002	3
199		5	max	543.969	2	4.902	4	.073	1	0	3	0	1	0	15
200			min	-681.148	3	1.153	15	.003	15	0	1	0	15	-.003	3
201		6	max	543.798	2	4.132	4	.073	1	0	3	0	1	-.001	15
202			min	-681.276	3	.972	15	.003	15	0	1	0	15	-.005	4
203		7	max	543.628	2	3.363	4	.073	1	0	3	0	1	-.001	15
204			min	-681.404	3	.791	15	.003	15	0	1	0	15	-.006	4
205		8	max	543.457	2	2.593	4	.073	1	0	3	0	1	-.002	15
206			min	-681.532	3	.61	15	.003	15	0	1	0	15	-.008	4
207		9	max	543.287	2	1.823	4	.073	1	0	3	0	1	-.002	15
208			min	-681.659	3	.429	15	.003	15	0	1	0	15	-.009	4
209		10	max	543.117	2	1.053	4	.073	1	0	3	0	1	-.002	15
210			min	-681.787	3	.248	15	.003	15	0	1	0	15	-.009	4
211		11	max	542.946	2	.406	2	.073	1	0	3	0	1	-.002	15
212			min	-681.915	3	-.088	3	.003	15	0	1	0	15	-.009	4
213		12	max	542.776	2	-.114	15	.073	1	0	3	0	1	-.002	15
214			min	-682.043	3	-.538	3	.003	15	0	1	0	15	-.009	4
215		13	max	542.606	2	-.295	15	.073	1	0	3	0	1	-.002	15
216			min	-682.17	3	-1.257	4	.003	15	0	1	0	15	-.009	4
217		14	max	542.435	2	-.476	15	.073	1	0	3	0	1	-.002	15
218			min	-682.298	3	-2.027	4	.003	15	0	1	0	15	-.008	4
219		15	max	542.265	2	-.657	15	.073	1	0	3	0	1	-.002	15
220			min	-682.426	3	-2.797	4	.003	15	0	1	0	15	-.007	4
221		16	max	542.095	2	-.838	15	.073	1	0	3	0	1	-.001	15
222			min	-682.554	3	-3.567	4	.003	15	0	1	0	15	-.006	4
223		17	max	541.924	2	-1.019	15	.073	1	0	3	0	1	-.001	15
224			min	-682.682	3	-4.337	4	.003	15	0	1	0	15	-.004	4
225		18	max	541.754	2	-1.2	15	.073	1	0	3	0	1	0	15
226			min	-682.809	3	-5.107	4	.003	15	0	1	0	15	-.002	4
227		19	max	541.584	2	-1.381	15	.073	1	0	3	0	1	0	1
228			min	-682.937	3	-5.877	4	.003	15	0	1	0	15	0	1
229	M4	1	max	1216.73	1	0	1	-.303	15	0	1	0	1	0	1
230			min	-312.697	3	0	1	-8.275	1	0	1	0	15	0	1
231		2	max	1216.9	1	0	1	-.303	15	0	1	0	12	0	1
232			min	-312.569	3	0	1	-8.275	1	0	1	0	1	0	1
233		3	max	1217.07	1	0	1	-.303	15	0	1	0	15	0	1
234			min	-312.441	3	0	1	-8.275	1	0	1	-.001	1	0	1
235		4	max	1217.241	1	0	1	-.303	15	0	1	0	15	0	1
236			min	-312.314	3	0	1	-8.275	1	0	1	-.002	1	0	1
237		5	max	1217.411	1	0	1	-.303	15	0	1	0	15	0	1
238			min	-312.186	3	0	1	-8.275	1	0	1	-.003	1	0	1
239		6	max	1217.581	1	0	1	-.303	15	0	1	0	15	0	1
240			min	-312.058	3	0	1	-8.275	1	0	1	-.004	1	0	1
241		7	max	1217.752	1	0	1	-.303	15	0	1	0	15	0	1
242			min	-311.93	3	0	1	-8.275	1	0	1	-.005	1	0	1
243		8	max	1217.922	1	0	1	-.303	15	0	1	0	15	0	1
244			min	-311.803	3	0	1	-8.275	1	0	1	-.006	1	0	1
245		9	max	1218.092	1	0	1	-.303	15	0	1	0	15	0	1
246			min	-311.675	3	0	1	-8.275	1	0	1	-.007	1	0	1
247		10	max	1218.263	1	0	1	-.303	15	0	1	0	15	0	1
248			min	-311.547	3	0	1	-8.275	1	0	1	-.008	1	0	1
249		11	max	1218.433	1	0	1	-.303	15	0	1	0	15	0	1
250			min	-311.419	3	0	1	-8.275	1	0	1	-.009	1	0	1
251		12	max	1218.604	1	0	1	-.303	15	0	1	0	15	0	1
252			min	-311.292	3	0	1	-8.275	1	0	1	-.01	1	0	1
253		13	max	1218.774	1	0	1	-.303	15	0	1	0	15	0	1
254			min	-311.164	3	0	1	-8.275	1	0	1	-.011	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1218.944	1	0	1	-.303	15	0	1	0	15	0	1
256			min	-311.036	3	0	1	-8.275	1	0	1	-.012	1	0	1
257		15	max	1219.115	1	0	1	-.303	15	0	1	0	15	0	1
258			min	-310.908	3	0	1	-8.275	1	0	1	-.013	1	0	1
259		16	max	1219.285	1	0	1	-.303	15	0	1	0	15	0	1
260			min	-310.78	3	0	1	-8.275	1	0	1	-.014	1	0	1
261		17	max	1219.455	1	0	1	-.303	15	0	1	0	15	0	1
262			min	-310.653	3	0	1	-8.275	1	0	1	-.015	1	0	1
263		18	max	1219.626	1	0	1	-.303	15	0	1	0	15	0	1
264			min	-310.525	3	0	1	-8.275	1	0	1	-.016	1	0	1
265		19	max	1219.796	1	0	1	-.303	15	0	1	0	15	0	1
266			min	-310.397	3	0	1	-8.275	1	0	1	-.017	1	0	1
267	M6	1	max	3525.2	1	2.658	2	0	1	0	1	0	1	0	1
268			min	-4692.816	3	-.142	3	0	1	0	1	0	1	0	1
269		2	max	3525.579	1	2.632	2	0	1	0	1	0	1	0	3
270			min	-4692.532	3	-.161	3	0	1	0	1	0	1	0	2
271		3	max	3525.958	1	2.606	2	0	1	0	1	0	1	0	3
272			min	-4692.247	3	-.181	3	0	1	0	1	0	1	-.001	2
273		4	max	3526.337	1	2.58	2	0	1	0	1	0	1	0	3
274			min	-4691.963	3	-.2	3	0	1	0	1	0	1	-.002	2
275		5	max	3526.717	1	2.554	2	0	1	0	1	0	1	0	3
276			min	-4691.678	3	-.22	3	0	1	0	1	0	1	-.003	2
277		6	max	3527.096	1	2.528	2	0	1	0	1	0	1	0	3
278			min	-4691.394	3	-.239	3	0	1	0	1	0	1	-.003	2
279		7	max	3527.475	1	2.502	2	0	1	0	1	0	1	0	3
280			min	-4691.109	3	-.259	3	0	1	0	1	0	1	-.004	2
281		8	max	3527.854	1	2.476	2	0	1	0	1	0	1	0	3
282			min	-4690.825	3	-.278	3	0	1	0	1	0	1	-.005	2
283		9	max	3528.234	1	2.45	2	0	1	0	1	0	1	0	3
284			min	-4690.54	3	-.298	3	0	1	0	1	0	1	-.005	2
285		10	max	3528.613	1	2.424	2	0	1	0	1	0	1	0	3
286			min	-4690.256	3	-.318	3	0	1	0	1	0	1	-.006	2
287		11	max	3528.992	1	2.398	2	0	1	0	1	0	1	0	3
288			min	-4689.972	3	-.337	3	0	1	0	1	0	1	-.006	2
289		12	max	3529.371	1	2.372	2	0	1	0	1	0	1	0	3
290			min	-4689.687	3	-.357	3	0	1	0	1	0	1	-.007	2
291		13	max	3529.751	1	2.346	2	0	1	0	1	0	1	0	3
292			min	-4689.403	3	-.376	3	0	1	0	1	0	1	-.008	2
293		14	max	3530.13	1	2.319	2	0	1	0	1	0	1	0	3
294			min	-4689.118	3	-.396	3	0	1	0	1	0	1	-.008	2
295		15	max	3530.509	1	2.293	2	0	1	0	1	0	1	0	3
296			min	-4688.834	3	-.415	3	0	1	0	1	0	1	-.009	2
297		16	max	3530.888	1	2.267	2	0	1	0	1	0	1	.001	3
298			min	-4688.549	3	-.435	3	0	1	0	1	0	1	-.009	2
299		17	max	3531.268	1	2.241	2	0	1	0	1	0	1	.001	3
300			min	-4688.265	3	-.454	3	0	1	0	1	0	1	-.01	2
301		18	max	3531.647	1	2.215	2	0	1	0	1	0	1	.001	3
302			min	-4687.98	3	-.474	3	0	1	0	1	0	1	-.011	2
303		19	max	3532.026	1	2.189	2	0	1	0	1	0	1	.001	3
304			min	-4687.696	3	-.493	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2006.961	2	8.017	4	0	1	0	1	0	1	.011	2
306			min	-2136.488	3	1.882	15	0	1	0	1	0	1	-.001	3
307		2	max	2006.791	2	7.247	4	0	1	0	1	0	1	.008	2
308			min	-2136.616	3	1.701	15	0	1	0	1	0	1	-.003	3
309		3	max	2006.621	2	6.477	4	0	1	0	1	0	1	.006	2
310			min	-2136.744	3	1.52	15	0	1	0	1	0	1	-.004	3
311		4	max	2006.45	2	5.707	4	0	1	0	1	0	1	.004	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2136.872	3	1.339	15	0	1	0	1	0	1	-.005	3
313		5	max	2006.28	2	4.937	4	0	1	0	1	0	1	.002	2
314			min	-2136.999	3	1.158	15	0	1	0	1	0	1	-.006	3
315		6	max	2006.11	2	4.167	4	0	1	0	1	0	1	0	2
316			min	-2137.127	3	.977	15	0	1	0	1	0	1	-.007	3
317		7	max	2005.939	2	3.397	4	0	1	0	1	0	1	-.001	15
318			min	-2137.255	3	.796	15	0	1	0	1	0	1	-.008	3
319		8	max	2005.769	2	2.677	2	0	1	0	1	0	1	-.002	15
320			min	-2137.383	3	.525	12	0	1	0	1	0	1	-.008	3
321		9	max	2005.599	2	2.077	2	0	1	0	1	0	1	-.002	15
322			min	-2137.51	3	.225	12	0	1	0	1	0	1	-.008	3
323		10	max	2005.428	2	1.477	2	0	1	0	1	0	1	-.002	15
324			min	-2137.638	3	-.194	3	0	1	0	1	0	1	-.009	4
325		11	max	2005.258	2	.877	2	0	1	0	1	0	1	-.002	15
326			min	-2137.766	3	-.644	3	0	1	0	1	0	1	-.009	4
327		12	max	2005.088	2	.277	2	0	1	0	1	0	1	-.002	15
328			min	-2137.894	3	-1.094	3	0	1	0	1	0	1	-.009	4
329		13	max	2004.917	2	-.29	15	0	1	0	1	0	1	-.002	15
330			min	-2138.021	3	-1.544	3	0	1	0	1	0	1	-.009	4
331		14	max	2004.747	2	-.471	15	0	1	0	1	0	1	-.002	15
332			min	-2138.149	3	-1.994	3	0	1	0	1	0	1	-.008	4
333		15	max	2004.577	2	-.652	15	0	1	0	1	0	1	-.002	15
334			min	-2138.277	3	-2.763	4	0	1	0	1	0	1	-.007	4
335		16	max	2004.406	2	-.833	15	0	1	0	1	0	1	-.001	15
336			min	-2138.405	3	-3.533	4	0	1	0	1	0	1	-.006	4
337		17	max	2004.236	2	-1.014	15	0	1	0	1	0	1	-.001	15
338			min	-2138.532	3	-4.303	4	0	1	0	1	0	1	-.004	4
339		18	max	2004.066	2	-1.195	15	0	1	0	1	0	1	0	15
340			min	-2138.66	3	-5.073	4	0	1	0	1	0	1	-.002	4
341		19	max	2003.895	2	-1.376	15	0	1	0	1	0	1	0	1
342			min	-2138.788	3	-5.843	4	0	1	0	1	0	1	0	1
343	M8	1	max	3472.919	1	0	1	0	1	0	1	0	1	0	1
344			min	-1077.683	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3473.09	1	0	1	0	1	0	1	0	1	0	1
346			min	-1077.556	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3473.26	1	0	1	0	1	0	1	0	1	0	1
348			min	-1077.428	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3473.43	1	0	1	0	1	0	1	0	1	0	1
350			min	-1077.3	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3473.601	1	0	1	0	1	0	1	0	1	0	1
352			min	-1077.172	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3473.771	1	0	1	0	1	0	1	0	1	0	1
354			min	-1077.044	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3473.941	1	0	1	0	1	0	1	0	1	0	1
356			min	-1076.917	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3474.112	1	0	1	0	1	0	1	0	1	0	1
358			min	-1076.789	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3474.282	1	0	1	0	1	0	1	0	1	0	1
360			min	-1076.661	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3474.452	1	0	1	0	1	0	1	0	1	0	1
362			min	-1076.533	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3474.623	1	0	1	0	1	0	1	0	1	0	1
364			min	-1076.406	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3474.793	1	0	1	0	1	0	1	0	1	0	1
366			min	-1076.278	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3474.963	1	0	1	0	1	0	1	0	1	0	1
368			min	-1076.15	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3475.134	1	0	1	0	1	0	1	0	1	0	1
370			min	-1076.022	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3475.304	1	0	1	0	1	0	1	0	1	0	1
372			min	-1075.895	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3475.474	1	0	1	0	1	0	1	0	1	0	1
374			min	-1075.767	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3475.645	1	0	1	0	1	0	1	0	1	0	1
376			min	-1075.639	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3475.815	1	0	1	0	1	0	1	0	1	0	1
378			min	-1075.511	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3475.985	1	0	1	0	1	0	1	0	1	0	1
380			min	-1075.384	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1102.926	1	2.027	4	-.029	15	0	1	0	1	0	1
382			min	-1443.063	3	.478	15	-.783	1	0	3	0	3	0	1
383		2	max	1103.306	1	1.994	4	-.029	15	0	1	0	15	0	15
384			min	-1442.778	3	.47	15	-.783	1	0	3	0	1	0	4
385		3	max	1103.685	1	1.961	4	-.029	15	0	1	0	15	0	15
386			min	-1442.494	3	.462	15	-.783	1	0	3	0	1	-.001	4
387		4	max	1104.064	1	1.927	4	-.029	15	0	1	0	15	0	15
388			min	-1442.209	3	.454	15	-.783	1	0	3	0	1	-.002	4
389		5	max	1104.443	1	1.894	4	-.029	15	0	1	0	15	0	15
390			min	-1441.925	3	.446	15	-.783	1	0	3	0	1	-.002	4
391		6	max	1104.823	1	1.86	4	-.029	15	0	1	0	15	0	15
392			min	-1441.641	3	.438	15	-.783	1	0	3	0	1	-.002	4
393		7	max	1105.202	1	1.827	4	-.029	15	0	1	0	15	0	15
394			min	-1441.356	3	.43	15	-.783	1	0	3	-.001	1	-.003	4
395		8	max	1105.581	1	1.794	4	-.029	15	0	1	0	15	0	15
396			min	-1441.072	3	.423	15	-.783	1	0	3	-.001	1	-.003	4
397		9	max	1105.961	1	1.76	4	-.029	15	0	1	0	15	0	15
398			min	-1440.787	3	.415	15	-.783	1	0	3	-.002	1	-.004	4
399		10	max	1106.34	1	1.727	4	-.029	15	0	1	0	15	-.001	15
400			min	-1440.503	3	.407	15	-.783	1	0	3	-.002	1	-.004	4
401		11	max	1106.719	1	1.693	4	-.029	15	0	1	0	15	-.001	15
402			min	-1440.218	3	.399	15	-.783	1	0	3	-.002	1	-.005	4
403		12	max	1107.098	1	1.66	4	-.029	15	0	1	0	15	-.001	15
404			min	-1439.934	3	.391	15	-.783	1	0	3	-.002	1	-.005	4
405		13	max	1107.478	1	1.627	4	-.029	15	0	1	0	15	-.001	15
406			min	-1439.649	3	.383	15	-.783	1	0	3	-.002	1	-.006	4
407		14	max	1107.857	1	1.593	4	-.029	15	0	1	0	15	-.001	15
408			min	-1439.365	3	.372	12	-.783	1	0	3	-.003	1	-.006	4
409		15	max	1108.236	1	1.56	4	-.029	15	0	1	0	15	-.002	15
410			min	-1439.081	3	.359	12	-.783	1	0	3	-.003	1	-.006	4
411		16	max	1108.615	1	1.526	4	-.029	15	0	1	0	15	-.002	15
412			min	-1438.796	3	.346	12	-.783	1	0	3	-.003	1	-.007	4
413		17	max	1108.995	1	1.493	4	-.029	15	0	1	0	15	-.002	15
414			min	-1438.512	3	.333	12	-.783	1	0	3	-.003	1	-.007	4
415		18	max	1109.374	1	1.46	4	-.029	15	0	1	0	15	-.002	15
416			min	-1438.227	3	.32	12	-.783	1	0	3	-.003	1	-.008	4
417		19	max	1109.753	1	1.426	4	-.029	15	0	1	0	15	-.002	15
418			min	-1437.943	3	.307	12	-.783	1	0	3	-.004	1	-.008	4
419	M11	1	max	544.65	2	7.982	4	-.003	15	0	1	0	15	.008	4
420			min	-680.637	3	1.877	15	-.073	1	0	3	0	1	.002	15
421		2	max	544.48	2	7.212	4	-.003	15	0	1	0	15	.005	2
422			min	-680.765	3	1.696	15	-.073	1	0	3	0	1	0	12
423		3	max	544.309	2	6.442	4	-.003	15	0	1	0	15	.003	2
424			min	-680.893	3	1.515	15	-.073	1	0	3	0	1	0	3
425		4	max	544.139	2	5.672	4	-.003	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-681.021	3	1.334	15	-.073	1	0	3	0	1	-.002	3
427		5	max	543.969	2	4.902	4	-.003	15	0	1	0	15	0	15
428			min	-681.148	3	1.153	15	-.073	1	0	3	0	1	-.003	3
429		6	max	543.798	2	4.132	4	-.003	15	0	1	0	15	-.001	15
430			min	-681.276	3	.972	15	-.073	1	0	3	0	1	-.005	4
431		7	max	543.628	2	3.363	4	-.003	15	0	1	0	15	-.001	15
432			min	-681.404	3	.791	15	-.073	1	0	3	0	1	-.006	4
433		8	max	543.457	2	2.593	4	-.003	15	0	1	0	15	-.002	15
434			min	-681.532	3	.61	15	-.073	1	0	3	0	1	-.008	4
435		9	max	543.287	2	1.823	4	-.003	15	0	1	0	15	-.002	15
436			min	-681.659	3	.429	15	-.073	1	0	3	0	1	-.009	4
437		10	max	543.117	2	1.053	4	-.003	15	0	1	0	15	-.002	15
438			min	-681.787	3	.248	15	-.073	1	0	3	0	1	-.009	4
439		11	max	542.946	2	.406	2	-.003	15	0	1	0	15	-.002	15
440			min	-681.915	3	-.088	3	-.073	1	0	3	0	1	-.009	4
441		12	max	542.776	2	-.114	15	-.003	15	0	1	0	15	-.002	15
442			min	-682.043	3	-.538	3	-.073	1	0	3	0	1	-.009	4
443		13	max	542.606	2	-.295	15	-.003	15	0	1	0	15	-.002	15
444			min	-682.17	3	-1.257	4	-.073	1	0	3	0	1	-.009	4
445		14	max	542.435	2	-.476	15	-.003	15	0	1	0	15	-.002	15
446			min	-682.298	3	-2.027	4	-.073	1	0	3	0	1	-.008	4
447		15	max	542.265	2	-.657	15	-.003	15	0	1	0	15	-.002	15
448			min	-682.426	3	-2.797	4	-.073	1	0	3	0	1	-.007	4
449		16	max	542.095	2	-.838	15	-.003	15	0	1	0	15	-.001	15
450			min	-682.554	3	-3.567	4	-.073	1	0	3	0	1	-.006	4
451		17	max	541.924	2	-1.019	15	-.003	15	0	1	0	15	-.001	15
452			min	-682.682	3	-4.337	4	-.073	1	0	3	0	1	-.004	4
453		18	max	541.754	2	-1.2	15	-.003	15	0	1	0	15	0	15
454			min	-682.809	3	-5.107	4	-.073	1	0	3	0	1	-.002	4
455		19	max	541.584	2	-1.381	15	-.003	15	0	1	0	15	0	1
456			min	-682.937	3	-5.877	4	-.073	1	0	3	0	1	0	1
457	M12	1	max	1216.73	1	0	1	8.275	1	0	1	0	15	0	1
458			min	-312.697	3	0	1	.303	15	0	1	0	1	0	1
459		2	max	1216.9	1	0	1	8.275	1	0	1	0	1	0	1
460			min	-312.569	3	0	1	.303	15	0	1	0	12	0	1
461		3	max	1217.07	1	0	1	8.275	1	0	1	.001	1	0	1
462			min	-312.441	3	0	1	.303	15	0	1	0	15	0	1
463		4	max	1217.241	1	0	1	8.275	1	0	1	.002	1	0	1
464			min	-312.314	3	0	1	.303	15	0	1	0	15	0	1
465		5	max	1217.411	1	0	1	8.275	1	0	1	.003	1	0	1
466			min	-312.186	3	0	1	.303	15	0	1	0	15	0	1
467		6	max	1217.581	1	0	1	8.275	1	0	1	.004	1	0	1
468			min	-312.058	3	0	1	.303	15	0	1	0	15	0	1
469		7	max	1217.752	1	0	1	8.275	1	0	1	.005	1	0	1
470			min	-311.93	3	0	1	.303	15	0	1	0	15	0	1
471		8	max	1217.922	1	0	1	8.275	1	0	1	.006	1	0	1
472			min	-311.803	3	0	1	.303	15	0	1	0	15	0	1
473		9	max	1218.092	1	0	1	8.275	1	0	1	.007	1	0	1
474			min	-311.675	3	0	1	.303	15	0	1	0	15	0	1
475		10	max	1218.263	1	0	1	8.275	1	0	1	.008	1	0	1
476			min	-311.547	3	0	1	.303	15	0	1	0	15	0	1
477		11	max	1218.433	1	0	1	8.275	1	0	1	.009	1	0	1
478			min	-311.419	3	0	1	.303	15	0	1	0	15	0	1
479		12	max	1218.604	1	0	1	8.275	1	0	1	.01	1	0	1
480			min	-311.292	3	0	1	.303	15	0	1	0	15	0	1
481		13	max	1218.774	1	0	1	8.275	1	0	1	.011	1	0	1
482			min	-311.164	3	0	1	.303	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1218.944	1	0	1	8.275	1	0	1	.012	1	0	1
484			min	-311.036	3	0	1	.303	15	0	1	0	15	0	1
485		15	max	1219.115	1	0	1	8.275	1	0	1	.013	1	0	1
486			min	-310.908	3	0	1	.303	15	0	1	0	15	0	1
487		16	max	1219.285	1	0	1	8.275	1	0	1	.014	1	0	1
488			min	-310.78	3	0	1	.303	15	0	1	0	15	0	1
489		17	max	1219.455	1	0	1	8.275	1	0	1	.015	1	0	1
490			min	-310.653	3	0	1	.303	15	0	1	0	15	0	1
491		18	max	1219.626	1	0	1	8.275	1	0	1	.016	1	0	1
492			min	-310.525	3	0	1	.303	15	0	1	0	15	0	1
493		19	max	1219.796	1	0	1	8.275	1	0	1	.017	1	0	1
494			min	-310.397	3	0	1	.303	15	0	1	0	15	0	1
495	M1	1	max	148.795	1	802.847	3	-3.077	15	0	1	.199	1	0	3
496			min	5.426	15	-491.813	1	-83.656	1	0	3	.007	15	-.016	2
497		2	max	149.285	1	801.838	3	-3.077	15	0	1	.155	1	.246	1
498			min	5.574	15	-493.159	1	-83.656	1	0	3	.006	15	-.423	3
499		3	max	410.244	3	573.134	2	-3.048	15	0	3	.111	1	.494	1
500			min	-243.61	2	-588.561	3	-83.057	1	0	1	.004	15	-.829	3
501		4	max	410.612	3	571.788	2	-3.048	15	0	3	.067	1	.197	1
502			min	-243.12	2	-589.571	3	-83.057	1	0	1	.002	15	-.518	3
503		5	max	410.979	3	570.442	2	-3.048	15	0	3	.023	1	-.004	15
504			min	-242.63	2	-590.58	3	-83.057	1	0	1	0	15	-.207	3
505		6	max	411.347	3	569.096	2	-3.048	15	0	3	0	15	.105	3
506			min	-242.14	2	-591.59	3	-83.057	1	0	1	-.02	1	-.427	2
507		7	max	411.714	3	567.749	2	-3.048	15	0	3	-.002	15	.417	3
508			min	-241.65	2	-592.599	3	-83.057	1	0	1	-.064	1	-.727	2
509		8	max	412.081	3	566.403	2	-3.048	15	0	3	-.004	15	.73	3
510			min	-241.16	2	-593.609	3	-83.057	1	0	1	-.108	1	-1.026	2
511		9	max	422.149	3	51.385	2	-4.55	15	0	9	.065	1	.852	3
512			min	-180.677	2	.409	15	-123.947	1	0	3	.002	15	-1.174	2
513		10	max	422.516	3	50.038	2	-4.55	15	0	9	0	15	.831	3
514			min	-180.188	2	.003	15	-123.947	1	0	3	0	1	-1.201	2
515		11	max	422.884	3	48.692	2	-4.55	15	0	9	-.002	15	.809	3
516			min	-179.698	2	-1.662	4	-123.947	1	0	3	-.066	1	-1.227	2
517		12	max	432.851	3	389.045	3	-2.975	15	0	2	.107	1	.706	3
518			min	-119.179	2	-673.015	2	-81.224	1	0	3	.004	15	-1.088	2
519		13	max	433.219	3	388.035	3	-2.975	15	0	2	.064	1	.501	3
520			min	-118.689	2	-674.361	2	-81.224	1	0	3	.002	15	-.732	2
521		14	max	433.586	3	387.026	3	-2.975	15	0	2	.021	1	.296	3
522			min	-118.199	2	-675.707	2	-81.224	1	0	3	0	15	-.376	2
523		15	max	433.954	3	386.016	3	-2.975	15	0	2	0	15	.093	3
524			min	-117.709	2	-677.053	2	-81.224	1	0	3	-.022	1	-.044	1
525		16	max	434.321	3	385.007	3	-2.975	15	0	2	-.002	15	.338	2
526			min	-117.219	2	-678.399	2	-81.224	1	0	3	-.065	1	-.111	3
527		17	max	434.689	3	383.997	3	-2.975	15	0	2	-.004	15	.697	2
528			min	-116.729	2	-679.745	2	-81.224	1	0	3	-.107	1	-.314	3
529		18	max	-5.579	15	686.558	2	-3.275	15	0	3	-.006	15	.351	2
530			min	-149.529	1	-317.144	3	-89.166	1	0	2	-.154	1	-.155	3
531		19	max	-5.432	15	685.212	2	-3.275	15	0	3	-.007	15	.012	3
532			min	-149.039	1	-318.153	3	-89.166	1	0	2	-.201	1	-.012	1
533	M5	1	max	324.351	1	2675.195	3	0	1	0	1	0	1	.031	2
534			min	10.193	12	-1671.825	1	0	1	0	1	0	1	0	3
535		2	max	324.841	1	2674.185	3	0	1	0	1	0	1	.911	1
536			min	10.438	12	-1673.171	1	0	1	0	1	0	1	-1.412	3
537		3	max	1312.53	3	1712.018	2	0	1	0	1	0	1	1.753	1
538			min	-839.731	2	-1863.006	3	0	1	0	1	0	1	-2.768	3
539		4	max	1312.897	3	1710.672	2	0	1	0	1	0	1	.863	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-839.241	2	-1864.015	3	0	1	0	1	0	1	-1.785	3
541		5	max	1313.265	3	1709.326	2	0	1	0	1	0	1	.015	9
542			min	-838.751	2	-1865.025	3	0	1	0	1	0	1	-.801	3
543		6	max	1313.632	3	1707.98	2	0	1	0	1	0	1	.183	3
544			min	-838.261	2	-1866.034	3	0	1	0	1	0	1	-.995	2
545		7	max	1314	3	1706.634	2	0	1	0	1	0	1	1.168	3
546			min	-837.771	2	-1867.044	3	0	1	0	1	0	1	-1.895	2
547		8	max	1314.367	3	1705.288	2	0	1	0	1	0	1	2.154	3
548			min	-837.281	2	-1868.053	3	0	1	0	1	0	1	-2.796	2
549		9	max	1329.242	3	172.259	2	0	1	0	1	0	1	2.479	3
550			min	-710.897	2	.406	15	0	1	0	1	0	1	-3.184	2
551		10	max	1329.609	3	170.913	2	0	1	0	1	0	1	2.4	3
552			min	-710.407	2	0	15	0	1	0	1	0	1	-3.275	2
553		11	max	1329.977	3	169.567	2	0	1	0	1	0	1	2.322	3
554			min	-709.917	2	-1.558	4	0	1	0	1	0	1	-3.364	2
555		12	max	1345.05	3	1211.135	3	0	1	0	1	0	1	2.038	3
556			min	-583.606	2	-2053.863	2	0	1	0	1	0	1	-3.012	2
557		13	max	1345.417	3	1210.125	3	0	1	0	1	0	1	1.4	3
558			min	-583.116	2	-2055.209	2	0	1	0	1	0	1	-1.928	2
559		14	max	1345.785	3	1209.115	3	0	1	0	1	0	1	.761	3
560			min	-582.626	2	-2056.555	2	0	1	0	1	0	1	-.843	2
561		15	max	1346.152	3	1208.106	3	0	1	0	1	0	1	.242	2
562			min	-582.136	2	-2057.901	2	0	1	0	1	0	1	-.003	13
563		16	max	1346.52	3	1207.096	3	0	1	0	1	0	1	1.329	2
564			min	-581.646	2	-2059.247	2	0	1	0	1	0	1	-.514	3
565		17	max	1346.887	3	1206.087	3	0	1	0	1	0	1	2.416	2
566			min	-581.156	2	-2060.593	2	0	1	0	1	0	1	-1.15	3
567		18	max	-10.842	12	2317.392	2	0	1	0	1	0	1	1.245	2
568			min	-324.352	1	-1092.518	3	0	1	0	1	0	1	-.602	3
569		19	max	-10.597	12	2316.046	2	0	1	0	1	0	1	.024	1
570			min	-323.862	1	-1093.527	3	0	1	0	1	0	1	-.025	3
571	M9	1	max	148.795	1	802.847	3	83.656	1	0	3	-.007	15	0	3
572			min	5.426	15	-491.813	1	3.077	15	0	1	-.199	1	-.016	2
573		2	max	149.285	1	801.838	3	83.656	1	0	3	-.006	15	.246	1
574			min	5.574	15	-493.159	1	3.077	15	0	1	-.155	1	-.423	3
575		3	max	410.244	3	573.134	2	83.057	1	0	1	-.004	15	.494	1
576			min	-243.61	2	-588.561	3	3.048	15	0	3	-.111	1	-.829	3
577		4	max	410.612	3	571.788	2	83.057	1	0	1	-.002	15	.197	1
578			min	-243.12	2	-589.571	3	3.048	15	0	3	-.067	1	-.518	3
579		5	max	410.979	3	570.442	2	83.057	1	0	1	0	15	-.004	15
580			min	-242.63	2	-590.58	3	3.048	15	0	3	-.023	1	-.207	3
581		6	max	411.347	3	569.096	2	83.057	1	0	1	.02	1	.105	3
582			min	-242.14	2	-591.59	3	3.048	15	0	3	0	15	-.427	2
583		7	max	411.714	3	567.749	2	83.057	1	0	1	.064	1	.417	3
584			min	-241.65	2	-592.599	3	3.048	15	0	3	.002	15	-.727	2
585		8	max	412.081	3	566.403	2	83.057	1	0	1	.108	1	.73	3
586			min	-241.16	2	-593.609	3	3.048	15	0	3	.004	15	-1.026	2
587		9	max	422.149	3	51.385	2	123.947	1	0	3	-.002	15	.852	3
588			min	-180.677	2	.409	15	4.55	15	0	9	-.065	1	-1.174	2
589		10	max	422.516	3	50.038	2	123.947	1	0	3	0	1	.831	3
590			min	-180.188	2	.003	15	4.55	15	0	9	0	15	-1.201	2
591		11	max	422.884	3	48.692	2	123.947	1	0	3	.066	1	.809	3
592			min	-179.698	2	-1.662	4	4.55	15	0	9	.002	15	-1.227	2
593		12	max	432.851	3	389.045	3	81.224	1	0	3	-.004	15	.706	3
594			min	-119.179	2	-673.015	2	2.975	15	0	2	-.107	1	-1.088	2
595		13	max	433.219	3	388.035	3	81.224	1	0	3	-.002	15	.501	3
596			min	-118.689	2	-674.361	2	2.975	15	0	2	-.064	1	-.732	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	433.586	3	387.026	3	81.224	1	0	3	0	15	.296	3
598			min	-118.199	2	-675.707	2	2.975	15	0	2	-.021	1	-.376	2
599		15	max	433.954	3	386.016	3	81.224	1	0	3	.022	1	.093	3
600			min	-117.709	2	-677.053	2	2.975	15	0	2	0	15	-.044	1
601		16	max	434.321	3	385.007	3	81.224	1	0	3	.065	1	.338	2
602			min	-117.219	2	-678.399	2	2.975	15	0	2	.002	15	-.111	3
603		17	max	434.689	3	383.997	3	81.224	1	0	3	.107	1	.697	2
604			min	-116.729	2	-679.745	2	2.975	15	0	2	.004	15	-.314	3
605		18	max	-5.579	15	686.558	2	89.166	1	0	2	.154	1	.351	2
606			min	-149.529	1	-317.144	3	3.275	15	0	3	.006	15	-.155	3
607		19	max	-5.432	15	685.212	2	89.166	1	0	2	.201	1	.012	3
608			min	-149.039	1	-318.153	3	3.275	15	0	3	.007	15	-.012	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	.125	2	.007	3	1.018e-2	2	NC	1	NC	1
2			min	0	15	-.025	3	-.004	2	-2.07e-3	3	NC	1	NC	1
3		2	max	0	1	.275	3	.028	1	1.16e-2	2	NC	5	NC	2
4			min	0	15	-.048	1	0	10	-2.095e-3	3	738.879	3	8220.151	1
5		3	max	0	1	.518	3	.066	1	1.301e-2	2	NC	5	NC	3
6			min	0	15	-.176	1	.003	15	-2.12e-3	3	408.318	3	3398.79	1
7		4	max	0	1	.666	3	.099	1	1.443e-2	2	NC	5	NC	3
8			min	0	15	-.247	1	.004	15	-2.145e-3	3	321.143	3	2261.92	1
9		5	max	0	1	.7	3	.115	1	1.584e-2	2	NC	5	NC	3
10			min	0	15	-.248	1	.004	15	-2.169e-3	3	306.092	3	1935.633	1
11		6	max	0	1	.623	3	.111	1	1.726e-2	2	NC	5	NC	3
12			min	0	15	-.182	1	.004	15	-2.194e-3	3	342.48	3	2015.829	1
13		7	max	0	1	.458	3	.086	1	1.867e-2	2	NC	5	NC	3
14			min	0	15	-.064	1	.001	10	-2.219e-3	3	459.494	3	2592.932	1
15		8	max	0	1	.248	3	.049	1	2.009e-2	2	NC	2	NC	2
16			min	0	15	.002	15	-.003	10	-2.244e-3	3	811.472	3	4596.429	1
17		9	max	0	1	.229	2	.023	3	2.15e-2	2	NC	4	NC	1
18			min	0	15	.005	15	-.008	2	-2.269e-3	3	2148.082	2	NC	1
19		10	max	0	1	.283	2	.023	3	2.292e-2	2	NC	3	NC	1
20			min	0	1	-.028	3	-.015	2	-2.293e-3	3	1403.509	2	NC	1
21		11	max	0	15	.229	2	.023	3	2.15e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.008	2	-2.269e-3	3	2148.082	2	NC	1
23		12	max	0	15	.248	3	.049	1	2.009e-2	2	NC	2	NC	2
24			min	0	1	.002	15	-.003	10	-2.244e-3	3	811.472	3	4596.429	1
25		13	max	0	15	.458	3	.086	1	1.867e-2	2	NC	5	NC	3
26			min	0	1	-.064	1	.001	10	-2.219e-3	3	459.494	3	2592.932	1
27		14	max	0	15	.623	3	.111	1	1.726e-2	2	NC	5	NC	3
28			min	0	1	-.182	1	.004	15	-2.194e-3	3	342.48	3	2015.829	1
29		15	max	0	15	.7	3	.115	1	1.584e-2	2	NC	5	NC	3
30			min	0	1	-.248	1	.004	15	-2.169e-3	3	306.092	3	1935.633	1
31		16	max	0	15	.666	3	.099	1	1.443e-2	2	NC	5	NC	3
32			min	0	1	-.247	1	.004	15	-2.145e-3	3	321.143	3	2261.92	1
33		17	max	0	15	.518	3	.066	1	1.301e-2	2	NC	5	NC	3
34			min	0	1	-.176	1	.003	15	-2.12e-3	3	408.318	3	3398.79	1
35		18	max	0	15	.275	3	.028	1	1.16e-2	2	NC	5	NC	2
36			min	0	1	-.048	1	0	10	-2.095e-3	3	738.879	3	8220.151	1
37		19	max	0	15	.125	2	.007	3	1.018e-2	2	NC	1	NC	1
38			min	0	1	-.025	3	-.004	2	-2.07e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.254	3	.007	3	5.958e-3	2	NC	1	NC	1
40			min	0	15	-.392	2	-.003	2	-4.539e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.56	3	.019	1	7.099e-3	2	NC	5	NC	1
42			min	0	15	-.681	2	0	10	-5.49e-3	3	725.791	3	NC	1
43		3	max	0	1	.82	3	.053	1	8.241e-3	2	NC	5	NC	2
44			min	0	15	-.933	2	.002	10	-6.442e-3	3	392.044	3	4293.04	1
45		4	max	0	1	1.004	3	.084	1	9.382e-3	2	NC	15	NC	3
46			min	0	15	-1.122	2	.003	15	-7.393e-3	3	296.005	3	2666.906	1
47		5	max	0	1	1.095	3	.102	1	1.052e-2	2	NC	15	NC	3
48			min	0	15	-1.234	2	.004	15	-8.345e-3	3	263.747	2	2197.497	1
49		6	max	0	1	1.095	3	.1	1	1.167e-2	2	NC	15	NC	3
50			min	0	15	-1.268	2	.004	15	-9.296e-3	3	253.449	2	2233.779	1
51		7	max	0	1	1.017	3	.08	1	1.281e-2	2	NC	15	NC	3
52			min	0	15	-1.235	2	.001	10	-1.025e-2	3	263.166	2	2823.413	1
53		8	max	0	1	.895	3	.046	1	1.395e-2	2	NC	15	NC	2
54			min	0	15	-1.16	2	-.003	10	-1.12e-2	3	288.929	2	4927.967	1
55		9	max	0	1	.774	3	.021	3	1.509e-2	2	NC	5	NC	1
56			min	0	15	-1.078	2	-.007	2	-1.215e-2	3	323.464	2	NC	1
57		10	max	0	1	.716	3	.021	3	1.623e-2	2	NC	5	NC	1
58			min	0	1	-1.038	2	-.014	2	-1.31e-2	3	343.698	2	NC	1
59		11	max	0	15	.774	3	.021	3	1.509e-2	2	NC	5	NC	1
60			min	0	1	-1.078	2	-.007	2	-1.215e-2	3	323.464	2	NC	1
61		12	max	0	15	.895	3	.046	1	1.395e-2	2	NC	15	NC	2
62			min	0	1	-1.16	2	-.003	10	-1.12e-2	3	288.929	2	4927.967	1
63		13	max	0	15	1.017	3	.08	1	1.281e-2	2	NC	15	NC	3
64			min	0	1	-1.235	2	.001	10	-1.025e-2	3	263.166	2	2823.413	1
65		14	max	0	15	1.095	3	.1	1	1.167e-2	2	NC	15	NC	3
66			min	0	1	-1.268	2	.004	15	-9.296e-3	3	253.449	2	2233.779	1
67		15	max	0	15	1.095	3	.102	1	1.052e-2	2	NC	15	NC	3
68			min	0	1	-1.234	2	.004	15	-8.345e-3	3	263.747	2	2197.497	1
69		16	max	0	15	1.004	3	.084	1	9.382e-3	2	NC	15	NC	3
70			min	0	1	-1.122	2	.003	15	-7.393e-3	3	296.005	3	2666.906	1
71		17	max	0	15	.82	3	.053	1	8.241e-3	2	NC	5	NC	2
72			min	0	1	-.933	2	.002	10	-6.442e-3	3	392.044	3	4293.04	1
73		18	max	0	15	.56	3	.019	1	7.099e-3	2	NC	5	NC	1
74			min	0	1	-.681	2	0	10	-5.49e-3	3	725.791	3	NC	1
75		19	max	0	15	.254	3	.007	3	5.958e-3	2	NC	1	NC	1
76			min	0	1	-.392	2	-.003	2	-4.539e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.26	3	.006	3	3.854e-3	3	NC	1	NC	1
78			min	0	1	-.391	2	-.003	2	-6.172e-3	2	NC	1	NC	1
79		2	max	0	15	.459	3	.019	1	4.664e-3	3	NC	5	NC	1
80			min	0	1	-.757	2	0	10	-7.357e-3	2	606.617	2	NC	1
81		3	max	0	15	.634	3	.053	1	5.473e-3	3	NC	5	NC	2
82			min	0	1	-1.071	2	.002	15	-8.542e-3	2	326.449	2	4279.025	1
83		4	max	0	15	.767	3	.084	1	6.283e-3	3	NC	15	NC	3
84			min	0	1	-1.298	2	.003	15	-9.728e-3	2	244.895	2	2659.573	1
85		5	max	0	15	.847	3	.102	1	7.093e-3	3	NC	15	NC	3
86			min	0	1	-1.418	2	.004	15	-1.091e-2	2	216.107	2	2191.518	1
87		6	max	0	15	.875	3	.101	1	7.903e-3	3	NC	15	NC	3
88			min	0	1	-1.433	2	.004	15	-1.21e-2	2	213.085	2	2226.846	1
89		7	max	0	15	.858	3	.08	1	8.712e-3	3	NC	15	NC	3
90			min	0	1	-1.359	2	.002	10	-1.328e-2	2	229.486	2	2811.517	1
91		8	max	0	15	.811	3	.046	1	9.522e-3	3	NC	15	NC	2
92			min	0	1	-1.23	2	-.003	10	-1.447e-2	2	264.706	2	4890.282	1
93		9	max	0	15	.758	3	.02	3	1.033e-2	3	NC	5	NC	1
94			min	0	1	-1.099	2	-.006	10	-1.565e-2	2	313.51	2	NC	1
95		10	max	0	1	.732	3	.019	3	1.114e-2	3	NC	5	NC	1
96			min	0	1	-1.037	2	-.013	2	-1.684e-2	2	343.788	2	NC	1
97		11	max	0	1	.758	3	.02	3	1.033e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.099	2	-.006	10	-1.565e-2	2	313.51	2	NC	1
99		12	max	0	1	.811	3	.046	1	9.522e-3	3	NC	15	NC	2
100			min	0	15	-1.23	2	-.003	10	-1.447e-2	2	264.706	2	4890.282	1
101		13	max	0	1	.858	3	.08	1	8.712e-3	3	NC	15	NC	3
102			min	0	15	-1.359	2	.002	10	-1.328e-2	2	229.486	2	2811.517	1
103		14	max	0	1	.875	3	.101	1	7.903e-3	3	NC	15	NC	3
104			min	0	15	-1.433	2	.004	15	-1.21e-2	2	213.085	2	2226.846	1
105		15	max	0	1	.847	3	.102	1	7.093e-3	3	NC	15	NC	3
106			min	0	15	-1.418	2	.004	15	-1.091e-2	2	216.107	2	2191.518	1
107		16	max	0	1	.767	3	.084	1	6.283e-3	3	NC	15	NC	3
108			min	0	15	-1.298	2	.003	15	-9.728e-3	2	244.895	2	2659.573	1
109		17	max	0	1	.634	3	.053	1	5.473e-3	3	NC	5	NC	2
110			min	0	15	-1.071	2	.002	15	-8.542e-3	2	326.449	2	4279.025	1
111		18	max	0	1	.459	3	.019	1	4.664e-3	3	NC	5	NC	1
112			min	0	15	-.757	2	0	10	-7.357e-3	2	606.617	2	NC	1
113		19	max	0	1	.26	3	.006	3	3.854e-3	3	NC	1	NC	1
114			min	0	15	-.391	2	-.003	2	-6.172e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.11	2	.005	3	6.891e-3	3	NC	1	NC	1
116			min	0	1	-.087	3	-.003	2	-8.525e-3	2	NC	1	NC	1
117		2	max	0	15	.013	3	.028	1	8.021e-3	3	NC	5	NC	2
118			min	0	1	-.127	2	0	10	-9.556e-3	1	933.9	2	8262.846	1
119		3	max	0	15	.09	3	.066	1	9.151e-3	3	NC	5	NC	3
120			min	0	1	-.316	2	.003	15	-1.063e-2	1	520.249	2	3403.928	1
121		4	max	0	15	.129	3	.099	1	1.028e-2	3	NC	5	NC	3
122			min	0	1	-.424	2	.004	15	-1.171e-2	1	415.366	2	2260.099	1
123		5	max	0	15	.125	3	.116	1	1.141e-2	3	NC	5	NC	3
124			min	0	1	-.436	2	.004	15	-1.279e-2	1	406.565	2	1929.75	1
125		6	max	0	15	.077	3	.112	1	1.254e-2	3	NC	5	NC	3
126			min	0	1	-.354	2	.004	15	-1.386e-2	1	478.312	2	2003.651	1
127		7	max	0	15	0	12	.087	1	1.367e-2	3	NC	5	NC	3
128			min	0	1	-.199	2	.003	10	-1.494e-2	1	718.258	2	2563.162	1
129		8	max	0	15	.026	1	.05	1	1.48e-2	3	NC	3	NC	2
130			min	0	1	-.098	3	-.002	10	-1.602e-2	1	1867.993	2	4477.671	1
131		9	max	0	15	.175	1	.017	3	1.593e-2	3	NC	4	NC	1
132			min	0	1	-.182	3	-.006	10	-1.709e-2	1	2342.48	3	NC	1
133		10	max	0	1	.242	1	.017	3	1.706e-2	3	NC	5	NC	1
134			min	0	1	-.219	3	-.012	2	-1.817e-2	1	1680.369	1	NC	1
135		11	max	0	1	.175	1	.017	3	1.593e-2	3	NC	4	NC	1
136			min	0	15	-.182	3	-.006	10	-1.709e-2	1	2342.48	3	NC	1
137		12	max	0	1	.026	1	.05	1	1.48e-2	3	NC	3	NC	2
138			min	0	15	-.098	3	-.002	10	-1.602e-2	1	1867.993	2	4477.671	1
139		13	max	0	1	0	12	.087	1	1.367e-2	3	NC	5	NC	3
140			min	0	15	-.199	2	.003	10	-1.494e-2	1	718.258	2	2563.162	1
141		14	max	0	1	.077	3	.112	1	1.254e-2	3	NC	5	NC	3
142			min	0	15	-.354	2	.004	15	-1.386e-2	1	478.312	2	2003.651	1
143		15	max	0	1	.125	3	.116	1	1.141e-2	3	NC	5	NC	3
144			min	0	15	-.436	2	.004	15	-1.279e-2	1	406.565	2	1929.75	1
145		16	max	0	1	.129	3	.099	1	1.028e-2	3	NC	5	NC	3
146			min	0	15	-.424	2	.004	15	-1.171e-2	1	415.366	2	2260.099	1
147		17	max	0	1	.09	3	.066	1	9.151e-3	3	NC	5	NC	3
148			min	0	15	-.316	2	.003	15	-1.063e-2	1	520.249	2	3403.928	1
149		18	max	0	1	.013	3	.028	1	8.021e-3	3	NC	5	NC	2
150			min	0	15	-.127	2	0	10	-9.556e-3	1	933.9	2	8262.846	1
151		19	max	0	1	.11	2	.005	3	6.891e-3	3	NC	1	NC	1
152			min	0	15	-.087	3	-.003	2	-8.525e-3	2	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.006	1	-6.221e-6	15	NC	1	NC	2
154			min	-.008	3	-.01	3	0	15	-1.695e-4	1	9721.297	2	8551.434	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.005	2	.006	1	-5.806e-6	15	NC	1	NC	2
156			min	-.007	3	-.009	3	0	15	-1.582e-4	1	NC	1	9327.861	1
157		3	max	.005	1	.004	2	.005	1	-5.39e-6	15	NC	1	NC	1
158			min	-.007	3	-.009	3	0	15	-1.469e-4	1	NC	1	NC	1
159		4	max	.005	1	.004	2	.005	1	-4.975e-6	15	NC	1	NC	1
160			min	-.006	3	-.009	3	0	15	-1.355e-4	1	NC	1	NC	1
161		5	max	.005	1	.003	2	.004	1	-4.559e-6	15	NC	1	NC	1
162			min	-.006	3	-.008	3	0	15	-1.242e-4	1	NC	1	NC	1
163		6	max	.004	1	.002	2	.004	1	-4.144e-6	15	NC	1	NC	1
164			min	-.006	3	-.008	3	0	15	-1.128e-4	1	NC	1	NC	1
165		7	max	.004	1	.002	2	.003	1	-3.728e-6	15	NC	1	NC	1
166			min	-.005	3	-.007	3	0	15	-1.015e-4	1	NC	1	NC	1
167		8	max	.004	1	.001	2	.003	1	-3.313e-6	15	NC	1	NC	1
168			min	-.005	3	-.007	3	0	15	-9.016e-5	1	NC	1	NC	1
169		9	max	.003	1	0	2	.002	1	-2.897e-6	15	NC	1	NC	1
170			min	-.004	3	-.006	3	0	15	-7.882e-5	1	NC	1	NC	1
171		10	max	.003	1	0	2	.002	1	-2.481e-6	15	NC	1	NC	1
172			min	-.004	3	-.006	3	0	15	-6.748e-5	1	NC	1	NC	1
173		11	max	.003	1	0	2	.002	1	-2.066e-6	15	NC	1	NC	1
174			min	-.003	3	-.005	3	0	15	-5.615e-5	1	NC	1	NC	1
175		12	max	.002	1	0	2	.001	1	-1.65e-6	15	NC	1	NC	1
176			min	-.003	3	-.005	3	0	15	-4.481e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	0	1	-1.235e-6	15	NC	1	NC	1
178			min	-.003	3	-.004	3	0	15	-3.347e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-8.192e-7	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-2.213e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-4.036e-7	15	NC	1	NC	1
182			min	-.002	3	-.003	3	0	15	-1.079e-5	1	NC	1	NC	1
183		16	max	0	1	0	15	0	1	5.505e-7	1	NC	1	NC	1
184			min	-.001	3	-.002	3	0	15	-6.05e-7	3	NC	1	NC	1
185		17	max	0	1	0	15	0	1	1.189e-5	1	NC	1	NC	1
186			min	0	3	-.002	3	0	15	2.599e-7	12	NC	1	NC	1
187		18	max	0	1	0	15	0	1	2.323e-5	1	NC	1	NC	1
188			min	0	3	0	3	0	15	8.43e-7	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.457e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.259e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.991e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.095e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	8.709e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	3.194e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.837e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	1.038e-6	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	4.803e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.757e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	6.769e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	2.475e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	.001	1	8.735e-5	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	3.194e-6	15	NC	1	NC	1
203		7	max	.002	3	-.002	15	.001	1	1.07e-4	1	NC	1	NC	1
204			min	-.002	2	-.01	4	0	15	3.912e-6	15	8930.104	4	NC	1
205		8	max	.002	3	-.003	15	.002	1	1.267e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	4.631e-6	15	7989.695	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	1.463e-4	1	NC	1	NC	1
208			min	-.002	2	-.013	4	0	15	5.349e-6	15	7430.556	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	1.66e-4	1	NC	2	NC	1
210			min	-.002	2	-.013	4	0	15	6.068e-6	15	7154.402	4	NC	1
211		11	max	.003	3	-.003	15	.002	1	1.856e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.013	4	0	15	6.786e-6	15	7120.236	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.053e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	7.505e-6	15	7328.582	4	NC	1
215		13	max	.004	3	-.003	15	.003	1	2.25e-4	1	NC	1	NC	1
216			min	-.003	2	-.012	4	0	15	8.223e-6	15	7823.67	4	NC	1
217		14	max	.004	3	-.003	15	.004	1	2.446e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	8.942e-6	15	8716.666	4	NC	1
219		15	max	.005	3	-.002	15	.004	1	2.643e-4	1	NC	1	NC	1
220			min	-.004	2	-.009	4	0	15	9.66e-6	15	NC	1	NC	1
221		16	max	.005	3	-.002	15	.005	1	2.839e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	1.038e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.005	1	3.036e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	1.11e-5	15	NC	1	NC	1
225		18	max	.006	3	0	15	.006	1	3.233e-4	1	NC	1	NC	1
226			min	-.004	2	-.004	1	0	15	1.182e-5	15	NC	1	NC	1
227		19	max	.006	3	0	15	.006	1	3.429e-4	1	NC	1	NC	1
228			min	-.005	2	-.003	1	0	15	1.253e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.004	2	0	15	2.022e-5	1	NC	1	NC	2
230			min	0	3	-.006	3	-.006	1	7.503e-7	15	NC	1	4005.701	1
231		2	max	.003	1	.004	2	0	15	2.022e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.006	1	7.503e-7	15	NC	1	4359.361	1
233		3	max	.003	1	.004	2	0	15	2.022e-5	1	NC	1	NC	2
234			min	0	3	-.005	3	-.005	1	7.503e-7	15	NC	1	4780.076	1
235		4	max	.002	1	.003	2	0	15	2.022e-5	1	NC	1	NC	2
236			min	0	3	-.005	3	-.005	1	7.503e-7	15	NC	1	5285.299	1
237		5	max	.002	1	.003	2	0	15	2.022e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.004	1	7.503e-7	15	NC	1	5898.75	1
239		6	max	.002	1	.003	2	0	15	2.022e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.004	1	7.503e-7	15	NC	1	6653.321	1
241		7	max	.002	1	.003	2	0	15	2.022e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.003	1	7.503e-7	15	NC	1	7595.706	1
243		8	max	.002	1	.003	2	0	15	2.022e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.003	1	7.503e-7	15	NC	1	8794.006	1
245		9	max	.002	1	.002	2	0	15	2.022e-5	1	NC	1	NC	1
246			min	0	3	-.003	3	-.002	1	7.503e-7	15	NC	1	NC	1
247		10	max	.001	1	.002	2	0	15	2.022e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.002	1	7.503e-7	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	2.022e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	7.503e-7	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	2.022e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.001	1	7.503e-7	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	2.022e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	7.503e-7	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	2.022e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	7.503e-7	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	2.022e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	7.503e-7	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	2.022e-5	1	NC	1	NC	1
260			min	0	3	0	3	0	1	7.503e-7	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	2.022e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	7.503e-7	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	2.022e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	7.503e-7	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.022e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.503e-7	15	NC	1	NC	1
267	M6	1	max	.019	1	.021	2	0	1	0	1	NC	4	NC	1
268			min	-.025	3	-.031	3	0	1	0	1	1783.778	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.018	1	.02	2	0	1	0	1	NC	4	NC	1
270			min	-.024	3	-.029	3	0	1	0	1	1892.14	3	NC	1
271		3	max	.017	1	.018	2	0	1	0	1	NC	4	NC	1
272			min	-.022	3	-.027	3	0	1	0	1	2014.472	3	NC	1
273		4	max	.016	1	.016	2	0	1	0	1	NC	4	NC	1
274			min	-.021	3	-.026	3	0	1	0	1	2153.598	3	NC	1
275		5	max	.015	1	.014	2	0	1	0	1	NC	4	NC	1
276			min	-.019	3	-.024	3	0	1	0	1	2313.153	3	NC	1
277		6	max	.014	1	.013	2	0	1	0	1	NC	4	NC	1
278			min	-.018	3	-.022	3	0	1	0	1	2497.89	3	NC	1
279		7	max	.013	1	.011	2	0	1	0	1	NC	1	NC	1
280			min	-.017	3	-.02	3	0	1	0	1	2714.15	3	NC	1
281		8	max	.011	1	.01	2	0	1	0	1	NC	1	NC	1
282			min	-.015	3	-.019	3	0	1	0	1	2970.581	3	NC	1
283		9	max	.01	1	.008	2	0	1	0	1	NC	1	NC	1
284			min	-.014	3	-.017	3	0	1	0	1	3279.292	3	NC	1
285		10	max	.009	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.015	3	0	1	0	1	3657.778	3	NC	1
287		11	max	.008	1	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.011	3	-.013	3	0	1	0	1	4132.286	3	NC	1
289		12	max	.007	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.012	3	0	1	0	1	4744.068	3	NC	1
291		13	max	.006	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.01	3	0	1	0	1	5561.881	3	NC	1
293		14	max	.005	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.008	3	0	1	0	1	6709.5	3	NC	1
295		15	max	.004	1	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.007	3	0	1	0	1	8434.488	3	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	0	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.011	3	0	1	0	1	8876.547	3	NC	1
317		7	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.012	3	0	1	0	1	7919.026	3	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7350.941	3	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7055.256	3	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.014	3	0	1	0	1	6979.271	3	NC	1
325		11	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.01	2	-.014	3	0	1	0	1	7109.351	3	NC	1
327		12	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7456.162	4	NC	1
329		13	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.013	3	0	1	0	1	7954.095	4	NC	1
331		14	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.013	2	-.012	3	0	1	0	1	8856.649	4	NC	1
333		15	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.01	3	0	1	0	1	NC	1	NC	1
335		16	max	.016	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.009	1	0	1	0	1	NC	1	NC	1
337		17	max	.017	3	-.001	15	0	1	0	1	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	0	1	0	1	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	0	1	0	1	NC	1	NC	1
342			min	-.018	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.016	2	0	1	0	1	NC	1	NC	1
344			min	-.003	3	-.019	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	1	.015	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.018	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.014	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.017	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.013	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.016	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.012	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.013	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.012	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.002	3	-.011	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.008	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.009	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	15	1.695e-4	1	NC	1	NC	2
382			min	-.008	3	-.01	3	-.006	1	6.221e-6	15	9721.297	2	8551.434	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.005	2	0	15	1.582e-4	1	NC	1	NC	2
384			min	-.007	3	-.009	3	-.006	1	5.806e-6	15	NC	1	9327.861	1
385		3	max	.005	1	.004	2	0	15	1.469e-4	1	NC	1	NC	1
386			min	-.007	3	-.009	3	-.005	1	5.39e-6	15	NC	1	NC	1
387		4	max	.005	1	.004	2	0	15	1.355e-4	1	NC	1	NC	1
388			min	-.006	3	-.009	3	-.005	1	4.975e-6	15	NC	1	NC	1
389		5	max	.005	1	.003	2	0	15	1.242e-4	1	NC	1	NC	1
390			min	-.006	3	-.008	3	-.004	1	4.559e-6	15	NC	1	NC	1
391		6	max	.004	1	.002	2	0	15	1.128e-4	1	NC	1	NC	1
392			min	-.006	3	-.008	3	-.004	1	4.144e-6	15	NC	1	NC	1
393		7	max	.004	1	.002	2	0	15	1.015e-4	1	NC	1	NC	1
394			min	-.005	3	-.007	3	-.003	1	3.728e-6	15	NC	1	NC	1
395		8	max	.004	1	.001	2	0	15	9.016e-5	1	NC	1	NC	1
396			min	-.005	3	-.007	3	-.003	1	3.313e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	7.882e-5	1	NC	1	NC	1
398			min	-.004	3	-.006	3	-.002	1	2.897e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	6.748e-5	1	NC	1	NC	1
400			min	-.004	3	-.006	3	-.002	1	2.481e-6	15	NC	1	NC	1
401		11	max	.003	1	0	2	0	15	5.615e-5	1	NC	1	NC	1
402			min	-.003	3	-.005	3	-.002	1	2.066e-6	15	NC	1	NC	1
403		12	max	.002	1	0	2	0	15	4.481e-5	1	NC	1	NC	1
404			min	-.003	3	-.005	3	-.001	1	1.65e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	3.347e-5	1	NC	1	NC	1
406			min	-.003	3	-.004	3	0	1	1.235e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	2.213e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	8.192e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	1.079e-5	1	NC	1	NC	1
410			min	-.002	3	-.003	3	0	1	4.036e-7	15	NC	1	NC	1
411		16	max	0	1	0	15	0	15	6.05e-7	3	NC	1	NC	1
412			min	-.001	3	-.002	3	0	1	-5.505e-7	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-2.599e-7	12	NC	1	NC	1
414			min	0	3	-.002	3	0	1	-1.189e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-8.43e-7	15	NC	1	NC	1
416			min	0	3	0	3	0	1	-2.323e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.259e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-3.457e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.095e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	3.991e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-3.194e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-8.709e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.038e-6	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.837e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-1.757e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-4.803e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-2.475e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-6.769e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-3.194e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	-.001	1	-8.735e-5	1	NC	1	NC	1
431		7	max	.002	3	-.002	15	0	15	-3.912e-6	15	NC	1	NC	1
432			min	-.002	2	-.01	4	-.001	1	-1.07e-4	1	8930.104	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-4.631e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.002	1	-1.267e-4	1	7989.695	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-5.349e-6	15	NC	1	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.463e-4	1	7430.556	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-6.068e-6	15	NC	2	NC	1
438			min	-.002	2	-.013	4	-.002	1	-1.66e-4	1	7154.402	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-6.786e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.013	4	-.002	1	-1.856e-4	1	7120.236	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-7.505e-6	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.053e-4	1	7328.582	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-8.223e-6	15	NC	1	NC	1
444			min	-.003	2	-.012	4	-.003	1	-2.25e-4	1	7823.67	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-8.942e-6	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-2.446e-4	1	8716.666	4	NC	1
447		15	max	.005	3	-.002	15	0	15	-9.66e-6	15	NC	1	NC	1
448			min	-.004	2	-.009	4	-.004	1	-2.643e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	0	15	-1.038e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.005	1	-2.839e-4	1	NC	1	NC	1
451		17	max	.005	3	-.001	15	0	15	-1.11e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.005	1	-3.036e-4	1	NC	1	NC	1
453		18	max	.006	3	0	15	0	15	-1.182e-5	15	NC	1	NC	1
454			min	-.004	2	-.004	1	-.006	1	-3.233e-4	1	NC	1	NC	1
455		19	max	.006	3	0	15	0	15	-1.253e-5	15	NC	1	NC	1
456			min	-.005	2	-.003	1	-.006	1	-3.429e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.004	2	.006	1	-7.503e-7	15	NC	1	NC	2
458			min	0	3	-.006	3	0	15	-2.022e-5	1	NC	1	4005.701	1
459		2	max	.003	1	.004	2	.006	1	-7.503e-7	15	NC	1	NC	2
460			min	0	3	-.006	3	0	15	-2.022e-5	1	NC	1	4359.361	1
461		3	max	.003	1	.004	2	.005	1	-7.503e-7	15	NC	1	NC	2
462			min	0	3	-.005	3	0	15	-2.022e-5	1	NC	1	4780.076	1
463		4	max	.002	1	.003	2	.005	1	-7.503e-7	15	NC	1	NC	2
464			min	0	3	-.005	3	0	15	-2.022e-5	1	NC	1	5285.299	1
465		5	max	.002	1	.003	2	.004	1	-7.503e-7	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-2.022e-5	1	NC	1	5898.75	1
467		6	max	.002	1	.003	2	.004	1	-7.503e-7	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-2.022e-5	1	NC	1	6653.321	1
469		7	max	.002	1	.003	2	.003	1	-7.503e-7	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-2.022e-5	1	NC	1	7595.706	1
471		8	max	.002	1	.003	2	.003	1	-7.503e-7	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-2.022e-5	1	NC	1	8794.006	1
473		9	max	.002	1	.002	2	.002	1	-7.503e-7	15	NC	1	NC	1
474			min	0	3	-.003	3	0	15	-2.022e-5	1	NC	1	NC	1
475		10	max	.001	1	.002	2	.002	1	-7.503e-7	15	NC	1	NC	1
476			min	0	3	-.003	3	0	15	-2.022e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.002	1	-7.503e-7	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-2.022e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-7.503e-7	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-2.022e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	0	1	-7.503e-7	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-2.022e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-7.503e-7	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-2.022e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-7.503e-7	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-2.022e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-7.503e-7	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-2.022e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.503e-7	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-2.022e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.503e-7	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-2.022e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.503e-7	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.022e-5	1	NC	1	NC	1
495	M1	1	max	.007	3	.125	2	0	1	1.383e-2	1	NC	1	NC	1
496			min	-.004	2	-.025	3	0	15	-2.528e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.007	3	.061	2	0	15	6.726e-3	1	NC	4	NC	1
498			min	-.004	2	-.011	3	-.005	1	-1.251e-2	3	1783.195	2	NC	1
499		3	max	.007	3	.011	3	0	15	3.351e-5	10	NC	5	NC	1
500			min	-.004	2	-.009	2	-.006	1	-1.263e-4	3	859.632	2	NC	1
501		4	max	.007	3	.049	3	0	15	4.468e-3	2	NC	5	NC	1
502			min	-.004	2	-.087	2	-.006	1	-4.83e-3	3	542.84	2	NC	1
503		5	max	.007	3	.097	3	0	15	8.915e-3	2	NC	5	NC	1
504			min	-.004	2	-.169	2	-.004	1	-9.535e-3	3	391.889	2	NC	1
505		6	max	.007	3	.149	3	0	15	1.336e-2	2	NC	15	NC	1
506			min	-.004	2	-.248	2	-.002	1	-1.424e-2	3	308.719	2	NC	1
507		7	max	.007	3	.199	3	0	1	1.781e-2	2	NC	15	NC	1
508			min	-.004	2	-.319	2	0	3	-1.894e-2	3	259.618	2	NC	1
509		8	max	.007	3	.241	3	0	1	2.226e-2	2	9263.806	15	NC	1
510			min	-.003	2	-.375	2	0	15	-2.365e-2	3	230.572	2	NC	1
511		9	max	.007	3	.268	3	0	15	2.524e-2	2	8661.636	15	NC	1
512			min	-.003	2	-.41	2	0	1	-2.385e-2	3	215.451	2	NC	1
513		10	max	.006	3	.278	3	0	1	2.726e-2	2	8478.086	15	NC	1
514			min	-.003	2	-.422	2	0	15	-2.106e-2	3	211.013	2	NC	1
515		11	max	.006	3	.271	3	0	1	2.928e-2	2	8661.37	15	NC	1
516			min	-.003	2	-.41	2	0	15	-1.827e-2	3	216.163	2	NC	1
517		12	max	.006	3	.248	3	0	15	2.826e-2	2	9263.242	15	NC	1
518			min	-.003	2	-.373	2	0	1	-1.538e-2	3	232.733	2	NC	1
519		13	max	.006	3	.211	3	0	15	2.266e-2	2	NC	15	NC	1
520			min	-.003	2	-.315	2	0	1	-1.231e-2	3	264.867	2	NC	1
521		14	max	.006	3	.164	3	.002	1	1.706e-2	2	NC	15	NC	1
522			min	-.003	2	-.242	2	0	15	-9.243e-3	3	319.912	2	NC	1
523		15	max	.006	3	.111	3	.004	1	1.146e-2	2	NC	5	NC	1
524			min	-.003	2	-.161	2	0	15	-6.177e-3	3	414.88	2	NC	1
525		16	max	.006	3	.057	3	.006	1	5.861e-3	2	NC	5	NC	1
526			min	-.003	2	-.08	2	0	15	-3.11e-3	3	591.211	2	NC	1
527		17	max	.005	3	.004	3	.006	1	4.604e-4	1	NC	5	NC	1
528			min	-.003	2	-.006	2	0	15	-4.41e-5	3	969.077	2	NC	1
529		18	max	.005	3	.056	2	.004	1	9.982e-3	2	NC	4	NC	1
530			min	-.003	2	-.043	3	0	15	-4.162e-3	3	2061.473	2	NC	1
531		19	max	.005	3	.11	2	0	15	2.006e-2	2	NC	1	NC	1
532			min	-.003	2	-.087	3	0	1	-8.447e-3	3	NC	1	NC	1
533	M5	1	max	.023	3	.283	2	0	1	0	1	NC	1	NC	1
534			min	-.015	2	-.028	3	0	1	0	1	NC	1	NC	1
535		2	max	.023	3	.137	2	0	1	0	1	NC	5	NC	1
536			min	-.015	2	-.011	3	0	1	0	1	789.861	2	NC	1
537		3	max	.023	3	.034	3	0	1	0	1	NC	5	NC	1
538			min	-.015	2	-.028	2	0	1	0	1	371.879	2	NC	1
539		4	max	.022	3	.131	3	0	1	0	1	NC	15	NC	1
540			min	-.015	2	-.224	2	0	1	0	1	227.831	2	NC	1
541		5	max	.022	3	.264	3	0	1	0	1	7339.459	15	NC	1
542			min	-.015	2	-.437	2	0	1	0	1	160.479	2	NC	1
543		6	max	.022	3	.412	3	0	1	0	1	5647.664	15	NC	1
544			min	-.015	2	-.648	2	0	1	0	1	124.113	2	NC	1
545		7	max	.021	3	.557	3	0	1	0	1	4671.26	15	NC	1
546			min	-.014	2	-.838	2	0	1	0	1	103	2	NC	1
547		8	max	.021	3	.679	3	0	1	0	1	4103.798	15	NC	1
548			min	-.014	2	-.991	2	0	1	0	1	90.678	2	NC	1
549		9	max	.02	3	.757	3	0	1	0	1	3812.891	15	NC	1
550			min	-.014	2	-1.088	2	0	1	0	1	84.342	2	NC	1
551		10	max	.02	3	.785	3	0	1	0	1	3725.258	15	NC	1
552			min	-.014	2	-1.121	2	0	1	0	1	82.487	2	NC	1
553		11	max	.019	3	.766	3	0	1	0	1	3812.994	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.013	2	-1.089	2	0	1	0	1	84.632	2	NC	1
555		12	max	.019	3	.7	3	0	1	0	1	4104.04	15	NC	1
556			min	-.013	2	-.988	2	0	1	0	1	91.627	2	NC	1
557		13	max	.018	3	.592	3	0	1	0	1	4671.75	15	NC	1
558			min	-.013	2	-.828	2	0	1	0	1	105.463	2	NC	1
559		14	max	.018	3	.457	3	0	1	0	1	5648.614	15	NC	1
560			min	-.013	2	-.629	2	0	1	0	1	129.662	2	NC	1
561		15	max	.018	3	.307	3	0	1	0	1	7341.328	15	NC	1
562			min	-.013	2	-.413	2	0	1	0	1	172.564	2	NC	1
563		16	max	.017	3	.154	3	0	1	0	1	NC	15	NC	1
564			min	-.012	2	-.201	2	0	1	0	1	255.102	2	NC	1
565		17	max	.017	3	.012	3	0	1	0	1	NC	5	NC	1
566			min	-.012	2	-.017	2	0	1	0	1	438.968	2	NC	1
567		18	max	.017	3	.125	1	0	1	0	1	NC	5	NC	1
568			min	-.012	2	-.109	3	0	1	0	1	966.025	1	NC	1
569		19	max	.017	3	.242	1	0	1	0	1	NC	1	NC	1
570			min	-.012	2	-.219	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.007	3	.125	2	0	15	2.528e-2	3	NC	1	NC	1
572			min	-.004	2	-.025	3	0	1	-1.383e-2	1	NC	1	NC	1
573		2	max	.007	3	.061	2	.005	1	1.251e-2	3	NC	4	NC	1
574			min	-.004	2	-.011	3	0	15	-6.726e-3	1	1783.195	2	NC	1
575		3	max	.007	3	.011	3	.006	1	1.263e-4	3	NC	5	NC	1
576			min	-.004	2	-.009	2	0	15	-3.351e-5	10	859.632	2	NC	1
577		4	max	.007	3	.049	3	.006	1	4.83e-3	3	NC	5	NC	1
578			min	-.004	2	-.087	2	0	15	-4.468e-3	2	542.84	2	NC	1
579		5	max	.007	3	.097	3	.004	1	9.535e-3	3	NC	5	NC	1
580			min	-.004	2	-.169	2	0	15	-8.915e-3	2	391.889	2	NC	1
581		6	max	.007	3	.149	3	.002	1	1.424e-2	3	NC	15	NC	1
582			min	-.004	2	-.248	2	0	15	-1.336e-2	2	308.719	2	NC	1
583		7	max	.007	3	.199	3	0	3	1.894e-2	3	NC	15	NC	1
584			min	-.004	2	-.319	2	0	1	-1.781e-2	2	259.618	2	NC	1
585		8	max	.007	3	.241	3	0	15	2.365e-2	3	9263.806	15	NC	1
586			min	-.003	2	-.375	2	0	1	-2.226e-2	2	230.572	2	NC	1
587		9	max	.007	3	.268	3	0	1	2.385e-2	3	8661.636	15	NC	1
588			min	-.003	2	-.41	2	0	15	-2.524e-2	2	215.451	2	NC	1
589		10	max	.006	3	.278	3	0	15	2.106e-2	3	8478.086	15	NC	1
590			min	-.003	2	-.422	2	0	1	-2.726e-2	2	211.013	2	NC	1
591		11	max	.006	3	.271	3	0	15	1.827e-2	3	8661.37	15	NC	1
592			min	-.003	2	-.41	2	0	1	-2.928e-2	2	216.163	2	NC	1
593		12	max	.006	3	.248	3	0	1	1.538e-2	3	9263.242	15	NC	1
594			min	-.003	2	-.373	2	0	15	-2.826e-2	2	232.733	2	NC	1
595		13	max	.006	3	.211	3	0	1	1.231e-2	3	NC	15	NC	1
596			min	-.003	2	-.315	2	0	15	-2.266e-2	2	264.867	2	NC	1
597		14	max	.006	3	.164	3	0	15	9.243e-3	3	NC	15	NC	1
598			min	-.003	2	-.242	2	-.002	1	-1.706e-2	2	319.912	2	NC	1
599		15	max	.006	3	.111	3	0	15	6.177e-3	3	NC	5	NC	1
600			min	-.003	2	-.161	2	-.004	1	-1.146e-2	2	414.88	2	NC	1
601		16	max	.006	3	.057	3	0	15	3.11e-3	3	NC	5	NC	1
602			min	-.003	2	-.08	2	-.006	1	-5.861e-3	2	591.211	2	NC	1
603		17	max	.005	3	.004	3	0	15	4.41e-5	3	NC	5	NC	1
604			min	-.003	2	-.006	2	-.006	1	-4.604e-4	1	969.077	2	NC	1
605		18	max	.005	3	.056	2	0	15	4.162e-3	3	NC	4	NC	1
606			min	-.003	2	-.043	3	-.004	1	-9.982e-3	2	2061.473	2	NC	1
607		19	max	.005	3	.11	2	0	1	8.447e-3	3	NC	1	NC	1
608			min	-.003	2	-.087	3	0	15	-2.006e-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

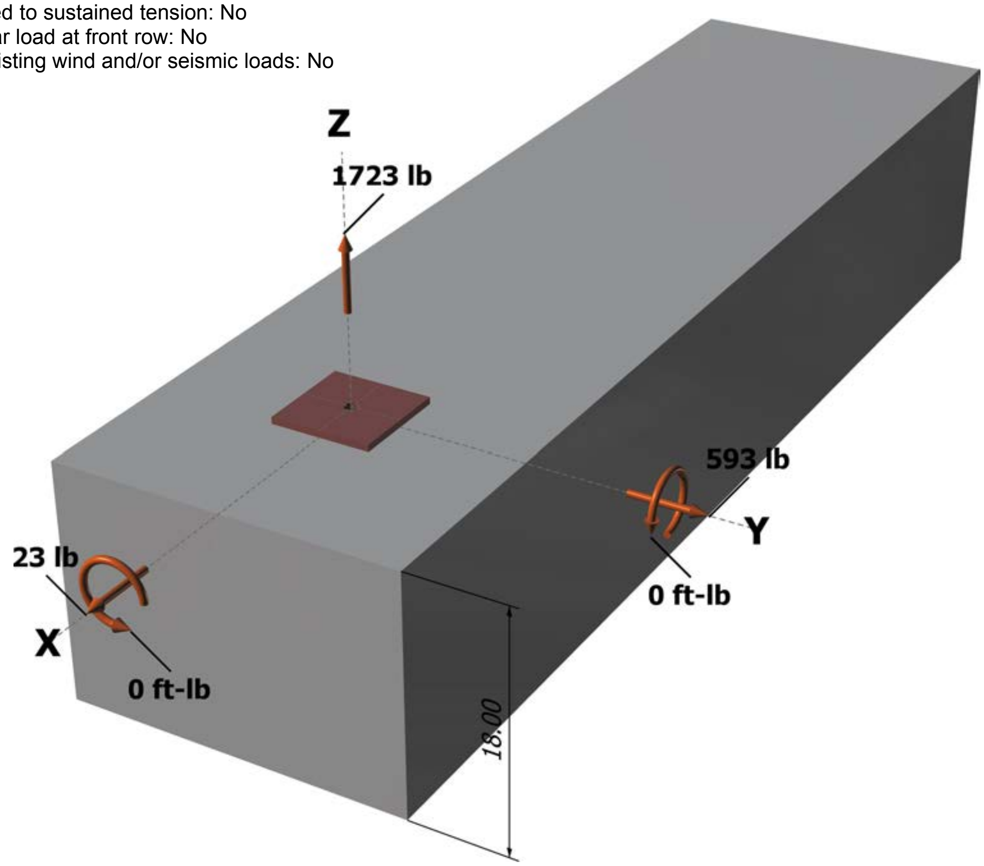
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

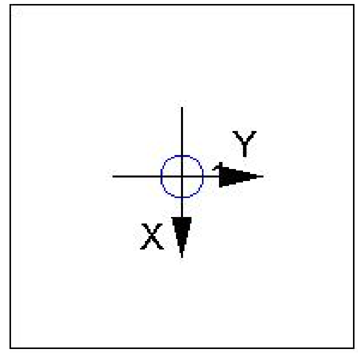
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	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

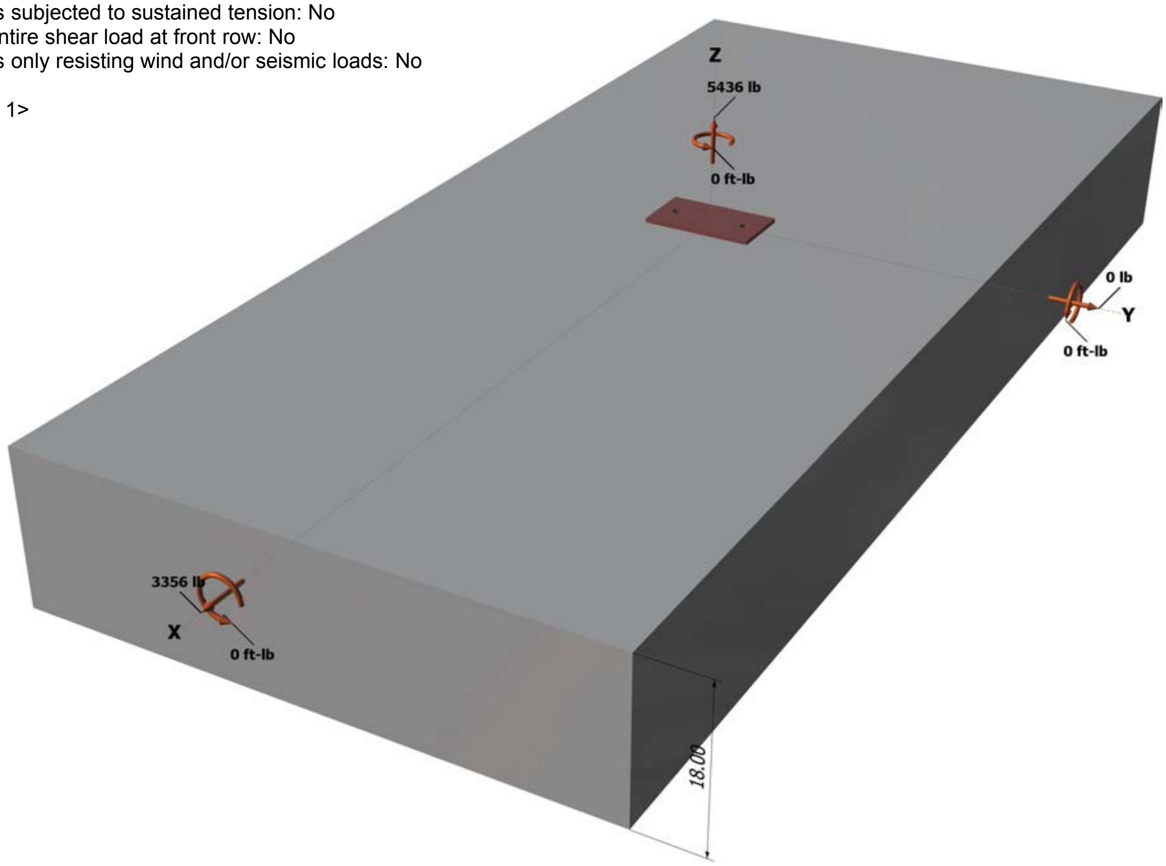
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

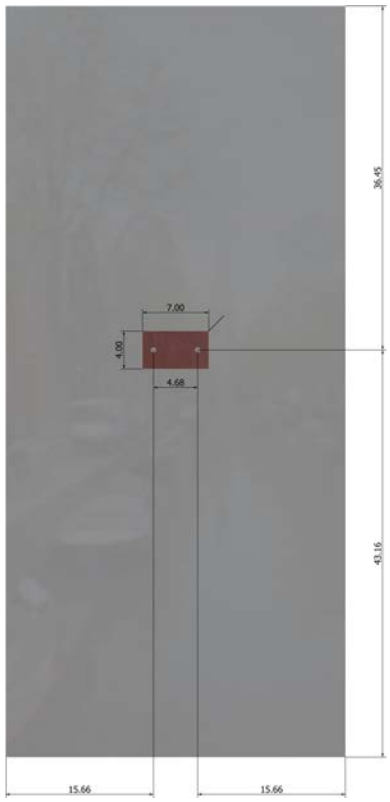
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



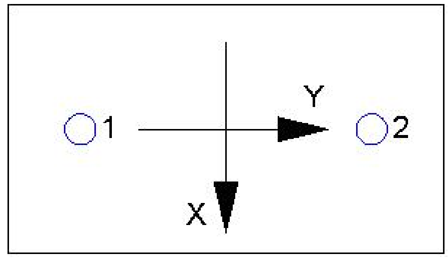
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2718.0	1678.0	0.0	1678.0
2	2718.0	1678.0	0.0	1678.0
Sum	5436.0	3356.0	0.0	3356.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5436
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} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	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)
648.00	648.00	1.000	0.961	1.000	1.000	15593	0.70	10490

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	15.66	23247

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
845.64	1103.56	1.000	1.000	1.000	23247	0.70	24939

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	2718	6071	0.45	Pass
Concrete breakout	5436	10231	0.53	Pass
Adhesive	**5436**	**8093**	**0.67**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1678**	**3156**	**0.53**	**Pass (Governs)**
T Concrete breakout x+	3356	10490	0.32	Pass
|| Concrete breakout y-	1678	24939	0.07	Pass
Pryout	3356	20601	0.16	Pass

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

Sec. D.7.3	0.67	0.53	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.