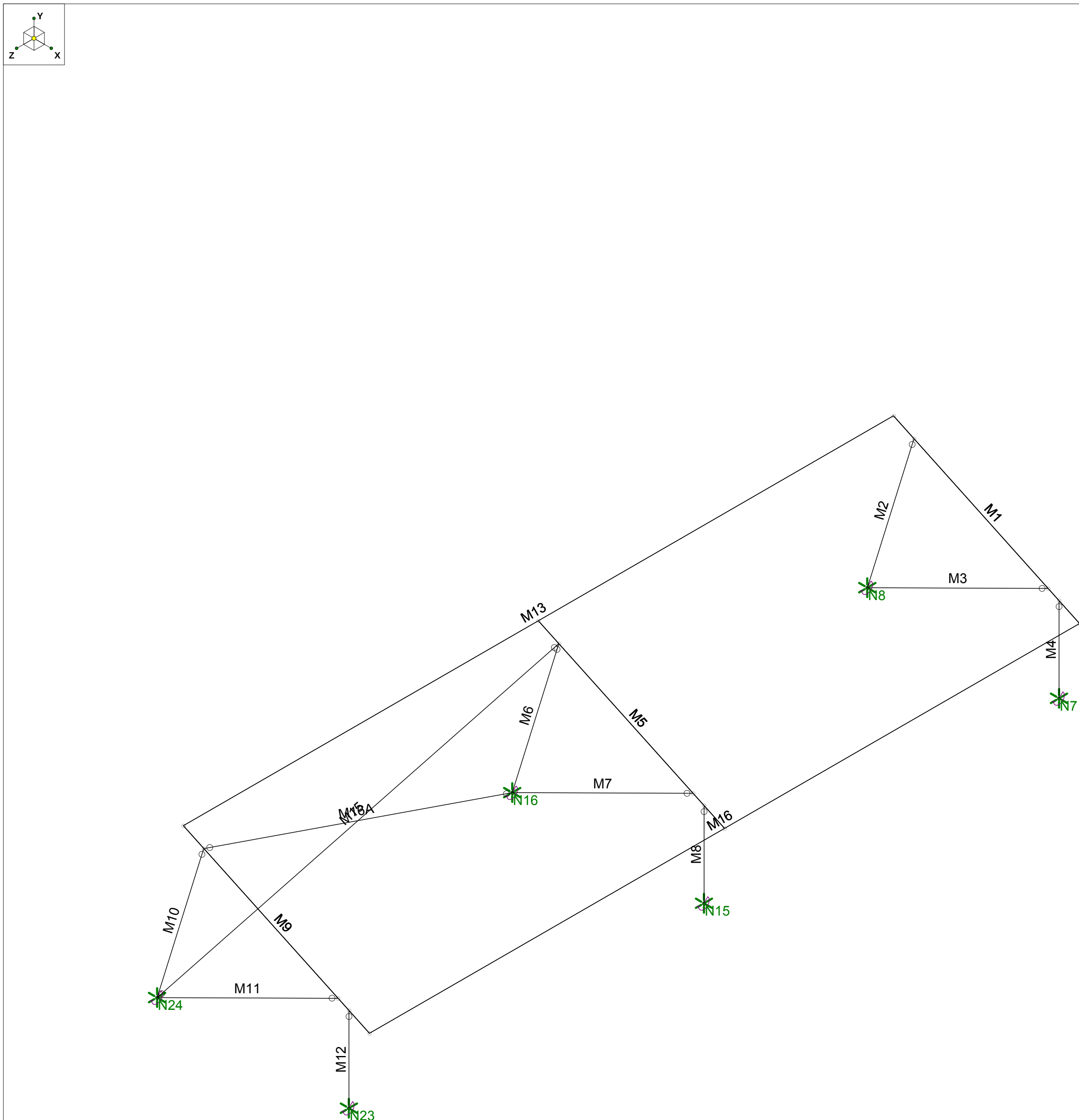


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

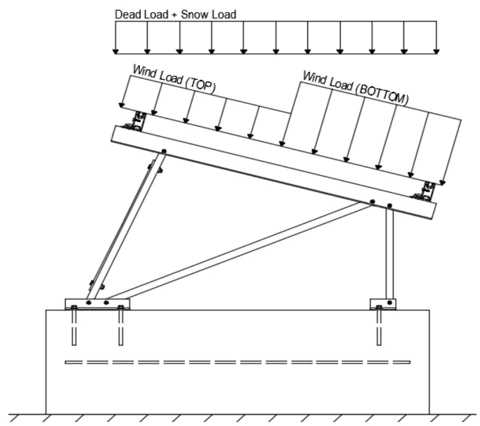
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 25°
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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 18.56 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 85 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 11.34 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.1	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.7	
$Cf-_{TOP}$	=	-2.2	*(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

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.04	C_d =	1.25

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	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

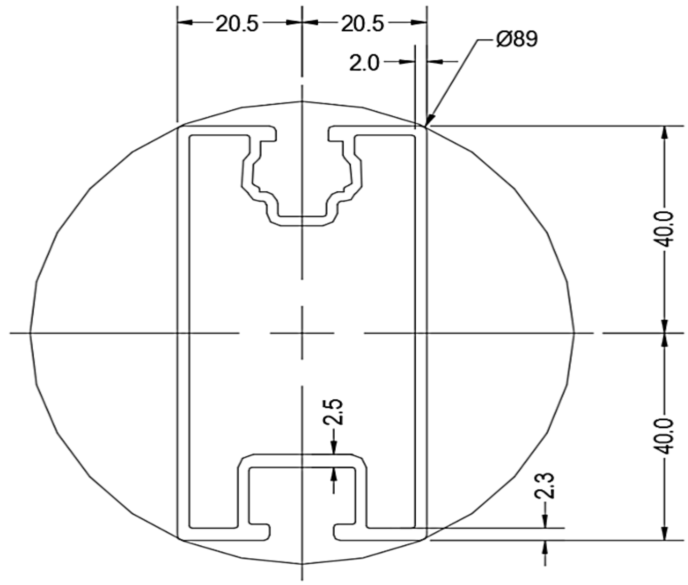
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

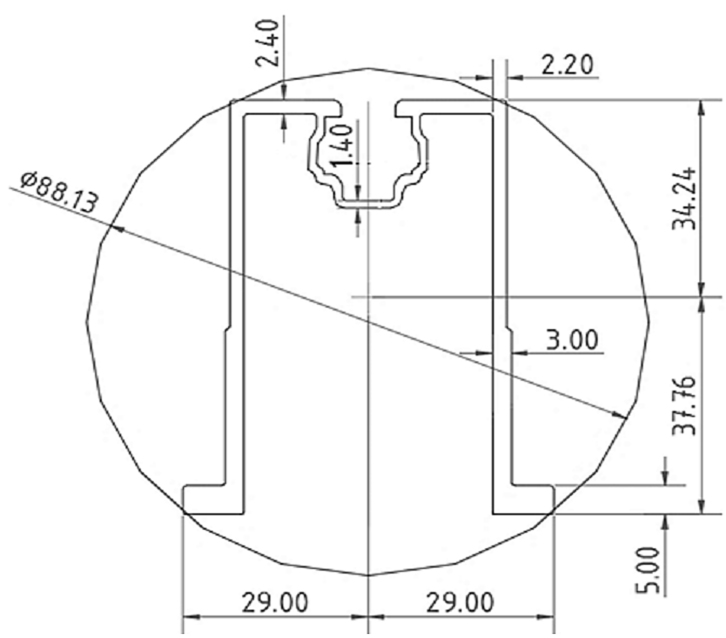
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.139	k-ft
M_z =	0.264	k-ft
$M_{y\ allowable}$ =	1.778	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	96%	



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).

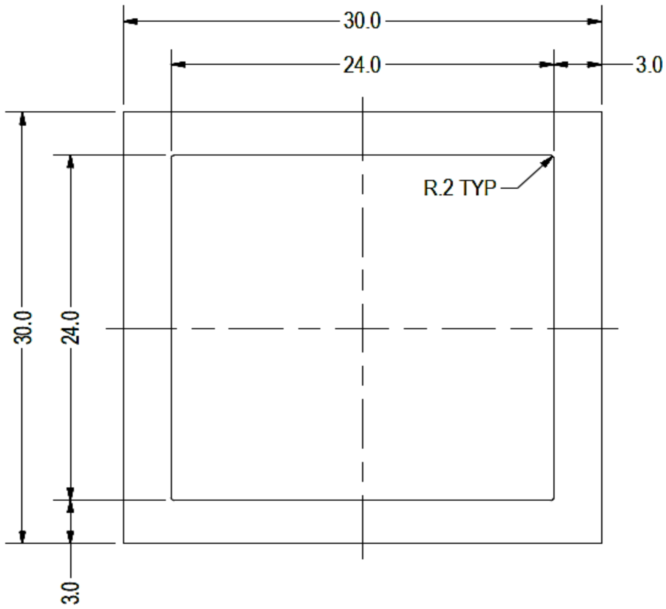
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.86	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.190	k-ft
M_z =	-0.151	k-ft
P_n =	0.063	k
$M_{y\ allowable}$ =	1.466	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



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).

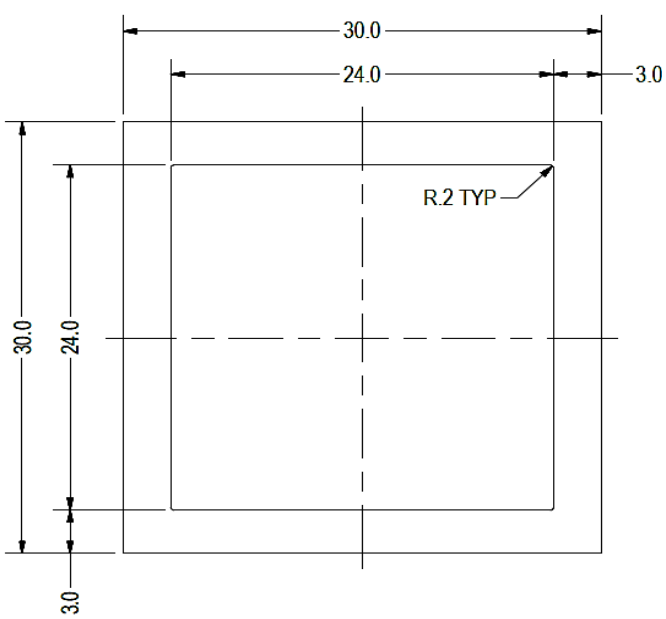
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.059	k-ft
P_n =	0.306	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	16%	



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).

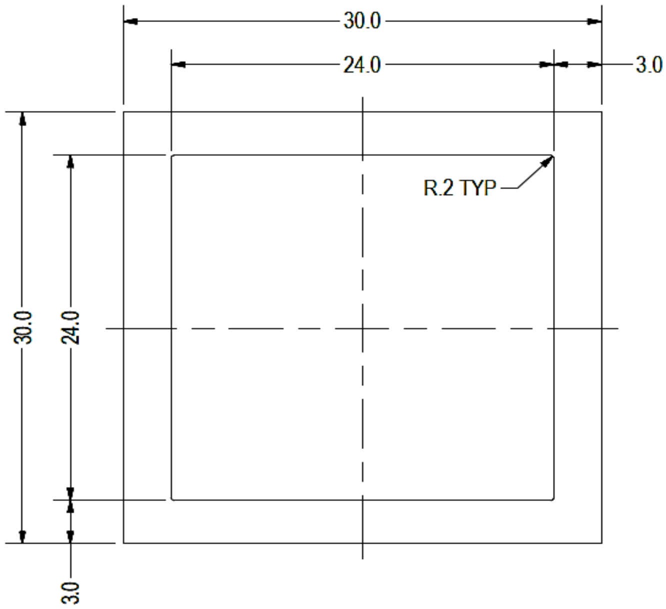
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.473	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	12%	



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).

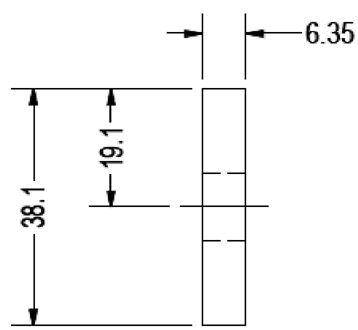
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.204	k
$M_{y\ allowable}$ =	0.410	k-ft
$M_{z\ allowable}$ =	0.410	k-ft
$P_{n\ allowable}$ =	5.820	k
Utilization =	21%	



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 =	0.008	k-ft
P_n =	0.276	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	20%	



A cross brace kit is required every 10 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

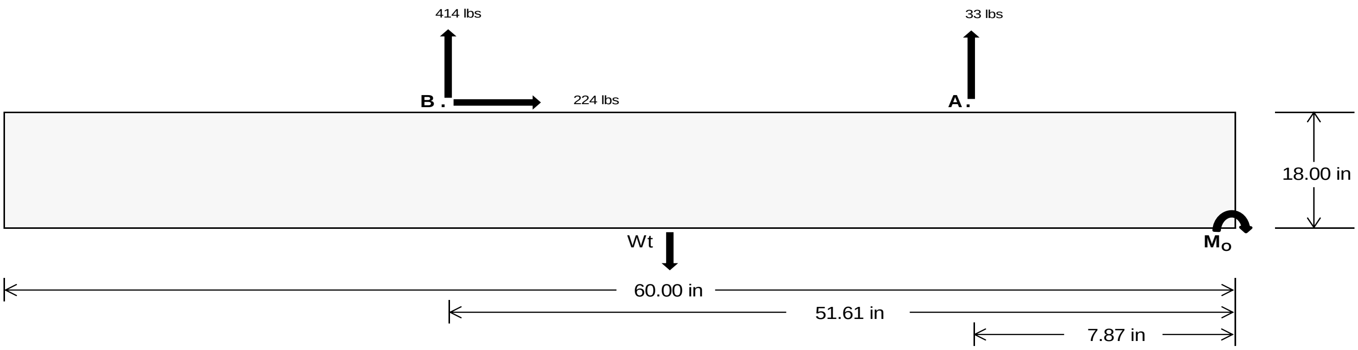
5.1 Helical Pile Foundations

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 =	144.91	1725.77	k
Compressive Load =	1878.19	1544.65	k
Lateral Load =	47.76	930.46	k
Moment (Weak Axis) =	0.08	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).



<u>Concrete Properties</u>
Weight of Concrete = 145 pcf
Compressive Strength = 2500 psi
Yield Strength = 60000 psi

<u>Footing Reinforcement</u>
Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>
M_O = 25649.2 in-lbs
Resisting Force Required = 854.97 lbs
S.F. = 1.67
Weight Required = 1424.95 lbs
Minimum Width = <u>22 in</u> in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>
Force = 223.55 lbs
Friction = 0.4
Weight Required = 558.87 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>
Sliding Force = 223.55 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>
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.

<u>Bearing Pressure</u>

	Ballast Width			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	738 lbs	738 lbs	738 lbs	738 lbs	510 lbs	510 lbs	510 lbs	510 lbs	876 lbs	876 lbs	876 lbs	876 lbs	-67 lbs	-67 lbs	-67 lbs	-67 lbs
F_B	534 lbs	534 lbs	534 lbs	534 lbs	549 lbs	549 lbs	549 lbs	549 lbs	768 lbs	768 lbs	768 lbs	768 lbs	-828 lbs	-828 lbs	-828 lbs	-828 lbs
F_V	80 lbs	80 lbs	80 lbs	80 lbs	408 lbs	408 lbs	408 lbs	408 lbs	360 lbs	360 lbs	360 lbs	360 lbs	-447 lbs	-447 lbs	-447 lbs	-447 lbs
P_{total}	3266 lbs	3357 lbs	3448 lbs	3538 lbs	3053 lbs	3144 lbs	3234 lbs	3325 lbs	3638 lbs	3729 lbs	3819 lbs	3910 lbs	302 lbs	356 lbs	410 lbs	465 lbs
M	519 lbs-ft	519 lbs-ft	519 lbs-ft	519 lbs-ft	563 lbs-ft	563 lbs-ft	563 lbs-ft	563 lbs-ft	772 lbs-ft	772 lbs-ft	772 lbs-ft	772 lbs-ft	697 lbs-ft	697 lbs-ft	697 lbs-ft	697 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	0.21 ft	0.21 ft	0.20 ft	0.20 ft	2.31 ft	1.96 ft	1.70 ft	1.50 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}	288.3 psf	285.3 psf	282.4 psf	279.8 psf	259.4 psf	257.6 psf	255.9 psf	254.4 psf	295.8 psf	292.4 psf	289.3 psf	286.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	424.3 psf	415.3 psf	407.1 psf	399.5 psf	406.7 psf	398.5 psf	391.0 psf	384.0 psf	498.0 psf	485.8 psf	474.6 psf	464.4 psf	580.1 psf	228.5 psf	170.7 psf	148.7 psf

Maximum Bearing Pressure = 580 psf
Allowable Bearing Pressure = 1500 psf

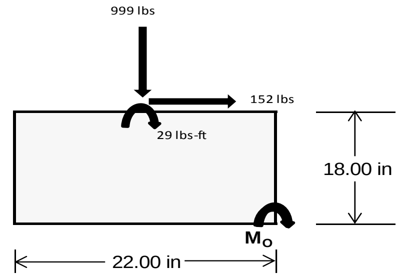
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 658.1 ft-lbs
Resisting Force Required = 717.97 lbs
S.F. = 1.67
Weight Required = 1196.61 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in 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	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	151 lbs	199 lbs	95 lbs	394 lbs	999 lbs	350 lbs	83 lbs	16 lbs	31 lbs
F_V	25 lbs	201 lbs	26 lbs	16 lbs	152 lbs	20 lbs	25 lbs	201 lbs	26 lbs
P_{total}	2620 lbs	2667 lbs	2563 lbs	2744 lbs	3349 lbs	2700 lbs	805 lbs	738 lbs	752 lbs
M	72 lbs-ft	341 lbs-ft	78 lbs-ft	46 lbs-ft	258 lbs-ft	62 lbs-ft	73 lbs-ft	341 lbs-ft	78 lbs-ft
e	0.03 ft	0.13 ft	0.03 ft	0.02 ft	0.08 ft	0.02 ft	0.09 ft	0.46 ft	0.10 ft
L/6	0.31 ft	1.58 ft	1.77 ft	1.80 ft	1.68 ft	1.79 ft	1.65 ft	0.91 ft	1.63 ft
f_{min}	259.9 sqft	169.1 sqft	251.8 sqft	282.9 sqft	273.3 sqft	272.3 sqft	61.7 sqft	-41.2 sqft	54.3 sqft
f_{max}	311.6 psf	412.9 psf	307.4 psf	315.8 psf	457.3 psf	316.8 psf	114.0 psf	202.2 psf	109.8 psf

Maximum Bearing Pressure = 457 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 22in 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.

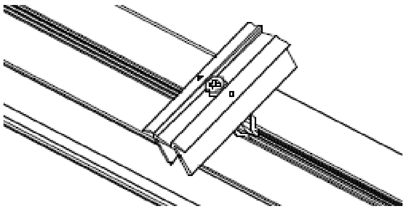
6. DESIGN OF JOINTS AND CONNECTIONS

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.

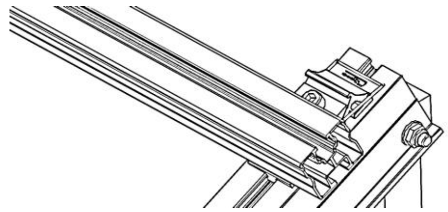
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.368	k
Allowable Uplift =	1.214	k
Utilization =	30%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.099	k
Allowable Uplift =	1.116	k
Utilization =	98%	



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 =	1.445	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

Rear Strut

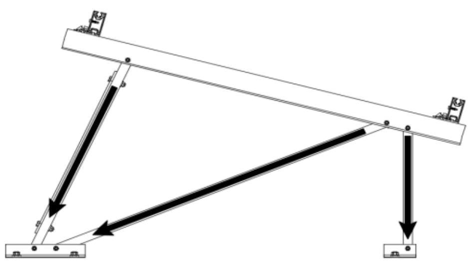
Maximum Axial Load =	1.204	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut

Maximum Axial Load =	0.473	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	8%	

Bracing

Maximum Axial Load =	0.276	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

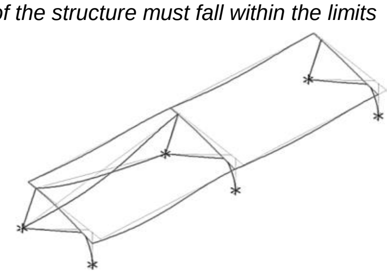
7.1 Seismic Drift

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} =	30.83	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.617	in
Max Drift, Δ_{MAX} =	0.125	in

$0.125 \leq 0.617$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 102.00 in

J = 0.427

212.736

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

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= 28.6 ksi

3.4.16

b/t = 6.6

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

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 = 102.00 in

J = 0.427

231.168

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

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= 28.4

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

S1 = 38.1

m = 0.63

C_0 = 40.784

Cc = 39.216

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

S2 = 79.7

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 28.6 ksi

Ix = 498305 mm^4

1.197 in^4

y = 40.784 mm

Sx = 0.746 in^3

$M_{max}St$ = 1.778 k-ft

3.4.18

h/t = 6.6

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

S1 = 36.9

m = 0.65

C_0 = 20.5

Cc = 20.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 22.7 ksi

Iy = 148662 mm^4

0.357 in^4

x = 20.5 mm

Sy = 0.443 in^3

$M_{max}Wk$ = 0.838 k-ft

<u>Compression</u>

3.4.9

b/t = 6.6

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 = 37.95

S1 = 12.21

S2 = 32.70

φF_L= (φck2*√(BpE))/(1.6b/t)

φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 21.42 ksi

A = 620.02 mm^2

0.96 in^2

P_{max} = 20.59 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.40
20.8038

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.9 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 = 1.40
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= 29.9 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

φF_LSt = 29.9 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.466 k-ft

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_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

$\lambda =$ 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

$\varphi cc =$ 0.83792

$\varphi F_L = \varphi cc(Bc\text{-}Dc^*\lambda)$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L =$ 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 = 36.18 in

J = 0.16

94.9139

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

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= 30.2 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= 30.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.410 k-ft

Weak Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

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= 30.2

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= 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

λ = 1.5514

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7972

φF_L= (φccFcy)/(λ²)

φF_L= 11.5927 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= 11.59 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.82 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			.8			4		

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	-51.748	-51.748	0	0
2	M16	Y	-51.748	-51.748	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	-34.799	-34.799	0	0
2	M16	y	-53.78	-53.78	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	69.597	69.597	0	0
2	M16	y	31.635	31.635	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	168.821	2	318.028	1	-.005	10	0	14	0	1	0	1
2		min	-223.864	3	-404.278	3	-2.176	4	0	3	0	1	0	1
3	N7	max	0	5	531.915	1	-.18	12	0	12	0	1	0	1
4		min	-.2	1	-23.813	3	-36.497	4	-.059	4	0	1	0	1
5	N15	max	-.001	15	1444.765	1	.702	1	.001	1	0	1	0	1
6		min	-2.11	1	-111.47	3	-36.739	5	-.059	4	0	1	0	1
7	N16	max	682.241	2	1188.194	1	-.34	10	0	1	0	1	0	1
8		min	-715.742	3	-1327.513	3	-263.426	4	0	3	0	1	0	1
9	N23	max	0	15	531.593	1	4.644	1	.008	1	0	1	0	1
10		min	-.2	1	-23.308	3	-34.046	5	-.054	5	0	1	0	1
11	N24	max	169.392	2	324.058	1	39.795	1	.002	1	0	1	0	1
12		min	-223.922	3	-401.234	3	-3.731	5	0	12	0	1	0	1
13	Totals:	max	1018.235	2	4338.552	1	0	10						
14		min	-1163.684	3	-2291.616	3	-374.11	5						

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	366.645	1	.638	6	1.345	4	0	12	0	3	0	1
2			min	-364.515	3	.149	15	-.024	3	-.001	1	0	1	0	1
3		2	max	366.761	1	.592	6	1.24	4	0	12	0	5	0	15
4			min	-364.428	3	.139	15	-.024	3	-.001	1	0	1	0	6
5		3	max	366.878	1	.546	6	1.134	4	0	12	0	4	0	15
6			min	-364.341	3	.128	15	-.024	3	-.001	1	0	3	0	6
7		4	max	366.994	1	.501	6	1.029	4	0	12	0	4	0	15
8			min	-364.253	3	.117	15	-.024	3	-.001	1	0	3	0	6
9		5	max	367.111	1	.455	6	.923	4	0	12	0	4	0	15
10			min	-364.166	3	.106	15	-.024	3	-.001	1	0	3	0	6
11		6	max	367.227	1	.409	6	.818	4	0	12	0	4	0	15
12			min	-364.079	3	.096	15	-.024	3	-.001	1	0	3	0	6
13		7	max	367.343	1	.364	6	.807	1	0	12	0	4	0	15
14			min	-363.992	3	.085	15	-.024	3	-.001	1	0	3	0	6
15		8	max	367.46	1	.318	6	.807	1	0	12	.001	4	0	15
16			min	-363.904	3	.074	15	-.024	3	-.001	1	0	3	0	6
17		9	max	367.576	1	.272	6	.807	1	0	12	.001	4	0	15
18			min	-363.817	3	.063	15	-.024	3	-.001	1	0	3	0	6
19		10	max	367.693	1	.227	6	.807	1	0	12	.001	4	0	15
20			min	-363.73	3	.053	15	-.024	3	-.001	1	0	3	0	6
21		11	max	367.809	1	.181	6	.807	1	0	12	.001	4	0	15
22			min	-363.642	3	.042	15	-.024	3	-.001	1	0	3	0	6
23		12	max	367.925	1	.135	6	.807	1	0	12	.001	4	0	15
24			min	-363.555	3	.031	15	-.025	5	-.001	1	0	3	0	6
25		13	max	368.042	1	.098	2	.807	1	0	12	.001	1	0	15
26			min	-363.468	3	.017	12	-.13	5	-.001	1	0	3	0	6
27		14	max	368.158	1	.062	2	.807	1	0	12	.002	1	0	15
28			min	-363.38	3	-.003	3	-.236	5	-.001	1	0	3	0	6

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
29		15	max	368.275	1	.027	2	.807	1	0	12	.002	1	0	15
30			min	-363.293	3	-.03	3	-.341	5	-.001	1	0	3	0	6
31		16	max	368.391	1	-.008	10	.807	1	0	12	.002	1	0	15
32			min	-363.206	3	-.056	3	-.447	5	-.001	1	0	3	0	6
33		17	max	368.507	1	-.022	15	.807	1	0	12	.002	1	0	15
34			min	-363.118	3	-.093	4	-.552	5	-.001	1	0	3	0	6
35		18	max	368.624	1	-.033	15	.807	1	0	12	.002	1	0	15
36			min	-363.031	3	-.139	4	-.658	5	-.001	1	0	3	0	6
37		19	max	368.74	1	-.044	15	.807	1	0	12	.002	1	0	15
38			min	-362.944	3	-.184	4	-.763	5	-.001	1	0	3	0	6
39	M3	1	max	100.045	2	1.774	6	-.041	12	0	5	.003	1	0	6
40			min	-130.753	3	.417	15	-1.516	4	0	1	0	12	0	15
41		2	max	99.977	2	1.597	6	-.041	12	0	5	.002	1	0	2
42			min	-130.804	3	.375	15	-1.382	4	0	1	0	12	0	15
43		3	max	99.908	2	1.419	6	-.041	12	0	5	.002	1	0	2
44			min	-130.856	3	.333	15	-1.249	4	0	1	0	12	0	3
45		4	max	99.839	2	1.242	6	-.041	12	0	5	.002	1	0	15
46			min	-130.907	3	.292	15	-1.115	4	0	1	0	5	0	4
47		5	max	99.771	2	1.065	6	-.041	12	0	5	.002	1	0	15
48			min	-130.959	3	.25	15	-.981	4	0	1	0	5	0	4
49		6	max	99.702	2	.888	6	-.041	12	0	5	.002	1	0	15
50			min	-131.01	3	.208	15	-.856	1	0	1	0	5	0	4
51		7	max	99.634	2	.711	6	-.041	12	0	5	.002	1	0	15
52			min	-131.062	3	.167	15	-.856	1	0	1	0	5	0	4
53		8	max	99.565	2	.533	6	-.041	12	0	5	.001	1	0	15
54			min	-131.113	3	.125	15	-.856	1	0	1	0	5	-.001	4
55		9	max	99.496	2	.356	6	-.041	12	0	5	.001	1	0	15
56			min	-131.164	3	.083	15	-.856	1	0	1	0	5	-.001	4
57		10	max	99.428	2	.179	6	-.041	12	0	5	.001	1	0	15
58			min	-131.216	3	.042	15	-.856	1	0	1	0	5	-.001	4
59		11	max	99.359	2	.024	2	0	15	0	5	0	1	0	15
60			min	-131.267	3	-.022	3	-.856	1	0	1	0	5	-.001	4
61		12	max	99.291	2	-.042	15	.13	5	0	5	0	1	0	15
62			min	-131.319	3	-.176	4	-.856	1	0	1	0	5	-.001	4
63		13	max	99.222	2	-.083	15	.264	5	0	5	0	1	0	15
64			min	-131.37	3	-.353	4	-.856	1	0	1	0	5	-.001	4
65		14	max	99.153	2	-.125	15	.398	5	0	5	0	1	0	15
66			min	-131.422	3	-.53	4	-.856	1	0	1	0	5	-.001	4
67		15	max	99.085	2	-.167	15	.531	5	0	5	0	1	0	15
68			min	-131.473	3	-.707	4	-.856	1	0	1	0	5	0	4
69		16	max	99.016	2	-.208	15	.665	5	0	5	0	10	0	15
70			min	-131.525	3	-.884	4	-.856	1	0	1	0	4	0	4
71		17	max	98.948	2	-.25	15	.798	5	0	5	0	12	0	15
72			min	-131.576	3	-1.062	4	-.856	1	0	1	0	4	0	4
73		18	max	98.879	2	-.292	15	.932	5	0	5	0	15	0	15
74			min	-131.628	3	-1.239	4	-.856	1	0	1	0	1	0	4
75		19	max	98.81	2	-.333	15	1.066	5	0	5	0	5	0	1
76			min	-131.679	3	-1.416	4	-.856	1	0	1	0	1	0	1
77	M4	1	max	530.75	1	0	1	-.18	12	0	1	0	5	0	1
78			min	-24.687	3	0	1	-36.286	4	0	1	0	1	0	1
79		2	max	530.815	1	0	1	-.18	12	0	1	0	12	0	1
80			min	-24.638	3	0	1	-36.342	4	0	1	-.003	4	0	1
81		3	max	530.88	1	0	1	-.18	12	0	1	0	12	0	1
82			min	-24.59	3	0	1	-36.398	4	0	1	-.006	4	0	1
83		4	max	530.944	1	0	1	-.18	12	0	1	0	12	0	1
84			min	-24.541	3	0	1	-36.454	4	0	1	-.01	4	0	1
85		5	max	531.009	1	0	1	-.18	12	0	1	0	12	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
86			min	-24.492	3	0	1	-36.51	4	0	1	-.013	4	0	1
87		6	max	531.074	1	0	1	-.18	12	0	1	0	12	0	1
88			min	-24.444	3	0	1	-36.566	4	0	1	-.016	4	0	1
89		7	max	531.139	1	0	1	-.18	12	0	1	0	12	0	1
90			min	-24.395	3	0	1	-36.622	4	0	1	-.02	4	0	1
91		8	max	531.203	1	0	1	-.18	12	0	1	0	12	0	1
92			min	-24.347	3	0	1	-36.678	4	0	1	-.023	4	0	1
93		9	max	531.268	1	0	1	-.18	12	0	1	0	12	0	1
94			min	-24.298	3	0	1	-36.734	4	0	1	-.026	4	0	1
95		10	max	531.333	1	0	1	-.18	12	0	1	0	12	0	1
96			min	-24.25	3	0	1	-36.79	4	0	1	-.029	4	0	1
97		11	max	531.397	1	0	1	-.18	12	0	1	0	12	0	1
98			min	-24.201	3	0	1	-36.847	4	0	1	-.033	4	0	1
99		12	max	531.462	1	0	1	-.18	12	0	1	0	12	0	1
100			min	-24.153	3	0	1	-36.903	4	0	1	-.036	4	0	1
101		13	max	531.527	1	0	1	-.18	12	0	1	0	12	0	1
102			min	-24.104	3	0	1	-36.959	4	0	1	-.039	4	0	1
103		14	max	531.591	1	0	1	-.18	12	0	1	0	12	0	1
104			min	-24.056	3	0	1	-37.015	4	0	1	-.043	4	0	1
105		15	max	531.656	1	0	1	-.18	12	0	1	0	12	0	1
106			min	-24.007	3	0	1	-37.071	4	0	1	-.046	4	0	1
107		16	max	531.721	1	0	1	-.18	12	0	1	0	12	0	1
108			min	-23.959	3	0	1	-37.127	4	0	1	-.049	4	0	1
109		17	max	531.786	1	0	1	-.18	12	0	1	0	12	0	1
110			min	-23.91	3	0	1	-37.183	4	0	1	-.053	4	0	1
111		18	max	531.85	1	0	1	-.18	12	0	1	0	12	0	1
112			min	-23.862	3	0	1	-37.239	4	0	1	-.056	4	0	1
113		19	max	531.915	1	0	1	-.18	12	0	1	0	12	0	1
114			min	-23.813	3	0	1	-37.295	4	0	1	-.059	4	0	1
115	M6	1	max	1202.234	1	.628	6	1.212	4	0	1	0	3	0	1
116			min	-1192.156	3	.142	15	-.112	3	0	5	0	2	0	1
117		2	max	1202.35	1	.582	6	1.107	4	0	1	0	4	0	15
118			min	-1192.069	3	.131	15	-.112	3	0	5	0	2	0	6
119		3	max	1202.467	1	.537	6	1.001	4	0	1	0	4	0	15
120			min	-1191.981	3	.121	15	-.112	3	0	5	0	2	0	6
121		4	max	1202.583	1	.491	6	.896	4	0	1	0	4	0	15
122			min	-1191.894	3	.11	15	-.112	3	0	5	0	12	0	6
123		5	max	1202.7	1	.449	2	.79	4	0	1	0	4	0	15
124			min	-1191.807	3	.099	15	-.112	3	0	5	0	12	0	6
125		6	max	1202.816	1	.414	2	.685	4	0	1	0	4	0	15
126			min	-1191.719	3	.088	15	-.112	3	0	5	0	3	0	6
127		7	max	1202.932	1	.378	2	.579	4	0	1	0	4	0	15
128			min	-1191.632	3	.078	15	-.112	3	0	5	0	3	0	6
129		8	max	1203.049	1	.343	2	.474	4	0	1	.001	4	0	15
130			min	-1191.545	3	.064	12	-.112	3	0	5	0	3	0	6
131		9	max	1203.165	1	.307	2	.368	4	0	1	.001	4	0	15
132			min	-1191.457	3	.046	12	-.112	3	0	5	0	3	0	2
133		10	max	1203.282	1	.271	2	.297	14	0	1	.001	4	0	15
134			min	-1191.37	3	.029	12	-.112	3	0	5	0	3	0	2
135		11	max	1203.398	1	.236	2	.244	14	0	1	.001	4	0	15
136			min	-1191.283	3	.01	3	-.112	3	0	5	0	3	0	2
137		12	max	1203.514	1	.2	2	.23	1	0	1	.001	4	0	15
138			min	-1191.196	3	-.017	3	-.112	3	0	5	0	3	0	2
139		13	max	1203.631	1	.165	2	.23	1	0	1	.001	4	0	15
140			min	-1191.108	3	-.043	3	-.148	5	0	5	0	3	0	2
141		14	max	1203.747	1	.129	2	.23	1	0	1	.001	4	0	15
142			min	-1191.021	3	-.07	3	-.254	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1203.864	1	.094	2	.23	1	0	1	.001	4	0	12
144			min	-1190.934	3	-.097	3	-.359	5	0	5	0	3	0	2
145		16	max	1203.98	1	.058	2	.23	1	0	1	.001	4	0	12
146			min	-1190.846	3	-.123	3	-.464	5	0	5	0	3	0	2
147		17	max	1204.096	1	.022	2	.23	1	0	1	.001	4	0	12
148			min	-1190.759	3	-.15	3	-.57	5	0	5	0	3	0	2
149		18	max	1204.213	1	-.013	2	.23	1	0	1	0	14	0	12
150			min	-1190.672	3	-.177	3	-.675	5	0	5	0	3	0	2
151		19	max	1204.329	1	-.049	2	.23	1	0	1	0	14	0	12
152			min	-1190.584	3	-.203	3	-.781	5	0	5	0	3	0	2
153	M7	1	max	472.906	2	1.788	4	.02	1	0	2	0	4	0	2
154			min	-404.916	3	.425	15	-1.394	5	0	3	0	3	0	12
155		2	max	472.837	2	1.611	4	.02	1	0	2	0	4	0	2
156			min	-404.968	3	.383	15	-1.261	5	0	3	0	3	0	3
157		3	max	472.769	2	1.434	4	.02	1	0	2	0	4	0	2
158			min	-405.019	3	.341	15	-1.127	5	0	3	0	3	0	3
159		4	max	472.7	2	1.256	4	.02	1	0	2	0	2	0	2
160			min	-405.071	3	.3	15	-.994	5	0	3	0	3	0	3
161		5	max	472.631	2	1.079	4	.02	1	0	2	0	2	0	15
162			min	-405.122	3	.258	15	-.86	5	0	3	0	5	0	3
163		6	max	472.563	2	.902	4	.02	1	0	2	0	2	0	15
164			min	-405.173	3	.217	15	-.726	5	0	3	0	5	0	6
165		7	max	472.494	2	.725	4	.02	1	0	2	0	2	0	15
166			min	-405.225	3	.175	15	-.593	5	0	3	0	5	0	6
167		8	max	472.426	2	.548	4	.02	1	0	2	0	2	0	15
168			min	-405.276	3	.133	15	-.459	5	0	3	0	5	-.001	6
169		9	max	472.357	2	.37	4	.02	1	0	2	0	2	0	15
170			min	-405.328	3	.086	12	-.325	5	0	3	0	5	-.001	6
171		10	max	472.288	2	.225	2	.02	1	0	2	0	2	0	15
172			min	-405.379	3	.017	12	-.192	5	0	3	0	5	-.001	6
173		11	max	472.22	2	.086	2	.02	1	0	2	0	2	0	15
174			min	-405.431	3	-.084	3	-.058	5	0	3	0	5	-.001	6
175		12	max	472.151	2	-.033	15	.08	4	0	2	0	2	0	15
176			min	-405.482	3	-.188	3	-.002	10	0	3	0	5	-.001	6
177		13	max	472.083	2	-.075	15	.214	4	0	2	0	2	0	15
178			min	-405.534	3	-.339	6	-.002	10	0	3	0	5	-.001	6
179		14	max	472.014	2	-.117	15	.348	4	0	2	0	2	0	15
180			min	-405.585	3	-.516	6	-.002	10	0	3	0	5	-.001	6
181		15	max	471.945	2	-.158	15	.481	4	0	2	0	2	0	15
182			min	-405.637	3	-.693	6	-.002	10	0	3	0	5	0	6
183		16	max	471.877	2	-.2	15	.615	4	0	2	0	2	0	15
184			min	-405.688	3	-.87	6	-.002	10	0	3	0	5	0	6
185		17	max	471.808	2	-.242	15	.748	4	0	2	0	2	0	15
186			min	-405.739	3	-1.048	6	-.002	10	0	3	0	5	0	6
187		18	max	471.74	2	-.283	15	.882	4	0	2	0	2	0	15
188			min	-405.791	3	-1.225	6	-.002	10	0	3	0	5	0	6
189		19	max	471.671	2	-.325	15	1.016	4	0	2	0	14	0	1
190			min	-405.842	3	-1.402	6	-.002	10	0	3	0	3	0	1
191	M8	1	max	1443.6	1	0	1	.919	1	0	1	0	4	0	1
192			min	-112.344	3	0	1	-36.296	4	0	1	0	1	0	1
193		2	max	1443.665	1	0	1	.919	1	0	1	0	1	0	1
194			min	-112.295	3	0	1	-36.352	4	0	1	-.003	4	0	1
195		3	max	1443.73	1	0	1	.919	1	0	1	0	1	0	1
196			min	-112.247	3	0	1	-36.408	4	0	1	-.006	4	0	1
197		4	max	1443.794	1	0	1	.919	1	0	1	0	1	0	1
198			min	-112.198	3	0	1	-36.464	4	0	1	-.01	4	0	1
199		5	max	1443.859	1	0	1	.919	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
200			min	-112.15	3	0	1	-36.52	4	0	1	-.013	4	0	1
201		6	max	1443.924	1	0	1	.919	1	0	1	0	1	0	1
202			min	-112.101	3	0	1	-36.576	4	0	1	-.016	4	0	1
203		7	max	1443.988	1	0	1	.919	1	0	1	0	1	0	1
204			min	-112.053	3	0	1	-36.632	4	0	1	-.02	4	0	1
205		8	max	1444.053	1	0	1	.919	1	0	1	0	1	0	1
206			min	-112.004	3	0	1	-36.688	4	0	1	-.023	4	0	1
207		9	max	1444.118	1	0	1	.919	1	0	1	0	1	0	1
208			min	-111.956	3	0	1	-36.745	4	0	1	-.026	4	0	1
209		10	max	1444.183	1	0	1	.919	1	0	1	0	1	0	1
210			min	-111.907	3	0	1	-36.801	4	0	1	-.029	4	0	1
211		11	max	1444.247	1	0	1	.919	1	0	1	0	1	0	1
212			min	-111.859	3	0	1	-36.857	4	0	1	-.033	4	0	1
213		12	max	1444.312	1	0	1	.919	1	0	1	0	1	0	1
214			min	-111.81	3	0	1	-36.913	4	0	1	-.036	4	0	1
215		13	max	1444.377	1	0	1	.919	1	0	1	0	1	0	1
216			min	-111.762	3	0	1	-36.969	4	0	1	-.039	4	0	1
217		14	max	1444.441	1	0	1	.919	1	0	1	.001	1	0	1
218			min	-111.713	3	0	1	-37.025	4	0	1	-.043	4	0	1
219		15	max	1444.506	1	0	1	.919	1	0	1	.001	1	0	1
220			min	-111.665	3	0	1	-37.081	4	0	1	-.046	4	0	1
221		16	max	1444.571	1	0	1	.919	1	0	1	.001	1	0	1
222			min	-111.616	3	0	1	-37.137	4	0	1	-.049	4	0	1
223		17	max	1444.635	1	0	1	.919	1	0	1	.001	1	0	1
224			min	-111.567	3	0	1	-37.193	4	0	1	-.053	4	0	1
225		18	max	1444.7	1	0	1	.919	1	0	1	.001	1	0	1
226			min	-111.519	3	0	1	-37.249	4	0	1	-.056	4	0	1
227		19	max	1444.765	1	0	1	.919	1	0	1	.001	1	0	1
228			min	-111.47	3	0	1	-37.305	4	0	1	-.059	4	0	1
229	M10	1	max	384.066	1	.664	4	1.413	5	.001	1	0	1	0	1
230			min	-350.321	3	.167	15	-.237	1	-.002	5	0	5	0	1
231		2	max	384.182	1	.619	4	1.307	5	.001	1	0	1	0	15
232			min	-350.234	3	.157	15	-.237	1	-.002	5	0	3	0	4
233		3	max	384.299	1	.573	4	1.202	5	.001	1	0	4	0	15
234			min	-350.147	3	.146	15	-.237	1	-.002	5	0	3	0	4
235		4	max	384.415	1	.527	4	1.096	5	.001	1	0	4	0	15
236			min	-350.059	3	.135	15	-.237	1	-.002	5	0	3	0	4
237		5	max	384.531	1	.482	4	.991	5	.001	1	0	4	0	15
238			min	-349.972	3	.124	15	-.237	1	-.002	5	0	3	0	4
239		6	max	384.648	1	.436	4	.885	5	.001	1	0	4	0	15
240			min	-349.885	3	.114	15	-.237	1	-.002	5	0	3	0	4
241		7	max	384.764	1	.39	4	.78	5	.001	1	.001	4	0	15
242			min	-349.797	3	.103	15	-.237	1	-.002	5	0	3	0	4
243		8	max	384.881	1	.345	4	.675	5	.001	1	.001	4	0	15
244			min	-349.71	3	.092	15	-.237	1	-.002	5	0	3	0	4
245		9	max	384.997	1	.299	4	.569	5	.001	1	.001	4	0	15
246			min	-349.623	3	.081	15	-.237	1	-.002	5	0	3	0	4
247		10	max	385.113	1	.253	4	.464	5	.001	1	.001	4	0	15
248			min	-349.535	3	.071	15	-.237	1	-.002	5	0	3	0	4
249		11	max	385.23	1	.208	4	.358	5	.001	1	.001	4	0	15
250			min	-349.448	3	.06	15	-.237	1	-.002	5	0	1	0	4
251		12	max	385.346	1	.162	4	.253	5	.001	1	.001	4	0	15
252			min	-349.361	3	.049	15	-.237	1	-.002	5	0	1	0	4
253		13	max	385.463	1	.116	4	.147	5	.001	1	.002	4	0	15
254			min	-349.274	3	.029	1	-.237	1	-.002	5	0	1	0	4
255		14	max	385.579	1	.071	4	.042	5	.001	1	.002	4	0	15
256			min	-349.186	3	-.007	1	-.237	1	-.002	5	0	1	0	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
257		15	max	385.695	1	.025	5	-.013	12	.001	1	.002	4	0	15
258			min	-349.099	3	-.043	1	-.237	1	-.002	5	0	1	0	4
259		16	max	385.812	1	.009	5	-.013	12	.001	1	.001	4	0	15
260			min	-349.012	3	-.078	1	-.237	1	-.002	5	0	1	0	4
261		17	max	385.928	1	-.004	15	-.013	12	.001	1	.001	4	0	15
262			min	-348.924	3	-.114	1	-.297	4	-.002	5	0	1	0	4
263		18	max	386.045	1	-.015	15	-.013	12	.001	1	.001	4	0	15
264			min	-348.837	3	-.149	1	-.403	4	-.002	5	0	1	0	4
265		19	max	386.161	1	-.026	15	-.013	12	.001	1	.001	4	0	15
266			min	-348.75	3	-.185	1	-.508	4	-.002	5	0	1	0	4
267	M11	1	max	99.833	2	1.768	6	.969	1	.002	4	.001	5	0	2
268			min	-131.399	3	.412	15	-1.165	5	0	10	-.003	1	0	15
269		2	max	99.765	2	1.591	6	.969	1	.002	4	.001	5	0	2
270			min	-131.451	3	.371	15	-1.031	5	0	10	-.002	1	0	12
271		3	max	99.696	2	1.413	6	.969	1	.002	4	0	5	0	2
272			min	-131.502	3	.329	15	-.898	5	0	10	-.002	1	0	3
273		4	max	99.627	2	1.236	6	.969	1	.002	4	0	5	0	2
274			min	-131.554	3	.287	15	-.764	5	0	10	-.002	1	0	4
275		5	max	99.559	2	1.059	6	.969	1	.002	4	0	5	0	15
276			min	-131.605	3	.246	15	-.63	5	0	10	-.002	1	0	4
277		6	max	99.49	2	.882	6	.969	1	.002	4	0	5	0	15
278			min	-131.657	3	.204	15	-.497	5	0	10	-.002	1	0	4
279		7	max	99.422	2	.705	6	.969	1	.002	4	0	5	0	15
280			min	-131.708	3	.162	15	-.363	5	0	10	-.001	1	0	4
281		8	max	99.353	2	.527	6	.969	1	.002	4	0	5	0	15
282			min	-131.759	3	.121	15	-.23	5	0	10	-.001	1	-.001	4
283		9	max	99.284	2	.35	6	.969	1	.002	4	0	5	0	15
284			min	-131.811	3	.079	15	-.096	5	0	10	0	1	-.001	4
285		10	max	99.216	2	.182	2	.969	1	.002	4	0	5	0	15
286			min	-131.862	3	.037	15	.021	12	0	10	0	1	-.001	4
287		11	max	99.147	2	.044	2	.969	1	.002	4	0	5	0	15
288			min	-131.914	3	-.039	3	.021	12	0	10	0	1	-.001	4
289		12	max	99.078	2	-.046	15	.969	1	.002	4	0	5	0	15
290			min	-131.965	3	-.182	4	.021	12	0	10	0	1	-.001	4
291		13	max	99.01	2	-.088	15	.969	1	.002	4	0	5	0	15
292			min	-132.017	3	-.359	4	.021	12	0	10	0	1	-.001	4
293		14	max	98.941	2	-.129	15	.969	1	.002	4	0	4	0	15
294			min	-132.068	3	-.536	4	.021	12	0	10	0	2	-.001	4
295		15	max	98.873	2	-.171	15	.969	1	.002	4	0	4	0	15
296			min	-132.12	3	-.713	4	.021	12	0	10	0	10	0	4
297		16	max	98.804	2	-.213	15	1.04	4	.002	4	0	4	0	15
298			min	-132.171	3	-.891	4	.021	12	0	10	0	10	0	4
299		17	max	98.735	2	-.254	15	1.174	4	.002	4	.001	4	0	15
300			min	-132.223	3	-1.068	4	.021	12	0	10	0	10	0	4
301		18	max	98.667	2	-.296	15	1.308	4	.002	4	.001	4	0	15
302			min	-132.274	3	-1.245	4	.021	12	0	10	0	10	0	4
303		19	max	98.598	2	-.337	15	1.441	4	.002	4	.002	4	0	1
304			min	-132.325	3	-1.422	4	.021	12	0	10	0	10	0	1
305	M12	1	max	530.428	1	0	1	5.088	1	0	1	0	4	0	1
306			min	-24.181	3	0	1	-33.13	5	0	1	0	3	0	1
307		2	max	530.493	1	0	1	5.088	1	0	1	0	1	0	1
308			min	-24.133	3	0	1	-33.186	5	0	1	-.003	5	0	1
309		3	max	530.557	1	0	1	5.088	1	0	1	0	1	0	1
310			min	-24.084	3	0	1	-33.243	5	0	1	-.006	5	0	1
311		4	max	530.622	1	0	1	5.088	1	0	1	.001	1	0	1
312			min	-24.036	3	0	1	-33.299	5	0	1	-.009	5	0	1
313		5	max	530.687	1	0	1	5.088	1	0	1	.002	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
314			min	-23.987	3	0	1	-33.355	5	0	1	-.012	5	0	1
315		6	max	530.752	1	0	1	5.088	1	0	1	.002	1	0	1
316			min	-23.938	3	0	1	-33.411	5	0	1	-.015	5	0	1
317		7	max	530.816	1	0	1	5.088	1	0	1	.003	1	0	1
318			min	-23.89	3	0	1	-33.467	5	0	1	-.018	5	0	1
319		8	max	530.881	1	0	1	5.088	1	0	1	.003	1	0	1
320			min	-23.841	3	0	1	-33.523	5	0	1	-.021	5	0	1
321		9	max	530.946	1	0	1	5.088	1	0	1	.004	1	0	1
322			min	-23.793	3	0	1	-33.579	5	0	1	-.024	5	0	1
323		10	max	531.01	1	0	1	5.088	1	0	1	.004	1	0	1
324			min	-23.744	3	0	1	-33.635	5	0	1	-.027	5	0	1
325		11	max	531.075	1	0	1	5.088	1	0	1	.005	1	0	1
326			min	-23.696	3	0	1	-33.691	5	0	1	-.03	5	0	1
327		12	max	531.14	1	0	1	5.088	1	0	1	.005	1	0	1
328			min	-23.647	3	0	1	-33.747	5	0	1	-.033	5	0	1
329		13	max	531.204	1	0	1	5.088	1	0	1	.005	1	0	1
330			min	-23.599	3	0	1	-33.803	5	0	1	-.036	5	0	1
331		14	max	531.269	1	0	1	5.088	1	0	1	.006	1	0	1
332			min	-23.55	3	0	1	-33.859	5	0	1	-.039	5	0	1
333		15	max	531.334	1	0	1	5.088	1	0	1	.006	1	0	1
334			min	-23.502	3	0	1	-33.916	5	0	1	-.042	5	0	1
335		16	max	531.399	1	0	1	5.088	1	0	1	.007	1	0	1
336			min	-23.453	3	0	1	-33.972	5	0	1	-.045	5	0	1
337		17	max	531.463	1	0	1	5.088	1	0	1	.007	1	0	1
338			min	-23.405	3	0	1	-34.028	5	0	1	-.048	5	0	1
339		18	max	531.528	1	0	1	5.088	1	0	1	.008	1	0	1
340			min	-23.356	3	0	1	-34.084	5	0	1	-.051	5	0	1
341		19	max	531.593	1	0	1	5.088	1	0	1	.008	1	0	1
342			min	-23.308	3	0	1	-34.14	5	0	1	-.054	5	0	1
343	M1	1	max	161.948	1	342.178	3	-4.183	12	0	1	.197	1	.013	1
344			min	6.33	12	-363.767	1	-99.798	1	0	3	.009	12	-.01	3
345		2	max	162.066	1	341.988	3	-4.183	12	0	1	.176	1	.092	1
346			min	6.389	12	-364.02	1	-99.798	1	0	3	.008	12	-.084	3
347		3	max	111.573	1	7.892	9	-4.199	12	0	12	.152	1	.169	1
348			min	-1.269	10	-19.153	3	-99.666	1	0	1	.007	12	-.157	3
349		4	max	111.691	1	7.681	9	-4.199	12	0	12	.131	1	.169	1
350			min	-1.171	10	-19.343	3	-99.666	1	0	1	.006	12	-.153	3
351		5	max	111.809	1	7.47	9	-4.199	12	0	12	.109	1	.169	1
352			min	-1.072	10	-19.533	3	-99.666	1	0	1	.005	12	-.149	3
353		6	max	111.927	1	7.259	9	-4.199	12	0	12	.088	1	.17	1
354			min	-.974	10	-19.723	3	-99.666	1	0	1	.004	12	-.144	3
355		7	max	112.045	1	7.048	9	-4.199	12	0	12	.066	1	.17	1
356			min	-.876	10	-19.913	3	-99.666	1	0	1	.003	12	-.14	3
357		8	max	112.163	1	6.837	9	-4.199	12	0	12	.044	1	.17	1
358			min	-.777	10	-20.102	3	-99.666	1	0	1	.002	12	-.136	3
359		9	max	112.281	1	6.626	9	-4.199	12	0	12	.023	1	.171	1
360			min	-.679	10	-20.292	3	-99.666	1	0	1	.001	12	-.131	3
361		10	max	112.399	1	6.415	9	-4.199	12	0	12	.003	4	.171	1
362			min	-.581	10	-20.482	3	-99.666	1	0	1	0	10	-.127	3
363		11	max	112.517	1	6.204	9	-4.199	12	0	12	0	15	.172	1
364			min	-.482	10	-20.672	3	-99.666	1	0	1	-.02	1	-.122	3
365		12	max	112.635	1	5.994	9	-4.199	12	0	12	-.001	12	.173	2
366			min	-.384	10	-20.862	3	-99.666	1	0	1	-.042	1	-.118	3
367		13	max	112.753	1	5.783	9	-4.199	12	0	12	-.002	12	.177	2
368			min	-.286	10	-21.051	3	-99.666	1	0	1	-.064	1	-.113	3
369		14	max	112.871	1	5.572	9	-4.199	12	0	12	-.003	12	.182	2
370			min	-.187	10	-21.241	3	-99.666	1	0	1	-.085	1	-.109	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
371		15	max	112.989	1	5.361	9	-4.199	12	0	12	-.004	12	.186	2
372			min	-.089	10	-21.473	2	-99.666	1	0	1	-.107	1	-.104	3
373		16	max	90.393	2	55.23	2	-4.24	12	0	1	-.005	12	.19	2
374			min	-19.584	3	-125.039	3	-100.389	1	0	5	-.13	1	-.099	3
375		17	max	90.511	2	54.977	2	-4.24	12	0	1	-.006	12	.19	1
376			min	-19.496	3	-125.229	3	-100.389	1	0	5	-.151	1	-.071	3
377		18	max	-5.979	12	411.258	1	-4.42	12	0	5	-.007	12	.103	1
378			min	-161.332	1	-147.822	3	-102.958	1	0	1	-.174	1	-.039	3
379		19	max	-5.92	12	411.005	1	-4.42	12	0	5	-.008	12	.014	1
380			min	-161.214	1	-148.012	3	-102.958	1	0	1	-.196	1	-.007	3
381	M5	1	max	353.811	1	1131.257	3	-.128	10	0	1	.05	4	.02	3
382			min	10.063	15	-1203.993	1	-36.541	1	0	5	0	10	-.025	1
383		2	max	353.929	1	1131.067	3	-.128	10	0	1	.043	4	.236	1
384			min	10.099	15	-1204.246	1	-36.541	1	0	5	-.003	3	-.225	3
385		3	max	189.376	1	8.278	9	3.604	3	0	3	.036	4	.492	1
386			min	-20.852	10	-69.755	2	-26.798	4	0	4	-.01	3	-.466	3
387		4	max	189.494	1	8.067	9	3.604	3	0	3	.03	4	.498	1
388			min	-20.753	10	-70.008	2	-26.556	4	0	4	-.009	3	-.452	3
389		5	max	189.612	1	7.856	9	3.604	3	0	3	.025	4	.503	1
390			min	-20.655	10	-70.261	2	-26.314	4	0	4	-.008	3	-.438	3
391		6	max	189.73	1	7.645	9	3.604	3	0	3	.019	4	.509	1
392			min	-20.556	10	-70.515	2	-26.072	4	0	4	-.007	3	-.424	3
393		7	max	189.848	1	7.434	9	3.604	3	0	3	.013	4	.514	1
394			min	-20.458	10	-70.768	2	-25.83	4	0	4	-.007	1	-.41	3
395		8	max	189.966	1	7.223	9	3.604	3	0	3	.008	4	.52	1
396			min	-20.36	10	-71.021	2	-25.588	4	0	4	-.006	1	-.396	3
397		9	max	190.084	1	7.012	9	3.604	3	0	3	.002	5	.526	1
398			min	-20.261	10	-71.274	2	-25.346	4	0	4	-.006	1	-.382	3
399		10	max	190.202	1	6.802	9	3.604	3	0	3	0	10	.532	1
400			min	-20.163	10	-71.527	2	-25.104	4	0	4	-.005	1	-.368	3
401		11	max	190.32	1	6.591	9	3.604	3	0	3	0	10	.538	1
402			min	-20.065	10	-71.78	2	-24.862	4	0	4	-.009	4	-.353	3
403		12	max	190.438	1	6.38	9	3.604	3	0	3	0	10	.543	1
404			min	-19.966	10	-72.033	2	-24.62	4	0	4	-.014	4	-.339	3
405		13	max	190.556	1	6.169	9	3.604	3	0	3	0	10	.549	1
406			min	-19.868	10	-72.286	2	-24.378	4	0	4	-.019	4	-.325	3
407		14	max	190.674	1	5.958	9	3.604	3	0	3	0	10	.556	2
408			min	-19.77	10	-72.539	2	-24.136	4	0	4	-.025	4	-.311	3
409		15	max	190.792	1	5.747	9	3.604	3	0	3	0	10	.572	2
410			min	-19.671	10	-72.792	2	-23.894	4	0	4	-.03	4	-.296	3
411		16	max	314.739	2	299.12	2	3.58	3	0	1	0	3	.584	2
412			min	-65.843	3	-383.728	3	-22.653	4	0	4	-.035	4	-.279	3
413		17	max	314.857	2	298.867	2	3.58	3	0	1	0	3	.555	1
414			min	-65.754	3	-383.917	3	-22.411	4	0	4	-.04	4	-.196	3
415		18	max	-12.238	12	1354.338	1	3.332	1	0	4	.002	3	.266	1
416			min	-354.912	1	-486.333	3	-56.945	5	0	1	-.052	4	-.091	3
417		19	max	-12.179	12	1354.085	1	3.332	1	0	4	.002	3	.015	3
418			min	-354.794	1	-486.523	3	-56.703	5	0	1	-.064	4	-.027	1
419	M9	1	max	161.175	1	342.162	3	241.57	4	0	3	-.003	15	.013	1
420			min	4	15	-363.743	1	9.598	10	0	1	-.197	1	-.01	3
421		2	max	161.293	1	341.972	3	241.812	4	0	3	.043	5	.092	1
422			min	4.036	15	-363.996	1	9.598	10	0	1	-.167	1	-.084	3
423		3	max	111.474	1	7.863	9	93.642	1	0	1	.088	5	.169	1
424			min	-.723	10	-19.095	3	-33.738	5	0	5	-.136	1	-.157	3
425		4	max	111.592	1	7.652	9	93.642	1	0	1	.08	5	.169	1
426			min	-.625	10	-19.284	3	-33.496	5	0	5	-.116	1	-.153	3
427		5	max	111.71	1	7.441	9	93.642	1	0	1	.073	5	.169	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
428			min	-.526	10	-19.474	3	-33.254	5	0	5	-.096	1	-.149	3
429		6	max	111.828	1	7.23	9	93.642	1	0	1	.066	5	.17	1
430			min	-.428	10	-19.664	3	-33.012	5	0	5	-.075	1	-.144	3
431		7	max	111.946	1	7.019	9	93.642	1	0	1	.059	5	.17	1
432			min	-.33	10	-19.854	3	-32.77	5	0	5	-.055	1	-.14	3
433		8	max	112.064	1	6.809	9	93.642	1	0	1	.052	5	.17	1
434			min	-.231	10	-20.044	3	-32.528	5	0	5	-.035	1	-.136	3
435		9	max	112.182	1	6.598	9	93.642	1	0	1	.045	5	.171	1
436			min	-.133	10	-20.233	3	-32.286	5	0	5	-.015	1	-.131	3
437		10	max	112.3	1	6.387	9	93.642	1	0	1	.038	4	.171	1
438			min	-.035	10	-20.423	3	-32.044	5	0	5	0	10	-.127	3
439		11	max	112.418	1	6.176	9	93.642	1	0	1	.035	4	.172	1
440			min	.064	10	-20.613	3	-31.802	5	0	5	.002	10	-.122	3
441		12	max	112.536	1	5.965	9	93.642	1	0	1	.046	1	.173	2
442			min	.162	10	-20.803	3	-31.56	5	0	5	.004	10	-.118	3
443		13	max	112.654	1	5.754	9	93.642	1	0	1	.067	1	.177	2
444			min	.26	10	-20.993	3	-31.318	5	0	5	.005	12	-.113	3
445		14	max	112.772	1	5.543	9	93.642	1	0	1	.087	1	.182	2
446			min	.359	10	-21.235	2	-31.076	5	0	5	.005	12	-.109	3
447		15	max	112.89	1	5.332	9	93.642	1	0	1	.107	1	.186	2
448			min	.457	10	-21.488	2	-30.834	5	0	5	.002	15	-.104	3
449		16	max	90.667	2	55.062	2	94.492	1	0	10	.129	1	.19	2
450			min	-19.599	3	-125.496	3	-29.359	5	0	4	0	5	-.099	3
451		17	max	90.785	2	54.809	2	94.492	1	0	10	.15	1	.19	1
452			min	-19.51	3	-125.685	3	-29.117	5	0	4	-.007	5	-.071	3
453		18	max	.335	15	411.258	1	99.647	1	0	1	.172	1	.103	1
454			min	-161.044	1	-147.82	3	-61.886	5	0	3	-.02	5	-.039	3
455		19	max	.37	15	411.004	1	99.647	1	0	1	.193	1	.014	1
456			min	-160.926	1	-148.01	3	-61.644	5	0	3	-.034	5	-.007	3
457	M13	1	max	241.591	4	363.063	1	-4	15	.013	1	.197	1	0	1
458			min	9.602	10	-342.143	3	-161.153	1	-.01	3	.003	15	0	3
459		2	max	232.239	4	256.121	1	-2.624	15	.013	1	.063	1	.275	3
460			min	9.602	10	-241.292	3	-123.546	1	-.01	3	0	15	-.292	1
461		3	max	222.888	4	149.179	1	-1.249	15	.013	1	.001	3	.456	3
462			min	9.602	10	-140.441	3	-85.938	1	-.01	3	-.036	1	-.484	1
463		4	max	213.536	4	42.237	1	.127	15	.013	1	-.002	12	.541	3
464			min	9.602	10	-39.589	3	-48.331	1	-.01	3	-.1	1	-.574	1
465		5	max	204.185	4	61.262	3	2.218	5	.013	1	-.002	15	.531	3
466			min	9.602	10	-64.705	1	-10.723	1	-.01	3	-.128	1	-.564	1
467		6	max	194.833	4	162.113	3	26.884	1	.013	1	0	15	.425	3
468			min	9.602	10	-171.647	1	.5	12	-.01	3	-.12	1	-.452	1
469		7	max	185.482	4	262.965	3	64.492	1	.013	1	.005	5	.224	3
470			min	9.602	10	-278.589	1	1.842	12	-.01	3	-.077	1	-.239	1
471		8	max	176.13	4	363.816	3	102.099	1	.013	1	.013	4	.074	1
472			min	9.602	10	-385.531	1	3.184	12	-.01	3	0	3	-.072	3
473		9	max	166.779	4	464.667	3	139.707	1	.013	1	.116	1	.489	1
474			min	9.602	10	-492.474	1	4.527	12	-.01	3	.004	12	-.463	3
475		10	max	157.427	4	565.518	3	177.314	1	.011	2	.266	1	1.005	1
476			min	9.602	10	-599.416	1	5.869	12	-.013	1	.008	12	-.949	3
477		11	max	117.497	4	492.473	1	-.308	15	.01	3	.11	1	.489	1
478			min	4.184	12	-464.667	3	-138.928	1	-.013	1	-.017	5	-.463	3
479		12	max	108.145	4	385.531	1	1.371	5	.01	3	0	10	.074	1
480			min	4.184	12	-363.816	3	-101.321	1	-.013	1	-.017	4	-.072	3
481		13	max	100.191	1	278.589	1	3.499	5	.01	3	-.004	12	.224	3
482			min	4.184	12	-262.964	3	-63.713	1	-.013	1	-.081	1	-.239	1
483		14	max	100.191	1	171.647	1	5.627	5	.01	3	-.005	12	.425	3
484			min	4.184	12	-162.113	3	-26.106	1	-.013	1	-.123	1	-.452	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
485		15	max	100.191	1	64.705	1	11.502	1	.01	3	-.002	15	.531	3
486			min	4.184	12	-61.262	3	.795	10	-.013	1	-.13	1	-.564	1
487		16	max	100.191	1	39.589	3	49.109	1	.01	3	.005	5	.541	3
488			min	4.184	12	-42.237	1	2.304	12	-.013	1	-.102	1	-.574	1
489		17	max	100.191	1	140.441	3	86.717	1	.01	3	.015	5	.456	3
490			min	4.184	12	-149.179	1	3.646	12	-.013	1	-.038	1	-.484	1
491		18	max	100.191	1	241.292	3	124.324	1	.01	3	.062	1	.275	3
492			min	4.184	12	-256.121	1	4.988	12	-.013	1	.003	12	-.292	1
493		19	max	100.191	1	342.143	3	161.932	1	.01	3	.197	1	0	1
494			min	4.184	12	-363.064	1	6.331	12	-.013	1	.009	12	0	3
495	M16	1	max	61.643	5	411.732	1	.37	15	.007	3	.193	1	0	1
496			min	-99.216	1	-148.036	3	-160.943	1	-.014	1	-.034	5	0	3
497		2	max	52.292	5	290.449	1	2.327	5	.007	3	.059	1	.119	3
498			min	-99.216	1	-104.55	3	-123.335	1	-.014	1	-.033	5	-.332	1
499		3	max	42.94	5	169.166	1	4.455	5	.007	3	-.001	12	.197	3
500			min	-99.216	1	-61.063	3	-85.728	1	-.014	1	-.04	1	-.549	1
501		4	max	33.589	5	47.882	1	6.583	5	.007	3	-.004	12	.235	3
502			min	-99.216	1	-17.577	3	-48.12	1	-.014	1	-.103	1	-.651	1
503		5	max	24.237	5	25.91	3	8.711	5	.007	3	-.005	12	.231	3
504			min	-99.216	1	-73.401	1	-10.513	1	-.014	1	-.131	1	-.639	1
505		6	max	14.886	5	69.396	3	27.095	1	.007	3	-.005	15	.186	3
506			min	-99.216	1	-194.684	1	.65	12	-.014	1	-.123	1	-.512	1
507		7	max	5.534	5	112.883	3	64.702	1	.007	3	.004	5	.1	3
508			min	-99.216	1	-315.968	1	1.992	12	-.014	1	-.08	1	-.271	1
509		8	max	-2.348	12	156.369	3	102.31	1	.007	3	.017	4	.084	1
510			min	-99.216	1	-437.251	1	3.334	12	-.014	1	-.002	3	-.028	3
511		9	max	-2.348	12	199.856	3	139.917	1	.007	3	.114	1	.555	1
512			min	-99.216	1	-558.534	1	4.676	12	-.014	1	.002	12	-.196	3
513		10	max	34.22	5	-16.532	15	177.525	1	.005	14	.264	1	1.139	1
514			min	-102.583	1	-679.818	1	-9.226	3	-.014	1	.009	12	-.405	3
515		11	max	24.869	5	558.534	1	-.254	15	.014	1	.114	1	.555	1
516			min	-102.583	1	-199.856	3	-139.628	1	-.007	3	-.015	5	-.196	3
517		12	max	15.517	5	437.251	1	1.448	5	.014	1	0	2	.084	1
518			min	-102.583	1	-156.369	3	-102.021	1	-.007	3	-.015	4	-.028	3
519		13	max	6.166	5	315.968	1	3.576	5	.014	1	-.003	12	.1	3
520			min	-102.583	1	-112.883	3	-64.413	1	-.007	3	-.078	1	-.271	1
521		14	max	-1.987	15	194.684	1	5.704	5	.014	1	-.004	12	.186	3
522			min	-102.583	1	-69.396	3	-26.806	1	-.007	3	-.121	1	-.512	1
523		15	max	-4.42	12	73.401	1	10.801	1	.014	1	0	15	.231	3
524			min	-102.583	1	-25.91	3	.551	12	-.007	3	-.129	1	-.639	1
525		16	max	-4.42	12	17.577	3	48.409	1	.014	1	.007	5	.235	3
526			min	-102.583	1	-47.882	1	1.893	12	-.007	3	-.101	1	-.651	1
527		17	max	-4.42	12	61.063	3	86.016	1	.014	1	.017	5	.197	3
528			min	-102.583	1	-169.166	1	3.235	12	-.007	3	-.038	1	-.549	1
529		18	max	-4.42	12	104.55	3	123.624	1	.014	1	.061	1	.119	3
530			min	-102.583	1	-290.449	1	4.577	12	-.007	3	.003	12	-.332	1
531		19	max	-4.42	12	148.036	3	161.231	1	.014	1	.196	1	0	1
532			min	-102.583	1	-411.732	1	5.919	12	-.007	3	.008	12	0	5
533	M15	1	max	0	4	2.307	2	.024	3	0	1	0	1	0	1
534			min	-40.623	1	0	4	-.027	1	0	3	0	3	0	1
535		2	max	0	4	2.051	2	.024	3	0	1	0	1	0	4
536			min	-40.71	1	0	4	-.027	1	0	3	0	3	-.001	2
537		3	max	0	4	1.795	2	.024	3	0	1	0	1	0	4
538			min	-40.797	1	0	4	-.027	1	0	3	0	3	-.002	2
539		4	max	0	4	1.538	2	.024	3	0	1	0	1	0	4
540			min	-40.884	1	0	4	-.027	1	0	3	0	3	-.003	2
541		5	max	0	4	1.282	2	.024	3	0	1	0	1	0	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
542			min	-40.971	1	0	4	-.027	1	0	3	0	3	-.004	2
543		6	max	0	4	1.026	2	.024	3	0	1	0	1	0	4
544			min	-41.058	1	0	4	-.027	1	0	3	0	3	-.004	2
545		7	max	0	4	.769	2	.024	3	0	1	0	3	0	4
546			min	-41.145	1	0	4	-.027	1	0	3	0	2	-.005	2
547		8	max	0	4	.513	2	.024	3	0	1	0	3	0	4
548			min	-41.232	1	0	4	-.027	1	0	3	0	1	-.005	2
549		9	max	0	4	.256	2	.024	3	0	1	0	3	0	4
550			min	-41.319	1	0	4	-.027	1	0	3	0	1	-.005	2
551		10	max	0	4	0	1	.024	3	0	1	0	3	0	4
552			min	-41.406	1	0	1	-.027	1	0	3	0	1	-.005	2
553		11	max	0	4	0	4	.024	3	0	1	0	3	0	4
554			min	-41.493	1	-.256	1	-.027	1	0	3	0	1	-.005	2
555		12	max	0	4	0	4	.024	3	0	1	0	3	0	4
556			min	-41.579	1	-.513	1	-.027	1	0	3	0	1	-.005	2
557		13	max	0	4	0	4	.024	3	0	1	0	3	0	4
558			min	-41.666	1	-.769	1	-.027	1	0	3	0	1	-.005	2
559		14	max	0	4	0	4	.024	3	0	1	0	3	0	4
560			min	-41.753	1	-1.026	1	-.027	1	0	3	0	1	-.004	2
561		15	max	0	4	0	4	.024	3	0	1	0	3	0	4
562			min	-41.84	1	-1.282	1	-.027	1	0	3	0	1	-.004	2
563		16	max	0	4	0	4	.024	3	0	1	0	3	0	4
564			min	-41.927	1	-1.538	1	-.027	1	0	3	0	1	-.003	2
565		17	max	0	4	0	4	.024	3	0	1	0	3	0	4
566			min	-42.014	1	-1.795	1	-.027	1	0	3	0	1	-.002	2
567		18	max	0	4	0	4	.024	3	0	1	0	3	0	4
568			min	-42.101	1	-2.051	1	-.027	1	0	3	0	1	-.001	2
569		19	max	0	4	0	4	.024	3	0	1	0	3	0	1
570			min	-42.188	1	-2.307	1	-.027	1	0	3	0	1	0	1
571	M16A	1	max	-1.024	10	3.636	4	.247	4	0	3	0	3	0	1
572			min	-274.253	4	1.15	15	-.01	3	0	1	0	4	0	1
573		2	max	-.952	10	3.232	4	.223	4	0	3	0	3	0	15
574			min	-274.362	4	1.022	15	-.01	3	0	1	0	4	-.002	4
575		3	max	-.88	10	2.828	4	.198	4	0	3	0	3	-.001	15
576			min	-274.472	4	.894	15	-.01	3	0	1	0	4	-.003	4
577		4	max	-.807	10	2.424	4	.174	4	0	3	0	3	-.001	15
578			min	-274.581	4	.767	15	-.01	3	0	1	0	4	-.005	4
579		5	max	-.735	10	2.02	4	.15	4	0	3	0	3	-.002	15
580			min	-274.691	4	.639	15	-.01	3	0	1	0	1	-.006	4
581		6	max	-.662	10	1.616	4	.126	4	0	3	0	5	-.002	15
582			min	-274.8	4	.511	15	-.01	3	0	1	0	1	-.007	4
583		7	max	-.59	10	1.212	4	.101	4	0	3	0	5	-.002	15
584			min	-274.909	4	.383	15	-.01	3	0	1	0	1	-.007	4
585		8	max	-.517	10	.808	4	.077	4	0	3	0	5	-.002	15
586			min	-275.019	4	.256	15	-.01	3	0	1	0	1	-.008	4
587		9	max	-.445	10	.404	4	.053	4	0	3	0	5	-.003	15
588			min	-275.128	4	.128	15	-.01	3	0	1	0	1	-.008	4
589		10	max	-.372	10	0	1	.028	4	0	3	0	5	-.003	15
590			min	-275.238	4	0	1	-.01	3	0	1	0	1	-.008	4
591		11	max	-.3	10	-.128	15	.02	1	0	3	0	5	-.003	15
592			min	-275.347	4	-.404	4	-.01	3	0	1	0	1	-.008	4
593		12	max	-.228	10	-.256	15	.02	1	0	3	0	5	-.002	15
594			min	-275.457	4	-.808	4	-.024	5	0	1	0	1	-.008	4
595		13	max	-.155	10	-.383	15	.02	1	0	3	0	5	-.002	15
596			min	-275.566	4	-1.212	4	-.049	5	0	1	0	3	-.007	4
597		14	max	-.083	10	-.511	15	.02	1	0	3	0	4	-.002	15
598			min	-275.676	4	-1.616	4	-.073	5	0	1	0	3	-.007	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
599		15	max	-.01	10	-.639	15	.02	1	0	3	0	4	-.002	15
600			min	-275.785	4	-2.02	4	-.097	5	0	1	0	3	-.006	4
601		16	max	.062	10	-.767	15	.02	1	0	3	0	4	-.001	15
602			min	-275.895	4	-2.424	4	-.122	5	0	1	0	3	-.005	4
603		17	max	.135	10	-.894	15	.02	1	0	3	0	1	-.001	15
604			min	-276.004	4	-2.828	4	-.146	5	0	1	0	5	-.003	4
605		18	max	.207	10	-1.022	15	.02	1	0	3	0	1	0	15
606			min	-276.113	4	-3.232	4	-.17	5	0	1	0	5	-.002	4
607		19	max	.279	10	-1.15	15	.02	1	0	3	0	1	0	1
608			min	-276.223	4	-3.636	4	-.194	5	0	1	0	5	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	.009	2	.018	1	2.066e-3	5	NC	3	NC	3
2			min	-.003	3	-.008	3	-.02	5	-1.579e-3	1	4166.282	2	1970.15	1
3		2	max	.003	1	.008	2	.017	1	2.093e-3	5	NC	3	NC	3
4			min	-.003	3	-.008	3	-.02	5	-1.512e-3	1	4526.106	2	2126.925	1
5		3	max	.003	1	.007	2	.016	1	2.12e-3	5	NC	3	NC	3
6			min	-.003	3	-.007	3	-.019	5	-1.445e-3	1	4950.335	2	2311.75	1
7		4	max	.003	1	.007	2	.014	1	2.147e-3	5	NC	3	NC	3
8			min	-.003	3	-.007	3	-.018	5	-1.378e-3	1	5453.797	2	2531.371	1
9		5	max	.003	1	.006	2	.013	1	2.174e-3	5	NC	3	NC	3
10			min	-.003	3	-.007	3	-.017	5	-1.311e-3	1	6056.053	2	2794.784	1
11		6	max	.002	1	.005	2	.012	1	2.202e-3	5	NC	1	NC	3
12			min	-.002	3	-.006	3	-.016	5	-1.244e-3	1	6783.314	2	3114.213	1
13		7	max	.002	1	.005	2	.01	1	2.229e-3	5	NC	1	NC	3
14			min	-.002	3	-.006	3	-.015	5	-1.177e-3	1	7671.363	2	3506.601	1
15		8	max	.002	1	.004	2	.009	1	2.256e-3	5	NC	1	NC	3
16			min	-.002	3	-.006	3	-.014	5	-1.11e-3	1	8770.114	2	3996.009	1
17		9	max	.002	1	.004	2	.008	1	2.283e-3	5	NC	1	NC	2
18			min	-.002	3	-.005	3	-.013	5	-1.043e-3	1	NC	1	4617.561	1
19		10	max	.002	1	.003	2	.007	1	2.31e-3	5	NC	1	NC	2
20			min	-.002	3	-.005	3	-.012	5	-9.763e-4	1	NC	1	5424.246	1
21		11	max	.001	1	.003	2	.006	1	2.338e-3	5	NC	1	NC	2
22			min	-.001	3	-.004	3	-.011	5	-9.094e-4	1	NC	1	6499.22	1
23		12	max	.001	1	.002	2	.005	1	2.365e-3	5	NC	1	NC	2
24			min	-.001	3	-.004	3	-.01	5	-8.425e-4	1	NC	1	7979.413	1
25		13	max	.001	1	.002	2	.004	1	2.392e-3	5	NC	1	NC	1
26			min	-.001	3	-.003	3	-.009	5	-7.755e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.003	1	2.419e-3	5	NC	1	NC	1
28			min	0	3	-.003	3	-.007	5	-7.086e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	2.446e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.006	5	-6.417e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	2.474e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.005	5	-5.748e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.501e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-5.078e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.528e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.002	5	-4.409e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.555e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.74e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.741e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.189e-3	5	NC	1	NC	1
41		2	max	0	3	0	2	.006	5	2.173e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.2e-3	5	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
43		3	max	0	3	0	2	.012	5	2.605e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	-1.21e-3	5	NC	1	8092.245	14
45		4	max	0	3	0	2	.019	5	3.037e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.002	1	-1.221e-3	5	NC	1	5268.988	14
47		5	max	0	3	0	2	.025	5	3.469e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.002	1	-1.231e-3	5	NC	1	3870.542	14
49		6	max	0	3	0	2	.031	4	3.901e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.242e-3	5	NC	1	3040.576	14
51		7	max	0	3	0	2	.037	4	4.333e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	-.001	1	-1.253e-3	5	NC	1	2493.857	14
53		8	max	0	3	.001	2	.044	4	4.765e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	-1.263e-3	5	NC	1	2108.281	14
55		9	max	0	3	.002	2	.05	4	5.196e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	-1.274e-3	5	NC	1	1822.893	14
57		10	max	0	3	.002	2	.056	4	5.628e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-1.285e-3	5	NC	1	1603.898	14
59		11	max	0	3	.003	2	.062	4	6.06e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.295e-3	5	NC	1	1431.064	14
61		12	max	0	3	.003	2	.068	4	6.492e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	12	-1.306e-3	5	NC	1	1291.553	14
63		13	max	0	3	.004	2	.074	4	6.924e-4	1	NC	1	NC	1
64			min	0	2	-.008	3	0	12	-1.316e-3	5	NC	1	1176.832	14
65		14	max	.001	3	.005	2	.08	4	7.356e-4	1	NC	1	NC	1
66			min	0	2	-.008	3	0	12	-1.327e-3	5	9523.667	2	1081.009	14
67		15	max	.001	3	.006	2	.086	4	7.788e-4	1	NC	1	NC	2
68			min	0	2	-.008	3	0	12	-1.338e-3	5	8039.685	2	999.892	14
69		16	max	.001	3	.007	2	.092	4	8.22e-4	1	NC	3	NC	2
70			min	0	2	-.008	3	0	12	-1.348e-3	5	6883.618	2	930.415	14
71		17	max	.001	3	.008	2	.098	4	8.651e-4	1	NC	3	NC	2
72			min	-.001	2	-.008	3	0	12	-1.359e-3	5	5974.111	2	870.286	14
73		18	max	.001	3	.009	2	.104	4	9.083e-4	1	NC	3	NC	2
74			min	-.001	2	-.008	3	0	12	-1.369e-3	5	5252.472	2	817.756	14
75		19	max	.001	3	.01	2	.11	4	9.515e-4	1	NC	3	NC	2
76			min	-.001	2	-.008	3	0	12	-1.38e-3	5	4676.077	2	771.469	14
77	M4	1	max	.003	1	.01	2	0	12	6.574e-3	5	NC	1	NC	3
78			min	0	3	-.008	3	-.116	4	-1.252e-3	1	NC	1	167.039	4
79		2	max	.002	1	.01	2	0	12	6.574e-3	5	NC	1	NC	3
80			min	0	3	-.008	3	-.106	4	-1.252e-3	1	NC	1	182.099	4
81		3	max	.002	1	.009	2	0	12	6.574e-3	5	NC	1	NC	3
82			min	0	3	-.007	3	-.097	4	-1.252e-3	1	NC	1	200.025	4
83		4	max	.002	1	.008	2	0	12	6.574e-3	5	NC	1	NC	3
84			min	0	3	-.007	3	-.087	4	-1.252e-3	1	NC	1	221.572	4
85		5	max	.002	1	.008	2	0	12	6.574e-3	5	NC	1	NC	2
86			min	0	3	-.006	3	-.078	4	-1.252e-3	1	NC	1	247.769	4
87		6	max	.002	1	.007	2	0	12	6.574e-3	5	NC	1	NC	2
88			min	0	3	-.006	3	-.069	4	-1.252e-3	1	NC	1	280.044	4
89		7	max	.002	1	.007	2	0	12	6.574e-3	5	NC	1	NC	2
90			min	0	3	-.005	3	-.06	4	-1.252e-3	1	NC	1	320.436	4
91		8	max	.002	1	.006	2	0	12	6.574e-3	5	NC	1	NC	2
92			min	0	3	-.005	3	-.052	4	-1.252e-3	1	NC	1	371.926	4
93		9	max	.001	1	.006	2	0	12	6.574e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.044	4	-1.252e-3	1	NC	1	439.027	4
95		10	max	.001	1	.005	2	0	12	6.574e-3	5	NC	1	NC	2
96			min	0	3	-.004	3	-.037	4	-1.252e-3	1	NC	1	528.83	4
97		11	max	.001	1	.004	2	0	12	6.574e-3	5	NC	1	NC	1
98			min	0	3	-.004	3	-.03	4	-1.252e-3	1	NC	1	653.015	4
99		12	max	0	1	.004	2	0	12	6.574e-3	5	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
100			min	0	3	-.003	3	-.023	4	-1.252e-3	1	NC	1	831.957	4
101		13	max	0	1	.003	2	0	12	6.574e-3	5	NC	1	NC	1
102			min	0	3	-.003	3	-.018	4	-1.252e-3	1	NC	1	1103.873	4
103		14	max	0	1	.003	2	0	12	6.574e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.012	4	-1.252e-3	1	NC	1	1547.598	4
105		15	max	0	1	.002	2	0	12	6.574e-3	5	NC	1	NC	1
106			min	0	3	-.002	3	-.008	4	-1.252e-3	1	NC	1	2348.342	4
107		16	max	0	1	.002	2	0	12	6.574e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.005	4	-1.252e-3	1	NC	1	4032.628	4
109		17	max	0	1	.001	2	0	12	6.574e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-1.252e-3	1	NC	1	8645.384	4
111		18	max	0	1	0	2	0	12	6.574e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-1.252e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	6.574e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.252e-3	1	NC	1	NC	1
115	M6	1	max	.011	1	.029	2	.005	1	2.297e-3	4	NC	3	NC	2
116			min	-.011	3	-.023	3	-.021	5	3.817e-6	10	1255.412	2	7129.532	1
117		2	max	.01	1	.027	2	.005	1	2.318e-3	4	NC	3	NC	2
118			min	-.01	3	-.022	3	-.02	5	2.792e-6	10	1341.381	2	7757.913	1
119		3	max	.01	1	.025	2	.004	1	2.339e-3	4	NC	3	NC	2
120			min	-.009	3	-.021	3	-.019	5	1.766e-6	10	1439.644	2	8503.439	1
121		4	max	.009	1	.023	2	.004	1	2.36e-3	4	NC	3	NC	2
122			min	-.009	3	-.02	3	-.018	5	7.409e-7	10	1552.658	2	9396.228	1
123		5	max	.008	1	.022	2	.003	1	2.382e-3	4	NC	3	NC	1
124			min	-.008	3	-.019	3	-.018	5	-2.845e-7	10	1683.586	2	NC	1
125		6	max	.008	1	.02	2	.003	1	2.403e-3	4	NC	3	NC	1
126			min	-.008	3	-.017	3	-.017	5	-1.31e-6	10	1836.573	2	NC	1
127		7	max	.007	1	.018	2	.003	1	2.424e-3	4	NC	3	NC	1
128			min	-.007	3	-.016	3	-.016	5	-2.335e-6	10	2017.145	2	NC	1
129		8	max	.007	1	.016	2	.002	1	2.445e-3	4	NC	3	NC	1
130			min	-.007	3	-.015	3	-.015	5	-3.361e-6	10	2232.844	2	NC	1
131		9	max	.006	1	.015	2	.002	1	2.466e-3	4	NC	3	NC	1
132			min	-.006	3	-.014	3	-.014	5	-4.386e-6	10	2494.228	2	NC	1
133		10	max	.005	1	.013	2	.002	1	2.488e-3	4	NC	3	NC	1
134			min	-.005	3	-.012	3	-.013	5	-5.412e-6	10	2816.552	2	NC	1
135		11	max	.005	1	.011	2	.001	1	2.509e-3	4	NC	3	NC	1
136			min	-.005	3	-.011	3	-.012	5	-6.437e-6	10	3222.693	2	NC	1
137		12	max	.004	1	.01	2	.001	1	2.53e-3	4	NC	3	NC	1
138			min	-.004	3	-.01	3	-.01	5	-1.162e-5	2	3748.602	2	NC	1
139		13	max	.004	1	.008	2	0	1	2.551e-3	4	NC	3	NC	1
140			min	-.004	3	-.008	3	-.009	5	-1.697e-5	2	4454.186	2	NC	1
141		14	max	.003	1	.007	2	0	1	2.573e-3	4	NC	3	NC	1
142			min	-.003	3	-.007	3	-.008	5	-2.231e-5	2	5447.269	2	NC	1
143		15	max	.002	1	.005	2	0	1	2.594e-3	4	NC	3	NC	1
144			min	-.002	3	-.006	3	-.006	5	-2.766e-5	2	6943.47	2	NC	1
145		16	max	.002	1	.004	2	0	1	2.615e-3	4	NC	1	NC	1
146			min	-.002	3	-.004	3	-.005	5	-3.301e-5	2	9445.869	2	NC	1
147		17	max	.001	1	.003	2	0	1	2.636e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.003	5	-3.836e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	2	2.657e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.002	5	-4.371e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.679e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.906e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.254e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.247e-3	4	NC	1	NC	1
155		2	max	0	3	.001	2	.006	4	1.917e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-1.24e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.013	4	1.745e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	2	-1.234e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.019	4	1.938e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.227e-3	4	NC	1	NC	1
161		5	max	.001	3	.006	2	.026	4	2.131e-5	1	NC	3	NC	1
162			min	-.001	2	-.007	3	0	2	-1.221e-3	4	8068.848	2	NC	1
163		6	max	.001	3	.007	2	.032	4	2.323e-5	1	NC	3	NC	1
164			min	-.001	2	-.009	3	0	2	-1.215e-3	4	6471.847	2	NC	1
165		7	max	.002	3	.009	2	.039	4	2.647e-5	3	NC	3	NC	1
166			min	-.002	2	-.01	3	0	2	-1.208e-3	4	5381.279	2	NC	1
167		8	max	.002	3	.01	2	.045	4	3.872e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-1.202e-3	4	4582.779	2	NC	1
169		9	max	.002	3	.012	2	.051	4	5.096e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	0	1	-1.196e-3	4	3969.521	2	NC	1
171		10	max	.002	3	.013	2	.058	4	6.321e-5	3	NC	3	NC	1
172			min	-.003	2	-.015	3	-.001	1	-1.189e-3	4	3482.301	2	NC	1
173		11	max	.003	3	.015	2	.064	4	7.545e-5	3	NC	3	NC	1
174			min	-.003	2	-.016	3	-.001	1	-1.183e-3	4	3085.594	2	NC	1
175		12	max	.003	3	.017	2	.07	4	8.77e-5	3	NC	3	NC	1
176			min	-.003	2	-.017	3	-.001	1	-1.177e-3	4	2756.692	2	NC	1
177		13	max	.003	3	.019	2	.076	4	9.994e-5	3	NC	3	NC	1
178			min	-.004	2	-.018	3	-.002	1	-1.17e-3	4	2480.311	2	NC	1
179		14	max	.003	3	.021	2	.082	4	1.122e-4	3	NC	3	NC	1
180			min	-.004	2	-.019	3	-.002	1	-1.164e-3	4	2245.703	2	NC	1
181		15	max	.004	3	.023	2	.087	4	1.244e-4	3	NC	3	NC	1
182			min	-.004	2	-.02	3	-.002	1	-1.157e-3	4	2045.028	2	NC	1
183		16	max	.004	3	.025	2	.093	4	1.367e-4	3	NC	3	NC	1
184			min	-.004	2	-.021	3	-.002	1	-1.151e-3	4	1872.39	2	NC	1
185		17	max	.004	3	.027	2	.099	4	1.489e-4	3	NC	3	NC	1
186			min	-.005	2	-.022	3	-.002	1	-1.145e-3	4	1723.244	2	NC	1
187		18	max	.004	3	.029	2	.104	4	1.612e-4	3	NC	3	NC	1
188			min	-.005	2	-.022	3	-.002	1	-1.138e-3	4	1594.014	2	NC	1
189		19	max	.005	3	.031	2	.11	4	1.734e-4	3	NC	3	NC	1
190			min	-.005	2	-.023	3	-.003	1	-1.132e-3	4	1481.845	2	NC	1
191	M8	1	max	.007	1	.033	2	.003	1	6.357e-3	4	NC	1	NC	2
192			min	0	3	-.023	3	-.116	4	-2.08e-4	1	NC	1	167.017	4
193		2	max	.006	1	.031	2	.003	1	6.357e-3	4	NC	1	NC	2
194			min	0	3	-.022	3	-.106	4	-2.08e-4	1	NC	1	182.075	4
195		3	max	.006	1	.029	2	.002	1	6.357e-3	4	NC	1	NC	2
196			min	0	3	-.021	3	-.097	4	-2.08e-4	1	NC	1	199.998	4
197		4	max	.006	1	.027	2	.002	1	6.357e-3	4	NC	1	NC	2
198			min	0	3	-.02	3	-.087	4	-2.08e-4	1	NC	1	221.541	4
199		5	max	.005	1	.026	2	.002	1	6.357e-3	4	NC	1	NC	2
200			min	0	3	-.018	3	-.078	4	-2.08e-4	1	NC	1	247.733	4
201		6	max	.005	1	.024	2	.002	1	6.357e-3	4	NC	1	NC	1
202			min	0	3	-.017	3	-.069	4	-2.08e-4	1	NC	1	280.003	4
203		7	max	.005	1	.022	2	.002	1	6.357e-3	4	NC	1	NC	1
204			min	0	3	-.016	3	-.06	4	-2.08e-4	1	NC	1	320.388	4
205		8	max	.004	1	.02	2	.001	1	6.357e-3	4	NC	1	NC	1
206			min	0	3	-.014	3	-.052	4	-2.08e-4	1	NC	1	371.869	4
207		9	max	.004	1	.018	2	.001	1	6.357e-3	4	NC	1	NC	1
208			min	0	3	-.013	3	-.044	4	-2.08e-4	1	NC	1	438.958	4
209		10	max	.003	1	.016	2	0	1	6.357e-3	4	NC	1	NC	1
210			min	0	3	-.012	3	-.037	4	-2.08e-4	1	NC	1	528.746	4
211		11	max	.003	1	.015	2	0	1	6.357e-3	4	NC	1	NC	1
212			min	0	3	-.01	3	-.03	4	-2.08e-4	1	NC	1	652.909	4
213		12	max	.003	1	.013	2	0	1	6.357e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.009	3	-.023	4	-2.08e-4	1	NC	1	831.82	4
215		13	max	.002	1	.011	2	0	1	6.357e-3	4	NC	1	NC	1
216			min	0	3	-.008	3	-.018	4	-2.08e-4	1	NC	1	1103.689	4
217		14	max	.002	1	.009	2	0	1	6.357e-3	4	NC	1	NC	1
218			min	0	3	-.007	3	-.012	4	-2.08e-4	1	NC	1	1547.336	4
219		15	max	.002	1	.007	2	0	1	6.357e-3	4	NC	1	NC	1
220			min	0	3	-.005	3	-.008	4	-2.08e-4	1	NC	1	2347.939	4
221		16	max	.001	1	.005	2	0	1	6.357e-3	4	NC	1	NC	1
222			min	0	3	-.004	3	-.005	4	-2.08e-4	1	NC	1	4031.925	4
223		17	max	0	1	.004	2	0	1	6.357e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	-.002	4	-2.08e-4	1	NC	1	8643.85	4
225		18	max	0	1	.002	2	0	1	6.357e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-2.08e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	6.357e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.08e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.009	2	0	3	1.27e-3	1	NC	3	NC	1
230			min	-.003	3	-.008	3	-.009	4	-1.978e-4	3	4168.396	2	NC	1
231		2	max	.003	1	.008	2	0	3	1.203e-3	1	NC	3	NC	1
232			min	-.003	3	-.008	3	-.009	4	-1.922e-4	3	4517.821	2	NC	1
233		3	max	.003	1	.007	2	0	3	1.136e-3	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.009	4	-1.866e-4	3	4927.834	2	NC	1
235		4	max	.003	1	.007	2	0	3	1.069e-3	1	NC	3	NC	1
236			min	-.003	3	-.007	3	-.009	4	-1.811e-4	3	5411.877	2	NC	1
237		5	max	.003	1	.006	2	0	3	1.051e-3	14	NC	3	NC	1
238			min	-.002	3	-.007	3	-.009	4	-1.755e-4	3	5987.549	2	NC	1
239		6	max	.002	1	.005	2	0	3	1.112e-3	4	NC	1	NC	1
240			min	-.002	3	-.006	3	-.009	4	-1.699e-4	3	6678.24	2	NC	1
241		7	max	.002	1	.005	2	0	3	1.184e-3	4	NC	1	NC	1
242			min	-.002	3	-.006	3	-.009	4	-1.644e-4	3	7515.611	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.256e-3	4	NC	1	NC	1
244			min	-.002	3	-.006	3	-.008	4	-1.588e-4	3	8543.428	2	NC	1
245		9	max	.002	1	.004	2	0	3	1.328e-3	4	NC	1	NC	1
246			min	-.002	3	-.005	3	-.008	4	-1.532e-4	3	9823.72	2	NC	1
247		10	max	.002	1	.003	2	0	3	1.4e-3	4	NC	1	NC	1
248			min	-.002	3	-.005	3	-.008	4	-1.477e-4	3	NC	1	NC	1
249		11	max	.002	1	.003	2	0	3	1.471e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.007	4	-1.421e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.543e-3	4	NC	1	NC	1
252			min	-.001	3	-.004	3	-.007	4	-1.365e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.615e-3	4	NC	1	NC	1
254			min	-.001	3	-.004	3	-.006	4	-1.31e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.687e-3	4	NC	1	NC	1
256			min	0	3	-.003	3	-.005	4	-1.254e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	1.759e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.004	4	-1.199e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.831e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-1.143e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.903e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-1.087e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.975e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.032e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.047e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-9.759e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	4.539e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-9.539e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.005	4	3.04e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.071e-3	4	NC	1	9331.85	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.01	4	1.54e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.189e-3	4	NC	1	4638.634	4
273		4	max	0	3	0	2	.015	4	4.013e-7	3	NC	1	NC	1
274			min	0	2	-.003	3	0	1	-1.306e-3	4	NC	1	3077.837	4
275		5	max	0	3	0	2	.02	4	-9.944e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	1	-1.423e-3	4	NC	1	2299.738	4
277		6	max	0	3	0	2	.025	5	-1.95e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-1.541e-3	4	NC	1	1832.636	5
279		7	max	0	3	.001	2	.03	5	-2.907e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.003	1	-1.658e-3	4	NC	1	1517.751	5
281		8	max	0	3	.001	2	.036	5	-3.863e-5	12	NC	1	NC	1
282			min	0	2	-.006	3	-.004	1	-1.775e-3	4	NC	1	1293.967	5
283		9	max	0	3	.002	2	.041	5	-4.819e-5	12	NC	1	NC	2
284			min	0	2	-.006	3	-.005	1	-1.893e-3	4	NC	1	1126.931	5
285		10	max	0	3	.002	2	.046	5	-5.775e-5	12	NC	1	NC	2
286			min	0	2	-.007	3	-.007	1	-2.01e-3	4	NC	1	997.567	5
287		11	max	0	3	.003	2	.051	5	-6.731e-5	12	NC	1	NC	2
288			min	0	2	-.007	3	-.008	1	-2.128e-3	4	NC	1	894.437	5
289		12	max	0	3	.003	2	.057	5	-7.597e-5	10	NC	1	NC	2
290			min	0	2	-.007	3	-.01	1	-2.245e-3	4	NC	1	810.264	5
291		13	max	0	3	.004	2	.062	5	-8.225e-5	10	NC	1	NC	2
292			min	0	2	-.008	3	-.011	1	-2.362e-3	4	NC	1	740.203	5
293		14	max	.001	3	.005	2	.068	5	-8.854e-5	10	NC	1	NC	2
294			min	0	2	-.008	3	-.013	1	-2.48e-3	4	9320.872	2	680.901	5
295		15	max	.001	3	.006	2	.073	5	-9.482e-5	10	NC	1	NC	3
296			min	0	2	-.008	3	-.014	1	-2.597e-3	4	7921.913	2	629.965	5
297		16	max	.001	3	.007	2	.079	5	-1.011e-4	10	NC	3	NC	3
298			min	0	2	-.008	3	-.016	1	-2.714e-3	4	6819.077	2	585.645	5
299		17	max	.001	3	.008	2	.084	5	-1.074e-4	10	NC	3	NC	3
300			min	-.001	2	-.008	3	-.017	1	-2.832e-3	4	5943.161	2	546.628	5
301		18	max	.001	3	.009	2	.09	5	-1.137e-4	10	NC	3	NC	3
302			min	-.001	2	-.008	3	-.018	1	-2.949e-3	4	5242.861	2	511.915	5
303		19	max	.001	3	.01	2	.096	5	-1.2e-4	10	NC	3	NC	3
304			min	-.001	2	-.008	3	-.02	1	-3.066e-3	4	4680.09	2	480.731	5
305	M12	1	max	.003	1	.01	2	.016	1	8.069e-3	4	NC	1	NC	3
306			min	0	3	-.008	3	-.106	5	1.117e-4	10	NC	1	182.832	5
307		2	max	.002	1	.01	2	.015	1	8.069e-3	4	NC	1	NC	3
308			min	0	3	-.008	3	-.097	5	1.117e-4	10	NC	1	199.312	5
309		3	max	.002	1	.009	2	.013	1	8.069e-3	4	NC	1	NC	3
310			min	0	3	-.007	3	-.088	5	1.117e-4	10	NC	1	218.929	5
311		4	max	.002	1	.008	2	.012	1	8.069e-3	4	NC	1	NC	3
312			min	0	3	-.007	3	-.08	5	1.117e-4	10	NC	1	242.507	5
313		5	max	.002	1	.008	2	.011	1	8.069e-3	4	NC	1	NC	3
314			min	0	3	-.006	3	-.071	5	1.117e-4	10	NC	1	271.172	5
315		6	max	.002	1	.007	2	.01	1	8.069e-3	4	NC	1	NC	3
316			min	0	3	-.006	3	-.063	5	1.117e-4	10	NC	1	306.489	5
317		7	max	.002	1	.007	2	.008	1	8.069e-3	4	NC	1	NC	3
318			min	0	3	-.005	3	-.055	5	1.117e-4	10	NC	1	350.687	5
319		8	max	.002	1	.006	2	.007	1	8.069e-3	4	NC	1	NC	3
320			min	0	3	-.005	3	-.047	5	1.117e-4	10	NC	1	407.029	5
321		9	max	.001	1	.006	2	.006	1	8.069e-3	4	NC	1	NC	3
322			min	0	3	-.004	3	-.04	5	1.117e-4	10	NC	1	480.451	5
323		10	max	.001	1	.005	2	.005	1	8.069e-3	4	NC	1	NC	2
324			min	0	3	-.004	3	-.033	5	1.117e-4	10	NC	1	578.712	5
325		11	max	.001	1	.004	2	.004	1	8.069e-3	4	NC	1	NC	2
326			min	0	3	-.004	3	-.027	5	1.117e-4	10	NC	1	714.593	5
327		12	max	0	1	.004	2	.003	1	8.069e-3	4	NC	1	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
328			min	0	3	-.003	3	-.021	5	1.117e-4	10	NC	1	910.385	5
329		13	max	0	1	.003	2	.002	1	8.069e-3	4	NC	1	NC	2
330			min	0	3	-.003	3	-.016	5	1.117e-4	10	NC	1	1207.904	5
331		14	max	0	1	.003	2	.002	1	8.069e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.011	5	1.117e-4	10	NC	1	1693.4	5
333		15	max	0	1	.002	2	.001	1	8.069e-3	4	NC	1	NC	1
334			min	0	3	-.002	3	-.008	5	1.117e-4	10	NC	1	2569.512	5
335		16	max	0	1	.002	2	0	1	8.069e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	1.117e-4	10	NC	1	4412.3	5
337		17	max	0	1	.001	2	0	1	8.069e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	1.117e-4	10	NC	1	9459.063	5
339		18	max	0	1	0	2	0	1	8.069e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	1.117e-4	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	8.069e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	1.117e-4	10	NC	1	NC	1
343	M1	1	max	.008	3	.024	3	.011	5	1.813e-2	1	NC	1	NC	1
344			min	-.008	2	-.028	1	-.006	1	-1.699e-2	3	NC	1	NC	1
345		2	max	.007	3	.014	3	.016	5	8.533e-3	1	NC	4	NC	2
346			min	-.008	2	-.016	1	-.014	1	-8.418e-3	3	3665.668	1	6056.259	1
347		3	max	.007	3	.004	3	.021	5	6.832e-4	5	NC	4	NC	3
348			min	-.008	2	-.004	1	-.019	1	-8.803e-4	1	1895.719	1	3671.352	1
349		4	max	.007	3	.006	1	.026	5	6.944e-4	5	NC	5	NC	3
350			min	-.008	2	-.004	3	-.021	1	-7.43e-4	1	1341.004	1	3036.737	1
351		5	max	.007	3	.015	1	.032	5	7.057e-4	5	NC	5	NC	3
352			min	-.008	2	-.011	3	-.022	1	-6.058e-4	1	1074.417	1	2272.709	5
353		6	max	.007	3	.022	1	.038	5	7.169e-4	5	NC	5	NC	3
354			min	-.008	2	-.016	3	-.021	1	-4.685e-4	1	923.777	1	1745.622	5
355		7	max	.007	3	.027	1	.045	5	7.282e-4	5	NC	5	NC	3
356			min	-.008	2	-.02	3	-.018	1	-3.312e-4	1	832.617	1	1404.364	5
357		8	max	.007	3	.031	1	.051	5	7.394e-4	5	NC	5	NC	2
358			min	-.008	2	-.023	3	-.015	1	-1.939e-4	1	777.458	1	1167.855	5
359		9	max	.007	3	.033	1	.058	5	7.507e-4	5	NC	5	NC	2
360			min	-.008	2	-.024	3	-.01	1	-5.667e-5	1	747.34	1	991.825	4
361		10	max	.007	3	.034	1	.065	5	7.708e-4	4	NC	5	NC	1
362			min	-.008	2	-.025	3	-.006	1	9.239e-6	10	737.211	1	846.144	4
363		11	max	.007	3	.033	1	.073	4	8.129e-4	4	NC	5	NC	1
364			min	-.008	2	-.024	3	-.001	1	2.222e-5	10	745.54	1	737.188	4
365		12	max	.007	3	.031	1	.081	4	8.551e-4	4	NC	5	NC	2
366			min	-.008	2	-.022	3	0	10	3.058e-5	12	773.684	1	653.819	4
367		13	max	.007	3	.027	1	.089	4	8.972e-4	4	NC	5	NC	2
368			min	-.008	2	-.019	3	0	12	3.464e-5	12	826.46	1	588.941	4
369		14	max	.007	3	.021	1	.096	4	9.393e-4	4	NC	5	NC	3
370			min	-.008	2	-.015	3	0	12	3.87e-5	12	914.43	1	537.863	4
371		15	max	.007	3	.014	1	.103	4	9.814e-4	4	NC	5	NC	3
372			min	-.008	2	-.01	3	0	12	4.276e-5	12	1060.245	1	497.393	4
373		16	max	.007	3	.005	1	.11	4	1.392e-3	4	NC	5	NC	3
374			min	-.008	2	-.004	3	0	12	4.556e-5	12	1317.944	1	465.315	4
375		17	max	.007	3	.003	3	.116	4	1.058e-2	4	NC	4	NC	3
376			min	-.008	2	-.006	2	0	12	-3.184e-6	2	1850.158	1	440.097	4
377		18	max	.007	3	.011	3	.121	4	1.018e-2	1	NC	4	NC	2
378			min	-.008	2	-.018	2	0	10	-3.722e-3	3	3566.193	1	420.604	4
379		19	max	.007	3	.019	3	.124	4	2.055e-2	1	NC	1	NC	1
380			min	-.008	2	-.031	2	-.004	1	-7.543e-3	3	NC	1	406.544	4
381	M5	1	max	.022	3	.073	3	.011	5	5.973e-6	4	NC	1	NC	1
382			min	-.027	2	-.087	1	-.007	1	5.779e-8	10	NC	1	NC	1
383		2	max	.022	3	.042	3	.015	5	3.435e-4	5	NC	5	NC	1
384			min	-.028	2	-.049	1	-.006	1	-8.051e-5	1	1215.194	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
385		3	max	.022	3	.013	3	.021	5	6.754e-4	5	NC	5	NC	1
386			min	-.028	2	-.013	1	-.005	1	-1.602e-4	1	625.358	1	NC	1
387		4	max	.022	3	.017	1	.027	5	7.012e-4	5	NC	5	NC	1
388			min	-.028	2	-.011	3	-.004	1	-1.501e-4	1	440.959	1	NC	1
389		5	max	.022	3	.044	1	.033	5	7.271e-4	5	NC	15	NC	1
390			min	-.028	2	-.03	3	-.004	1	-1.401e-4	1	352.25	1	NC	1
391		6	max	.022	3	.065	1	.04	5	7.529e-4	5	NC	15	NC	1
392			min	-.028	2	-.046	3	-.003	1	-1.3e-4	1	302.007	1	NC	1
393		7	max	.021	3	.082	1	.047	5	7.788e-4	5	NC	15	NC	1
394			min	-.028	2	-.058	3	-.003	1	-1.2e-4	1	271.466	1	NC	1
395		8	max	.021	3	.094	1	.054	5	8.046e-4	5	NC	15	NC	1
396			min	-.028	2	-.066	3	-.002	1	-1.099e-4	1	252.823	1	NC	1
397		9	max	.021	3	.102	1	.062	5	8.305e-4	5	9977.466	15	NC	1
398			min	-.028	2	-.07	3	-.002	1	-9.986e-5	1	242.426	1	NC	1
399		10	max	.021	3	.104	1	.069	5	8.563e-4	5	9872.337	15	NC	1
400			min	-.028	2	-.071	3	-.002	1	-8.98e-5	1	238.579	1	NC	1
401		11	max	.021	3	.102	1	.076	5	8.821e-4	5	NC	15	NC	1
402			min	-.028	2	-.069	3	-.002	1	-7.974e-5	1	240.748	1	NC	1
403		12	max	.021	3	.095	1	.084	5	9.08e-4	5	NC	15	NC	1
404			min	-.028	2	-.063	3	-.002	1	-6.969e-5	1	249.342	1	NC	1
405		13	max	.021	3	.083	1	.091	5	9.338e-4	5	NC	15	NC	1
406			min	-.028	2	-.054	3	-.002	1	-5.963e-5	1	265.901	1	NC	1
407		14	max	.021	3	.065	1	.097	4	9.597e-4	5	NC	15	NC	1
408			min	-.028	2	-.042	3	-.002	1	-4.957e-5	1	293.833	1	9221.296	4
409		15	max	.021	3	.043	1	.104	4	9.855e-4	5	NC	15	NC	1
410			min	-.028	2	-.028	3	-.002	1	-4.291e-5	2	340.499	1	9081.936	4
411		16	max	.021	3	.015	1	.11	4	1.378e-3	5	NC	5	NC	1
412			min	-.028	2	-.01	3	-.003	1	-4.133e-5	2	423.641	1	9803.063	4
413		17	max	.021	3	.01	3	.116	4	1.057e-2	4	NC	5	NC	1
414			min	-.028	2	-.018	2	-.003	1	-2.853e-4	1	598.126	1	NC	1
415		18	max	.021	3	.032	3	.121	4	5.42e-3	4	NC	5	NC	1
416			min	-.028	2	-.056	1	-.003	1	-1.463e-4	1	1159.759	1	NC	1
417		19	max	.021	3	.055	3	.125	4	1.807e-6	5	NC	1	NC	1
418			min	-.028	2	-.097	1	-.003	1	-1.506e-7	3	NC	1	NC	1
419	M9	1	max	.008	3	.024	3	.009	5	1.699e-2	3	NC	1	NC	1
420			min	-.008	2	-.028	1	-.008	1	-1.812e-2	1	NC	1	NC	1
421		2	max	.008	3	.014	3	.008	5	8.414e-3	3	NC	4	NC	2
422			min	-.008	2	-.016	1	-.002	1	-8.859e-3	1	3666.435	1	7217.144	1
423		3	max	.008	3	.004	3	.009	4	2.326e-4	1	NC	4	NC	2
424			min	-.008	2	-.004	1	0	3	-3.407e-6	3	1896.122	1	4504.634	1
425		4	max	.008	3	.006	1	.011	4	1.153e-4	1	NC	5	NC	3
426			min	-.008	2	-.004	3	0	3	-1.287e-5	3	1341.281	1	3837.834	1
427		5	max	.007	3	.015	1	.015	4	5.761e-5	5	NC	5	NC	3
428			min	-.008	2	-.011	3	0	3	-2.234e-5	3	1074.62	1	3832.665	1
429		6	max	.007	3	.022	1	.019	4	5.998e-5	5	NC	5	NC	3
430			min	-.008	2	-.016	3	-.001	3	-1.192e-4	1	923.933	1	3574.514	14
431		7	max	.007	3	.027	1	.023	4	6.234e-5	5	NC	5	NC	2
432			min	-.008	2	-.02	3	-.002	3	-2.365e-4	1	832.739	1	2715.18	4
433		8	max	.007	3	.031	1	.029	4	6.471e-5	5	NC	5	NC	1
434			min	-.008	2	-.023	3	-.002	3	-3.537e-4	1	777.553	1	2059.237	4
435		9	max	.007	3	.033	1	.035	5	6.708e-5	5	NC	5	NC	1
436			min	-.008	2	-.025	3	-.005	1	-4.71e-4	1	747.414	1	1620.361	4
437		10	max	.007	3	.034	1	.043	5	6.945e-5	5	NC	5	NC	1
438			min	-.008	2	-.025	3	-.009	1	-5.883e-4	1	737.266	1	1312.33	4
439		11	max	.007	3	.033	1	.051	5	7.181e-5	5	NC	5	NC	2
440			min	-.008	2	-.024	3	-.013	1	-7.055e-4	1	745.578	1	1087.758	4
441		12	max	.007	3	.031	1	.059	5	7.418e-5	5	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
442			min	-.008	2	-.022	3	-.016	1	-8.228e-4	1	773.705	1	918.905	4
443		13	max	.007	3	.027	1	.068	5	7.655e-5	5	NC	5	NC	3
444			min	-.008	2	-.019	3	-.019	1	-9.4e-4	1	826.463	1	786.859	5
445		14	max	.007	3	.021	1	.077	5	7.892e-5	5	NC	5	NC	3
446			min	-.008	2	-.015	3	-.021	1	-1.057e-3	1	914.414	1	681.801	5
447		15	max	.007	3	.014	1	.087	5	8.128e-5	5	NC	5	NC	3
448			min	-.008	2	-.01	3	-.021	1	-1.175e-3	1	1060.207	1	600.263	5
449		16	max	.007	3	.005	1	.096	5	4.848e-4	5	NC	5	NC	3
450			min	-.008	2	-.004	3	-.02	1	-1.26e-3	1	1317.878	1	535.802	5
451		17	max	.007	3	.003	3	.106	5	1.044e-2	4	NC	4	NC	3
452			min	-.008	2	-.006	2	-.016	1	-5.761e-4	1	1850.074	1	481.01	4
453		18	max	.007	3	.011	3	.115	5	4.976e-3	5	NC	4	NC	2
454			min	-.008	2	-.018	2	-.011	1	-1.046e-2	1	3566.032	1	434.357	4
455		19	max	.007	3	.019	3	.125	4	7.543e-3	3	NC	1	NC	1
456			min	-.008	2	-.031	2	-.002	1	-2.055e-2	1	NC	1	395.169	4
457	M13	1	max	.008	1	.024	3	.008	3	4.002e-3	3	NC	1	NC	1
458			min	-.009	5	-.028	1	-.008	2	-4.822e-3	1	NC	1	NC	1
459		2	max	.008	1	.21	3	.063	1	4.846e-3	3	NC	5	NC	3
460			min	-.009	5	-.227	1	0	5	-5.881e-3	1	1028.607	1	2985.805	1
461		3	max	.008	1	.362	3	.16	1	5.689e-3	3	NC	5	NC	3
462			min	-.009	5	-.389	1	-.001	5	-6.941e-3	1	565.814	1	1239.138	1
463		4	max	.008	1	.457	3	.242	1	6.533e-3	3	NC	5	NC	3
464			min	-.009	5	-.491	1	-.003	5	-8.e-3	1	441.264	1	827.132	1
465		5	max	.008	1	.484	3	.282	1	7.377e-3	3	NC	15	NC	3
466			min	-.01	5	-.521	1	-.006	5	-9.06e-3	1	414.527	1	710.223	1
467		6	max	.008	1	.445	3	.27	1	8.22e-3	3	NC	5	NC	3
468			min	-.01	5	-.48	1	-.011	5	-1.012e-2	1	451.976	1	743.155	1
469		7	max	.007	1	.352	3	.207	1	9.064e-3	3	NC	5	NC	3
470			min	-.01	5	-.383	1	-.015	5	-1.118e-2	1	575.992	1	963.572	1
471		8	max	.007	1	.232	3	.112	1	9.908e-3	3	NC	5	NC	3
472			min	-.01	5	-.256	1	-.017	5	-1.224e-2	1	896.197	1	1739.132	1
473		9	max	.007	1	.123	3	.021	3	1.075e-2	3	NC	5	NC	2
474			min	-.01	5	-.14	1	-.013	5	-1.33e-2	1	1827.891	1	8193.822	1
475		10	max	.007	1	.073	3	.022	3	1.159e-2	3	NC	4	NC	1
476			min	-.011	5	-.087	1	-.027	2	-1.436e-2	1	3467.862	1	NC	1
477		11	max	.007	1	.123	3	.026	1	1.075e-2	3	NC	5	NC	2
478			min	-.011	5	-.14	1	-.011	10	-1.33e-2	1	1827.893	1	6487.97	1
479		12	max	.007	1	.232	3	.123	1	9.908e-3	3	NC	5	NC	10
480			min	-.011	5	-.256	1	0	10	-1.224e-2	1	896.198	1	1593.479	1
481		13	max	.007	1	.352	3	.22	1	9.065e-3	3	NC	5	NC	10
482			min	-.011	5	-.383	1	.01	10	-1.118e-2	1	575.992	1	908.466	1
483		14	max	.007	1	.445	3	.283	1	8.222e-3	3	NC	5	NC	5
484			min	-.011	5	-.48	1	.013	15	-1.012e-2	1	451.977	1	709.007	1
485		15	max	.006	1	.484	3	.294	1	7.379e-3	3	NC	15	NC	5
486			min	-.011	5	-.52	1	.007	15	-9.058e-3	1	414.527	1	681.347	1
487		16	max	.006	1	.457	3	.252	1	6.536e-3	3	NC	5	NC	5
488			min	-.011	5	-.491	1	0	15	-7.998e-3	1	441.265	1	794.864	1
489		17	max	.006	1	.362	3	.167	1	5.692e-3	3	NC	5	NC	3
490			min	-.011	5	-.389	1	-.007	5	-6.938e-3	1	565.815	1	1188.226	1
491		18	max	.006	1	.21	3	.067	1	4.849e-3	3	NC	5	NC	3
492			min	-.011	5	-.227	1	-.009	5	-5.878e-3	1	1028.608	1	2835.899	1
493		19	max	.006	1	.024	3	.008	3	4.006e-3	3	NC	1	NC	1
494			min	-.011	5	-.028	1	-.008	2	-4.819e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.019	3	.007	3	5.052e-3	1	NC	1	NC	1
496			min	-.125	4	-.031	2	-.008	2	-3.081e-3	3	NC	1	NC	1
497		2	max	.002	1	.102	3	.068	1	6.207e-3	1	NC	5	NC	3
498			min	-.125	4	-.256	1	.002	10	-3.7e-3	3	907.344	1	2770.453	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
499		3	max	.003	1	.17	3	.168	1	7.363e-3	1	NC	5	NC	3
500			min	-.125	4	-.439	1	.011	10	-4.319e-3	3	499.128	1	1174.325	1
501		4	max	.003	1	.213	3	.253	1	8.518e-3	1	NC	5	NC	12
502			min	-.125	4	-.555	1	.018	10	-4.938e-3	3	389.282	1	790.557	1
503		5	max	.003	1	.227	3	.294	1	9.674e-3	1	NC	15	NC	12
504			min	-.125	4	-.589	1	.021	10	-5.557e-3	3	365.734	1	680.901	1
505		6	max	.003	1	.211	3	.281	1	1.083e-2	1	NC	5	NC	12
506			min	-.125	4	-.542	1	.018	10	-6.176e-3	3	398.85	1	711.911	1
507		7	max	.003	1	.173	3	.217	1	1.199e-2	1	NC	5	NC	5
508			min	-.125	4	-.432	1	.01	15	-6.795e-3	3	508.472	1	917.919	1
509		8	max	.003	1	.123	3	.12	1	1.314e-2	1	NC	5	NC	5
510			min	-.125	4	-.288	1	0	10	-7.414e-3	3	791.787	1	1629.385	1
511		9	max	.003	1	.076	3	.024	3	1.43e-2	1	NC	5	NC	2
512			min	-.125	4	-.157	1	-.011	10	-8.033e-3	3	1618.617	1	7000.031	1
513		10	max	.003	1	.055	3	.021	3	1.545e-2	1	NC	4	NC	1
514			min	-.125	4	-.097	1	-.028	2	-8.652e-3	3	3083.067	1	NC	1
515		11	max	.004	1	.076	3	.023	14	1.43e-2	1	NC	5	NC	2
516			min	-.125	4	-.157	1	-.011	10	-8.033e-3	3	1618.617	1	7556.017	1
517		12	max	.004	1	.123	3	.116	1	1.314e-2	1	NC	5	NC	3
518			min	-.125	4	-.288	1	0	10	-7.413e-3	3	791.787	1	1683.503	1
519		13	max	.004	1	.173	3	.211	1	1.199e-2	1	NC	5	NC	5
520			min	-.125	4	-.432	1	.01	10	-6.794e-3	3	508.473	1	941.319	1
521		14	max	.004	1	.211	3	.275	1	1.083e-2	1	NC	5	NC	5
522			min	-.125	4	-.542	1	.008	15	-6.174e-3	3	398.851	1	728.505	1
523		15	max	.004	1	.227	3	.287	1	9.676e-3	1	NC	15	NC	5
524			min	-.125	4	-.589	1	.001	15	-5.555e-3	3	365.734	1	696.989	1
525		16	max	.004	1	.213	3	.246	1	8.521e-3	1	NC	5	NC	3
526			min	-.124	4	-.555	1	-.007	5	-4.935e-3	3	389.282	1	811.223	1
527		17	max	.004	1	.17	3	.163	1	7.366e-3	1	NC	5	NC	3
528			min	-.124	4	-.439	1	-.014	5	-4.315e-3	3	499.128	1	1211.894	1
529		18	max	.004	1	.102	3	.065	1	6.211e-3	1	NC	5	NC	3
530			min	-.124	4	-.256	1	-.013	5	-3.696e-3	3	907.345	1	2897.667	1
531		19	max	.004	1	.019	3	.007	3	5.056e-3	1	NC	1	NC	1
532			min	-.124	4	-.031	2	-.008	2	-3.076e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.441e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.02e-4	5	NC	1	NC	1
535		2	max	0	1	-.002	15	.015	4	8.46e-4	3	NC	5	NC	1
536			min	-.001	5	-.024	1	0	3	-7.2e-4	1	4552.337	6	7285.892	4
537		3	max	0	1	-.004	15	.032	4	1.348e-3	3	NC	5	NC	1
538			min	-.002	5	-.047	1	-.003	3	-1.389e-3	1	2316.529	6	3321.698	4
539		4	max	0	1	-.006	15	.051	4	1.85e-3	3	NC	15	NC	9
540			min	-.003	5	-.069	1	-.007	3	-2.057e-3	1	1589.274	6	2119.653	4
541		5	max	0	1	-.008	15	.068	4	2.351e-3	3	NC	15	NC	9
542			min	-.004	5	-.088	1	-.011	3	-2.726e-3	1	1240.127	6	1580.027	4
543		6	max	0	1	-.01	15	.083	4	2.853e-3	3	9966.167	15	9221.725	9
544			min	-.005	5	-.105	1	-.016	3	-3.395e-3	1	1043.698	6	1297.017	4
545		7	max	0	1	-.011	15	.094	4	3.355e-3	3	8838.192	15	7235.794	9
546			min	-.007	5	-.118	1	-.021	3	-4.063e-3	1	925.572	6	1141.886	4
547		8	max	0	1	-.012	15	.101	4	3.857e-3	3	8161.238	15	5983.038	9
548			min	-.008	5	-.128	1	-.026	3	-4.732e-3	1	854.678	6	1063.939	4
549		9	max	0	1	-.012	15	.103	4	4.359e-3	3	7796.861	15	5161.435	9
550			min	-.009	5	-.134	1	-.03	3	-5.401e-3	1	816.519	6	1042.378	4
551		10	max	0	1	-.012	15	.1	4	4.861e-3	3	7681.589	15	4618.702	9
552			min	-.01	5	-.136	1	-.033	3	-6.069e-3	1	804.447	6	1071.775	4
553		11	max	0	1	-.012	15	.093	4	5.362e-3	3	7796.861	15	4274.755	9
554			min	-.011	5	-.135	1	-.036	3	-6.738e-3	1	816.519	6	1158.71	4
555		12	max	0	1	-.011	15	.081	4	5.864e-3	3	8161.238	15	4089.995	9

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
556			min	-.012	5	-.129	1	-.037	3	-7.406e-3	1	854.678	6	1325.389	4
557		13	max	0	1	-.009	15	.066	4	6.366e-3	3	8838.192	15	4053.397	9
558			min	-.013	5	-.119	1	-.036	3	-8.075e-3	1	925.572	6	1624.189	4
559		14	max	0	1	-.008	15	.048	4	6.868e-3	3	9966.167	15	4183.273	9
560			min	-.014	5	-.106	1	-.033	3	-8.744e-3	1	1043.698	6	1851.609	1
561		15	max	0	1	-.006	15	.034	1	7.37e-3	3	NC	15	6818.071	15
562			min	-.015	5	-.09	1	-.027	3	-9.412e-3	1	1240.127	6	2011.316	1
563		16	max	0	1	-.004	15	.024	1	7.871e-3	3	NC	15	NC	5
564			min	-.016	5	-.071	1	-.019	3	-1.008e-2	1	1589.274	6	2352.081	1
565		17	max	.001	1	-.001	15	.011	1	8.373e-3	3	NC	5	NC	4
566			min	-.017	5	-.05	1	-.008	3	-1.075e-2	1	2316.529	6	3119.555	1
567		18	max	.001	1	.002	5	.007	3	8.875e-3	3	NC	5	NC	4
568			min	-.019	5	-.028	1	-.011	2	-1.142e-2	1	4552.337	6	5556.197	1
569		19	max	.001	1	.006	5	.026	3	9.377e-3	3	NC	1	NC	1
570			min	-.02	5	-.004	1	-.03	2	-1.209e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.009	3	3.153e-3	3	NC	1	NC	1
572			min	-.008	4	-.004	4	-.009	2	-3.517e-3	1	NC	1	NC	1
573		2	max	0	10	-.012	12	.007	1	3.016e-3	3	9155.893	15	NC	2
574			min	-.007	4	-.041	4	-.004	5	-3.348e-3	1	2896.077	4	8312.084	1
575		3	max	0	10	-.023	12	.017	1	2.88e-3	3	4659.121	15	NC	4
576			min	-.007	4	-.077	4	-.015	5	-3.178e-3	1	1473.715	4	4699.855	1
577		4	max	0	10	-.034	12	.025	1	2.743e-3	3	3196.429	15	NC	10
578			min	-.007	4	-.11	4	-.031	5	-3.009e-3	1	1011.054	4	3571.893	1
579		5	max	0	10	-.043	12	.03	1	2.606e-3	3	2494.206	15	NC	10
580			min	-.006	4	-.14	4	-.05	5	-2.839e-3	1	788.936	4	2209.335	5
581		6	max	0	10	-.052	12	.033	1	2.47e-3	3	2099.138	15	NC	10
582			min	-.006	4	-.166	4	-.07	5	-2.67e-3	1	663.973	4	1575.978	5
583		7	max	0	10	-.058	12	.034	1	2.333e-3	3	1861.557	15	9863.763	10
584			min	-.005	4	-.187	4	-.088	5	-2.5e-3	1	588.824	4	1241.947	5
585		8	max	0	10	-.063	12	.034	1	2.196e-3	3	1718.972	15	NC	10
586			min	-.005	4	-.202	4	-.104	5	-2.331e-3	1	543.724	4	1051.904	5
587		9	max	0	10	-.066	12	.032	1	2.06e-3	3	1642.225	15	NC	10
588			min	-.004	4	-.211	4	-.116	5	-2.161e-3	1	519.448	4	943.319	5
589		10	max	0	10	-.067	12	.029	1	1.923e-3	3	1617.946	15	NC	10
590			min	-.004	4	-.214	4	-.123	5	-1.992e-3	1	511.768	4	888.318	5
591		11	max	0	10	-.066	12	.025	1	1.786e-3	3	1642.225	15	NC	10
592			min	-.003	4	-.21	4	-.124	5	-1.822e-3	1	519.448	4	874.959	5
593		12	max	0	10	-.063	12	.021	1	1.65e-3	3	1718.972	15	NC	10
594			min	-.003	4	-.201	4	-.121	5	-1.653e-3	1	543.724	4	900.825	5
595		13	max	0	10	-.058	12	.016	1	1.513e-3	3	1861.557	15	NC	3
596			min	-.003	4	-.185	4	-.112	5	-1.497e-3	2	588.824	4	971.995	5
597		14	max	0	10	-.052	12	.012	1	1.376e-3	3	2099.138	15	NC	2
598			min	-.002	4	-.164	4	-.098	5	-1.344e-3	2	663.973	4	1106.557	5
599		15	max	0	10	-.044	12	.008	1	1.24e-3	3	2494.206	15	NC	1
600			min	-.002	4	-.138	4	-.081	5	-1.191e-3	2	788.936	4	1346.786	5
601		16	max	0	10	-.034	12	.004	1	1.103e-3	3	3196.429	15	NC	1
602			min	-.001	4	-.108	4	-.06	5	-1.037e-3	2	1011.054	4	1798.373	5
603		17	max	0	10	-.023	12	.002	1	9.664e-4	3	4659.121	15	NC	1
604			min	0	4	-.074	4	-.039	5	-8.842e-4	2	1473.715	4	2791.059	5
605		18	max	0	10	-.012	12	0	3	9.126e-4	4	9155.893	15	NC	1
606			min	0	4	-.038	4	-.018	5	-7.311e-4	2	2896.077	4	6015.952	5
607		19	max	0	1	0	1	0	1	9.944e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.779e-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

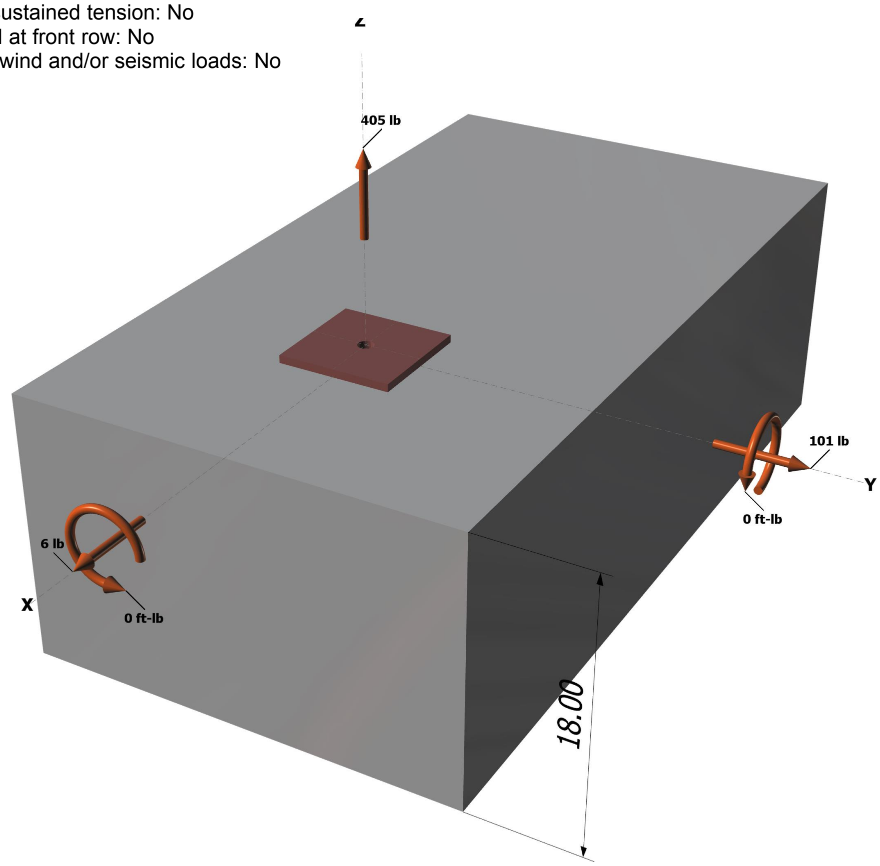
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

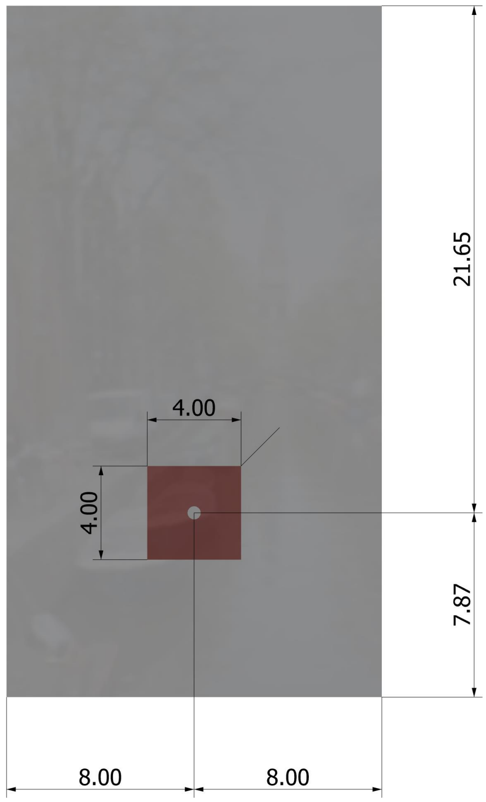
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



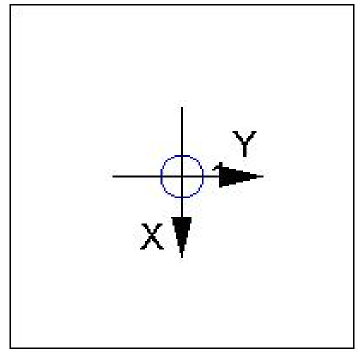
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

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

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

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

Shear perpendicular to edge in y-direction:

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

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

$\phi V_{cp} = \phi\,\mathrm{min}|k_{cp}N_a\,;\,k_{cp}N_{cb}| = \phi\,\mathrm{min}|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc} / A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (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, $øN_n$ (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, $øV_n$ (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

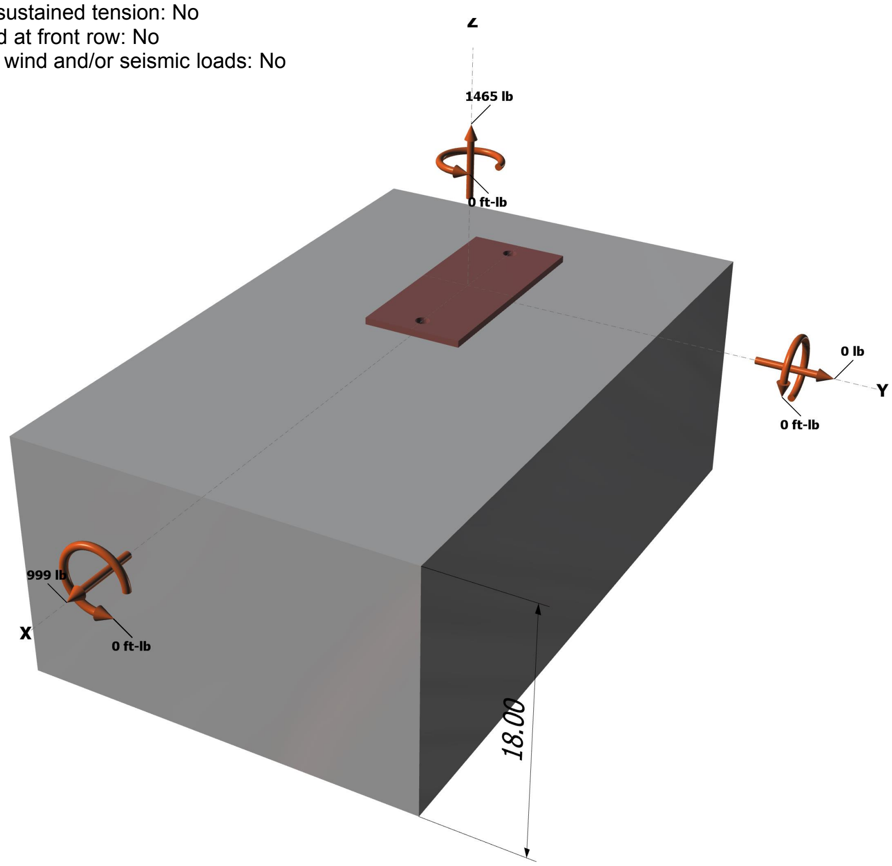
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

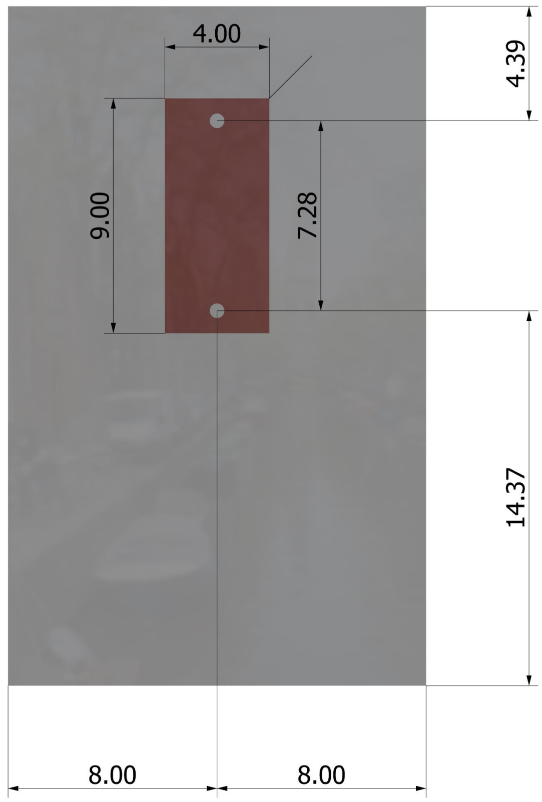
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



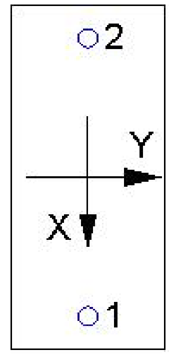
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, $øN_n$ (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, $øV_n$ (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.