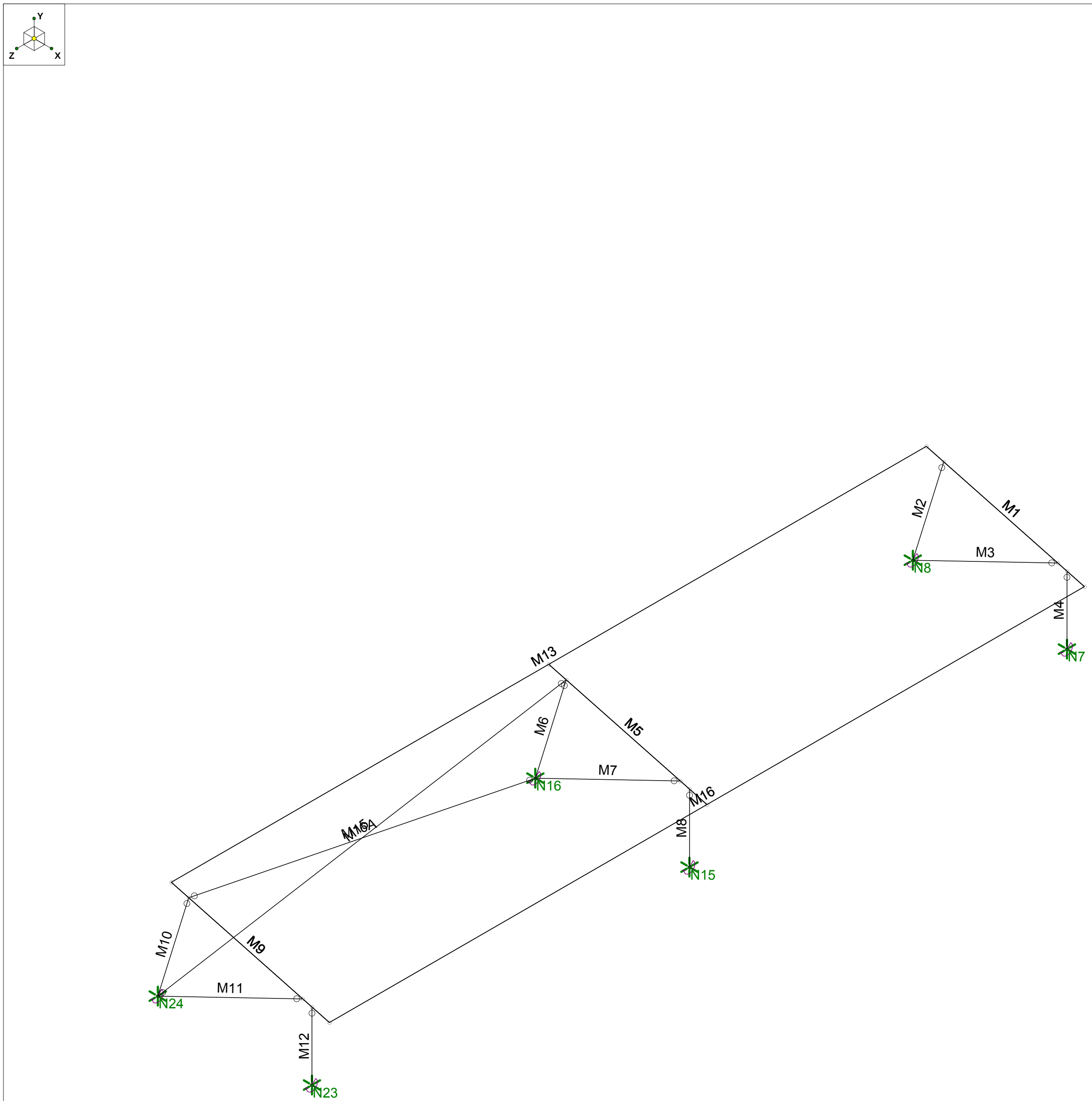


Schletter, Inc.	Standard PVMini Racking System	15° Tilt w/o Seismic Design
HCV	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

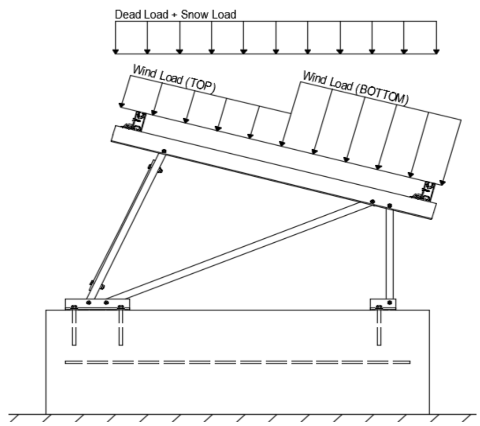
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 =	1
Module Tilt =	15°
Maximum Height Above Grade =	3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	22.68	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	1.00		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	100	mph	Exposure Category = C
Height ≤	15	ft	Importance Category = II

Peak Velocity Pressure, q_z = 15.70 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.6	
$Cf-_{TOP}$	=	-2.04	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	

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 + 0.8W	
1.2D + 1.6W + 0.5S	
0.9D + 1.6W [M]	
1.54D + 1.3E + 0.2S [R]	*(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E [R]	
1.54D + 1.25E + 0.2S [O]	
0.56D + 1.25E [O]	

Allowable Stress Design, ASD

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

1.0D + 1.0S	
1.0D + 1.0W	
1.0D + 0.75L + 0.75W + 0.75S	
0.6D + 1.0W [M]	*(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E [O]	
1.1785D + 0.65625E + 0.75S [O]	
0.362D + 0.875E [O]	

[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
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer

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

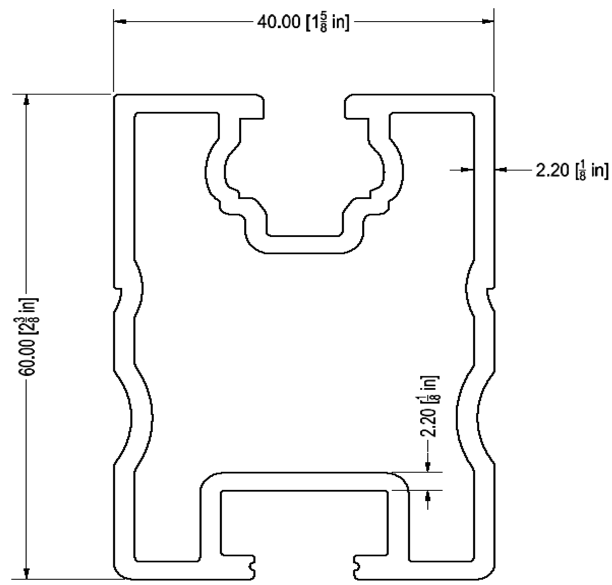
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

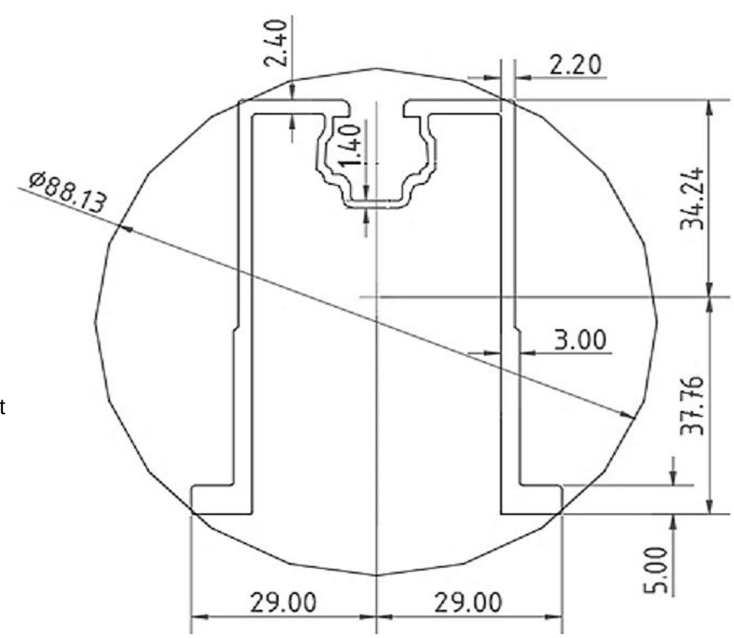
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	75	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.81	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.787	k-ft
M_z =	0.107	k-ft
$M_{y\ allowable}$ =	1.226	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	76%	



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).

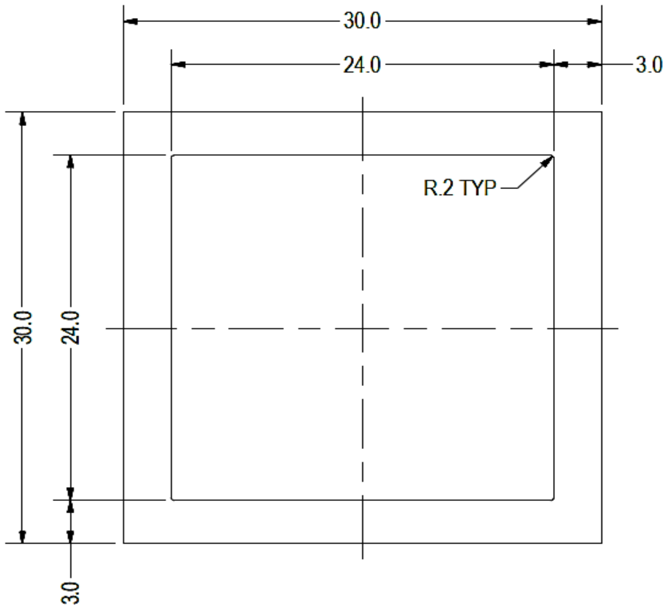
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.50	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.549	k-ft
M_z =	0.000	k-ft
P_n =	0.172	k
$M_{y\ allowable}$ =	1.448	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	39%	



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 M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

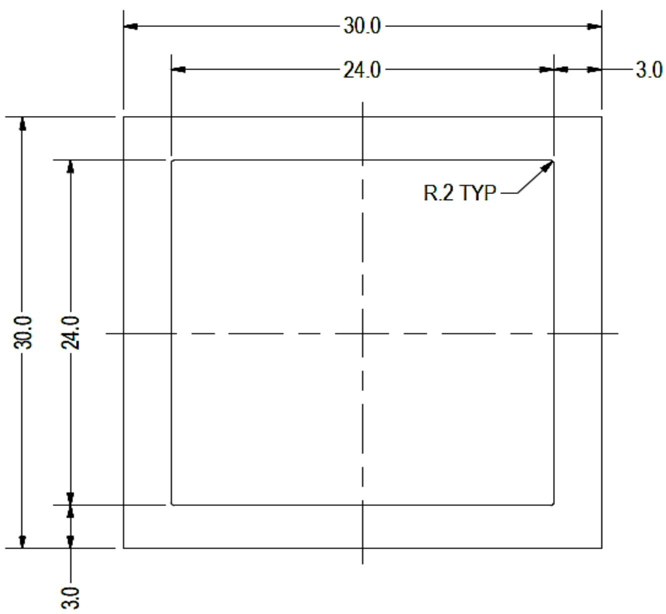
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.405	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	11%	



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 M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

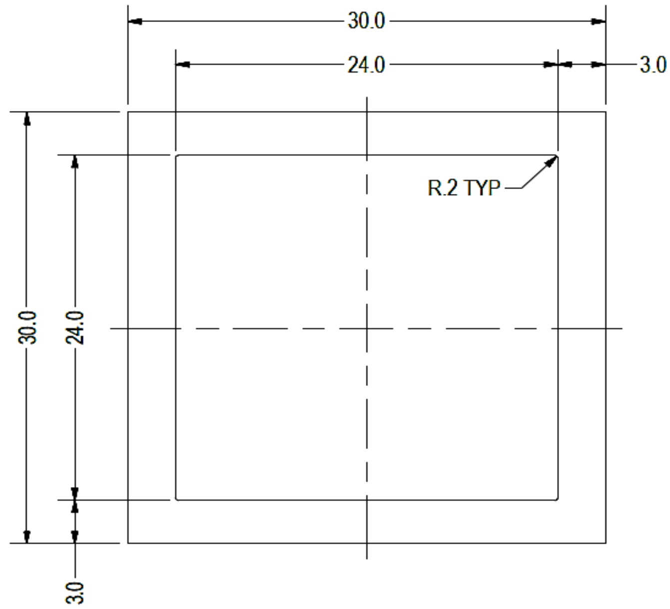
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.169	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	4%	



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 M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

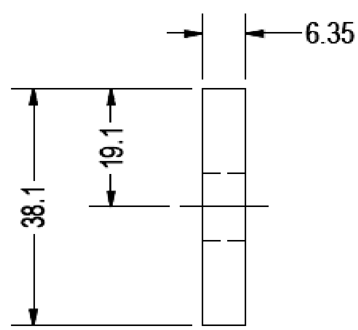
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.106	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	14%	



4.6 Cross Brace Design

In order to resist weak side loading, aluminum cross bracing kits are provided. The cross bracing is attached at one end of a rear aluminum strut diagonally down to the bottom end of an adjacent strut. Single M10 bolts are provided at each of the cross bracing. Section units are in (mm).

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.004	k-ft
P_n =	0.036	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	9%	



A cross brace kit is required every 22 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

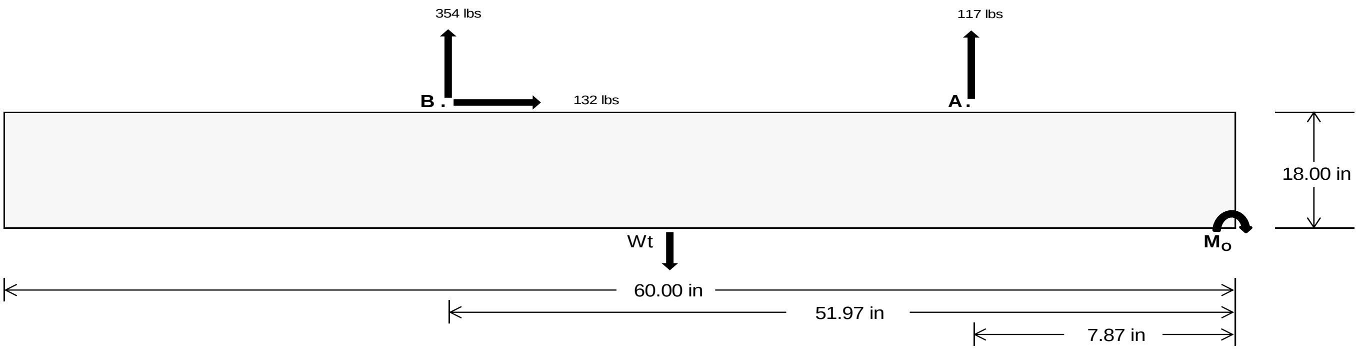
5.1 Helical Pile Foundations

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 =	491.27	1475.84	k
Compressive Load =	1826.76	1333.22	k
Lateral Load =	2.29	549.06	k
Moment (Weak Axis) =	0.00	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 21694.8 in-lbs
Resisting Force Required = 723.16 lbs
S.F. = 1.67
Weight Required = 1205.27 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 131.96 lbs
Friction = 0.4
Weight Required = 329.90 lbs
Resisting Weight = 1903.13 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 131.96 lbs
Cohesion = 130 psf
Area = 8.75 ft^2
Resisting = 951.56 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 21in 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			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	652 lbs	652 lbs	652 lbs	652 lbs	587 lbs	587 lbs	587 lbs	587 lbs	885 lbs	885 lbs	885 lbs	885 lbs	-234 lbs	-234 lbs	-234 lbs	-234 lbs
F_B	478 lbs	478 lbs	478 lbs	478 lbs	426 lbs	426 lbs	426 lbs	426 lbs	645 lbs	645 lbs	645 lbs	645 lbs	-708 lbs	-708 lbs	-708 lbs	-708 lbs
F_V	44 lbs	44 lbs	44 lbs	44 lbs	233 lbs	233 lbs	233 lbs	233 lbs	205 lbs	205 lbs	205 lbs	205 lbs	-264 lbs	-264 lbs	-264 lbs	-264 lbs
P_{total}	3034 lbs	3124 lbs	3215 lbs	3306 lbs	2916 lbs	3007 lbs	3097 lbs	3188 lbs	3432 lbs	3523 lbs	3614 lbs	3704 lbs	200 lbs	254 lbs	309 lbs	363 lbs
M	392 lbs-ft	392 lbs-ft	392 lbs-ft	392 lbs-ft	652 lbs-ft	652 lbs-ft	652 lbs-ft	652 lbs-ft	758 lbs-ft	758 lbs-ft	758 lbs-ft	758 lbs-ft	469 lbs-ft	469 lbs-ft	469 lbs-ft	469 lbs-ft
e	0.13 ft	0.13 ft	0.12 ft	0.12 ft	0.22 ft	0.22 ft	0.21 ft	0.20 ft	0.22 ft	0.22 ft	0.21 ft	0.20 ft	2.35 ft	1.84 ft	1.52 ft	1.29 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	292.9 psf	289.5 psf	286.4 psf	283.5 psf	243.9 psf	242.7 psf	241.6 psf	240.6 psf	288.3 psf	285.0 psf	282.1 psf	279.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	400.5 psf	392.2 psf	384.6 psf	377.6 psf	422.6 psf	413.3 psf	404.8 psf	397.0 psf	496.3 psf	483.6 psf	472.0 psf	461.4 psf	496.2 psf	141.0 psf	109.5 psf	100.1 psf

Maximum Bearing Pressure = 496 psf
Allowable Bearing Pressure = 1500 psf

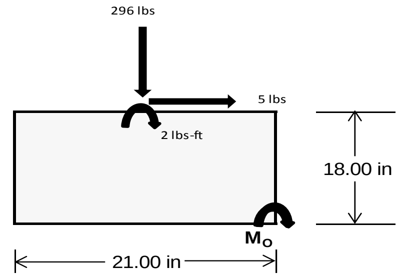
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 249.4 ft-lbs
Resisting Force Required = 285.05 lbs
S.F. = 1.67
Weight Required = 475.08 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

A minimum 60in long x 21in 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	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	71 lbs	195 lbs	67 lbs	296 lbs	916 lbs	292 lbs	21 lbs	57 lbs	20 lbs
F_V	1 lbs	1 lbs	0 lbs	5 lbs	5 lbs	0 lbs	0 lbs	0 lbs	0 lbs
P_{total}	2427 lbs	2551 lbs	2423 lbs	2539 lbs	3158 lbs	2535 lbs	710 lbs	746 lbs	709 lbs
M	1 lbs-ft	1 lbs-ft	0 lbs-ft	9 lbs-ft	7 lbs-ft	1 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	0.29 ft	1.75 ft	1.75 ft	1.74 ft	1.75 ft	1.75 ft	1.75 ft	1.75 ft	1.75 ft
f_{min}	276.9 sqft	291.1 sqft	276.9 sqft	286.4 sqft	358.3 sqft	289.4 sqft	81.0 sqft	85.1 sqft	81.0 sqft
f_{max}	277.9 psf	292.0 psf	277.0 psf	293.8 psf	363.6 psf	289.9 psf	81.2 psf	85.4 psf	81.0 psf

Maximum Bearing Pressure = 364 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 21in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

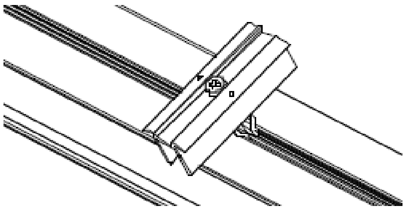
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

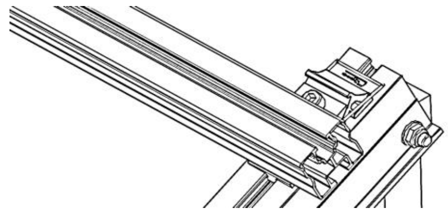
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.477	k
Allowable Uplift =	1.214	k
Utilization =	39%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.050	k
Allowable Uplift =	1.116	k
Utilization =	94%	



6.2 Bolted Connections

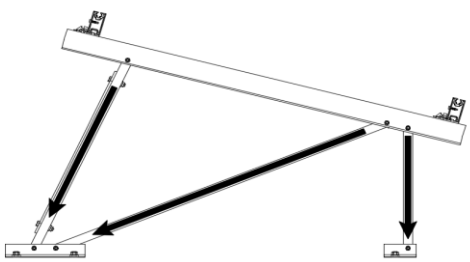
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	1.405	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

Rear Strut		
Maximum Axial Load =	1.134	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut		
Maximum Axial Load =	0.169	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	

Bracing		
Maximum Axial Load =	0.036	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	0%	



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 M8 bolts are located at each end of the strut and are subjected to double shear.

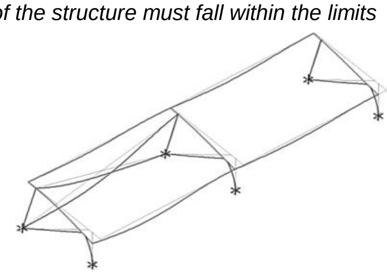
7. SEISMIC DESIGN

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} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.019	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 = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 75.00 in

J = 0.255

195.296

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

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= 28.8 ksi

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 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

Weak Axis:

3.4.14

L_b = 75.00 in

J = 0.255

202.803

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

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= 28.7

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.8 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.226 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in^3

$M_{max}Wk$ = 0.871 k-ft

Compression

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 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= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.15

22.8869

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.5 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.15

24.5845

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.5 ksi

3.4.15

b/t = 24.46

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{5.1Dp}$$

S1 = 3.8

$$S2 = \frac{k_1 Bp}{5.1Dp}$$

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 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

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.5 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.448 k-ft

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

b/t = 24.46
S1 = 3.83
S2 = 10.30
φF_L= (φck2*√(BpE))/(5.1b/t)
φF_L= 10.4 ksi

3.4.9

b/t = 4.29
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 24.46
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT}= 10.43
F_{ST}= 28.24
φF_L= Fut + (Fst - Fut)ρst < Fst
φF_L= 14.3 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= 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in
J = 0.16
47.2194

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

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= 31.2 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9
m = 0.65
C_0 = 15
Cc = 15

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 31.2 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in
J = 0.16
47.2194

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

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= 31.2

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9
m = 0.65
C_0 = 15
Cc = 15

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 31.2 ksi
Iy = 39958.2 mm^4
0.096 in^4
x = 15 mm
Sy = 0.163 in^3
M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L = φcc(Bc-Dc*λ)

φF_L = 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φyFcy

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 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 = 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^{*} =$ 0.33515

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

$S2^{*} =$ 1.23671

$\varphi cc =$ 0.85841

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 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

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.5 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.28467

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.75985

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 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

$\varphi F_L =$ 16.11 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 8.09 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				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
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	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	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	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	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	-43.785	-43.785	0	0
2	M16	y	-70.057	-70.057	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	89.322	89.322	0	0
2	M16	y	43.785	43.785	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	100.036	2	290.431	1	.038	1	0	1	0	1	0	1
2		min	-133.102	3	-344.439	3	-.132	3	0	3	0	1	0	1
3	N7	max	0	15	468.274	1	-.027	15	0	15	0	1	0	1
4		min	-.12	2	-108.918	3	-.746	1	-.001	1	0	1	0	1
5	N15	max	0	15	1405.202	1	.409	1	0	1	0	1	0	1
6		min	-1.428	1	-377.9	3	-.296	3	0	3	0	1	0	1
7	N16	max	390.568	2	1025.552	1	0	10	0	1	0	1	0	1
8		min	-422.357	3	-1135.261	3	-32.846	3	0	3	0	1	0	1
9	N23	max	0	15	468.154	1	1.76	1	.003	1	0	1	0	1
10		min	-.119	2	-108.558	3	.059	15	0	15	0	1	0	1
11	N24	max	100.253	2	294.834	1	33.155	3	.001	1	0	1	0	1
12		min	-133.214	3	-342.274	3	.005	10	0	3	0	1	0	1
13	Totals:	max	589.29	2	3952.448	1	0	3						
14		min	-689.013	3	-2417.351	3	0	11						

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	M2	1	max	339.383	1	.664	4	.538	1	0	15	0	3	0	1
2			min	-346.527	3	.157	15	-.087	3	0	1	0	2	0	1
3		2	max	339.479	1	.626	4	.538	1	0	15	0	1	0	15
4			min	-346.455	3	.149	15	-.087	3	0	1	0	10	0	4
5		3	max	339.576	1	.588	4	.538	1	0	15	0	1	0	15
6			min	-346.383	3	.14	15	-.087	3	0	1	0	10	0	4
7		4	max	339.672	1	.551	4	.538	1	0	15	0	1	0	15
8			min	-346.31	3	.131	15	-.087	3	0	1	0	3	0	4
9		5	max	339.769	1	.513	4	.538	1	0	15	0	1	0	15
10			min	-346.238	3	.122	15	-.087	3	0	1	0	3	0	4
11		6	max	339.865	1	.475	4	.538	1	0	15	0	1	0	15
12			min	-346.166	3	.113	15	-.087	3	0	1	0	3	0	4
13		7	max	339.961	1	.437	4	.538	1	0	15	0	1	0	15
14			min	-346.093	3	.104	15	-.087	3	0	1	0	3	0	4
15		8	max	340.058	1	.399	4	.538	1	0	15	0	1	0	15
16			min	-346.021	3	.095	15	-.087	3	0	1	0	3	0	4
17		9	max	340.154	1	.361	4	.538	1	0	15	0	1	0	15
18			min	-345.949	3	.086	15	-.087	3	0	1	0	3	0	4
19		10	max	340.25	1	.324	4	.538	1	0	15	0	1	0	15
20			min	-345.877	3	.077	15	-.087	3	0	1	0	3	0	4
21		11	max	340.347	1	.286	4	.538	1	0	15	0	1	0	15
22			min	-345.804	3	.068	15	-.087	3	0	1	0	3	0	4
23		12	max	340.443	1	.248	4	.538	1	0	15	0	1	0	15
24			min	-345.732	3	.06	15	-.087	3	0	1	0	3	0	4
25		13	max	340.54	1	.21	4	.538	1	0	15	0	1	0	15
26			min	-345.66	3	.051	15	-.087	3	0	1	0	3	0	4
27		14	max	340.636	1	.172	4	.538	1	0	15	0	1	0	15
28			min	-345.588	3	.042	15	-.087	3	0	1	0	3	0	4
29		15	max	340.732	1	.134	4	.538	1	0	15	.001	1	0	15
30			min	-345.515	3	.033	15	-.087	3	0	1	0	3	0	4
31		16	max	340.829	1	.097	4	.538	1	0	15	.001	1	0	15
32			min	-345.443	3	.024	15	-.087	3	0	1	0	3	0	4
33		17	max	340.925	1	.059	4	.538	1	0	15	.001	1	0	15
34			min	-345.371	3	.014	9	-.087	3	0	1	0	3	0	4
35		18	max	341.021	1	.03	10	.538	1	0	15	.001	1	0	15
36			min	-345.298	3	-.014	1	-.087	3	0	1	0	3	0	4
37		19	max	341.118	1	.006	10	.538	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-345.226	3	-.043	1	-.087	3	0	1	0	3	0	4
39	M3	1	max	37.465	10	1.814	4	-.013	15	0	15	.001	1	0	4
40			min	-85.055	1	.427	15	-.405	1	0	1	0	15	0	15
41		2	max	37.409	10	1.636	4	-.013	15	0	15	.001	1	0	4
42			min	-85.122	1	.385	15	-.405	1	0	1	0	15	0	15
43		3	max	37.353	10	1.458	4	-.013	15	0	15	0	1	0	4
44			min	-85.189	1	.344	15	-.405	1	0	1	0	15	0	9
45		4	max	37.297	10	1.28	4	-.013	15	0	15	0	1	0	15
46			min	-85.256	1	.302	15	-.405	1	0	1	0	15	0	1
47		5	max	37.241	10	1.102	4	-.013	15	0	15	0	1	0	15
48			min	-85.323	1	.26	15	-.405	1	0	1	0	15	0	4
49		6	max	37.186	10	.924	4	-.013	15	0	15	0	1	0	15
50			min	-85.39	1	.218	15	-.405	1	0	1	0	15	0	4
51		7	max	37.13	10	.746	4	-.013	15	0	15	0	1	0	15
52			min	-85.457	1	.176	15	-.405	1	0	1	0	15	0	4
53		8	max	37.074	10	.568	4	-.013	15	0	15	0	1	0	15
54			min	-85.524	1	.134	15	-.405	1	0	1	0	15	0	4
55		9	max	37.018	10	.39	4	-.013	15	0	15	0	1	0	15
56			min	-85.592	1	.092	15	-.405	1	0	1	0	15	-.001	4
57		10	max	36.962	10	.212	4	-.013	15	0	15	0	1	0	15
58			min	-85.659	1	.051	15	-.405	1	0	1	0	15	-.001	4
59		11	max	36.906	10	.034	4	-.013	15	0	15	0	1	0	15
60			min	-85.726	1	.006	9	-.405	1	0	1	0	15	-.001	4
61		12	max	36.85	10	-.033	15	-.013	15	0	15	0	1	0	15
62			min	-85.793	1	-.144	4	-.405	1	0	1	0	15	-.001	4
63		13	max	36.794	10	-.075	15	-.013	15	0	15	0	1	0	15
64			min	-85.86	1	-.322	4	-.405	1	0	1	0	12	-.001	4
65		14	max	36.738	10	-.117	15	-.013	15	0	15	0	1	0	15
66			min	-85.927	1	-.5	4	-.405	1	0	1	0	3	-.001	4
67		15	max	36.682	10	-.159	15	-.013	15	0	15	0	15	0	15
68			min	-85.994	1	-.678	4	-.405	1	0	1	0	1	0	4
69		16	max	36.626	10	-.2	15	-.013	15	0	15	0	15	0	15
70			min	-86.061	1	-.856	4	-.405	1	0	1	0	1	0	4
71		17	max	36.571	10	-.242	15	-.013	15	0	15	0	15	0	15
72			min	-86.128	1	-1.034	4	-.405	1	0	1	0	1	0	4
73		18	max	36.515	10	-.284	15	-.013	15	0	15	0	15	0	15
74			min	-86.195	1	-1.213	4	-.405	1	0	1	0	1	0	4
75		19	max	36.459	10	-.326	15	-.013	15	0	15	0	15	0	1
76			min	-86.263	1	-1.391	4	-.405	1	0	1	0	1	0	1
77	M4	1	max	467.11	1	0	1	-.027	15	0	1	0	3	0	1
78			min	-109.791	3	0	1	-.81	1	0	1	0	1	0	1
79		2	max	467.174	1	0	1	-.027	15	0	1	0	12	0	1
80			min	-109.743	3	0	1	-.81	1	0	1	0	1	0	1
81		3	max	467.239	1	0	1	-.027	15	0	1	0	15	0	1
82			min	-109.694	3	0	1	-.81	1	0	1	0	1	0	1
83		4	max	467.304	1	0	1	-.027	15	0	1	0	15	0	1
84			min	-109.646	3	0	1	-.81	1	0	1	0	1	0	1
85		5	max	467.368	1	0	1	-.027	15	0	1	0	15	0	1
86			min	-109.597	3	0	1	-.81	1	0	1	0	1	0	1
87		6	max	467.433	1	0	1	-.027	15	0	1	0	15	0	1
88			min	-109.549	3	0	1	-.81	1	0	1	0	1	0	1
89		7	max	467.498	1	0	1	-.027	15	0	1	0	15	0	1
90			min	-109.5	3	0	1	-.81	1	0	1	0	1	0	1
91		8	max	467.563	1	0	1	-.027	15	0	1	0	15	0	1
92			min	-109.452	3	0	1	-.81	1	0	1	0	1	0	1
93		9	max	467.627	1	0	1	-.027	15	0	1	0	15	0	1
94			min	-109.403	3	0	1	-.81	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
95		10	max	467.692	1	0	1	-.027	15	0	1	0	15	0	1
96			min	-109.355	3	0	1	-.81	1	0	1	0	1	0	1
97		11	max	467.757	1	0	1	-.027	15	0	1	0	15	0	1
98			min	-109.306	3	0	1	-.81	1	0	1	0	1	0	1
99		12	max	467.821	1	0	1	-.027	15	0	1	0	15	0	1
100			min	-109.258	3	0	1	-.81	1	0	1	0	1	0	1
101		13	max	467.886	1	0	1	-.027	15	0	1	0	15	0	1
102			min	-109.209	3	0	1	-.81	1	0	1	0	1	0	1
103		14	max	467.951	1	0	1	-.027	15	0	1	0	15	0	1
104			min	-109.161	3	0	1	-.81	1	0	1	0	1	0	1
105		15	max	468.016	1	0	1	-.027	15	0	1	0	15	0	1
106			min	-109.112	3	0	1	-.81	1	0	1	-.001	1	0	1
107		16	max	468.08	1	0	1	-.027	15	0	1	0	15	0	1
108			min	-109.063	3	0	1	-.81	1	0	1	-.001	1	0	1
109		17	max	468.145	1	0	1	-.027	15	0	1	0	15	0	1
110			min	-109.015	3	0	1	-.81	1	0	1	-.001	1	0	1
111		18	max	468.21	1	0	1	-.027	15	0	1	0	15	0	1
112			min	-108.966	3	0	1	-.81	1	0	1	-.001	1	0	1
113		19	max	468.274	1	0	1	-.027	15	0	1	0	15	0	1
114			min	-108.918	3	0	1	-.81	1	0	1	-.001	1	0	1
115	M6	1	max	1104.588	1	.65	4	.274	1	0	1	0	3	0	1
116			min	-1134.445	3	.156	15	-.165	3	0	10	0	1	0	1
117		2	max	1104.685	1	.612	4	.274	1	0	1	0	3	0	15
118			min	-1134.373	3	.147	15	-.165	3	0	10	0	1	0	4
119		3	max	1104.781	1	.575	4	.274	1	0	1	0	11	0	15
120			min	-1134.301	3	.138	15	-.165	3	0	10	0	1	0	4
121		4	max	1104.878	1	.537	4	.274	1	0	1	0	11	0	15
122			min	-1134.228	3	.129	15	-.165	3	0	10	0	3	0	4
123		5	max	1104.974	1	.499	4	.274	1	0	1	0	1	0	15
124			min	-1134.156	3	.12	15	-.165	3	0	10	0	3	0	4
125		6	max	1105.07	1	.461	4	.274	1	0	1	0	1	0	15
126			min	-1134.084	3	.111	15	-.165	3	0	10	0	3	0	4
127		7	max	1105.167	1	.423	4	.274	1	0	1	0	1	0	15
128			min	-1134.012	3	.102	15	-.165	3	0	10	0	3	0	4
129		8	max	1105.263	1	.385	4	.274	1	0	1	0	1	0	15
130			min	-1133.939	3	.093	15	-.165	3	0	10	0	3	0	4
131		9	max	1105.359	1	.348	4	.274	1	0	1	0	1	0	15
132			min	-1133.867	3	.084	15	-.165	3	0	10	0	3	0	4
133		10	max	1105.456	1	.31	4	.274	1	0	1	0	1	0	15
134			min	-1133.795	3	.075	15	-.165	3	0	10	0	3	0	4
135		11	max	1105.552	1	.272	4	.274	1	0	1	0	1	0	15
136			min	-1133.723	3	.067	15	-.165	3	0	10	0	3	0	4
137		12	max	1105.648	1	.234	4	.274	1	0	1	0	1	0	15
138			min	-1133.65	3	.058	15	-.165	3	0	10	0	3	0	4
139		13	max	1105.745	1	.196	4	.274	1	0	1	0	1	0	15
140			min	-1133.578	3	.049	15	-.165	3	0	10	0	3	0	4
141		14	max	1105.841	1	.162	2	.274	1	0	1	0	1	0	15
142			min	-1133.506	3	.04	15	-.165	3	0	10	0	3	0	4
143		15	max	1105.938	1	.132	2	.274	1	0	1	0	1	0	15
144			min	-1133.433	3	.029	9	-.165	3	0	10	0	3	0	4
145		16	max	1106.034	1	.103	2	.274	1	0	1	0	1	0	15
146			min	-1133.361	3	.004	9	-.165	3	0	10	0	3	0	4
147		17	max	1106.13	1	.078	10	.274	1	0	1	0	1	0	15
148			min	-1133.289	3	-.02	9	-.165	3	0	10	0	3	0	4
149		18	max	1106.227	1	.054	10	.274	1	0	1	0	1	0	15
150			min	-1133.217	3	-.047	1	-.165	3	0	10	0	3	0	4
151		19	max	1106.323	1	.029	10	.274	1	0	1	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1133.144	3	-.077	1	-.165	3	0	10	0	3	0	4
153	M7	1	max	168.932	2	1.808	4	.009	1	0	1	0	1	0	4
154			min	-131.961	9	.427	15	-.008	3	0	3	0	3	0	15
155		2	max	168.865	2	1.63	4	.009	1	0	1	0	1	0	2
156			min	-132.017	9	.385	15	-.008	3	0	3	0	3	0	15
157		3	max	168.798	2	1.452	4	.009	1	0	1	0	1	0	2
158			min	-132.073	9	.343	15	-.008	3	0	3	0	3	0	9
159		4	max	168.731	2	1.274	4	.009	1	0	1	0	1	0	10
160			min	-132.129	9	.301	15	-.008	3	0	3	0	3	0	1
161		5	max	168.664	2	1.096	4	.009	1	0	1	0	1	0	15
162			min	-132.185	9	.259	15	-.008	3	0	3	0	3	0	4
163		6	max	168.597	2	.918	4	.009	1	0	1	0	1	0	15
164			min	-132.241	9	.217	15	-.008	3	0	3	0	3	0	4
165		7	max	168.529	2	.74	4	.009	1	0	1	0	1	0	15
166			min	-132.297	9	.175	15	-.008	3	0	3	0	3	0	4
167		8	max	168.462	2	.562	4	.009	1	0	1	0	1	0	15
168			min	-132.353	9	.134	15	-.008	3	0	3	0	3	0	4
169		9	max	168.395	2	.384	4	.009	1	0	1	0	1	0	15
170			min	-132.409	9	.092	15	-.008	3	0	3	0	3	-.001	4
171		10	max	168.328	2	.206	4	.009	1	0	1	0	1	0	15
172			min	-132.464	9	.05	15	-.008	3	0	3	0	3	-.001	4
173		11	max	168.261	2	.056	2	.009	1	0	1	0	1	0	15
174			min	-132.52	9	-.01	9	-.008	3	0	3	0	3	-.001	4
175		12	max	168.194	2	-.034	15	.009	1	0	1	0	1	0	15
176			min	-132.576	9	-.15	4	-.008	3	0	3	0	3	-.001	4
177		13	max	168.127	2	-.076	15	.009	1	0	1	0	1	0	15
178			min	-132.632	9	-.328	4	-.008	3	0	3	0	3	-.001	4
179		14	max	168.06	2	-.117	15	.009	1	0	1	0	1	0	15
180			min	-132.688	9	-.506	4	-.008	3	0	3	0	3	-.001	4
181		15	max	167.993	2	-.159	15	.009	1	0	1	0	1	0	15
182			min	-132.744	9	-.684	4	-.008	3	0	3	0	3	0	4
183		16	max	167.926	2	-.201	15	.009	1	0	1	0	1	0	15
184			min	-132.8	9	-.862	4	-.008	3	0	3	0	3	0	4
185		17	max	167.859	2	-.243	15	.009	1	0	1	0	1	0	15
186			min	-132.856	9	-1.04	4	-.008	3	0	3	0	3	0	4
187		18	max	167.791	2	-.285	15	.009	1	0	1	0	1	0	15
188			min	-132.912	9	-1.218	4	-.008	3	0	3	0	3	0	4
189		19	max	167.724	2	-.327	15	.009	1	0	1	0	1	0	1
190			min	-132.968	9	-1.396	4	-.008	3	0	3	0	3	0	1
191	M8	1	max	1404.037	1	0	1	.53	1	0	1	0	10	0	1
192			min	-378.774	3	0	1	-.279	3	0	1	0	1	0	1
193		2	max	1404.102	1	0	1	.53	1	0	1	0	1	0	1
194			min	-378.725	3	0	1	-.279	3	0	1	0	3	0	1
195		3	max	1404.167	1	0	1	.53	1	0	1	0	1	0	1
196			min	-378.677	3	0	1	-.279	3	0	1	0	3	0	1
197		4	max	1404.231	1	0	1	.53	1	0	1	0	1	0	1
198			min	-378.628	3	0	1	-.279	3	0	1	0	3	0	1
199		5	max	1404.296	1	0	1	.53	1	0	1	0	1	0	1
200			min	-378.58	3	0	1	-.279	3	0	1	0	3	0	1
201		6	max	1404.361	1	0	1	.53	1	0	1	0	1	0	1
202			min	-378.531	3	0	1	-.279	3	0	1	0	3	0	1
203		7	max	1404.426	1	0	1	.53	1	0	1	0	1	0	1
204			min	-378.482	3	0	1	-.279	3	0	1	0	3	0	1
205		8	max	1404.49	1	0	1	.53	1	0	1	0	1	0	1
206			min	-378.434	3	0	1	-.279	3	0	1	0	3	0	1
207		9	max	1404.555	1	0	1	.53	1	0	1	0	1	0	1
208			min	-378.385	3	0	1	-.279	3	0	1	0	3	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
209		10	max	1404.62	1	0	1	.53	1	0	1	0	1	0	1
210			min	-378.337	3	0	1	-.279	3	0	1	0	3	0	1
211		11	max	1404.684	1	0	1	.53	1	0	1	0	1	0	1
212			min	-378.288	3	0	1	-.279	3	0	1	0	3	0	1
213		12	max	1404.749	1	0	1	.53	1	0	1	0	1	0	1
214			min	-378.24	3	0	1	-.279	3	0	1	0	3	0	1
215		13	max	1404.814	1	0	1	.53	1	0	1	0	1	0	1
216			min	-378.191	3	0	1	-.279	3	0	1	0	3	0	1
217		14	max	1404.879	1	0	1	.53	1	0	1	0	1	0	1
218			min	-378.143	3	0	1	-.279	3	0	1	0	3	0	1
219		15	max	1404.943	1	0	1	.53	1	0	1	0	1	0	1
220			min	-378.094	3	0	1	-.279	3	0	1	0	3	0	1
221		16	max	1405.008	1	0	1	.53	1	0	1	0	1	0	1
222			min	-378.046	3	0	1	-.279	3	0	1	0	3	0	1
223		17	max	1405.073	1	0	1	.53	1	0	1	0	1	0	1
224			min	-377.997	3	0	1	-.279	3	0	1	0	3	0	1
225		18	max	1405.137	1	0	1	.53	1	0	1	0	1	0	1
226			min	-377.949	3	0	1	-.279	3	0	1	0	3	0	1
227		19	max	1405.202	1	0	1	.53	1	0	1	0	1	0	1
228			min	-377.9	3	0	1	-.279	3	0	1	0	3	0	1
229	M10	1	max	342.094	1	.653	4	-.002	15	0	1	0	2	0	1
230			min	-332.062	3	.156	15	-.068	2	0	3	0	3	0	1
231		2	max	342.19	1	.615	4	-.002	15	0	1	0	1	0	15
232			min	-331.989	3	.147	15	-.068	2	0	3	0	3	0	4
233		3	max	342.287	1	.577	4	-.002	15	0	1	0	1	0	15
234			min	-331.917	3	.138	15	-.068	2	0	3	0	3	0	4
235		4	max	342.383	1	.539	4	-.002	15	0	1	0	1	0	15
236			min	-331.845	3	.129	15	-.068	2	0	3	0	3	0	4
237		5	max	342.48	1	.501	4	-.002	15	0	1	0	1	0	15
238			min	-331.773	3	.12	15	-.068	2	0	3	0	3	0	4
239		6	max	342.576	1	.463	4	-.002	15	0	1	0	1	0	15
240			min	-331.7	3	.111	15	-.068	2	0	3	0	3	0	4
241		7	max	342.672	1	.426	4	-.002	15	0	1	0	15	0	15
242			min	-331.628	3	.102	15	-.068	2	0	3	0	3	0	4
243		8	max	342.769	1	.388	4	-.002	15	0	1	0	15	0	15
244			min	-331.556	3	.094	15	-.068	2	0	3	0	3	0	4
245		9	max	342.865	1	.35	4	-.002	15	0	1	0	15	0	15
246			min	-331.484	3	.085	15	-.068	2	0	3	0	3	0	4
247		10	max	342.961	1	.312	4	-.002	15	0	1	0	15	0	15
248			min	-331.411	3	.076	15	-.068	2	0	3	0	3	0	4
249		11	max	343.058	1	.274	4	-.002	15	0	1	0	15	0	15
250			min	-331.339	3	.067	15	-.068	2	0	3	0	3	0	4
251		12	max	343.154	1	.236	4	-.002	15	0	1	0	15	0	15
252			min	-331.267	3	.058	15	-.068	2	0	3	0	3	0	4
253		13	max	343.25	1	.199	4	-.002	15	0	1	0	15	0	15
254			min	-331.194	3	.049	15	-.068	2	0	3	0	3	0	4
255		14	max	343.347	1	.161	4	-.002	15	0	1	0	15	0	15
256			min	-331.122	3	.04	15	-.068	2	0	3	0	3	0	4
257		15	max	343.443	1	.124	3	-.002	15	0	1	0	15	0	15
258			min	-331.05	3	.015	1	-.068	2	0	3	0	3	0	4
259		16	max	343.54	1	.101	3	-.002	15	0	1	0	15	0	15
260			min	-330.978	3	-.014	1	-.068	2	0	3	0	3	0	4
261		17	max	343.636	1	.079	3	-.002	15	0	1	0	15	0	15
262			min	-330.905	3	-.044	1	-.068	2	0	3	0	3	0	4
263		18	max	343.732	1	.057	3	-.002	15	0	1	0	15	0	15
264			min	-330.833	3	-.073	1	-.068	2	0	3	0	3	0	4
265		19	max	343.829	1	.035	3	-.002	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-330.761	3	-.103	1	-.068	2	0	3	0	3	0	4
267	M11	1	max	36.982	10	1.818	4	.507	1	0	1	0	3	0	4
268			min	-84.831	1	.428	15	.005	12	0	15	-.001	1	0	15
269		2	max	36.926	10	1.64	4	.507	1	0	1	0	3	0	4
270			min	-84.898	1	.386	15	.005	12	0	15	-.001	1	0	15
271		3	max	36.87	10	1.462	4	.507	1	0	1	0	3	0	4
272			min	-84.965	1	.344	15	.005	12	0	15	-.001	1	0	3
273		4	max	36.814	10	1.284	4	.507	1	0	1	0	3	0	15
274			min	-85.032	1	.302	15	.005	12	0	15	0	1	0	3
275		5	max	36.758	10	1.106	4	.507	1	0	1	0	3	0	15
276			min	-85.099	1	.26	15	.005	12	0	15	0	1	0	4
277		6	max	36.702	10	.928	4	.507	1	0	1	0	3	0	15
278			min	-85.166	1	.219	15	.005	12	0	15	0	1	0	4
279		7	max	36.647	10	.75	4	.507	1	0	1	0	3	0	15
280			min	-85.233	1	.177	15	.005	12	0	15	0	1	0	4
281		8	max	36.591	10	.572	4	.507	1	0	1	0	3	0	15
282			min	-85.3	1	.135	15	.005	12	0	15	0	1	0	4
283		9	max	36.535	10	.394	4	.507	1	0	1	0	3	0	15
284			min	-85.367	1	.093	15	.005	12	0	15	0	1	-.001	4
285		10	max	36.479	10	.216	4	.507	1	0	1	0	3	0	15
286			min	-85.434	1	.051	15	.005	12	0	15	0	1	-.001	4
287		11	max	36.423	10	.038	4	.507	1	0	1	0	3	0	15
288			min	-85.502	1	.001	3	.005	12	0	15	0	1	-.001	4
289		12	max	36.367	10	-.032	15	.507	1	0	1	0	3	0	15
290			min	-85.569	1	-.14	4	.005	12	0	15	0	1	-.001	4
291		13	max	36.311	10	-.074	15	.507	1	0	1	0	3	0	15
292			min	-85.636	1	-.318	4	.005	12	0	15	0	1	-.001	4
293		14	max	36.255	10	-.116	15	.507	1	0	1	0	3	0	15
294			min	-85.703	1	-.496	4	.005	12	0	15	0	10	-.001	4
295		15	max	36.199	10	-.158	15	.507	1	0	1	0	3	0	15
296			min	-85.77	1	-.674	4	.005	12	0	15	0	15	0	4
297		16	max	36.143	10	-.2	15	.507	1	0	1	0	1	0	15
298			min	-85.837	1	-.852	4	.005	12	0	15	0	15	0	4
299		17	max	36.087	10	-.242	15	.507	1	0	1	0	1	0	15
300			min	-85.904	1	-1.03	4	.005	12	0	15	0	15	0	4
301		18	max	36.031	10	-.284	15	.507	1	0	1	0	1	0	15
302			min	-85.971	1	-1.208	4	.005	12	0	15	0	15	0	4
303		19	max	35.976	10	-.325	15	.507	1	0	1	0	1	0	1
304			min	-86.038	1	-1.386	4	.005	12	0	15	0	15	0	1
305	M12	1	max	466.989	1	0	1	1.908	1	0	1	0	1	0	1
306			min	-109.432	3	0	1	.059	15	0	1	0	3	0	1
307		2	max	467.054	1	0	1	1.908	1	0	1	0	1	0	1
308			min	-109.383	3	0	1	.059	15	0	1	0	15	0	1
309		3	max	467.118	1	0	1	1.908	1	0	1	0	1	0	1
310			min	-109.335	3	0	1	.059	15	0	1	0	15	0	1
311		4	max	467.183	1	0	1	1.908	1	0	1	0	1	0	1
312			min	-109.286	3	0	1	.059	15	0	1	0	15	0	1
313		5	max	467.248	1	0	1	1.908	1	0	1	0	1	0	1
314			min	-109.238	3	0	1	.059	15	0	1	0	15	0	1
315		6	max	467.312	1	0	1	1.908	1	0	1	0	1	0	1
316			min	-109.189	3	0	1	.059	15	0	1	0	15	0	1
317		7	max	467.377	1	0	1	1.908	1	0	1	.001	1	0	1
318			min	-109.141	3	0	1	.059	15	0	1	0	15	0	1
319		8	max	467.442	1	0	1	1.908	1	0	1	.001	1	0	1
320			min	-109.092	3	0	1	.059	15	0	1	0	15	0	1
321		9	max	467.507	1	0	1	1.908	1	0	1	.001	1	0	1
322			min	-109.044	3	0	1	.059	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
323		10	max	467.571	1	0	1	1.908	1	0	1	.002	1	0	1
324			min	-108.995	3	0	1	.059	15	0	1	0	15	0	1
325		11	max	467.636	1	0	1	1.908	1	0	1	.002	1	0	1
326			min	-108.947	3	0	1	.059	15	0	1	0	15	0	1
327		12	max	467.701	1	0	1	1.908	1	0	1	.002	1	0	1
328			min	-108.898	3	0	1	.059	15	0	1	0	15	0	1
329		13	max	467.765	1	0	1	1.908	1	0	1	.002	1	0	1
330			min	-108.85	3	0	1	.059	15	0	1	0	15	0	1
331		14	max	467.83	1	0	1	1.908	1	0	1	.002	1	0	1
332			min	-108.801	3	0	1	.059	15	0	1	0	15	0	1
333		15	max	467.895	1	0	1	1.908	1	0	1	.002	1	0	1
334			min	-108.752	3	0	1	.059	15	0	1	0	15	0	1
335		16	max	467.96	1	0	1	1.908	1	0	1	.003	1	0	1
336			min	-108.704	3	0	1	.059	15	0	1	0	15	0	1
337		17	max	468.024	1	0	1	1.908	1	0	1	.003	1	0	1
338			min	-108.655	3	0	1	.059	15	0	1	0	15	0	1
339		18	max	468.089	1	0	1	1.908	1	0	1	.003	1	0	1
340			min	-108.607	3	0	1	.059	15	0	1	0	15	0	1
341		19	max	468.154	1	0	1	1.908	1	0	1	.003	1	0	1
342			min	-108.558	3	0	1	.059	15	0	1	0	15	0	1
343	M1	1	max	85.986	1	325.773	3	-1.182	15	0	1	.075	1	0	1
344			min	2.627	15	-339.662	1	-38.156	1	0	3	.002	15	0	3
345		2	max	86.058	1	325.571	3	-1.182	15	0	1	.066	1	.074	1
346			min	2.649	15	-339.931	1	-38.156	1	0	3	.002	15	-.071	3
347		3	max	98.466	1	5.65	9	-1.166	15	0	3	.058	1	.146	1
348			min	-6.687	3	-20.976	3	-37.816	1	0	1	.002	15	-.14	3
349		4	max	98.538	1	5.425	9	-1.166	15	0	3	.049	1	.147	1
350			min	-6.633	3	-21.178	3	-37.816	1	0	1	.002	15	-.135	3
351		5	max	98.61	1	5.2	9	-1.166	15	0	3	.041	1	.147	1
352			min	-6.579	3	-21.38	3	-37.816	1	0	1	.001	15	-.131	3
353		6	max	98.683	1	4.975	9	-1.166	15	0	3	.033	1	.147	1
354			min	-6.525	3	-21.583	3	-37.816	1	0	1	.001	15	-.126	3
355		7	max	98.755	1	4.75	9	-1.166	15	0	3	.025	1	.147	1
356			min	-6.47	3	-21.785	3	-37.816	1	0	1	0	15	-.121	3
357		8	max	98.827	1	4.526	9	-1.166	15	0	3	.017	1	.148	1
358			min	-6.416	3	-21.987	3	-37.816	1	0	1	0	15	-.117	3
359		9	max	98.899	1	4.301	9	-1.166	15	0	3	.008	1	.148	1
360			min	-6.362	3	-22.19	3	-37.816	1	0	1	0	15	-.112	3
361		10	max	98.972	1	4.076	9	-1.166	15	0	3	0	3	.149	1
362			min	-6.308	3	-22.392	3	-37.816	1	0	1	0	15	-.107	3
363		11	max	99.044	1	3.851	9	-1.166	15	0	3	0	3	.149	1
364			min	-6.253	3	-22.594	3	-37.816	1	0	1	-.008	1	-.102	3
365		12	max	99.116	1	3.627	9	-1.166	15	0	3	0	12	.15	1
366			min	-6.199	3	-22.796	3	-37.816	1	0	1	-.016	1	-.097	3
367		13	max	99.188	1	3.402	9	-1.166	15	0	3	0	12	.151	1
368			min	-6.145	3	-22.999	3	-37.816	1	0	1	-.024	1	-.092	3
369		14	max	99.261	1	3.177	9	-1.166	15	0	3	-.001	15	.152	1
370			min	-6.091	3	-23.201	3	-37.816	1	0	1	-.033	1	-.087	3
371		15	max	99.333	1	2.952	9	-1.166	15	0	3	-.001	15	.153	2
372			min	-6.037	3	-23.403	3	-37.816	1	0	1	-.041	1	-.082	3
373		16	max	64.869	2	11.383	10	-1.179	15	0	1	-.002	15	.156	2
374			min	-32.713	3	-61.301	1	-38.183	1	0	12	-.05	1	-.077	3
375		17	max	64.942	2	11.158	10	-1.179	15	0	1	-.002	15	.167	1
376			min	-32.658	3	-61.571	1	-38.183	1	0	12	-.058	1	-.067	3
377		18	max	-2.644	15	388.833	1	-1.206	15	0	3	-.002	15	.085	1
378			min	-86.017	1	-154.205	3	-39.016	1	0	1	-.066	1	-.034	3
379		19	max	-2.622	15	388.563	1	-1.206	15	0	3	-.002	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
380			min	-85.945	1	-154.407	3	-39.016	1	0	1	-.075	1	0	3
381	M5	1	max	192.409	1	1074.948	3	0	10	0	1	.003	3	0	3
382			min	4.303	12	-1120.542	1	-29.558	3	0	3	0	10	0	1
383		2	max	192.482	1	1074.746	3	0	10	0	1	0	1	.243	1
384			min	4.339	12	-1120.812	1	-29.558	3	0	3	-.003	3	-.233	3
385		3	max	231.525	1	8.337	9	3.378	3	0	3	0	1	.481	1
386			min	-33.493	3	-73.915	3	-.533	1	0	1	-.009	3	-.461	3
387		4	max	231.597	1	8.112	9	3.378	3	0	3	0	1	.485	1
388			min	-33.438	3	-74.118	3	-.533	1	0	1	-.008	3	-.445	3
389		5	max	231.67	1	7.887	9	3.378	3	0	3	0	1	.488	1
390			min	-33.384	3	-74.32	3	-.533	1	0	1	-.008	3	-.429	3
391		6	max	231.742	1	7.663	9	3.378	3	0	3	0	1	.492	1
392			min	-33.33	3	-74.522	3	-.533	1	0	1	-.007	3	-.413	3
393		7	max	231.814	1	7.438	9	3.378	3	0	3	0	1	.496	1
394			min	-33.276	3	-74.724	3	-.533	1	0	1	-.006	3	-.396	3
395		8	max	231.887	1	7.213	9	3.378	3	0	3	0	11	.5	1
396			min	-33.222	3	-74.927	3	-.533	1	0	1	-.005	3	-.38	3
397		9	max	231.959	1	6.988	9	3.378	3	0	3	0	11	.504	1
398			min	-33.167	3	-75.129	3	-.533	1	0	1	-.005	3	-.364	3
399		10	max	232.031	1	6.764	9	3.378	3	0	3	0	10	.508	1
400			min	-33.113	3	-75.331	3	-.533	1	0	1	-.004	3	-.348	3
401		11	max	232.103	1	6.539	9	3.378	3	0	3	0	10	.512	1
402			min	-33.059	3	-75.534	3	-.533	1	0	1	-.003	3	-.331	3
403		12	max	232.176	1	6.314	9	3.378	3	0	3	0	10	.516	1
404			min	-33.005	3	-75.736	3	-.533	1	0	1	-.002	3	-.315	3
405		13	max	232.248	1	6.089	9	3.378	3	0	3	0	10	.52	1
406			min	-32.951	3	-75.938	3	-.533	1	0	1	-.002	3	-.298	3
407		14	max	232.32	1	5.864	9	3.378	3	0	3	0	10	.524	1
408			min	-32.896	3	-76.141	3	-.533	1	0	1	-.001	3	-.282	3
409		15	max	232.392	1	5.64	9	3.378	3	0	3	0	10	.528	1
410			min	-32.842	3	-76.343	3	-.533	1	0	1	0	1	-.265	3
411		16	max	232.526	2	55.619	2	3.354	3	0	1	0	3	.533	1
412			min	-105.391	3	-139.496	3	-.516	1	0	10	0	1	-.248	3
413		17	max	232.598	2	55.35	2	3.354	3	0	1	0	3	.549	1
414			min	-105.337	3	-139.699	3	-.516	1	0	10	0	1	-.218	3
415		18	max	-5.059	12	1278.837	1	3.071	3	0	3	.002	3	.277	1
416			min	-192.542	1	-506.535	3	-.097	1	0	1	0	1	-.11	3
417		19	max	-5.023	12	1278.568	1	3.071	3	0	3	.002	3	0	3
418			min	-192.47	1	-506.737	3	-.097	1	0	1	0	1	0	1
419	M9	1	max	85.66	1	325.755	3	39.201	1	0	3	-.002	15	0	1
420			min	2.615	15	-339.659	1	1.353	15	0	1	-.074	1	0	3
421		2	max	85.732	1	325.553	3	39.201	1	0	3	0	12	.074	1
422			min	2.637	15	-339.929	1	1.353	15	0	1	-.065	1	-.071	3
423		3	max	98.586	1	5.63	9	36.787	1	0	1	.006	3	.146	1
424			min	-6.458	3	-20.916	3	-.472	3	0	15	-.056	1	-.14	3
425		4	max	98.658	1	5.405	9	36.787	1	0	1	.006	3	.146	1
426			min	-6.404	3	-21.119	3	-.472	3	0	15	-.048	1	-.135	3
427		5	max	98.73	1	5.18	9	36.787	1	0	1	.005	3	.147	1
428			min	-6.35	3	-21.321	3	-.472	3	0	15	-.04	1	-.131	3
429		6	max	98.803	1	4.956	9	36.787	1	0	1	.005	3	.147	1
430			min	-6.295	3	-21.523	3	-.472	3	0	15	-.032	1	-.126	3
431		7	max	98.875	1	4.731	9	36.787	1	0	1	.005	3	.147	1
432			min	-6.241	3	-21.726	3	-.472	3	0	15	-.024	1	-.121	3
433		8	max	98.947	1	4.506	9	36.787	1	0	1	.005	3	.148	1
434			min	-6.187	3	-21.928	3	-.472	3	0	15	-.016	1	-.117	3
435		9	max	99.02	1	4.281	9	36.787	1	0	1	.005	3	.148	1
436			min	-6.133	3	-22.13	3	-.472	3	0	15	-.008	1	-.112	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
437		10	max	99.092	1	4.057	9	36.787	1	0	1	.005	3	.149	1
438			min	-6.079	3	-22.332	3	-.472	3	0	15	0	1	-.107	3
439		11	max	99.164	1	3.832	9	36.787	1	0	1	.008	1	.149	1
440			min	-6.024	3	-22.535	3	-.472	3	0	15	0	15	-.102	3
441		12	max	99.236	1	3.607	9	36.787	1	0	1	.016	1	.15	1
442			min	-5.97	3	-22.737	3	-.472	3	0	15	0	15	-.097	3
443		13	max	99.309	1	3.382	9	36.787	1	0	1	.024	1	.151	1
444			min	-5.916	3	-22.939	3	-.472	3	0	15	0	15	-.092	3
445		14	max	99.381	1	3.158	9	36.787	1	0	1	.032	1	.152	1
446			min	-5.862	3	-23.142	3	-.472	3	0	15	0	15	-.087	3
447		15	max	99.453	1	2.933	9	36.787	1	0	1	.04	1	.153	2
448			min	-5.808	3	-23.344	3	-.472	3	0	15	.001	15	-.082	3
449		16	max	65.014	2	11.091	10	37.268	1	0	15	.049	1	.156	2
450			min	-32.924	3	-61.184	1	-.46	3	0	1	.002	15	-.077	3
451		17	max	65.087	2	10.866	10	37.268	1	0	15	.057	1	.167	1
452			min	-32.869	3	-61.453	1	-.46	3	0	1	.002	15	-.067	3
453		18	max	-2.635	15	388.834	1	39.123	1	0	1	.065	1	.085	1
454			min	-85.712	1	-154.203	3	-.178	3	0	3	.002	15	-.034	3
455		19	max	-2.614	15	388.564	1	39.123	1	0	1	.074	1	0	1
456			min	-85.64	1	-154.405	3	-.178	3	0	3	.002	15	0	3
457	M13	1	max	39.282	1	339.338	1	-2.615	15	0	1	.074	1	0	1
458			min	1.353	15	-325.758	3	-85.653	1	0	3	.002	15	0	3
459		2	max	39.282	1	239.531	1	-2.001	15	0	1	.021	1	.193	3
460			min	1.353	15	-229.848	3	-65.428	1	0	3	0	15	-.201	1
461		3	max	39.282	1	139.724	1	-1.387	15	0	1	.003	3	.319	3
462			min	1.353	15	-133.939	3	-45.203	1	0	3	-.017	1	-.333	1
463		4	max	39.282	1	39.917	1	-.772	15	0	1	0	3	.379	3
464			min	1.353	15	-38.029	3	-24.977	1	0	3	-.041	1	-.395	1
465		5	max	39.282	1	57.88	3	.045	10	0	1	0	12	.372	3
466			min	1.353	15	-59.89	1	-4.752	1	0	3	-.052	1	-.388	1
467		6	max	39.282	1	153.79	3	15.473	1	0	1	0	12	.299	3
468			min	1.353	15	-159.697	1	-.303	3	0	3	-.048	1	-.312	1
469		7	max	39.282	1	249.7	3	35.699	1	0	1	0	12	.158	3
470			min	1.353	15	-259.504	1	.434	12	0	3	-.03	1	-.166	1
471		8	max	39.282	1	345.609	3	55.924	1	0	1	.002	2	.049	1
472			min	1.353	15	-359.311	1	1.031	12	0	3	0	3	-.048	3
473		9	max	39.282	1	441.519	3	76.149	1	0	1	.047	1	.333	1
474			min	1.353	15	-459.118	1	1.627	12	0	3	0	12	-.322	3
475		10	max	39.282	1	537.429	3	96.375	1	0	1	.107	1	.686	1
476			min	1.353	15	-558.925	1	2.223	12	0	3	.002	12	-.661	3
477		11	max	38.233	1	459.118	1	-1.482	12	0	3	.047	1	.333	1
478			min	1.182	15	-441.519	3	-75.823	1	0	1	-.002	3	-.322	3
479		12	max	38.233	1	359.311	1	-.886	12	0	3	.002	2	.049	1
480			min	1.182	15	-345.609	3	-55.598	1	0	1	-.003	3	-.048	3
481		13	max	38.233	1	259.504	1	-.29	12	0	3	0	15	.158	3
482			min	1.182	15	-249.7	3	-35.372	1	0	1	-.031	1	-.166	1
483		14	max	38.233	1	159.697	1	.532	3	0	3	-.001	15	.299	3
484			min	1.182	15	-153.79	3	-15.147	1	0	1	-.048	1	-.312	1
485		15	max	38.233	1	59.89	1	5.078	1	0	3	-.002	15	.372	3
486			min	1.182	15	-57.88	3	-.045	10	0	1	-.052	1	-.388	1
487		16	max	38.233	1	38.029	3	25.304	1	0	3	-.001	12	.379	3
488			min	1.182	15	-39.917	1	.784	15	0	1	-.041	1	-.395	1
489		17	max	38.233	1	133.939	3	45.529	1	0	3	0	3	.319	3
490			min	1.182	15	-139.724	1	1.398	15	0	1	-.017	1	-.333	1
491		18	max	38.233	1	229.848	3	65.754	1	0	3	.022	1	.193	3
492			min	1.182	15	-239.531	1	2.012	15	0	1	0	15	-.201	1
493		19	max	38.233	1	325.758	3	85.98	1	0	3	.075	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
494			min	1.182	15	-339.338	1	2.627	15	0	1	.002	15	0	3
495	M16	1	max	.179	3	388.9	1	-2.614	15	0	3	.074	1	0	1
496			min	-39.042	1	-154.416	3	-85.647	1	0	1	.002	15	0	3
497		2	max	.179	3	274.498	1	-1.999	15	0	3	.021	1	.091	3
498			min	-39.042	1	-109.103	3	-65.422	1	0	1	0	15	-.23	1
499		3	max	.179	3	160.095	1	-1.385	15	0	3	0	12	.152	3
500			min	-39.042	1	-63.791	3	-45.197	1	0	1	-.017	1	-.381	1
501		4	max	.179	3	45.693	1	-.77	15	0	3	-.001	15	.18	3
502			min	-39.042	1	-18.478	3	-24.971	1	0	1	-.042	1	-.453	1
503		5	max	.179	3	26.835	3	.048	10	0	3	-.002	15	.177	3
504			min	-39.042	1	-68.71	1	-4.746	1	0	1	-.052	1	-.445	1
505		6	max	.179	3	72.148	3	15.479	1	0	3	-.001	15	.143	3
506			min	-39.042	1	-183.113	1	.008	3	0	1	-.048	1	-.357	1
507		7	max	.179	3	117.461	3	35.705	1	0	3	0	15	.077	3
508			min	-39.042	1	-297.515	1	.629	12	0	1	-.03	1	-.19	1
509		8	max	.179	3	162.774	3	55.93	1	0	3	.002	2	.056	1
510			min	-39.042	1	-411.918	1	1.225	12	0	1	-.002	3	-.02	3
511		9	max	.179	3	208.087	3	76.155	1	0	3	.047	1	.382	1
512			min	-39.042	1	-526.32	1	1.821	12	0	1	0	3	-.149	3
513		10	max	-1.206	15	-12.843	15	96.381	1	0	15	.107	1	.787	1
514			min	-39.042	1	-640.723	1	-3.889	3	0	1	.003	12	-.309	3
515		11	max	-1.206	15	526.32	1	-2.01	12	0	1	.047	1	.382	1
516			min	-38.941	1	-208.087	3	-75.851	1	0	3	.001	12	-.149	3
517		12	max	-1.206	15	411.918	1	-1.414	12	0	1	.002	2	.056	1
518			min	-38.941	1	-162.774	3	-55.626	1	0	3	0	3	-.02	3
519		13	max	-1.206	15	297.515	1	-.818	12	0	1	0	15	.077	3
520			min	-38.941	1	-117.461	3	-35.4	1	0	3	-.031	1	-.19	1
521		14	max	-1.206	15	183.112	1	-.222	12	0	1	-.001	12	.143	3
522			min	-38.941	1	-72.148	3	-15.175	1	0	3	-.048	1	-.357	1
523		15	max	-1.206	15	68.71	1	5.05	1	0	1	-.001	12	.177	3
524			min	-38.941	1	-26.835	3	-.048	10	0	3	-.052	1	-.445	1
525		16	max	-1.206	15	18.478	3	25.276	1	0	1	0	12	.18	3
526			min	-38.941	1	-45.693	1	.779	15	0	3	-.041	1	-.453	1
527		17	max	-1.206	15	63.791	3	45.501	1	0	1	0	3	.152	3
528			min	-38.941	1	-160.095	1	1.393	15	0	3	-.017	1	-.381	1
529		18	max	-1.206	15	109.103	3	65.726	1	0	1	.022	1	.091	3
530			min	-38.941	1	-274.498	1	2.008	15	0	3	0	15	-.23	1
531		19	max	-1.206	15	154.416	3	85.952	1	0	1	.075	1	0	1
532			min	-38.941	1	-388.9	1	2.622	15	0	3	.002	15	0	3
533	M15	1	max	.237	1	2.18	4	.046	3	0	1	0	1	0	1
534			min	-35.281	3	0	2	-.055	1	0	3	0	3	0	1
535		2	max	.165	1	1.938	4	.046	3	0	1	0	1	0	2
536			min	-35.335	3	0	2	-.055	1	0	3	0	3	0	4
537		3	max	.093	1	1.696	4	.046	3	0	1	0	1	0	2
538			min	-35.389	3	0	2	-.055	1	0	3	0	3	-.001	4
539		4	max	.021	1	1.454	4	.046	3	0	1	0	1	0	2
540			min	-35.443	3	0	2	-.055	1	0	3	0	3	-.002	4
541		5	max	0	2	1.211	4	.046	3	0	1	0	1	0	2
542			min	-35.497	3	0	2	-.055	1	0	3	0	3	-.003	4
543		6	max	0	2	.969	4	.046	3	0	1	0	1	0	2
544			min	-35.55	3	0	2	-.055	1	0	3	0	3	-.003	4
545		7	max	0	2	.727	4	.046	3	0	1	0	3	0	2
546			min	-35.604	3	0	2	-.055	1	0	3	0	1	-.003	4
547		8	max	0	2	.485	4	.046	3	0	1	0	3	0	2
548			min	-35.658	3	0	2	-.055	1	0	3	0	1	-.003	4
549		9	max	0	2	.242	4	.046	3	0	1	0	3	0	2
550			min	-35.712	3	0	2	-.055	1	0	3	0	1	-.004	4

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
551		10	max	0	2	0	1	.046	3	0	1	0	3	0	2
552			min	-35.766	3	0	1	-.055	1	0	3	0	1	-.004	4
553		11	max	0	2	0	2	.046	3	0	1	0	3	0	2
554			min	-35.82	3	-.242	4	-.055	1	0	3	0	1	-.004	4
555		12	max	0	2	0	2	.046	3	0	1	0	3	0	2
556			min	-35.874	3	-.485	4	-.055	1	0	3	0	1	-.003	4
557		13	max	0	2	0	2	.046	3	0	1	0	3	0	2
558			min	-35.928	3	-.727	4	-.055	1	0	3	0	1	-.003	4
559		14	max	0	2	0	2	.046	3	0	1	0	3	0	2
560			min	-35.982	3	-.969	4	-.055	1	0	3	0	1	-.003	4
561		15	max	0	2	0	2	.046	3	0	1	0	3	0	2
562			min	-36.036	3	-1.211	4	-.055	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.046	3	0	1	0	3	0	2
564			min	-36.09	3	-1.454	4	-.055	1	0	3	0	1	-.002	4
565		17	max	0	2	0	2	.046	3	0	1	0	3	0	2
566			min	-36.144	3	-1.696	4	-.055	1	0	3	0	1	-.001	4
567		18	max	0	2	0	2	.046	3	0	1	0	3	0	2
568			min	-36.198	3	-1.938	4	-.055	1	0	3	0	1	0	4
569		19	max	0	2	0	2	.046	3	0	1	0	3	0	1
570			min	-36.252	3	-2.18	4	-.055	1	0	3	0	1	0	1
571	M16A	1	max	0	10	2.18	4	.026	1	0	3	0	3	0	1
572			min	-35.583	3	0	10	-.018	3	0	1	0	1	0	1
573		2	max	0	10	1.938	4	.026	1	0	3	0	3	0	10
574			min	-35.529	3	0	10	-.018	3	0	1	0	1	0	4
575		3	max	0	10	1.696	4	.026	1	0	3	0	3	0	10
576			min	-35.475	3	0	10	-.018	3	0	1	0	1	-.001	4
577		4	max	0	10	1.454	4	.026	1	0	3	0	3	0	10
578			min	-35.421	3	0	10	-.018	3	0	1	0	1	-.002	4
579		5	max	0	10	1.211	4	.026	1	0	3	0	3	0	10
580			min	-35.367	3	0	10	-.018	3	0	1	0	1	-.003	4
581		6	max	0	10	.969	4	.026	1	0	3	0	3	0	10
582			min	-35.313	3	0	10	-.018	3	0	1	0	1	-.003	4
583		7	max	0	10	.727	4	.026	1	0	3	0	3	0	10
584			min	-35.259	3	0	10	-.018	3	0	1	0	1	-.003	4
585		8	max	0	10	.485	4	.026	1	0	3	0	3	0	10
586			min	-35.205	3	0	10	-.018	3	0	1	0	1	-.003	4
587		9	max	0	10	.242	4	.026	1	0	3	0	3	0	10
588			min	-35.151	3	0	10	-.018	3	0	1	0	1	-.004	4
589		10	max	0	10	0	1	.026	1	0	3	0	3	0	10
590			min	-35.097	3	0	1	-.018	3	0	1	0	1	-.004	4
591		11	max	0	10	0	10	.026	1	0	3	0	3	0	10
592			min	-35.043	3	-.242	4	-.018	3	0	1	0	1	-.004	4
593		12	max	0	10	0	10	.026	1	0	3	0	3	0	10
594			min	-34.989	3	-.485	4	-.018	3	0	1	0	1	-.003	4
595		13	max	0	10	0	10	.026	1	0	3	0	2	0	10
596			min	-34.935	3	-.727	4	-.018	3	0	1	0	4	-.003	4
597		14	max	0	10	0	10	.026	1	0	3	0	1	0	10
598			min	-34.881	3	-.969	4	-.018	3	0	1	0	3	-.003	4
599		15	max	0	10	0	10	.026	1	0	3	0	1	0	10
600			min	-34.827	3	-1.211	4	-.018	3	0	1	0	3	-.003	4
601		16	max	0	10	0	10	.026	1	0	3	0	1	0	10
602			min	-34.774	3	-1.454	4	-.018	3	0	1	0	3	-.002	4
603		17	max	0	10	0	10	.026	1	0	3	0	1	0	10
604			min	-34.72	3	-1.696	4	-.018	3	0	1	0	3	-.001	4
605		18	max	.034	2	0	10	.026	1	0	3	0	1	0	10
606			min	-34.666	3	-1.938	4	-.018	3	0	1	0	3	0	4
607		19	max	.106	2	0	10	.026	1	0	3	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
608			min	-34.612	3	-2.18	4	-.018	3	0	1	0	3	0	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	M2	1	max	.003	1	.005	2	.008	1	-1.626e-5	15	NC	3	NC	2
2			min	-.003	3	-.004	3	0	3	-5.201e-4	1	5751.503	2	3867.158	1
3		2	max	.002	1	.005	2	.007	1	-1.563e-5	15	NC	3	NC	2
4			min	-.002	3	-.004	3	0	3	-5.002e-4	1	6252.54	2	4192.637	1
5		3	max	.002	1	.004	2	.007	1	-1.5e-5	15	NC	1	NC	2
6			min	-.002	3	-.004	3	0	3	-4.804e-4	1	6844.39	2	4575.948	1
7		4	max	.002	1	.004	2	.006	1	-1.437e-5	15	NC	1	NC	2
8			min	-.002	3	-.004	3	0	3	-4.605e-4	1	7548.597	2	5031.252	1
9		5	max	.002	1	.004	2	.005	1	-1.373e-5	15	NC	1	NC	2
10			min	-.002	3	-.004	3	0	3	-4.406e-4	1	8393.768	2	5577.473	1
11		6	max	.002	1	.003	2	.005	1	-1.31e-5	15	NC	1	NC	2
12			min	-.002	3	-.003	3	0	3	-4.208e-4	1	9418.539	2	6240.367	1
13		7	max	.002	1	.003	2	.004	1	-1.247e-5	15	NC	1	NC	2
14			min	-.002	3	-.003	3	0	3	-4.009e-4	1	NC	1	7055.731	1
15		8	max	.002	1	.002	2	.004	1	-1.184e-5	15	NC	1	NC	2
16			min	-.002	3	-.003	3	0	3	-3.81e-4	1	NC	1	8074.539	1
17		9	max	.001	1	.002	2	.003	1	-1.121e-5	15	NC	1	NC	2
18			min	-.001	3	-.003	3	0	3	-3.611e-4	1	NC	1	9371.452	1
19		10	max	.001	1	.002	2	.003	1	-1.057e-5	15	NC	1	NC	1
20			min	-.001	3	-.003	3	0	3	-3.413e-4	1	NC	1	NC	1
21		11	max	.001	1	.001	2	.002	1	-9.942e-6	15	NC	1	NC	1
22			min	-.001	3	-.002	3	0	3	-3.214e-4	1	NC	1	NC	1
23		12	max	0	1	.001	2	.002	1	-9.31e-6	15	NC	1	NC	1
24			min	0	3	-.002	3	0	3	-3.015e-4	1	NC	1	NC	1
25		13	max	0	1	0	2	.001	1	-8.678e-6	15	NC	1	NC	1
26			min	0	3	-.002	3	0	3	-2.817e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	.001	1	-8.046e-6	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-2.618e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	-7.414e-6	15	NC	1	NC	1
30			min	0	3	-.001	3	0	3	-2.419e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-6.781e-6	15	NC	1	NC	1
32			min	0	3	-.001	3	0	3	-2.221e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-6.149e-6	15	NC	1	NC	1
34			min	0	3	0	3	0	3	-2.022e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-5.517e-6	15	NC	1	NC	1
36			min	0	3	0	3	0	3	-1.823e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-4.191e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.625e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	7.375e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	2.035e-6	12	NC	1	NC	1
41		2	max	0	1	0	2	0	12	9.297e-5	1	NC	1	NC	1
42			min	0	10	0	3	0	1	2.821e-6	15	NC	1	NC	1
43		3	max	0	1	0	2	0	12	1.122e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	3.422e-6	15	NC	1	NC	1
45		4	max	0	1	0	2	0	12	1.314e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	0	1	4.024e-6	15	NC	1	NC	1
47		5	max	0	1	0	2	0	3	1.506e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	0	1	4.625e-6	15	NC	1	NC	1
49		6	max	0	1	0	2	0	3	1.699e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	0	1	5.227e-6	15	NC	1	NC	1
51		7	max	0	1	0	2	0	3	1.891e-4	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
52			min	0	10	-.004	3	0	1	5.828e-6	15	NC	1	NC	1
53		8	max	0	1	0	2	0	3	2.083e-4	1	NC	1	NC	1
54			min	0	10	-.004	3	0	1	6.43e-6	15	NC	1	NC	1
55		9	max	0	1	0	2	0	3	2.275e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	1	7.031e-6	15	NC	1	NC	1
57		10	max	0	1	.001	2	0	1	2.467e-4	1	NC	1	NC	1
58			min	0	10	-.005	3	0	15	7.633e-6	15	NC	1	NC	1
59		11	max	0	1	.002	2	0	1	2.66e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	15	8.235e-6	15	NC	1	NC	1
61		12	max	0	1	.002	2	0	1	2.852e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	15	8.836e-6	15	NC	1	NC	1
63		13	max	0	1	.003	2	.001	1	3.044e-4	1	NC	1	NC	1
64			min	0	10	-.006	3	0	15	9.438e-6	15	NC	1	NC	1
65		14	max	0	1	.004	2	.002	1	3.236e-4	1	NC	1	NC	1
66			min	0	10	-.006	3	0	15	1.004e-5	15	NC	1	NC	1
67		15	max	0	1	.004	2	.002	1	3.428e-4	1	NC	1	NC	1
68			min	0	10	-.006	3	0	15	1.064e-5	15	NC	1	NC	1
69		16	max	0	1	.005	2	.002	1	3.621e-4	1	NC	1	NC	1
70			min	0	10	-.006	3	0	15	1.124e-5	15	8946.438	2	NC	1
71		17	max	0	1	.006	2	.003	1	3.813e-4	1	NC	3	NC	1
72			min	0	10	-.006	3	0	15	1.184e-5	15	7608.949	2	NC	1
73		18	max	0	1	.007	2	.003	1	4.005e-4	1	NC	3	NC	1
74			min	0	10	-.006	3	0	15	1.245e-5	15	6581.238	2	NC	1
75		19	max	0	1	.008	2	.004	1	4.197e-4	1	NC	3	NC	1
76			min	0	10	-.006	3	0	15	1.305e-5	15	5782.439	2	NC	1
77	M4	1	max	.002	1	.006	2	0	15	-1.471e-5	15	NC	1	NC	2
78			min	0	3	-.005	3	-.003	1	-4.804e-4	1	NC	1	7280.76	1
79		2	max	.002	1	.006	2	0	15	-1.471e-5	15	NC	1	NC	2
80			min	0	3	-.004	3	-.002	1	-4.804e-4	1	NC	1	7946.012	1
81		3	max	.002	1	.005	2	0	15	-1.471e-5	15	NC	1	NC	2
82			min	0	3	-.004	3	-.002	1	-4.804e-4	1	NC	1	8737.612	1
83		4	max	.002	1	.005	2	0	15	-1.471e-5	15	NC	1	NC	2
84			min	0	3	-.004	3	-.002	1	-4.804e-4	1	NC	1	9688.918	1
85		5	max	.002	1	.005	2	0	15	-1.471e-5	15	NC	1	NC	1
86			min	0	3	-.004	3	-.002	1	-4.804e-4	1	NC	1	NC	1
87		6	max	.002	1	.004	2	0	15	-1.471e-5	15	NC	1	NC	1
88			min	0	3	-.003	3	-.002	1	-4.804e-4	1	NC	1	NC	1
89		7	max	.001	1	.004	2	0	15	-1.471e-5	15	NC	1	NC	1
90			min	0	3	-.003	3	-.001	1	-4.804e-4	1	NC	1	NC	1
91		8	max	.001	1	.004	2	0	15	-1.471e-5	15	NC	1	NC	1
92			min	0	3	-.003	3	-.001	1	-4.804e-4	1	NC	1	NC	1
93		9	max	.001	1	.003	2	0	15	-1.471e-5	15	NC	1	NC	1
94			min	0	3	-.003	3	-.001	1	-4.804e-4	1	NC	1	NC	1
95		10	max	.001	1	.003	2	0	15	-1.471e-5	15	NC	1	NC	1
96			min	0	3	-.002	3	0	1	-4.804e-4	1	NC	1	NC	1
97		11	max	0	1	.003	2	0	15	-1.471e-5	15	NC	1	NC	1
98			min	0	3	-.002	3	0	1	-4.804e-4	1	NC	1	NC	1
99		12	max	0	1	.002	2	0	15	-1.471e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	0	1	-4.804e-4	1	NC	1	NC	1
101		13	max	0	1	.002	2	0	15	-1.471e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-4.804e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-1.471e-5	15	NC	1	NC	1
104			min	0	3	-.001	3	0	1	-4.804e-4	1	NC	1	NC	1
105		15	max	0	1	.001	2	0	15	-1.471e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-4.804e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-1.471e-5	15	NC	1	NC	1
108			min	0	3	0	3	0	1	-4.804e-4	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
109		17	max	0	1	0	2	0	15	-1.471e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-4.804e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-1.471e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-4.804e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-1.471e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-4.804e-4	1	NC	1	NC	1
115	M6	1	max	.008	1	.019	2	.003	1	1.871e-4	3	NC	3	NC	2
116			min	-.008	3	-.013	3	-.003	3	-6.337e-8	10	1597.828	2	9120.291	1
117		2	max	.008	1	.018	2	.003	1	1.828e-4	3	NC	3	NC	2
118			min	-.008	3	-.013	3	-.002	3	-6.003e-8	10	1704.665	2	9841.428	1
119		3	max	.007	1	.016	2	.003	1	1.785e-4	3	NC	3	NC	1
120			min	-.007	3	-.012	3	-.002	3	-5.669e-8	10	1826.459	2	NC	1
121		4	max	.007	1	.015	2	.003	1	1.743e-4	3	NC	3	NC	1
122			min	-.007	3	-.011	3	-.002	3	-5.335e-8	10	1966.197	2	NC	1
123		5	max	.006	1	.014	2	.002	1	1.7e-4	3	NC	3	NC	1
124			min	-.007	3	-.011	3	-.002	3	-5.001e-8	10	2127.723	2	NC	1
125		6	max	.006	1	.013	2	.002	1	1.657e-4	3	NC	3	NC	1
126			min	-.006	3	-.01	3	-.002	3	-4.488e-7	2	2316.07	2	NC	1
127		7	max	.005	1	.012	2	.002	1	1.614e-4	3	NC	3	NC	1
128			min	-.006	3	-.009	3	-.002	3	-2.377e-6	2	2537.952	2	NC	1
129		8	max	.005	1	.011	2	.002	1	1.572e-4	3	NC	3	NC	1
130			min	-.005	3	-.009	3	-.001	3	-4.306e-6	2	2802.526	2	NC	1
131		9	max	.005	1	.01	2	.001	1	1.529e-4	3	NC	3	NC	1
132			min	-.005	3	-.008	3	-.001	3	-6.261e-6	1	3122.618	2	NC	1
133		10	max	.004	1	.009	2	.001	1	1.486e-4	3	NC	3	NC	1
134			min	-.004	3	-.007	3	-.001	3	-1.258e-5	1	3516.756	2	NC	1
135		11	max	.004	1	.008	2	0	1	1.443e-4	3	NC	3	NC	1
136			min	-.004	3	-.007	3	0	3	-1.889e-5	1	4012.731	2	NC	1
137		12	max	.003	1	.006	2	0	1	1.401e-4	3	NC	3	NC	1
138			min	-.003	3	-.006	3	0	3	-2.521e-5	1	4654.219	2	NC	1
139		13	max	.003	1	.005	2	0	1	1.358e-4	3	NC	3	NC	1
140			min	-.003	3	-.005	3	0	3	-3.152e-5	1	5514.007	2	NC	1
141		14	max	.002	1	.004	2	0	1	1.315e-4	3	NC	3	NC	1
142			min	-.002	3	-.004	3	0	3	-3.784e-5	1	6723.111	2	NC	1
143		15	max	.002	1	.004	2	0	1	1.273e-4	3	NC	3	NC	1
144			min	-.002	3	-.003	3	0	3	-4.415e-5	1	8543.549	2	NC	1
145		16	max	.001	1	.003	2	0	1	1.23e-4	3	NC	1	NC	1
146			min	-.001	3	-.003	3	0	3	-5.047e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.187e-4	3	NC	1	NC	1
148			min	0	3	-.002	3	0	3	-5.678e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.144e-4	3	NC	1	NC	1
150			min	0	3	0	3	0	3	-6.31e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.102e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-6.942e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	3.115e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-4.989e-5	3	NC	1	NC	1
155		2	max	0	9	.001	2	0	3	2.622e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	1	-3.837e-5	3	NC	1	NC	1
157		3	max	0	9	.002	2	0	3	2.13e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-2.685e-5	3	NC	1	NC	1
159		4	max	0	9	.004	2	0	3	1.637e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-1.533e-5	3	NC	1	NC	1
161		5	max	0	9	.005	2	0	3	1.145e-5	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-3.81e-6	3	9767.234	2	NC	1
163		6	max	0	9	.006	2	.001	3	7.71e-6	3	NC	3	NC	1
164			min	0	2	-.007	3	0	1	0	10	7804.93	2	NC	1
165		7	max	0	9	.007	2	.001	3	1.923e-5	3	NC	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
166			min	0	2	-.008	3	0	1	0	10	6460.381	2	NC	1
167		8	max	0	9	.008	2	.001	3	3.075e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	-.001	1	-3.329e-6	1	5473.488	2	NC	1
169		9	max	0	9	.01	2	.001	3	4.227e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	-.001	1	-8.254e-6	1	4714.626	2	NC	1
171		10	max	0	9	.011	2	.002	3	5.379e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	-.001	1	-1.318e-5	1	4111.846	2	NC	1
173		11	max	0	9	.013	2	.002	3	6.531e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-1.81e-5	1	3621.82	2	NC	1
175		12	max	0	9	.014	2	.002	3	7.683e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-2.303e-5	1	3216.695	2	NC	1
177		13	max	.001	9	.016	2	.002	3	8.835e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-2.795e-5	1	2877.574	2	NC	1
179		14	max	.001	9	.018	2	.002	3	9.988e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.002	1	-3.288e-5	1	2591.055	2	NC	1
181		15	max	.001	9	.02	2	.002	3	1.114e-4	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-3.78e-5	1	2347.273	2	NC	1
183		16	max	.001	9	.022	2	.002	3	1.229e-4	3	NC	3	NC	1
184			min	-.002	2	-.018	3	-.002	1	-4.273e-5	1	2138.753	2	NC	1
185		17	max	.001	9	.023	2	.001	3	1.344e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-4.765e-5	1	1959.692	2	NC	1
187		18	max	.001	9	.025	2	.001	3	1.46e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-5.258e-5	1	1805.509	2	NC	1
189		19	max	.002	9	.028	2	.001	3	1.575e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-5.75e-5	1	1672.539	2	NC	1
191	M8	1	max	.007	1	.022	2	.002	1	-6.581e-8	10	NC	1	NC	1
192			min	-.002	3	-.015	3	0	3	-1.261e-4	3	NC	1	NC	1
193		2	max	.006	1	.02	2	.002	1	-6.581e-8	10	NC	1	NC	1
194			min	-.002	3	-.014	3	0	3	-1.261e-4	3	NC	1	NC	1
195		3	max	.006	1	.019	2	.001	1	-6.581e-8	10	NC	1	NC	1
196			min	-.002	3	-.013	3	0	3	-1.261e-4	3	NC	1	NC	1
197		4	max	.006	1	.018	2	.001	1	-6.581e-8	10	NC	1	NC	1
198			min	-.002	3	-.012	3	0	3	-1.261e-4	3	NC	1	NC	1
199		5	max	.005	1	.017	2	.001	1	-6.581e-8	10	NC	1	NC	1
200			min	-.001	3	-.011	3	0	3	-1.261e-4	3	NC	1	NC	1
201		6	max	.005	1	.016	2	0	1	-6.581e-8	10	NC	1	NC	1
202			min	-.001	3	-.011	3	0	3	-1.261e-4	3	NC	1	NC	1
203		7	max	.004	1	.014	2	0	1	-6.581e-8	10	NC	1	NC	1
204			min	-.001	3	-.01	3	0	3	-1.261e-4	3	NC	1	NC	1
205		8	max	.004	1	.013	2	0	1	-6.581e-8	10	NC	1	NC	1
206			min	-.001	3	-.009	3	0	3	-1.261e-4	3	NC	1	NC	1
207		9	max	.004	1	.012	2	0	1	-6.581e-8	10	NC	1	NC	1
208			min	-.001	3	-.008	3	0	3	-1.261e-4	3	NC	1	NC	1
209		10	max	.003	1	.011	2	0	1	-6.581e-8	10	NC	1	NC	1
210			min	0	3	-.007	3	0	3	-1.261e-4	3	NC	1	NC	1
211		11	max	.003	1	.01	2	0	1	-6.581e-8	10	NC	1	NC	1
212			min	0	3	-.007	3	0	3	-1.261e-4	3	NC	1	NC	1
213		12	max	.003	1	.008	2	0	1	-6.581e-8	10	NC	1	NC	1
214			min	0	3	-.006	3	0	3	-1.261e-4	3	NC	1	NC	1
215		13	max	.002	1	.007	2	0	1	-6.581e-8	10	NC	1	NC	1
216			min	0	3	-.005	3	0	3	-1.261e-4	3	NC	1	NC	1
217		14	max	.002	1	.006	2	0	1	-6.581e-8	10	NC	1	NC	1
218			min	0	3	-.004	3	0	3	-1.261e-4	3	NC	1	NC	1
219		15	max	.001	1	.005	2	0	1	-6.581e-8	10	NC	1	NC	1
220			min	0	3	-.003	3	0	3	-1.261e-4	3	NC	1	NC	1
221		16	max	.001	1	.004	2	0	1	-6.581e-8	10	NC	1	NC	1
222			min	0	3	-.002	3	0	3	-1.261e-4	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
223		17	max	0	1	.002	2	0	1	-6.581e-8	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.261e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	-6.581e-8	10	NC	1	NC	1
226			min	0	3	0	3	0	3	-1.261e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-6.581e-8	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.261e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.005	2	0	3	5.917e-4	1	NC	3	NC	1
230			min	-.002	3	-.004	3	-.001	1	-2.33e-4	3	5764.667	2	NC	1
231		2	max	.002	1	.005	2	0	3	5.638e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.001	1	-2.266e-4	3	6267.154	2	NC	1
233		3	max	.002	1	.004	2	0	3	5.359e-4	1	NC	1	NC	1
234			min	-.002	3	-.004	3	0	1	-2.201e-4	3	6860.775	2	NC	1
235		4	max	.002	1	.004	2	0	3	5.08e-4	1	NC	1	NC	1
236			min	-.002	3	-.004	3	0	1	-2.137e-4	3	7567.159	2	NC	1
237		5	max	.002	1	.004	2	0	3	4.8e-4	1	NC	1	NC	1
238			min	-.002	3	-.004	3	0	1	-2.072e-4	3	8415.037	2	NC	1
239		6	max	.002	1	.003	2	0	3	4.521e-4	1	NC	1	NC	1
240			min	-.002	3	-.004	3	0	1	-2.007e-4	3	9443.212	2	NC	1
241		7	max	.002	1	.003	2	0	3	4.242e-4	1	NC	1	NC	1
242			min	-.002	3	-.003	3	0	1	-1.943e-4	3	NC	1	NC	1
243		8	max	.002	1	.002	2	0	3	3.963e-4	1	NC	1	NC	1
244			min	-.002	3	-.003	3	0	1	-1.878e-4	3	NC	1	NC	1
245		9	max	.001	1	.002	2	0	3	3.684e-4	1	NC	1	NC	1
246			min	-.001	3	-.003	3	0	1	-1.814e-4	3	NC	1	NC	1
247		10	max	.001	1	.002	2	0	3	3.404e-4	1	NC	1	NC	1
248			min	-.001	3	-.003	3	0	1	-1.749e-4	3	NC	1	NC	1
249		11	max	.001	1	.001	2	0	3	3.125e-4	1	NC	1	NC	1
250			min	-.001	3	-.003	3	0	1	-1.685e-4	3	NC	1	NC	1
251		12	max	0	1	.001	2	0	3	2.846e-4	1	NC	1	NC	1
252			min	0	3	-.002	3	0	1	-1.62e-4	3	NC	1	NC	1
253		13	max	0	1	0	2	0	3	2.567e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	-1.555e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	2.288e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-1.491e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.008e-4	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	-1.426e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.729e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	-1.362e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.45e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	-1.297e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.171e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.233e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.915e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.168e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.328e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-4.144e-5	1	NC	1	NC	1
269		2	max	0	1	0	2	0	1	4.129e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-7.212e-5	1	NC	1	NC	1
271		3	max	0	1	0	2	0	1	2.929e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.028e-4	1	NC	1	NC	1
273		4	max	0	1	0	2	0	1	1.73e-5	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-1.335e-4	1	NC	1	NC	1
275		5	max	0	1	0	2	0	10	5.308e-6	3	NC	1	NC	1
276			min	0	10	-.003	3	0	3	-1.642e-4	1	NC	1	NC	1
277		6	max	0	1	0	2	0	10	-4.558e-6	12	NC	1	NC	1
278			min	0	10	-.003	3	-.001	3	-1.949e-4	1	NC	1	NC	1
279		7	max	0	1	0	2	0	10	-6.845e-6	15	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
280			min	0	10	-.004	3	-.001	3	-2.255e-4	1	NC	1	NC	1
281		8	max	0	1	0	2	0	10	-7.834e-6	15	NC	1	NC	1
282			min	0	10	-.004	3	-.001	3	-2.562e-4	1	NC	1	NC	1
283		9	max	0	1	0	2	0	10	-8.824e-6	15	NC	1	NC	1
284			min	0	10	-.005	3	-.002	1	-2.869e-4	1	NC	1	NC	1
285		10	max	0	1	.001	2	0	15	-9.813e-6	15	NC	1	NC	1
286			min	0	10	-.005	3	-.002	1	-3.176e-4	1	NC	1	NC	1
287		11	max	0	1	.002	2	0	15	-1.08e-5	15	NC	1	NC	1
288			min	0	10	-.006	3	-.003	1	-3.483e-4	1	NC	1	NC	1
289		12	max	0	1	.002	2	0	15	-1.179e-5	15	NC	1	NC	1
290			min	0	10	-.006	3	-.003	1	-3.789e-4	1	NC	1	NC	1
291		13	max	0	1	.003	2	0	15	-1.278e-5	15	NC	1	NC	1
292			min	0	10	-.006	3	-.004	1	-4.096e-4	1	NC	1	NC	1
293		14	max	0	1	.004	2	0	15	-1.377e-5	15	NC	1	NC	1
294			min	0	10	-.006	3	-.005	1	-4.403e-4	1	NC	1	NC	1
295		15	max	0	1	.004	2	0	15	-1.476e-5	15	NC	1	NC	2
296			min	0	10	-.006	3	-.005	1	-4.71e-4	1	NC	1	8914.487	1
297		16	max	0	1	.005	2	0	15	-1.575e-5	15	NC	1	NC	2
298			min	0	10	-.006	3	-.006	1	-5.017e-4	1	8961.357	2	8015.033	1
299		17	max	0	1	.006	2	0	15	-1.674e-5	15	NC	3	NC	2
300			min	0	10	-.006	3	-.006	1	-5.324e-4	1	7620.255	2	7315.569	1
301		18	max	0	1	.007	2	0	15	-1.773e-5	15	NC	3	NC	2
302			min	0	10	-.006	3	-.007	1	-5.63e-4	1	6590.075	2	6769.264	1
303		19	max	0	1	.008	2	0	15	-1.872e-5	15	NC	3	NC	2
304			min	0	10	-.006	3	-.007	1	-5.937e-4	1	5789.553	2	6344.257	1
305	M12	1	max	.002	1	.006	2	.006	1	4.864e-4	1	NC	1	NC	3
306			min	0	3	-.005	3	0	15	1.575e-5	15	NC	1	3158.269	1
307		2	max	.002	1	.006	2	.006	1	4.864e-4	1	NC	1	NC	2
308			min	0	3	-.004	3	0	15	1.575e-5	15	NC	1	3444.905	1
309		3	max	.002	1	.005	2	.005	1	4.864e-4	1	NC	1	NC	2
310			min	0	3	-.004	3	0	15	1.575e-5	15	NC	1	3786.07	1
311		4	max	.002	1	.005	2	.005	1	4.864e-4	1	NC	1	NC	2
312			min	0	3	-.004	3	0	15	1.575e-5	15	NC	1	4196.142	1
313		5	max	.002	1	.005	2	.004	1	4.864e-4	1	NC	1	NC	2
314			min	0	3	-.004	3	0	15	1.575e-5	15	NC	1	4694.711	1
315		6	max	.002	1	.004	2	.004	1	4.864e-4	1	NC	1	NC	2
316			min	0	3	-.003	3	0	15	1.575e-5	15	NC	1	5309.021	1
317		7	max	.001	1	.004	2	.003	1	4.864e-4	1	NC	1	NC	2
318			min	0	3	-.003	3	0	15	1.575e-5	15	NC	1	6077.88	1
319		8	max	.001	1	.004	2	.003	1	4.864e-4	1	NC	1	NC	2
320			min	0	3	-.003	3	0	15	1.575e-5	15	NC	1	7058.12	1
321		9	max	.001	1	.003	2	.002	1	4.864e-4	1	NC	1	NC	2
322			min	0	3	-.003	3	0	15	1.575e-5	15	NC	1	8335.709	1
323		10	max	.001	1	.003	2	.002	1	4.864e-4	1	NC	1	NC	1
324			min	0	3	-.002	3	0	15	1.575e-5	15	NC	1	NC	1
325		11	max	0	1	.003	2	.002	1	4.864e-4	1	NC	1	NC	1
326			min	0	3	-.002	3	0	15	1.575e-5	15	NC	1	NC	1
327		12	max	0	1	.002	2	.001	1	4.864e-4	1	NC	1	NC	1
328			min	0	3	-.002	3	0	15	1.575e-5	15	NC	1	NC	1
329		13	max	0	1	.002	2	0	1	4.864e-4	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	1.575e-5	15	NC	1	NC	1
331		14	max	0	1	.002	2	0	1	4.864e-4	1	NC	1	NC	1
332			min	0	3	-.001	3	0	15	1.575e-5	15	NC	1	NC	1
333		15	max	0	1	.001	2	0	1	4.864e-4	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	1.575e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	4.864e-4	1	NC	1	NC	1
336			min	0	3	0	3	0	15	1.575e-5	15	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
337		17	max	0	1	0	2	0	1	4.864e-4	1	NC	1	NC	1
338			min	0	3	0	3	0	15	1.575e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	4.864e-4	1	NC	1	NC	1
340			min	0	3	0	3	0	15	1.575e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	4.864e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	1.575e-5	15	NC	1	NC	1
343	M1	1	max	.004	3	.02	3	.001	3	1.84e-2	1	NC	1	NC	1
344			min	-.005	2	-.023	1	-.003	1	-1.753e-2	3	NC	1	NC	1
345		2	max	.004	3	.011	3	.001	3	8.941e-3	1	NC	4	NC	1
346			min	-.005	2	-.012	1	-.006	1	-8.663e-3	3	4232.683	1	NC	1
347		3	max	.004	3	.002	3	0	3	3.819e-5	3	NC	4	NC	2
348			min	-.005	2	-.002	1	-.008	1	-3.415e-4	1	2183.999	1	9790.17	1
349		4	max	.004	3	.007	1	0	3	3.835e-5	3	NC	5	NC	2
350			min	-.005	2	-.005	3	-.009	1	-2.844e-4	1	1543.984	1	8113.462	1
351		5	max	.004	3	.014	1	0	3	3.852e-5	3	NC	5	NC	2
352			min	-.005	2	-.01	3	-.009	1	-2.274e-4	1	1236.496	1	7807.123	1
353		6	max	.004	3	.02	1	0	3	3.868e-5	3	NC	5	NC	2
354			min	-.005	2	-.015	3	-.008	1	-1.704e-4	1	1062.725	1	8379.597	1
355		7	max	.004	3	.025	1	0	3	3.885e-5	3	NC	5	NC	1
356			min	-.005	2	-.018	3	-.007	1	-1.133e-4	1	957.511	1	NC	1
357		8	max	.004	3	.028	1	0	3	3.902e-5	3	NC	5	NC	1
358			min	-.005	2	-.021	3	-.006	1	-5.627e-5	1	893.768	1	NC	1
359		9	max	.004	3	.03	1	0	3	3.918e-5	3	NC	5	NC	1
360			min	-.005	2	-.022	3	-.004	1	2.961e-7	15	858.851	1	NC	1
361		10	max	.004	3	.031	1	0	3	5.782e-5	1	NC	5	NC	1
362			min	-.005	2	-.022	3	-.003	1	2.035e-6	15	846.923	1	NC	1
363		11	max	.004	3	.03	1	0	3	1.149e-4	1	NC	5	NC	1
364			min	-.005	2	-.021	3	0	1	3.773e-6	15	856.202	1	NC	1
365		12	max	.004	3	.028	1	0	1	1.719e-4	1	NC	5	NC	1
366			min	-.005	2	-.02	3	0	15	5.512e-6	15	888.224	1	NC	1
367		13	max	.004	3	.025	1	.002	1	2.289e-4	1	NC	5	NC	1
368			min	-.005	2	-.017	3	0	15	7.251e-6	15	948.5	1	NC	1
369		14	max	.004	3	.02	1	.003	1	2.86e-4	1	NC	5	NC	2
370			min	-.005	2	-.013	3	0	15	8.989e-6	15	1049.128	1	8682.796	1
371		15	max	.004	3	.013	1	.004	1	3.43e-4	1	NC	5	NC	2
372			min	-.005	2	-.009	3	0	15	1.073e-5	15	1216.072	1	8027.986	1
373		16	max	.004	3	.006	1	.004	1	3.855e-4	1	NC	4	NC	2
374			min	-.005	2	-.004	3	0	15	1.203e-5	15	1511.312	1	8293.984	1
375		17	max	.004	3	.002	3	.003	1	8.085e-5	1	NC	4	NC	2
376			min	-.005	2	-.003	1	0	15	2.876e-6	15	2121.473	1	9967.337	1
377		18	max	.004	3	.008	3	0	1	1.047e-2	1	NC	4	NC	1
378			min	-.005	2	-.014	1	0	15	-4.205e-3	3	4097.576	1	NC	1
379		19	max	.004	3	.015	3	0	3	2.106e-2	1	NC	1	NC	1
380			min	-.005	2	-.026	1	-.002	1	-8.517e-3	3	NC	1	NC	1
381	M5	1	max	.014	3	.065	3	.001	3	8.515e-7	3	NC	1	NC	1
382			min	-.019	2	-.078	1	-.003	1	0	15	NC	1	NC	1
383		2	max	.014	3	.035	3	.002	3	4.903e-5	3	NC	5	NC	1
384			min	-.019	2	-.042	1	-.003	1	-7.307e-5	1	1258.926	1	NC	1
385		3	max	.014	3	.007	3	.003	3	9.629e-5	3	NC	5	NC	1
386			min	-.019	2	-.007	1	-.003	1	-1.447e-4	1	649.081	1	NC	1
387		4	max	.014	3	.023	1	.003	3	9.543e-5	3	NC	5	NC	1
388			min	-.019	2	-.015	3	-.003	1	-1.373e-4	1	458.213	1	NC	1
389		5	max	.014	3	.048	1	.003	3	9.456e-5	3	NC	5	NC	1
390			min	-.019	2	-.034	3	-.003	1	-1.298e-4	1	366.419	1	NC	1
391		6	max	.014	3	.068	1	.003	3	9.37e-5	3	NC	15	NC	1
392			min	-.019	2	-.049	3	-.003	1	-1.223e-4	1	314.469	1	NC	1
393		7	max	.014	3	.084	1	.004	3	9.283e-5	3	NC	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
394			min	-.019	2	-.06	3	-.003	1	-1.148e-4	1	282.939	1	NC	1
395		8	max	.014	3	.096	1	.004	3	9.196e-5	3	NC	15	NC	1
396			min	-.019	2	-.067	3	-.003	1	-1.074e-4	1	263.751	1	NC	1
397		9	max	.014	3	.103	1	.003	3	9.11e-5	3	NC	15	NC	1
398			min	-.019	2	-.071	3	-.003	1	-9.989e-5	1	253.126	1	NC	1
399		10	max	.014	3	.105	1	.003	3	9.023e-5	3	NC	15	NC	1
400			min	-.019	2	-.072	3	-.002	1	-9.241e-5	1	249.317	1	NC	1
401		11	max	.014	3	.103	1	.003	3	8.936e-5	3	NC	15	NC	1
402			min	-.019	2	-.069	3	-.002	1	-8.494e-5	1	251.776	1	NC	1
403		12	max	.014	3	.096	1	.003	3	8.85e-5	3	NC	15	NC	1
404			min	-.019	2	-.064	3	-.002	1	-7.746e-5	1	260.942	1	NC	1
405		13	max	.014	3	.084	1	.002	3	8.763e-5	3	NC	15	NC	1
406			min	-.019	2	-.055	3	-.002	1	-6.999e-5	1	278.427	1	NC	1
407		14	max	.014	3	.068	1	.002	3	8.676e-5	3	NC	5	NC	1
408			min	-.019	2	-.044	3	-.002	1	-6.251e-5	1	307.79	1	NC	1
409		15	max	.014	3	.046	1	.002	3	8.59e-5	3	NC	5	NC	1
410			min	-.019	2	-.03	3	-.002	1	-5.503e-5	1	356.691	1	NC	1
411		16	max	.014	3	.02	1	.001	3	8.308e-5	3	NC	5	NC	1
412			min	-.019	2	-.013	3	-.002	1	-5.083e-5	1	443.51	1	NC	1
413		17	max	.014	3	.005	3	0	3	3.379e-5	3	NC	5	NC	1
414			min	-.019	2	-.011	1	-.002	1	-1.244e-4	1	624.365	1	NC	1
415		18	max	.014	3	.026	3	0	3	1.652e-5	3	NC	5	NC	1
416			min	-.019	2	-.048	1	-.002	1	-6.351e-5	1	1207.493	1	NC	1
417		19	max	.014	3	.048	3	0	3	0	5	NC	1	NC	1
418			min	-.019	2	-.087	1	-.002	1	-1.404e-7	3	NC	1	NC	1
419	M9	1	max	.004	3	.02	3	.001	3	1.753e-2	3	NC	1	NC	1
420			min	-.005	2	-.023	1	-.004	1	-1.84e-2	1	NC	1	NC	1
421		2	max	.004	3	.011	3	0	3	8.694e-3	3	NC	4	NC	1
422			min	-.005	2	-.013	1	0	1	-9.106e-3	1	4234.076	1	NC	1
423		3	max	.004	3	.002	3	.001	1	2.275e-5	2	NC	4	NC	1
424			min	-.005	2	-.002	1	0	3	7.571e-7	15	2184.74	1	NC	1
425		4	max	.004	3	.007	1	.002	1	1.336e-5	3	NC	5	NC	1
426			min	-.005	2	-.005	3	0	3	-2.901e-5	1	1544.511	1	NC	1
427		5	max	.004	3	.014	1	.003	1	5.015e-6	3	NC	5	NC	1
428			min	-.005	2	-.011	3	-.001	3	-7.323e-5	1	1236.904	1	NC	1
429		6	max	.004	3	.02	1	.002	1	1.659e-6	10	NC	5	NC	1
430			min	-.005	2	-.015	3	-.002	3	-1.174e-4	1	1063.059	1	NC	1
431		7	max	.004	3	.025	1	.002	1	-1.551e-6	10	NC	5	NC	1
432			min	-.005	2	-.019	3	-.002	3	-1.617e-4	1	957.794	1	NC	1
433		8	max	.004	3	.028	1	0	2	-4.761e-6	10	NC	5	NC	1
434			min	-.005	2	-.021	3	-.002	3	-2.059e-4	1	894.015	1	NC	1
435		9	max	.004	3	.03	1	0	10	-7.541e-6	15	NC	5	NC	1
436			min	-.005	2	-.022	3	-.002	3	-2.501e-4	1	859.07	1	NC	1
437		10	max	.004	3	.031	1	0	10	-8.924e-6	15	NC	5	NC	1
438			min	-.005	2	-.022	3	-.002	1	-2.943e-4	1	847.121	1	NC	1
439		11	max	.004	3	.03	1	0	10	-1.031e-5	15	NC	5	NC	1
440			min	-.005	2	-.021	3	-.004	1	-3.385e-4	1	856.384	1	NC	1
441		12	max	.004	3	.028	1	0	15	-1.169e-5	15	NC	5	NC	1
442			min	-.005	2	-.02	3	-.005	1	-3.827e-4	1	888.394	1	NC	1
443		13	max	.004	3	.025	1	0	15	-1.307e-5	15	NC	5	NC	2
444			min	-.005	2	-.017	3	-.007	1	-4.27e-4	1	948.662	1	8867.829	1
445		14	max	.004	3	.02	1	0	15	-1.446e-5	15	NC	5	NC	2
446			min	-.005	2	-.014	3	-.007	1	-4.712e-4	1	1049.286	1	7741.72	1
447		15	max	.004	3	.013	1	0	15	-1.584e-5	15	NC	5	NC	2
448			min	-.005	2	-.009	3	-.008	1	-5.154e-4	1	1216.232	1	7402.259	1
449		16	max	.004	3	.006	1	0	15	-1.689e-5	15	NC	4	NC	2
450			min	-.005	2	-.004	3	-.007	1	-5.492e-4	1	1511.486	1	7815.821	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
451		17	max	.004	3	.002	3	0	15	-9.991e-6	15	NC	4	NC	2
452			min	-.005	2	-.003	1	-.006	1	-3.349e-4	1	2121.705	1	9533.933	1
453		18	max	.004	3	.008	3	0	15	4.209e-3	3	NC	4	NC	1
454			min	-.005	2	-.014	1	-.004	1	-1.06e-2	1	4098.008	1	NC	1
455		19	max	.004	3	.015	3	0	3	8.517e-3	3	NC	1	NC	1
456			min	-.005	2	-.026	1	-.001	1	-2.106e-2	1	NC	1	NC	1
457	M13	1	max	.004	1	.02	3	.004	3	3.44e-3	3	NC	1	NC	1
458			min	-.001	3	-.023	1	-.005	2	-4.151e-3	1	NC	1	NC	1
459		2	max	.004	1	.161	3	.016	1	4.308e-3	3	NC	5	NC	2
460			min	-.001	3	-.172	1	-.002	10	-5.236e-3	1	1012.905	1	7821.341	1
461		3	max	.004	1	.276	3	.041	1	5.176e-3	3	NC	5	NC	3
462			min	-.001	3	-.293	1	0	10	-6.322e-3	1	556.558	1	3350.701	1
463		4	max	.004	1	.349	3	.062	1	6.044e-3	3	NC	5	NC	3
464			min	-.001	3	-.37	1	0	10	-7.408e-3	1	433.168	1	2279.688	1
465		5	max	.004	1	.37	3	.072	1	6.912e-3	3	NC	5	NC	3
466			min	-.001	3	-.393	1	0	10	-8.494e-3	1	405.532	1	1991.597	1
467		6	max	.004	1	.342	3	.067	1	7.781e-3	3	NC	5	NC	3
468			min	-.001	3	-.365	1	-.001	10	-9.58e-3	1	439.551	1	2131.482	1
469		7	max	.004	1	.274	3	.048	1	8.649e-3	3	NC	5	NC	2
470			min	-.001	3	-.294	1	-.004	10	-1.067e-2	1	553.875	1	2882.805	1
471		8	max	.004	1	.184	3	.022	1	9.517e-3	3	NC	5	NC	2
472			min	-.001	3	-.202	1	-.007	10	-1.175e-2	1	840.553	1	5913.343	1
473		9	max	.004	1	.102	3	.012	3	1.038e-2	3	NC	5	NC	1
474			min	-.001	3	-.117	1	-.014	2	-1.284e-2	1	1604.061	1	NC	1
475		10	max	.003	1	.065	3	.014	3	1.125e-2	3	NC	4	NC	1
476			min	-.001	3	-.078	1	-.019	2	-1.392e-2	1	2736.486	1	NC	1
477		11	max	.003	1	.102	3	.015	3	1.039e-2	3	NC	5	NC	1
478			min	-.001	3	-.117	1	-.014	2	-1.284e-2	1	1604.061	1	NC	1
479		12	max	.003	1	.184	3	.022	1	9.517e-3	3	NC	5	NC	2
480			min	-.001	3	-.202	1	-.007	10	-1.175e-2	1	840.553	1	5808.07	1
481		13	max	.003	1	.274	3	.049	1	8.65e-3	3	NC	5	NC	2
482			min	-.001	3	-.294	1	-.004	10	-1.067e-2	1	553.875	1	2860.966	1
483		14	max	.003	1	.342	3	.067	1	7.782e-3	3	NC	5	NC	3
484			min	-.001	3	-.365	1	-.001	10	-9.581e-3	1	439.551	1	2124.664	1
485		15	max	.003	1	.371	3	.072	1	6.915e-3	3	NC	5	NC	3
486			min	-.001	3	-.393	1	0	10	-8.495e-3	1	405.532	1	1991.325	1
487		16	max	.003	1	.349	3	.062	1	6.047e-3	3	NC	5	NC	3
488			min	-.001	3	-.37	1	0	10	-7.409e-3	1	433.168	1	2286.105	1
489		17	max	.003	1	.276	3	.041	1	5.179e-3	3	NC	5	NC	3
490			min	-.001	3	-.293	1	0	10	-6.323e-3	1	556.558	1	3372.89	1
491		18	max	.003	1	.161	3	.015	1	4.312e-3	3	NC	5	NC	2
492			min	-.001	3	-.172	1	-.002	10	-5.237e-3	1	1012.906	1	7926.523	1
493		19	max	.003	1	.02	3	.004	3	3.444e-3	3	NC	1	NC	1
494			min	-.001	3	-.023	1	-.005	2	-4.152e-3	1	NC	1	NC	1
495	M16	1	max	.001	1	.015	3	.004	3	4.371e-3	1	NC	1	NC	1
496			min	0	3	-.026	1	-.005	2	-2.563e-3	3	NC	1	NC	1
497		2	max	.001	1	.083	3	.015	1	5.539e-3	1	NC	5	NC	2
498			min	0	3	-.195	1	-.002	10	-3.201e-3	3	884.912	1	7827.191	1
499		3	max	.001	1	.14	3	.041	1	6.706e-3	1	NC	5	NC	3
500			min	0	3	-.334	1	0	10	-3.838e-3	3	486.288	1	3353.921	1
501		4	max	.001	1	.176	3	.062	1	7.873e-3	1	NC	5	NC	3
502			min	0	3	-.422	1	0	10	-4.476e-3	3	378.559	1	2282.626	1
503		5	max	.001	1	.188	3	.071	1	9.04e-3	1	NC	5	NC	3
504			min	0	3	-.449	1	0	10	-5.113e-3	3	354.537	1	1995.259	1
505		6	max	.001	1	.176	3	.066	1	1.021e-2	1	NC	5	NC	3
506			min	0	3	-.416	1	-.001	10	-5.751e-3	3	384.521	1	2137.629	1
507		7	max	.001	1	.145	3	.048	1	1.137e-2	1	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.335	1	-.004	10	-6.388e-3	3	485.111	1	2898.169	1
509		8	max	.001	1	.103	3	.021	1	1.254e-2	1	NC	5	NC	2
510			min	0	3	-.229	1	-.007	10	-7.026e-3	3	738.11	1	5997.857	1
511		9	max	.002	1	.065	3	.015	3	1.371e-2	1	NC	5	NC	1
512			min	0	3	-.131	1	-.015	2	-7.663e-3	3	1417.955	1	NC	1
513		10	max	.002	1	.048	3	.014	3	1.488e-2	1	NC	4	NC	1
514			min	0	3	-.087	1	-.019	2	-8.301e-3	3	2442.851	1	NC	1
515		11	max	.002	1	.065	3	.013	3	1.371e-2	1	NC	5	NC	1
516			min	0	3	-.131	1	-.014	2	-7.663e-3	3	1417.955	1	NC	1
517		12	max	.002	1	.103	3	.021	1	1.254e-2	1	NC	5	NC	2
518			min	0	3	-.229	1	-.007	10	-7.025e-3	3	738.111	1	5955.036	1
519		13	max	.002	1	.145	3	.048	1	1.137e-2	1	NC	5	NC	2
520			min	0	3	-.335	1	-.004	10	-6.387e-3	3	485.111	1	2895.363	1
521		14	max	.002	1	.176	3	.066	1	1.021e-2	1	NC	5	NC	3
522			min	0	3	-.416	1	-.001	10	-5.749e-3	3	384.521	1	2142.069	1
523		15	max	.002	1	.188	3	.071	1	9.041e-3	1	NC	5	NC	3
524			min	0	3	-.449	1	0	10	-5.111e-3	3	354.537	1	2004.501	1
525		16	max	.002	1	.176	3	.061	1	7.874e-3	1	NC	5	NC	3
526			min	0	3	-.422	1	0	10	-4.473e-3	3	378.559	1	2299.881	1
527		17	max	.002	1	.14	3	.04	1	6.706e-3	1	NC	5	NC	3
528			min	0	3	-.334	1	0	10	-3.835e-3	3	486.288	1	3393.705	1
529		18	max	.002	1	.083	3	.015	1	5.539e-3	1	NC	5	NC	2
530			min	0	3	-.195	1	-.002	10	-3.198e-3	3	884.913	1	7985.562	1
531		19	max	.002	1	.015	3	.004	3	4.372e-3	1	NC	1	NC	1
532			min	0	3	-.026	1	-.005	2	-2.56e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.771e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.03e-5	1	NC	1	NC	1
535		2	max	0	3	-.002	15	.001	1	7.548e-4	3	NC	1	NC	1
536			min	0	2	-.009	4	0	3	-6.891e-4	1	8669.266	4	NC	1
537		3	max	0	3	-.004	15	.004	1	1.233e-3	3	NC	5	NC	1
538			min	0	2	-.018	4	-.003	3	-1.318e-3	1	4411.494	4	NC	1
539		4	max	0	3	-.006	15	.007	1	1.71e-3	3	NC	15	NC	4
540			min	0	2	-.027	4	-.006	3	-1.947e-3	1	3026.542	4	7700.261	1
541		5	max	0	3	-.008	15	.012	1	2.188e-3	3	NC	15	NC	4
542			min	0	2	-.034	4	-.01	3	-2.575e-3	1	2361.642	4	5044.481	1
543		6	max	0	3	-.01	15	.017	1	2.666e-3	3	8455.413	15	NC	4
544			min	0	2	-.041	4	-.014	3	-3.204e-3	1	1987.571	4	3668.272	1
545		7	max	0	3	-.011	15	.022	1	3.144e-3	3	7498.426	15	NC	4
546			min	0	2	-.046	4	-.018	3	-3.833e-3	1	1762.617	4	2864.87	1
547		8	max	0	3	-.012	15	.027	1	3.621e-3	3	6924.09	15	NC	4
548			min	0	2	-.05	4	-.022	3	-4.462e-3	1	1627.611	4	2360.404	1
549		9	max	0	3	-.012	15	.032	1	4.099e-3	3	6614.948	15	NC	4
550			min	0	2	-.052	4	-.026	3	-5.091e-3	1	1554.942	4	2030.519	1
551		10	max	0	3	-.012	15	.036	1	4.577e-3	3	6517.151	15	NC	4
552			min	0	2	-.053	4	-.029	3	-5.719e-3	1	1531.954	4	1812.85	1
553		11	max	0	3	-.012	15	.038	1	5.055e-3	3	6614.948	15	NC	5
554			min	0	2	-.053	4	-.031	3	-6.348e-3	1	1554.942	4	1674.677	1
555		12	max	0	3	-.012	15	.04	1	5.532e-3	3	6924.09	15	NC	5
556			min	0	2	-.05	4	-.032	3	-6.977e-3	1	1627.611	4	1599.749	1
557		13	max	0	3	-.011	15	.039	1	6.01e-3	3	7498.426	15	NC	5
558			min	-.001	2	-.047	4	-.032	3	-7.606e-3	1	1762.617	4	1583.287	1
559		14	max	0	3	-.01	15	.037	1	6.488e-3	3	8455.413	15	NC	5
560			min	-.001	2	-.041	4	-.03	3	-8.234e-3	1	1987.571	4	1632.109	1
561		15	max	0	3	-.008	15	.032	1	6.966e-3	3	NC	15	NC	4
562			min	-.001	2	-.035	4	-.026	3	-8.863e-3	1	2361.642	4	1771.498	1
563		16	max	0	3	-.006	15	.024	1	7.443e-3	3	NC	15	NC	4
564			min	-.001	2	-.028	4	-.02	3	-9.492e-3	1	3026.542	4	2070.21	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
565		17	max	0	3	-.004	15	.013	1	7.921e-3	3	NC	5	NC	4
566			min	-.001	2	-.019	4	-.011	3	-1.012e-2	1	4411.494	4	2744.041	1
567		18	max	0	3	-.001	12	.002	9	8.399e-3	3	NC	1	NC	4
568			min	-.001	2	-.01	1	-.005	2	-1.075e-2	1	8669.266	4	4884.724	1
569		19	max	0	3	.004	3	.015	3	8.877e-3	3	NC	1	NC	1
570			min	-.002	2	-.003	1	-.02	2	-1.138e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	2.65e-3	3	NC	1	NC	1
572			min	0	3	-.002	1	-.006	2	-3.156e-3	1	NC	1	NC	1
573		2	max	0	10	-.002	15	.003	1	2.533e-3	3	NC	1	NC	1
574			min	0	3	-.01	4	0	10	-3.004e-3	1	8669.266	4	NC	1
575		3	max	0	10	-.004	15	.009	1	2.416e-3	3	NC	5	NC	4
576			min	0	3	-.019	4	-.004	3	-2.853e-3	1	4411.494	4	6460.527	1
577		4	max	0	10	-.006	15	.013	1	2.298e-3	3	NC	15	NC	4
578			min	0	3	-.027	4	-.007	3	-2.701e-3	1	3026.542	4	4907.22	1
579		5	max	0	10	-.008	15	.016	1	2.181e-3	3	NC	15	NC	4
580			min	0	3	-.035	4	-.009	3	-2.55e-3	1	2361.642	4	4231.668	1
581		6	max	0	10	-.01	15	.017	1	2.064e-3	3	8455.413	15	NC	4
582			min	0	3	-.041	4	-.01	3	-2.398e-3	1	1987.571	4	3933.386	1
583		7	max	0	10	-.011	15	.018	1	1.946e-3	3	7498.426	15	NC	4
584			min	0	3	-.046	4	-.011	3	-2.247e-3	1	1762.617	4	3855.135	1
585		8	max	0	10	-.012	15	.018	1	1.829e-3	3	6924.09	15	NC	4
586			min	0	3	-.05	4	-.011	3	-2.095e-3	1	1627.611	4	3942.5	1
587		9	max	0	10	-.012	15	.017	1	1.712e-3	3	6614.948	15	NC	4
588			min	0	3	-.052	4	-.01	3	-1.944e-3	1	1554.942	4	4186.883	1
589		10	max	0	10	-.012	15	.015	1	1.594e-3	3	6517.151	15	NC	4
590			min	0	3	-.053	4	-.009	3	-1.792e-3	1	1531.954	4	4611.893	1
591		11	max	0	10	-.012	15	.013	1	1.477e-3	3	6614.948	15	NC	4
592			min	0	3	-.052	4	-.008	3	-1.64e-3	1	1554.942	4	5277.981	1
593		12	max	0	10	-.012	15	.011	1	1.36e-3	3	6924.09	15	NC	4
594			min	0	3	-.05	4	-.007	3	-1.489e-3	1	1627.611	4	6305.177	1
595		13	max	0	10	-.011	15	.009	1	1.242e-3	3	7498.426	15	NC	2
596			min	0	3	-.046	4	-.005	3	-1.337e-3	1	1762.617	4	7931.314	1
597		14	max	0	10	-.01	15	.006	1	1.125e-3	3	8455.413	15	NC	1
598			min	0	3	-.041	4	-.004	3	-1.186e-3	1	1987.571	4	NC	1
599		15	max	0	10	-.008	15	.004	1	1.008e-3	3	NC	15	NC	1
600			min	0	3	-.034	4	-.002	3	-1.034e-3	1	2361.642	4	NC	1
601		16	max	0	10	-.006	15	.002	1	8.903e-4	3	NC	15	NC	1
602			min	0	3	-.027	4	-.001	3	-8.827e-4	1	3026.542	4	NC	1
603		17	max	0	10	-.004	15	0	1	7.73e-4	3	NC	5	NC	1
604			min	0	3	-.018	4	0	3	-7.312e-4	1	4411.494	4	NC	1
605		18	max	0	10	-.002	15	0	4	6.557e-4	3	NC	1	NC	1
606			min	0	3	-.009	4	0	2	-5.957e-4	2	8669.266	4	NC	1
607		19	max	0	1	0	1	0	1	5.383e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.646e-4	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

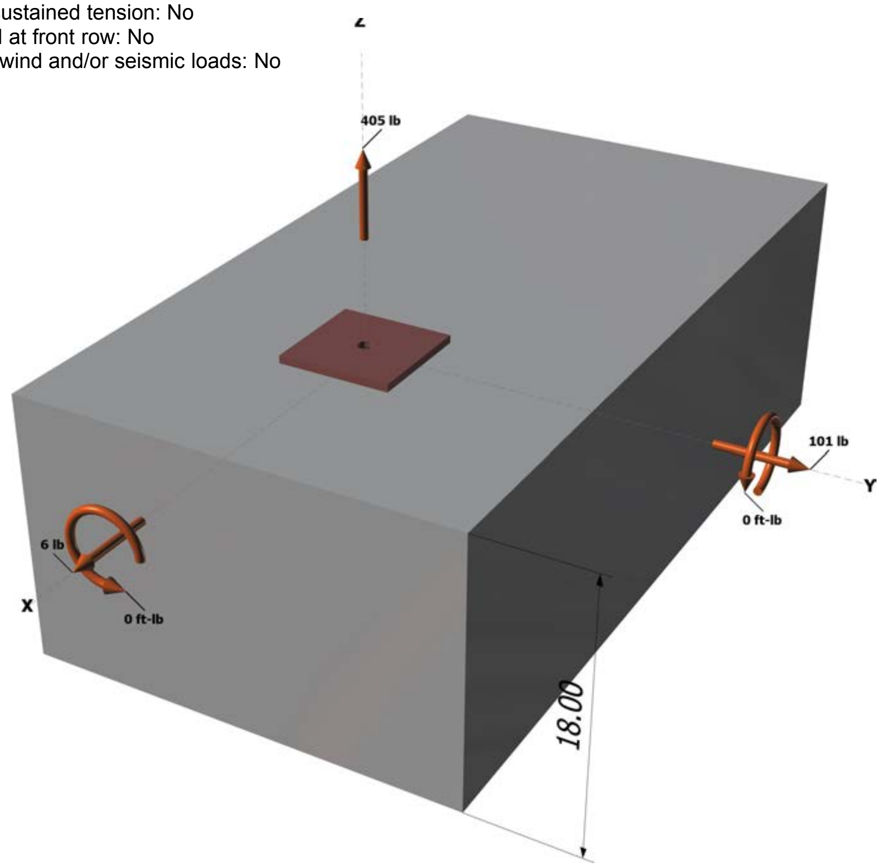
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

<Figure 1>



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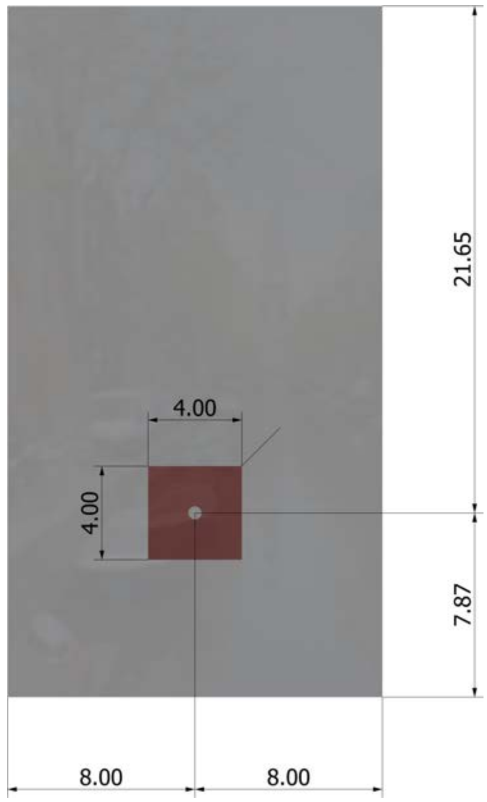


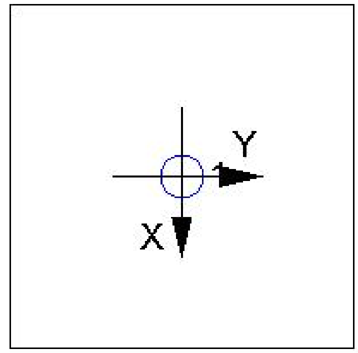
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
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	5.333	10469

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

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	8.00	8488

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

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)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

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)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

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)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

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	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**101**	**3156**	**0.03**	**Pass (Governs)**
T Concrete breakout y+	101	4411	0.02	Pass
T Concrete breakout x+	6	3549	0.00	Pass
|| Concrete breakout y+	6	9838	0.00	Pass
|| Concrete breakout x+	101	7858	0.01	Pass
Concrete breakout, combined	-	-	0.02	Pass
Pryout	101	13657	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	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

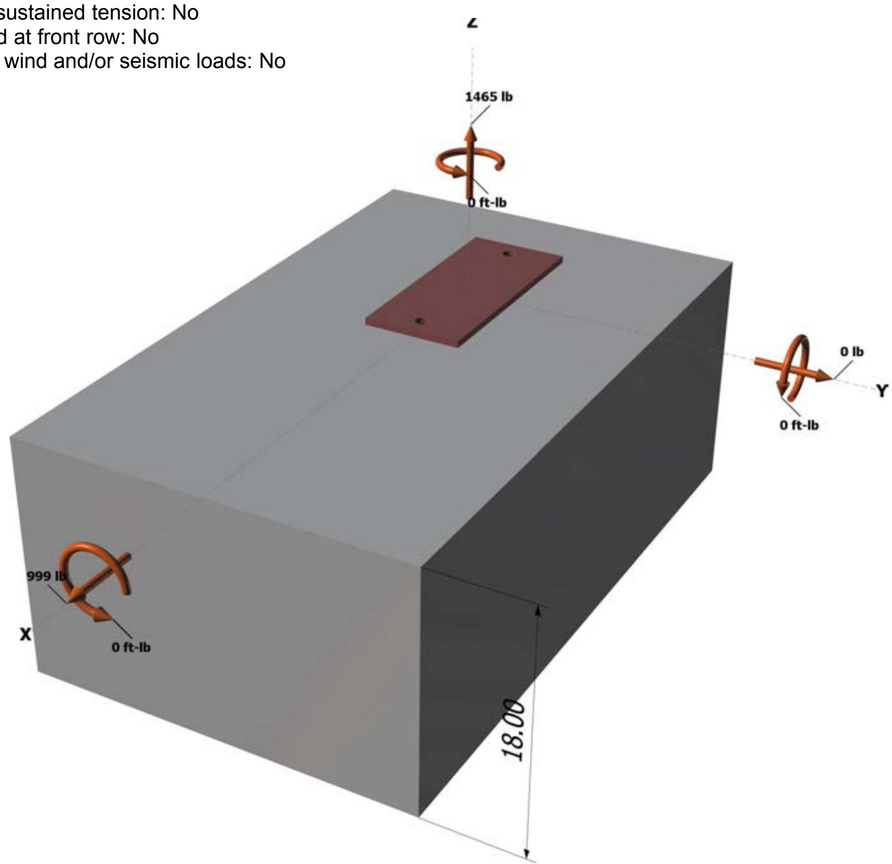
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

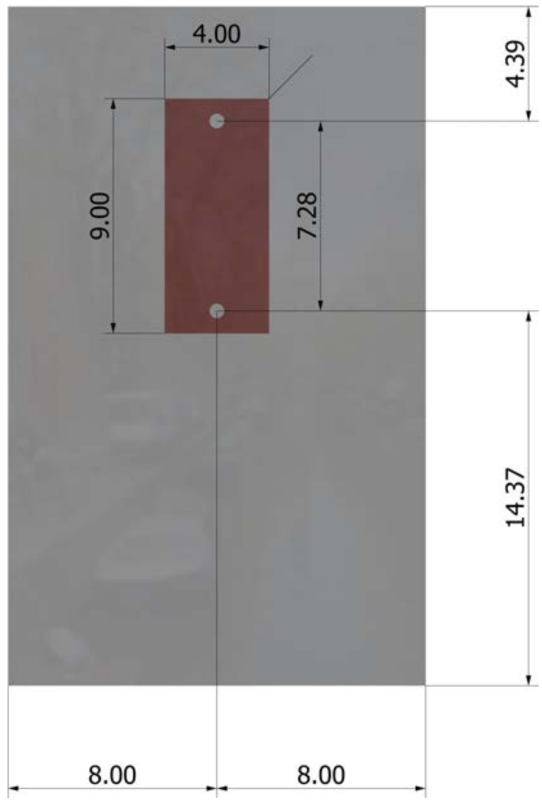
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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): 9.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



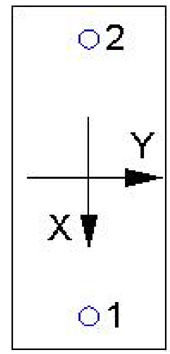
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
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	5.333	10469

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

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)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

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

$\phi V_{cbx} = \phi\, (A_{Vc} / A_{Vco}) \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{bx}$ (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)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cbgx} = \phi\, (2)(A_{Vc} / A_{Vco}) \Psi_{ec,V} \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
284.04	288.00	1.000	1.000	1.000	1.000	8488	0.70	11720

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	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

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
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

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	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	500	3156	0.16	Pass
T Concrete breakout x+	**999**	**4043**	**0.25**	**Pass (Governs)**
|| Concrete breakout y-	**999**	**11720**	**0.09**	**Pass (Governs)**
Pryout	999	15580	0.06	Pass

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

Sec. D.7.3	0.20	0.25	45.0 %	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.