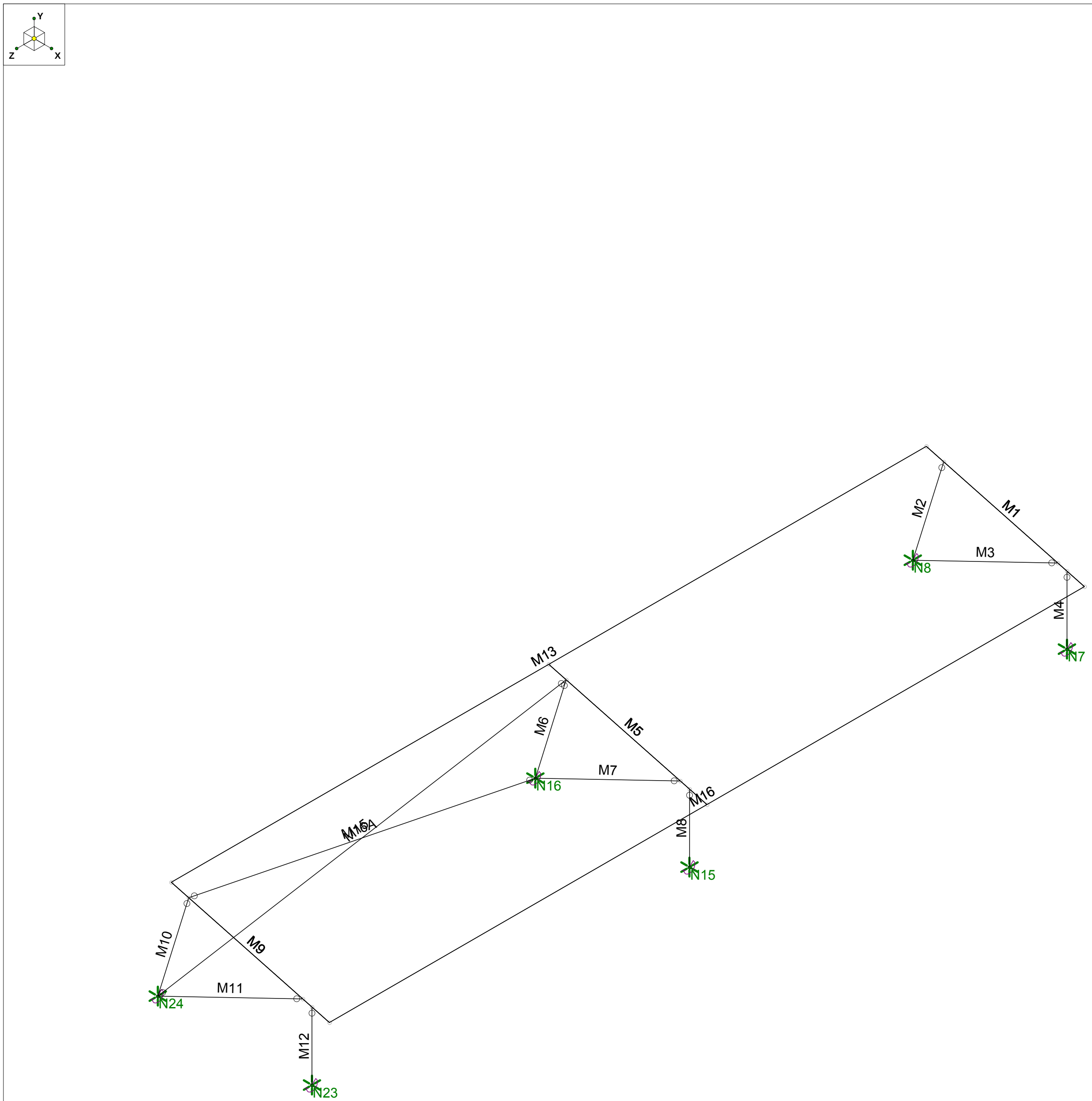


Schletter, Inc.	Standard PVMini Racking System	15° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

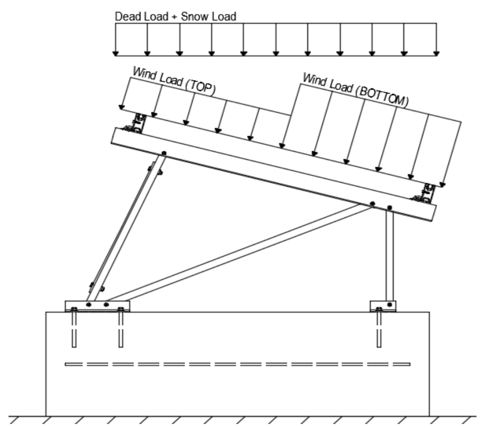
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	1700 mm	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

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



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
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 = 22.68 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 1.00
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 85 mph — Exposure Category = C
Height ≤ 15 ft — 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	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.6	
$Cf-_{TOP}$	=	-2.04	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	

Provided pressure coefficients are the result of wind tunnel testing done by Ruscheweyh Consult. Coefficients are located in test report # 1127/0611-1e. Negative forces are applied away from the surface.

2.4 Seismic Loads

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

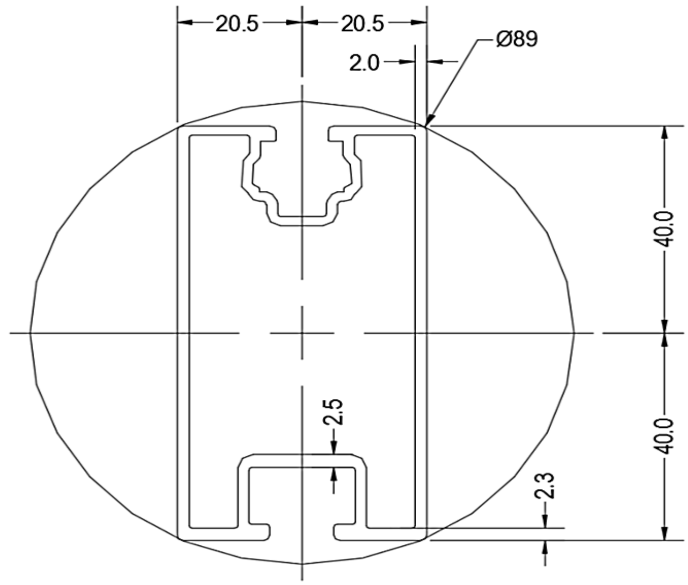
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

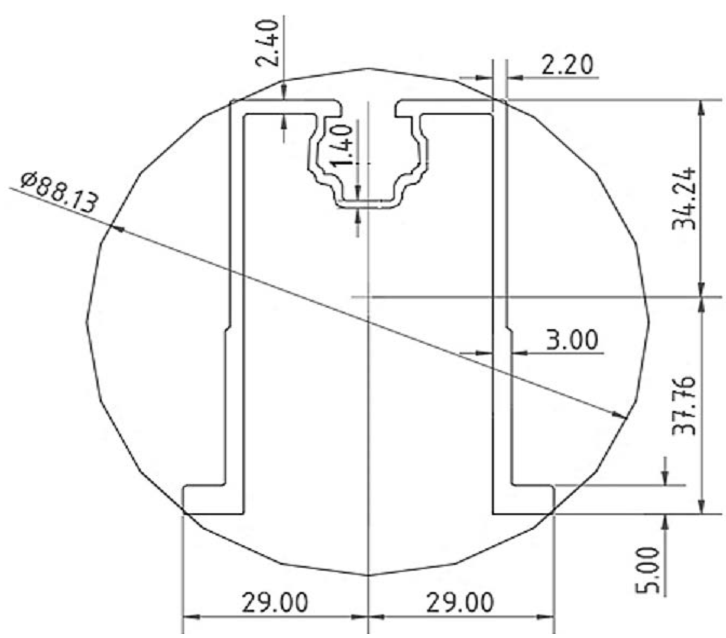
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.327	k-ft
M_z =	0.193	k-ft
$M_{y\ allowable}$ =	1.778	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	98%	



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).

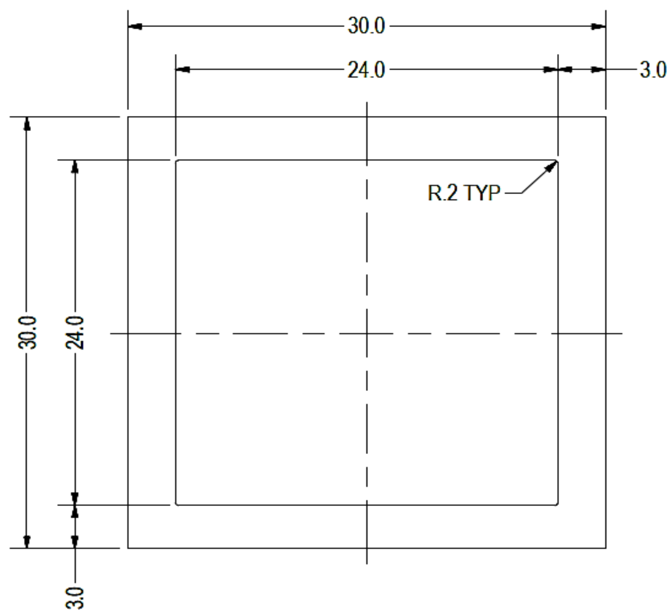
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.93	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.647	k-ft
M_z =	0.000	k-ft
P_n =	0.197	k
$M_{y\ allowable}$ =	1.469	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	46%	



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).

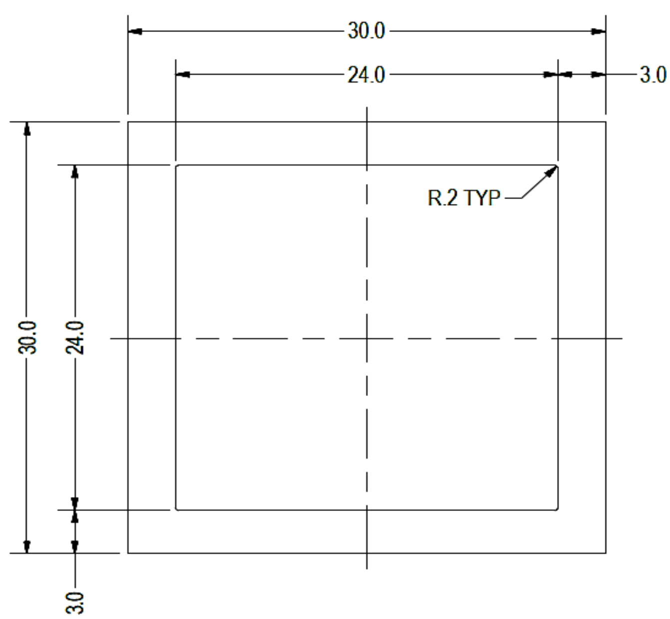
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.059	k-ft
P_n =	0.337	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	17%	



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).

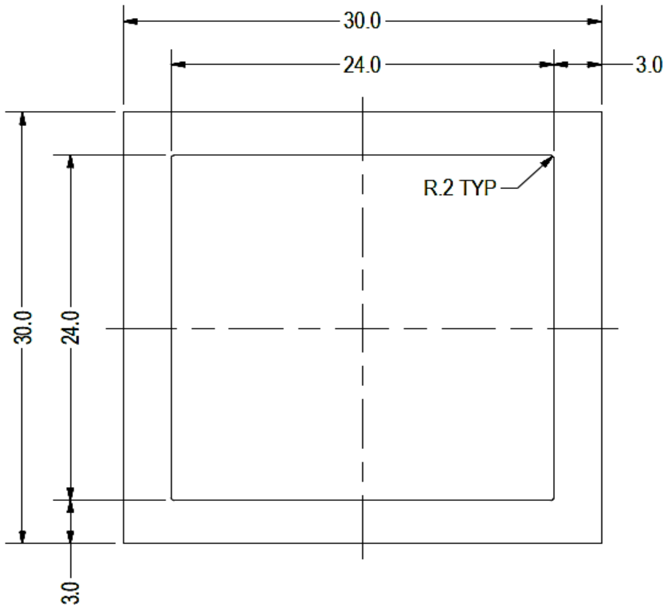
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.140	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	4%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

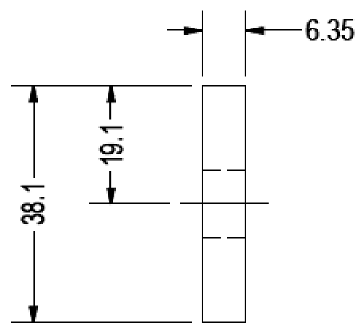
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.422	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	18%	



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 =	0.271	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

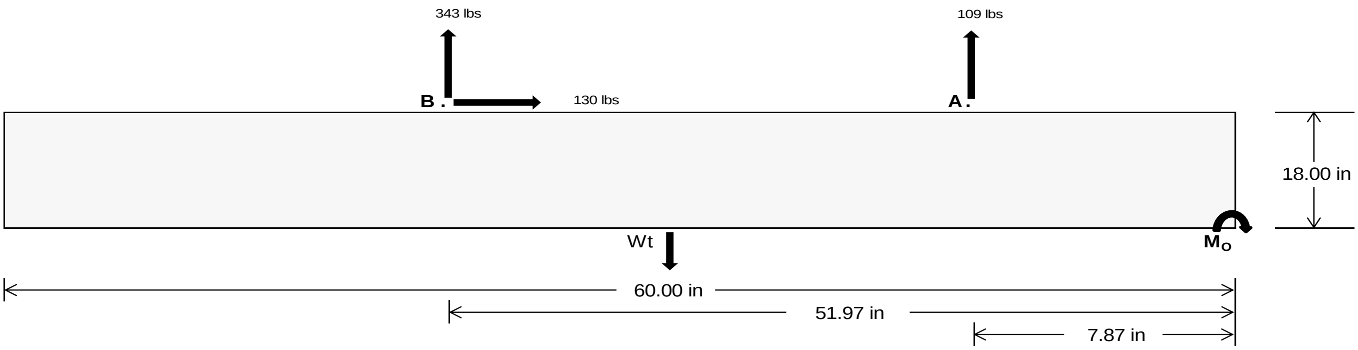
5.1 Helical Pile Foundations

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 =	460.89	1433.11	k
Compressive Load =	2285.07	1677.08	k
Lateral Load =	47.68	540.61	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 = 21048.9 in-lbs
Resisting Force Required = 701.63 lbs
S.F. = 1.67
Weight Required = 1169.39 lbs
Minimum Width = <u>21 in</u> in
Weight Provided = 1903.13 lbs

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

<u>Sliding</u>

Force = 129.90 lbs
Friction = 0.4
Weight Required = 324.74 lbs
Resisting Weight = 1903.13 lbs
Additional Weight Required = 0 lbs

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

<u>Cohesion</u>

Sliding Force = 129.90 lbs
Cohesion = 130 psf
Area = 8.75 ft^2
Resisting = 951.56 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation. Cohesion is OK.

<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			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	885 lbs	885 lbs	885 lbs	885 lbs	609 lbs	609 lbs	609 lbs	609 lbs	1060 lbs	1060 lbs	1060 lbs	1060 lbs	-219 lbs	-219 lbs	-219 lbs	-219 lbs
F_B	652 lbs	652 lbs	652 lbs	652 lbs	445 lbs	445 lbs	445 lbs	445 lbs	777 lbs	777 lbs	777 lbs	777 lbs	-687 lbs	-687 lbs	-687 lbs	-687 lbs
F_V	62 lbs	62 lbs	62 lbs	62 lbs	233 lbs	233 lbs	233 lbs	233 lbs	218 lbs	218 lbs	218 lbs	218 lbs	-260 lbs	-260 lbs	-260 lbs	-260 lbs
P_{total}	3440 lbs	3531 lbs	3622 lbs	3712 lbs	2957 lbs	3048 lbs	3138 lbs	3229 lbs	3740 lbs	3831 lbs	3921 lbs	4012 lbs	236 lbs	291 lbs	345 lbs	399 lbs
M	532 lbs-ft	532 lbs-ft	532 lbs-ft	532 lbs-ft	656 lbs-ft	656 lbs-ft	656 lbs-ft	656 lbs-ft	858 lbs-ft	858 lbs-ft	858 lbs-ft	858 lbs-ft	465 lbs-ft	465 lbs-ft	465 lbs-ft	465 lbs-ft
e	0.15 ft	0.15 ft	0.15 ft	0.14 ft	0.22 ft	0.22 ft	0.21 ft	0.20 ft	0.23 ft	0.22 ft	0.22 ft	0.21 ft	1.97 ft	1.60 ft	1.35 ft	1.16 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}	320.2 psf	315.5 psf	311.2 psf	307.3 psf	247.9 psf	246.6 psf	245.3 psf	244.1 psf	309.7 psf	305.5 psf	301.7 psf	298.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	466.2 psf	454.9 psf	444.6 psf	435.1 psf	428.0 psf	418.4 psf	409.7 psf	401.7 psf	545.2 psf	530.3 psf	516.7 psf	504.2 psf	168.8 psf	117.3 psf	104.0 psf	99.6 psf

Maximum Bearing Pressure = 545 psf
Allowable Bearing Pressure = 1500 psf

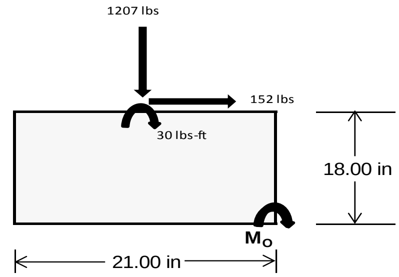
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 798.4 ft-lbs
Resisting Force Required = 912.44 lbs
S.F. = 1.67
Weight Required = 1520.74 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	140 lbs	214 lbs	91 lbs	434 lbs	1207 lbs	395 lbs	74 lbs	28 lbs	28 lbs
F_V	25 lbs	200 lbs	26 lbs	17 lbs	152 lbs	20 lbs	25 lbs	200 lbs	26 lbs
P_{total}	2496 lbs	2570 lbs	2447 lbs	2677 lbs	3450 lbs	2638 lbs	763 lbs	717 lbs	717 lbs
M	72 lbs-ft	340 lbs-ft	78 lbs-ft	48 lbs-ft	257 lbs-ft	61 lbs-ft	74 lbs-ft	340 lbs-ft	78 lbs-ft
e	0.03 ft	0.13 ft	0.03 ft	0.02 ft	0.07 ft	0.02 ft	0.10 ft	0.47 ft	0.11 ft
L/6	0.29 ft	1.49 ft	1.69 ft	1.71 ft	1.60 ft	1.70 ft	1.56 ft	0.80 ft	1.53 ft
f_{min}	256.8 sqft	160.3 sqft	249.2 sqft	287.1 sqft	293.3 sqft	277.7 sqft	58.2 sqft	-51.3 sqft	51.6 sqft
f_{max}	313.6 psf	427.1 psf	310.1 psf	324.7 psf	495.1 psf	325.3 psf	116.1 psf	215.2 psf	112.4 psf

Maximum Bearing Pressure = 495 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

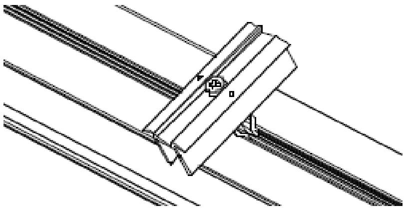
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

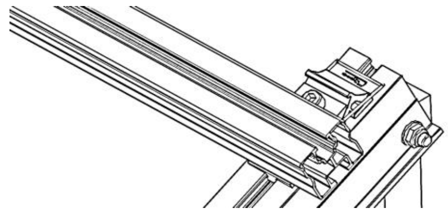
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.341	k
Allowable Uplift =	1.214	k
Utilization =	28%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.007	k
Allowable Uplift =	1.116	k
Utilization =	90%	



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 =	1.758	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	31%	

Rear Strut

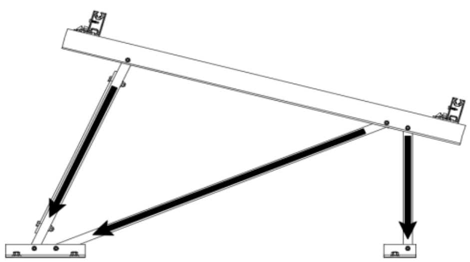
Maximum Axial Load =	1.422	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

Diagonal Strut

Maximum Axial Load =	0.151	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	

Bracing

Maximum Axial Load =	0.271	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

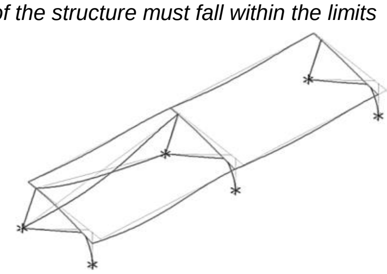
7.1 Seismic Drift

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} =	28.39 in	
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568 in	
Max Drift, Δ_{MAX} =	0.125 in	

$0.125 \leq 0.568$, 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

Compression

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.45
20.4426

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

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 = 1.45
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 = 1.469 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

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

$\varphi F_L =$ 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 = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.5 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.28467

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.75985

φF_L= (φccFcy)/(λ²)

φF_L= 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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= 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.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	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-31.635	-31.635	0	0
2	M16	y	-50.616	-50.616	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	64.535	64.535	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	91.559	2	358.381	1	.029	2	0	1	0	1	0	1
2		min	-130.415	3	-334.733	3	-2.163	5	0	5	0	1	0	1
3	N7	max	0	5	590.713	1	-.114	12	0	12	0	1	0	1
4		min	-.188	1	-100.441	3	-36.284	4	-.059	4	0	1	0	1
5	N15	max	0	15	1757.747	1	.511	1	.001	1	0	1	0	1
6		min	-2.019	1	-354.527	3	-36.676	5	-.059	4	0	1	0	1
7	N16	max	397.285	2	1290.059	1	-.228	10	0	1	0	1	0	1
8		min	-415.855	3	-1102.389	3	-262.519	4	0	5	0	1	0	1
9	N23	max	0	15	590.619	1	3.357	1	.006	1	0	1	0	1
10		min	-.187	1	-100.037	3	-34.093	5	-.054	5	0	1	0	1
11	N24	max	91.973	2	363.987	1	27.53	1	.002	1	0	1	0	1
12		min	-130.454	3	-331.635	3	-3.476	5	0	3	0	1	0	1
13	Totals:	max	579.037	2	4951.507	1	0	1						
14		min	-677.025	3	-2323.763	3	-372.974	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	432.104	1	.654	6	1.046	4	0	12	0	4	0	1
2			min	-336.211	3	.153	15	-.043	3	-.001	1	0	2	0	1
3		2	max	432.201	1	.616	6	.958	4	0	12	0	4	0	15
4			min	-336.139	3	.144	15	-.043	3	-.001	1	0	10	0	6
5		3	max	432.297	1	.579	6	.912	1	0	12	0	4	0	15
6			min	-336.066	3	.135	15	-.043	3	-.001	1	0	12	0	6
7		4	max	432.393	1	.541	6	.912	1	0	12	0	4	0	15
8			min	-335.994	3	.127	15	-.043	3	-.001	1	0	12	0	6
9		5	max	432.49	1	.503	6	.912	1	0	12	0	1	0	15
10			min	-335.922	3	.118	15	-.043	3	-.001	1	0	12	0	6
11		6	max	432.586	1	.465	6	.912	1	0	12	0	1	0	15
12			min	-335.85	3	.109	15	-.043	3	-.001	1	0	3	0	6
13		7	max	432.683	1	.427	6	.912	1	0	12	0	1	0	15
14			min	-335.777	3	.1	15	-.043	3	-.001	1	0	3	0	6
15		8	max	432.779	1	.389	6	.912	1	0	12	0	1	0	15
16			min	-335.705	3	.091	15	-.043	3	-.001	1	0	3	0	6
17		9	max	432.875	1	.352	6	.912	1	0	12	.001	1	0	15
18			min	-335.633	3	.082	15	-.043	3	-.001	1	0	3	0	6
19		10	max	432.972	1	.314	6	.912	1	0	12	.001	1	0	15
20			min	-335.56	3	.073	15	-.043	3	-.001	1	0	3	0	6
21		11	max	433.068	1	.276	6	.912	1	0	12	.001	1	0	15
22			min	-335.488	3	.064	15	-.056	5	-.001	1	0	3	0	6
23		12	max	433.164	1	.238	6	.912	1	0	12	.001	1	0	15
24			min	-335.416	3	.055	15	-.144	5	-.001	1	0	3	0	6
25		13	max	433.261	1	.2	6	.912	1	0	12	.002	1	0	15
26			min	-335.344	3	.046	15	-.231	5	-.001	1	0	3	0	6
27		14	max	433.357	1	.162	6	.912	1	0	12	.002	1	0	15
28			min	-335.271	3	.038	15	-.318	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	433.453	1	.125	6	.912	1	0	12	.002	1	0	15
30			min	-335.199	3	.029	15	-.406	5	-.001	1	0	3	0	6
31		16	max	433.55	1	.087	6	.912	1	0	12	.002	1	0	15
32			min	-335.127	3	.02	15	-.493	5	-.001	1	0	3	0	6
33		17	max	433.646	1	.053	10	.912	1	0	12	.002	1	0	15
34			min	-335.055	3	-.003	1	-.58	5	-.001	1	0	3	0	6
35		18	max	433.743	1	.028	10	.912	1	0	12	.002	1	0	15
36			min	-334.982	3	-.033	1	-.668	5	-.001	1	0	3	0	6
37		19	max	433.839	1	.004	10	.912	1	0	12	.002	1	0	15
38			min	-334.91	3	-.062	1	-.755	5	-.001	1	0	3	0	6
39	M3	1	max	32.075	10	1.807	6	-.031	12	0	5	.002	1	0	6
40			min	-132.606	1	.424	15	-1.518	4	0	1	0	12	0	15
41		2	max	32.019	10	1.629	6	-.031	12	0	5	.002	1	0	6
42			min	-132.673	1	.383	15	-1.384	4	0	1	0	12	0	15
43		3	max	31.963	10	1.451	6	-.031	12	0	5	.002	1	0	10
44			min	-132.74	1	.341	15	-1.251	4	0	1	0	12	0	1
45		4	max	31.907	10	1.273	6	-.031	12	0	5	.002	1	0	15
46			min	-132.807	1	.299	15	-1.117	4	0	1	0	15	0	1
47		5	max	31.852	10	1.095	6	-.031	12	0	5	.002	1	0	15
48			min	-132.874	1	.257	15	-.983	4	0	1	0	5	0	4
49		6	max	31.796	10	.917	6	-.031	12	0	5	.001	1	0	15
50			min	-132.941	1	.215	15	-.85	4	0	1	0	5	0	4
51		7	max	31.74	10	.739	6	-.031	12	0	5	.001	1	0	15
52			min	-133.008	1	.173	15	-.79	1	0	1	0	5	0	4
53		8	max	31.684	10	.561	6	-.031	12	0	5	.001	1	0	15
54			min	-133.076	1	.132	15	-.79	1	0	1	0	5	0	4
55		9	max	31.628	10	.383	6	-.031	12	0	5	0	1	0	15
56			min	-133.143	1	.09	15	-.79	1	0	1	0	5	-.001	4
57		10	max	31.572	10	.205	6	-.031	12	0	5	0	1	0	15
58			min	-133.21	1	.048	15	-.79	1	0	1	0	5	-.001	4
59		11	max	31.516	10	.031	10	-.019	15	0	5	0	1	0	15
60			min	-133.277	1	-.006	1	-.79	1	0	1	0	5	-.001	4
61		12	max	31.46	10	-.036	15	.104	5	0	5	0	1	0	15
62			min	-133.344	1	-.151	4	-.79	1	0	1	0	5	-.001	4
63		13	max	31.404	10	-.078	15	.237	5	0	5	0	1	0	15
64			min	-133.411	1	-.329	4	-.79	1	0	1	0	5	-.001	4
65		14	max	31.348	10	-.12	15	.371	5	0	5	0	1	0	15
66			min	-133.478	1	-.507	4	-.79	1	0	1	0	5	-.001	4
67		15	max	31.292	10	-.161	15	.504	5	0	5	0	12	0	15
68			min	-133.545	1	-.685	4	-.79	1	0	1	0	4	0	4
69		16	max	31.237	10	-.203	15	.638	5	0	5	0	12	0	15
70			min	-133.612	1	-.863	4	-.79	1	0	1	0	4	0	4
71		17	max	31.181	10	-.245	15	.771	5	0	5	0	12	0	15
72			min	-133.679	1	-1.041	4	-.79	1	0	1	0	1	0	4
73		18	max	31.125	10	-.287	15	.905	5	0	5	0	12	0	15
74			min	-133.747	1	-1.219	4	-.79	1	0	1	0	1	0	4
75		19	max	31.069	10	-.329	15	1.038	5	0	5	0	5	0	1
76			min	-133.814	1	-1.397	4	-.79	1	0	1	0	1	0	1
77	M4	1	max	589.548	1	0	1	-.113	12	0	1	0	5	0	1
78			min	-101.315	3	0	1	-36.046	4	0	1	0	1	0	1
79		2	max	589.613	1	0	1	-.113	12	0	1	0	12	0	1
80			min	-101.266	3	0	1	-36.102	4	0	1	-.003	4	0	1
81		3	max	589.678	1	0	1	-.113	12	0	1	0	12	0	1
82			min	-101.218	3	0	1	-36.158	4	0	1	-.006	4	0	1
83		4	max	589.743	1	0	1	-.113	12	0	1	0	12	0	1
84			min	-101.169	3	0	1	-36.214	4	0	1	-.01	4	0	1
85		5	max	589.807	1	0	1	-.113	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	-101.121	3	0	1	-36.27	4	0	1	-.013	4	0	1
87		6	max	589.872	1	0	1	-.113	12	0	1	0	12	0	1
88			min	-101.072	3	0	1	-36.326	4	0	1	-.016	4	0	1
89		7	max	589.937	1	0	1	-.113	12	0	1	0	12	0	1
90			min	-101.024	3	0	1	-36.383	4	0	1	-.019	4	0	1
91		8	max	590.001	1	0	1	-.113	12	0	1	0	12	0	1
92			min	-100.975	3	0	1	-36.439	4	0	1	-.023	4	0	1
93		9	max	590.066	1	0	1	-.113	12	0	1	0	12	0	1
94			min	-100.927	3	0	1	-36.495	4	0	1	-.026	4	0	1
95		10	max	590.131	1	0	1	-.113	12	0	1	0	12	0	1
96			min	-100.878	3	0	1	-36.551	4	0	1	-.029	4	0	1
97		11	max	590.195	1	0	1	-.113	12	0	1	0	12	0	1
98			min	-100.83	3	0	1	-36.607	4	0	1	-.032	4	0	1
99		12	max	590.26	1	0	1	-.113	12	0	1	0	12	0	1
100			min	-100.781	3	0	1	-36.663	4	0	1	-.036	4	0	1
101		13	max	590.325	1	0	1	-.113	12	0	1	0	12	0	1
102			min	-100.733	3	0	1	-36.719	4	0	1	-.039	4	0	1
103		14	max	590.39	1	0	1	-.113	12	0	1	0	12	0	1
104			min	-100.684	3	0	1	-36.775	4	0	1	-.042	4	0	1
105		15	max	590.454	1	0	1	-.113	12	0	1	0	12	0	1
106			min	-100.636	3	0	1	-36.831	4	0	1	-.046	4	0	1
107		16	max	590.519	1	0	1	-.113	12	0	1	0	12	0	1
108			min	-100.587	3	0	1	-36.887	4	0	1	-.049	4	0	1
109		17	max	590.584	1	0	1	-.113	12	0	1	0	12	0	1
110			min	-100.539	3	0	1	-36.943	4	0	1	-.052	4	0	1
111		18	max	590.648	1	0	1	-.113	12	0	1	0	12	0	1
112			min	-100.49	3	0	1	-36.999	4	0	1	-.056	4	0	1
113		19	max	590.713	1	0	1	-.113	12	0	1	0	12	0	1
114			min	-100.441	3	0	1	-37.055	4	0	1	-.059	4	0	1
115	M6	1	max	1420.266	1	.632	6	.996	4	0	1	0	5	0	1
116			min	-1104.863	3	.148	15	-.104	3	0	5	0	1	0	1
117		2	max	1420.362	1	.594	6	.908	4	0	1	0	4	0	15
118			min	-1104.791	3	.139	15	-.104	3	0	5	0	2	0	6
119		3	max	1420.459	1	.556	6	.821	4	0	1	0	4	0	15
120			min	-1104.719	3	.13	15	-.104	3	0	5	0	12	0	6
121		4	max	1420.555	1	.519	6	.734	4	0	1	0	4	0	15
122			min	-1104.647	3	.121	15	-.104	3	0	5	0	3	0	6
123		5	max	1420.652	1	.481	6	.646	4	0	1	0	4	0	15
124			min	-1104.574	3	.112	15	-.104	3	0	5	0	3	0	6
125		6	max	1420.748	1	.443	6	.559	4	0	1	0	4	0	15
126			min	-1104.502	3	.103	15	-.104	3	0	5	0	3	0	6
127		7	max	1420.844	1	.405	6	.472	4	0	1	0	4	0	15
128			min	-1104.43	3	.094	15	-.104	3	0	5	0	3	0	6
129		8	max	1420.941	1	.367	6	.42	14	0	1	0	4	0	15
130			min	-1104.357	3	.085	15	-.104	3	0	5	0	3	0	6
131		9	max	1421.037	1	.329	6	.376	14	0	1	0	4	0	15
132			min	-1104.285	3	.076	15	-.104	3	0	5	0	3	0	6
133		10	max	1421.133	1	.292	6	.346	1	0	1	0	4	0	15
134			min	-1104.213	3	.068	15	-.104	3	0	5	0	3	0	6
135		11	max	1421.23	1	.254	6	.346	1	0	1	0	4	0	15
136			min	-1104.141	3	.059	15	-.104	3	0	5	0	3	0	6
137		12	max	1421.326	1	.216	6	.346	1	0	1	0	4	0	15
138			min	-1104.068	3	.05	15	-.104	3	0	5	0	3	0	6
139		13	max	1421.422	1	.178	6	.346	1	0	1	0	4	0	15
140			min	-1103.996	3	.041	15	-.174	5	0	5	0	3	0	6
141		14	max	1421.519	1	.148	2	.346	1	0	1	0	4	0	15
142			min	-1103.924	3	.03	9	-.262	5	0	5	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
143		15	max	1421.615	1	.118	10	.346	1	0	1	0	14	0	15
144			min	-1103.852	3	.005	1	-.349	5	0	5	0	3	0	6
145		16	max	1421.712	1	.094	10	.346	1	0	1	0	14	0	15
146			min	-1103.779	3	-.025	1	-.436	5	0	5	0	3	0	6
147		17	max	1421.808	1	.069	10	.346	1	0	1	0	14	0	15
148			min	-1103.707	3	-.054	1	-.524	5	0	5	0	3	0	6
149		18	max	1421.904	1	.045	10	.346	1	0	1	0	14	0	15
150			min	-1103.635	3	-.084	1	-.611	5	0	5	0	3	0	6
151		19	max	1422.001	1	.02	10	.346	1	0	1	0	14	0	15
152			min	-1103.562	3	-.113	1	-.698	5	0	5	0	3	0	6
153	M7	1	max	139.83	2	1.808	4	.015	1	0	2	0	4	0	4
154			min	-176.683	9	.43	15	-1.505	5	0	5	0	3	0	15
155		2	max	139.763	2	1.63	4	.015	1	0	2	0	4	0	4
156			min	-176.739	9	.388	15	-1.371	5	0	5	0	3	0	15
157		3	max	139.696	2	1.452	4	.015	1	0	2	0	4	0	10
158			min	-176.795	9	.346	15	-1.237	5	0	5	0	3	0	9
159		4	max	139.629	2	1.274	4	.015	1	0	2	0	14	0	10
160			min	-176.851	9	.304	15	-1.104	5	0	5	0	3	0	1
161		5	max	139.562	2	1.096	4	.015	1	0	2	0	2	0	15
162			min	-176.907	9	.262	15	-.97	5	0	5	0	5	0	1
163		6	max	139.495	2	.918	4	.015	1	0	2	0	2	0	15
164			min	-176.963	9	.22	15	-.837	5	0	5	0	5	0	6
165		7	max	139.428	2	.74	4	.015	1	0	2	0	2	0	15
166			min	-177.019	9	.179	15	-.703	5	0	5	0	5	0	6
167		8	max	139.361	2	.562	4	.015	1	0	2	0	2	0	15
168			min	-177.075	9	.137	15	-.57	5	0	5	0	5	0	6
169		9	max	139.293	2	.384	4	.015	1	0	2	0	2	0	15
170			min	-177.131	9	.095	15	-.436	5	0	5	0	5	-.001	6
171		10	max	139.226	2	.206	4	.015	1	0	2	0	2	0	15
172			min	-177.186	9	.053	15	-.303	5	0	5	0	5	-.001	6
173		11	max	139.159	2	.048	10	.015	1	0	2	0	2	0	15
174			min	-177.242	9	-.023	9	-.169	5	0	5	0	5	-.001	6
175		12	max	139.092	2	-.031	15	.015	1	0	2	0	2	0	15
176			min	-177.298	9	-.161	1	-.036	5	0	5	0	5	-.001	6
177		13	max	139.025	2	-.072	15	.101	4	0	2	0	2	0	15
178			min	-177.354	9	-.328	6	-.007	3	0	5	0	5	-.001	6
179		14	max	138.958	2	-.114	15	.234	4	0	2	0	2	0	15
180			min	-177.41	9	-.506	6	-.007	3	0	5	0	5	-.001	6
181		15	max	138.891	2	-.156	15	.368	4	0	2	0	2	0	15
182			min	-177.466	9	-.684	6	-.007	3	0	5	0	5	0	6
183		16	max	138.824	2	-.198	15	.502	4	0	2	0	2	0	15
184			min	-177.522	9	-.862	6	-.007	3	0	5	0	5	0	6
185		17	max	138.757	2	-.24	15	.635	4	0	2	0	2	0	15
186			min	-177.578	9	-1.04	6	-.007	3	0	5	0	5	0	6
187		18	max	138.69	2	-.282	15	.769	4	0	2	0	2	0	15
188			min	-177.634	9	-1.218	6	-.007	3	0	5	0	5	0	6
189		19	max	138.622	2	-.324	15	.902	4	0	2	0	2	0	1
190			min	-177.69	9	-1.396	6	-.007	3	0	5	0	5	0	1
191	M8	1	max	1756.583	1	0	1	.717	1	0	1	0	4	0	1
192			min	-355.4	3	0	1	-36.375	4	0	1	0	1	0	1
193		2	max	1756.647	1	0	1	.717	1	0	1	0	1	0	1
194			min	-355.352	3	0	1	-36.431	4	0	1	-.003	4	0	1
195		3	max	1756.712	1	0	1	.717	1	0	1	0	1	0	1
196			min	-355.303	3	0	1	-36.487	4	0	1	-.006	4	0	1
197		4	max	1756.777	1	0	1	.717	1	0	1	0	1	0	1
198			min	-355.255	3	0	1	-36.543	4	0	1	-.01	4	0	1
199		5	max	1756.842	1	0	1	.717	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	-355.206	3	0	1	-36.6	4	0	1	-.013	4	0	1
201		6	max	1756.906	1	0	1	.717	1	0	1	0	1	0	1
202			min	-355.158	3	0	1	-36.656	4	0	1	-.016	4	0	1
203		7	max	1756.971	1	0	1	.717	1	0	1	0	1	0	1
204			min	-355.109	3	0	1	-36.712	4	0	1	-.02	4	0	1
205		8	max	1757.036	1	0	1	.717	1	0	1	0	1	0	1
206			min	-355.061	3	0	1	-36.768	4	0	1	-.023	4	0	1
207		9	max	1757.1	1	0	1	.717	1	0	1	0	1	0	1
208			min	-355.012	3	0	1	-36.824	4	0	1	-.026	4	0	1
209		10	max	1757.165	1	0	1	.717	1	0	1	0	1	0	1
210			min	-354.964	3	0	1	-36.88	4	0	1	-.029	4	0	1
211		11	max	1757.23	1	0	1	.717	1	0	1	0	1	0	1
212			min	-354.915	3	0	1	-36.936	4	0	1	-.033	4	0	1
213		12	max	1757.295	1	0	1	.717	1	0	1	0	1	0	1
214			min	-354.867	3	0	1	-36.992	4	0	1	-.036	4	0	1
215		13	max	1757.359	1	0	1	.717	1	0	1	0	1	0	1
216			min	-354.818	3	0	1	-37.048	4	0	1	-.039	4	0	1
217		14	max	1757.424	1	0	1	.717	1	0	1	0	1	0	1
218			min	-354.77	3	0	1	-37.104	4	0	1	-.043	4	0	1
219		15	max	1757.489	1	0	1	.717	1	0	1	0	1	0	1
220			min	-354.721	3	0	1	-37.16	4	0	1	-.046	4	0	1
221		16	max	1757.553	1	0	1	.717	1	0	1	0	1	0	1
222			min	-354.673	3	0	1	-37.216	4	0	1	-.049	4	0	1
223		17	max	1757.618	1	0	1	.717	1	0	1	.001	1	0	1
224			min	-354.624	3	0	1	-37.272	4	0	1	-.053	4	0	1
225		18	max	1757.683	1	0	1	.717	1	0	1	.001	1	0	1
226			min	-354.575	3	0	1	-37.329	4	0	1	-.056	4	0	1
227		19	max	1757.747	1	0	1	.717	1	0	1	.001	1	0	1
228			min	-354.527	3	0	1	-37.385	4	0	1	-.059	4	0	1
229	M10	1	max	443.202	1	.68	4	1.254	4	.001	1	0	5	0	1
230			min	-327.761	3	.171	15	-.13	1	-.002	5	0	3	0	1
231		2	max	443.299	1	.642	4	1.166	4	.001	1	0	4	0	15
232			min	-327.688	3	.162	15	-.13	1	-.002	5	0	3	0	4
233		3	max	443.395	1	.604	4	1.079	4	.001	1	0	4	0	15
234			min	-327.616	3	.153	15	-.13	1	-.002	5	0	3	0	4
235		4	max	443.492	1	.566	4	.992	4	.001	1	0	4	0	15
236			min	-327.544	3	.144	15	-.13	1	-.002	5	0	3	0	4
237		5	max	443.588	1	.529	4	.904	4	.001	1	0	4	0	15
238			min	-327.471	3	.135	15	-.13	1	-.002	5	0	1	0	4
239		6	max	443.684	1	.491	4	.817	4	.001	1	0	4	0	15
240			min	-327.399	3	.126	15	-.13	1	-.002	5	0	1	0	4
241		7	max	443.781	1	.453	4	.73	4	.001	1	.001	4	0	15
242			min	-327.327	3	.117	15	-.13	1	-.002	5	0	1	0	4
243		8	max	443.877	1	.415	4	.642	4	.001	1	.001	4	0	15
244			min	-327.255	3	.108	15	-.13	1	-.002	5	0	1	0	4
245		9	max	443.973	1	.377	4	.555	4	.001	1	.001	4	0	15
246			min	-327.182	3	.1	15	-.13	1	-.002	5	0	1	0	4
247		10	max	444.07	1	.339	4	.468	4	.001	1	.001	4	0	15
248			min	-327.11	3	.091	15	-.13	1	-.002	5	0	1	0	4
249		11	max	444.166	1	.302	4	.38	4	.001	1	.001	4	0	15
250			min	-327.038	3	.082	15	-.13	1	-.002	5	0	1	0	4
251		12	max	444.262	1	.264	4	.293	4	.001	1	.001	4	0	15
252			min	-326.966	3	.073	15	-.13	1	-.002	5	0	1	0	4
253		13	max	444.359	1	.226	4	.206	4	.001	1	.001	4	0	15
254			min	-326.893	3	.052	1	-.13	1	-.002	5	0	1	0	4
255		14	max	444.455	1	.188	4	.118	4	.001	1	.001	4	0	15
256			min	-326.821	3	.023	1	-.13	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	444.552	1	.15	4	.031	4	.001	1	.001	4	0	15
258			min	-326.749	3	-.007	1	-.13	1	-.002	5	0	1	0	4
259		16	max	444.648	1	.112	4	-.022	14	.001	1	.001	4	0	15
260			min	-326.676	3	-.036	1	-.13	1	-.002	5	0	1	0	4
261		17	max	444.744	1	.075	4	-.023	12	.001	1	.001	4	0	15
262			min	-326.604	3	-.066	1	-.158	5	-.002	5	0	1	0	4
263		18	max	444.841	1	.049	3	-.023	12	.001	1	.001	4	0	15
264			min	-326.532	3	-.095	1	-.246	5	-.002	5	0	1	0	4
265		19	max	444.937	1	.027	3	-.023	12	.001	1	.001	4	0	15
266			min	-326.46	3	-.125	1	-.333	5	-.002	5	0	1	0	4
267	M11	1	max	31.503	10	1.806	6	.932	1	.002	4	.002	5	0	6
268			min	-132.425	1	.423	15	-1.103	5	0	10	-.002	1	0	15
269		2	max	31.447	10	1.628	6	.932	1	.002	4	.001	5	0	2
270			min	-132.492	1	.382	15	-.97	5	0	10	-.002	1	0	15
271		3	max	31.391	10	1.45	6	.932	1	.002	4	.001	5	0	2
272			min	-132.559	1	.34	15	-.836	5	0	10	-.002	1	0	12
273		4	max	31.335	10	1.272	6	.932	1	.002	4	.001	5	0	15
274			min	-132.626	1	.298	15	-.703	5	0	10	-.002	1	0	4
275		5	max	31.279	10	1.094	6	.932	1	.002	4	0	5	0	15
276			min	-132.693	1	.256	15	-.569	5	0	10	-.001	1	0	4
277		6	max	31.223	10	.916	6	.932	1	.002	4	0	5	0	15
278			min	-132.76	1	.214	15	-.436	5	0	10	-.001	1	0	4
279		7	max	31.167	10	.738	6	.932	1	.002	4	0	5	0	15
280			min	-132.827	1	.172	15	-.302	5	0	10	-.001	1	0	4
281		8	max	31.111	10	.56	6	.932	1	.002	4	0	5	0	15
282			min	-132.894	1	.13	15	-.169	5	0	10	0	1	0	4
283		9	max	31.055	10	.382	6	.932	1	.002	4	0	5	0	15
284			min	-132.961	1	.089	15	-.035	5	0	10	0	1	-.001	4
285		10	max	30.999	10	.204	6	.932	1	.002	4	0	5	0	15
286			min	-133.028	1	.047	15	.023	12	0	10	0	1	-.001	4
287		11	max	30.943	10	.048	2	.932	1	.002	4	0	5	0	15
288			min	-133.095	1	.004	12	.023	12	0	10	0	1	-.001	4
289		12	max	30.887	10	-.037	15	.932	1	.002	4	0	5	0	15
290			min	-133.163	1	-.153	4	.023	12	0	10	0	2	-.001	4
291		13	max	30.832	10	-.079	15	.932	1	.002	4	0	4	0	15
292			min	-133.23	1	-.331	4	.023	12	0	10	0	10	-.001	4
293		14	max	30.776	10	-.121	15	.932	1	.002	4	.001	4	0	15
294			min	-133.297	1	-.509	4	.023	12	0	10	0	10	-.001	4
295		15	max	30.72	10	-.162	15	.944	4	.002	4	.001	4	0	15
296			min	-133.364	1	-.687	4	.023	12	0	10	0	10	0	4
297		16	max	30.664	10	-.204	15	1.077	4	.002	4	.001	4	0	15
298			min	-133.431	1	-.865	4	.023	12	0	10	0	10	0	4
299		17	max	30.608	10	-.246	15	1.211	4	.002	4	.002	4	0	15
300			min	-133.498	1	-1.043	4	.023	12	0	10	0	10	0	4
301		18	max	30.552	10	-.288	15	1.345	4	.002	4	.002	4	0	15
302			min	-133.565	1	-1.221	4	.023	12	0	10	0	10	0	4
303		19	max	30.496	10	-.33	15	1.478	4	.002	4	.002	4	0	1
304			min	-133.632	1	-1.399	4	.023	12	0	10	0	10	0	1
305	M12	1	max	589.454	1	0	1	3.719	1	0	1	0	4	0	1
306			min	-100.911	3	0	1	-33.174	5	0	1	0	3	0	1
307		2	max	589.519	1	0	1	3.719	1	0	1	0	1	0	1
308			min	-100.862	3	0	1	-33.23	5	0	1	-.003	5	0	1
309		3	max	589.584	1	0	1	3.719	1	0	1	0	1	0	1
310			min	-100.814	3	0	1	-33.286	5	0	1	-.006	5	0	1
311		4	max	589.648	1	0	1	3.719	1	0	1	.001	1	0	1
312			min	-100.765	3	0	1	-33.342	5	0	1	-.009	5	0	1
313		5	max	589.713	1	0	1	3.719	1	0	1	.001	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	-100.717	3	0	1	-33.398	5	0	1	-.012	5	0	1
315		6	max	589.778	1	0	1	3.719	1	0	1	.002	1	0	1
316			min	-100.668	3	0	1	-33.454	5	0	1	-.015	5	0	1
317		7	max	589.842	1	0	1	3.719	1	0	1	.002	1	0	1
318			min	-100.62	3	0	1	-33.51	5	0	1	-.018	5	0	1
319		8	max	589.907	1	0	1	3.719	1	0	1	.002	1	0	1
320			min	-100.571	3	0	1	-33.566	5	0	1	-.021	5	0	1
321		9	max	589.972	1	0	1	3.719	1	0	1	.003	1	0	1
322			min	-100.523	3	0	1	-33.622	5	0	1	-.024	5	0	1
323		10	max	590.037	1	0	1	3.719	1	0	1	.003	1	0	1
324			min	-100.474	3	0	1	-33.678	5	0	1	-.027	5	0	1
325		11	max	590.101	1	0	1	3.719	1	0	1	.003	1	0	1
326			min	-100.426	3	0	1	-33.734	5	0	1	-.03	5	0	1
327		12	max	590.166	1	0	1	3.719	1	0	1	.004	1	0	1
328			min	-100.377	3	0	1	-33.79	5	0	1	-.033	5	0	1
329		13	max	590.231	1	0	1	3.719	1	0	1	.004	1	0	1
330			min	-100.329	3	0	1	-33.846	5	0	1	-.036	5	0	1
331		14	max	590.295	1	0	1	3.719	1	0	1	.004	1	0	1
332			min	-100.28	3	0	1	-33.903	5	0	1	-.039	5	0	1
333		15	max	590.36	1	0	1	3.719	1	0	1	.005	1	0	1
334			min	-100.231	3	0	1	-33.959	5	0	1	-.042	5	0	1
335		16	max	590.425	1	0	1	3.719	1	0	1	.005	1	0	1
336			min	-100.183	3	0	1	-34.015	5	0	1	-.045	5	0	1
337		17	max	590.49	1	0	1	3.719	1	0	1	.005	1	0	1
338			min	-100.134	3	0	1	-34.071	5	0	1	-.048	5	0	1
339		18	max	590.554	1	0	1	3.719	1	0	1	.006	1	0	1
340			min	-100.086	3	0	1	-34.127	5	0	1	-.051	5	0	1
341		19	max	590.619	1	0	1	3.719	1	0	1	.006	1	0	1
342			min	-100.037	3	0	1	-34.183	5	0	1	-.054	5	0	1
343	M1	1	max	118.48	1	315.1	3	-2.52	12	0	1	.144	1	.014	1
344			min	3.872	12	-430.323	1	-73.151	1	0	3	.005	12	-.009	3
345		2	max	118.552	1	314.898	3	-2.52	12	0	1	.128	1	.108	1
346			min	3.908	12	-430.593	1	-73.151	1	0	3	.005	12	-.077	3
347		3	max	134.163	1	7.176	9	-2.546	12	0	5	.111	1	.2	1
348			min	-5.489	3	-21.343	3	-72.728	1	0	1	.004	12	-.144	3
349		4	max	134.236	1	6.951	9	-2.546	12	0	5	.096	1	.199	1
350			min	-5.435	3	-21.545	3	-72.728	1	0	1	.004	12	-.14	3
351		5	max	134.308	1	6.726	9	-2.546	12	0	5	.08	1	.199	1
352			min	-5.381	3	-21.747	3	-72.728	1	0	1	.003	12	-.135	3
353		6	max	134.38	1	6.501	9	-2.546	12	0	5	.064	1	.199	1
354			min	-5.327	3	-21.949	3	-72.728	1	0	1	.003	12	-.13	3
355		7	max	134.453	1	6.277	9	-2.546	12	0	5	.048	1	.199	1
356			min	-5.272	3	-22.152	3	-72.728	1	0	1	.002	12	-.125	3
357		8	max	134.525	1	6.052	9	-2.546	12	0	5	.032	1	.199	1
358			min	-5.218	3	-22.354	3	-72.728	1	0	1	.001	12	-.121	3
359		9	max	134.597	1	5.827	9	-2.546	12	0	5	.017	1	.199	1
360			min	-5.164	3	-22.556	3	-72.728	1	0	1	0	12	-.116	3
361		10	max	134.669	1	5.602	9	-2.546	12	0	5	.003	4	.199	1
362			min	-5.11	3	-22.759	3	-72.728	1	0	1	0	10	-.111	3
363		11	max	134.742	1	5.377	9	-2.546	12	0	5	0	15	.199	1
364			min	-5.056	3	-22.961	3	-72.728	1	0	1	-.015	1	-.106	3
365		12	max	134.814	1	5.153	9	-2.546	12	0	5	0	12	.199	1
366			min	-5.001	3	-23.163	3	-72.728	1	0	1	-.031	1	-.101	3
367		13	max	134.886	1	4.928	9	-2.546	12	0	5	-.001	12	.199	1
368			min	-4.947	3	-23.365	3	-72.728	1	0	1	-.046	1	-.096	3
369		14	max	134.958	1	4.703	9	-2.546	12	0	5	-.002	12	.199	1
370			min	-4.893	3	-23.568	3	-72.728	1	0	1	-.062	1	-.091	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	135.031	1	4.478	9	-2.546	12	0	5	-.002	12	.2	1
372			min	-4.839	3	-23.77	3	-72.728	1	0	1	-.078	1	-.086	3
373		16	max	63.601	2	7.924	10	-2.578	12	0	1	-.003	12	.201	1
374			min	-31.792	3	-90.057	1	-73.434	1	0	4	-.095	1	-.08	3
375		17	max	63.673	2	7.699	10	-2.578	12	0	1	-.004	12	.22	1
376			min	-31.738	3	-90.327	1	-73.434	1	0	4	-.111	1	-.07	3
377		18	max	-3.651	12	477.986	1	-2.692	12	0	5	-.004	12	.119	1
378			min	-118.05	1	-146.619	3	-75.157	1	0	1	-.127	1	-.038	3
379		19	max	-3.615	12	477.716	1	-2.692	12	0	5	-.005	12	.015	1
380			min	-117.977	1	-146.822	3	-75.157	1	0	1	-.143	1	-.006	3
381	M5	1	max	259.107	1	1042.483	3	-.086	10	0	1	.05	4	.018	3
382			min	5.066	15	-1424.476	1	-30.364	4	0	5	0	10	-.029	1
383		2	max	259.179	1	1042.281	3	-.086	10	0	1	.043	4	.28	1
384			min	5.088	15	-1424.746	1	-30.122	4	0	5	-.002	3	-.208	3
385		3	max	308.907	1	10.668	9	2.34	3	0	3	.036	4	.583	1
386			min	-27.777	3	-70.718	3	-26.702	4	0	4	-.006	3	-.429	3
387		4	max	308.98	1	10.444	9	2.34	3	0	3	.03	4	.586	1
388			min	-27.723	3	-70.92	3	-26.46	4	0	4	-.006	3	-.414	3
389		5	max	309.052	1	10.219	9	2.34	3	0	3	.025	4	.588	1
390			min	-27.668	3	-71.122	3	-26.218	4	0	4	-.005	1	-.399	3
391		6	max	309.124	1	9.994	9	2.34	3	0	3	.019	4	.591	1
392			min	-27.614	3	-71.325	3	-25.976	4	0	4	-.005	1	-.383	3
393		7	max	309.197	1	9.769	9	2.34	3	0	3	.013	4	.594	1
394			min	-27.56	3	-71.527	3	-25.734	4	0	4	-.005	1	-.368	3
395		8	max	309.269	1	9.545	9	2.34	3	0	3	.008	4	.597	1
396			min	-27.506	3	-71.729	3	-25.492	4	0	4	-.004	1	-.352	3
397		9	max	309.341	1	9.32	9	2.34	3	0	3	.002	5	.6	1
398			min	-27.452	3	-71.931	3	-25.25	4	0	4	-.004	1	-.337	3
399		10	max	309.413	1	9.095	9	2.34	3	0	3	0	10	.603	1
400			min	-27.397	3	-72.134	3	-25.008	4	0	4	-.003	1	-.321	3
401		11	max	309.486	1	8.87	9	2.34	3	0	3	0	10	.606	1
402			min	-27.343	3	-72.336	3	-24.766	4	0	4	-.008	4	-.305	3
403		12	max	309.558	1	8.646	9	2.34	3	0	3	0	10	.609	1
404			min	-27.289	3	-72.538	3	-24.524	4	0	4	-.014	4	-.29	3
405		13	max	309.63	1	8.421	9	2.34	3	0	3	0	10	.612	1
406			min	-27.235	3	-72.741	3	-24.282	4	0	4	-.019	4	-.274	3
407		14	max	309.702	1	8.196	9	2.34	3	0	3	0	10	.615	1
408			min	-27.181	3	-72.943	3	-24.04	4	0	4	-.024	4	-.258	3
409		15	max	309.775	1	7.971	9	2.34	3	0	3	0	10	.618	1
410			min	-27.126	3	-73.145	3	-23.798	4	0	4	-.03	4	-.242	3
411		16	max	239.525	2	48.096	10	2.321	3	0	1	0	3	.622	1
412			min	-103.09	3	-139.333	3	-22.668	4	0	4	-.035	4	-.226	3
413		17	max	239.597	2	47.872	10	2.321	3	0	1	0	3	.647	1
414			min	-103.036	3	-139.536	3	-22.426	4	0	4	-.04	4	-.196	3
415		18	max	-7.511	12	1576.719	1	2.272	1	0	4	0	3	.311	1
416			min	-259.855	1	-483.686	3	-57.002	5	0	1	-.052	4	-.092	3
417		19	max	-7.475	12	1576.449	1	2.272	1	0	4	.001	3	.013	3
418			min	-259.783	1	-483.889	3	-56.76	5	0	1	-.064	4	-.031	1
419	M9	1	max	117.934	1	315.092	3	232.111	4	0	3	0	15	.014	1
420			min	1.682	15	-430.305	1	5.869	10	0	1	-.144	1	-.009	3
421		2	max	118.006	1	314.889	3	232.353	4	0	3	.047	5	.108	1
422			min	1.704	15	-430.574	1	5.869	10	0	1	-.123	1	-.077	3
423		3	max	134.236	1	7.156	9	68.402	1	0	1	.091	5	.199	1
424			min	-5.043	3	-21.291	3	-35.971	5	0	12	-.1	1	-.144	3
425		4	max	134.308	1	6.931	9	68.402	1	0	1	.083	5	.199	1
426			min	-4.989	3	-21.493	3	-35.729	5	0	12	-.085	1	-.14	3
427		5	max	134.38	1	6.706	9	68.402	1	0	1	.075	5	.199	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	-4.935	3	-21.695	3	-35.487	5	0	12	-.07	1	-.135	3
429		6	max	134.452	1	6.481	9	68.402	1	0	1	.068	5	.199	1
430			min	-4.881	3	-21.898	3	-35.245	5	0	12	-.056	1	-.13	3
431		7	max	134.525	1	6.256	9	68.402	1	0	1	.06	5	.199	1
432			min	-4.827	3	-22.1	3	-35.003	5	0	12	-.041	1	-.125	3
433		8	max	134.597	1	6.032	9	68.402	1	0	1	.052	5	.198	1
434			min	-4.772	3	-22.302	3	-34.761	5	0	12	-.026	1	-.121	3
435		9	max	134.669	1	5.807	9	68.402	1	0	1	.045	5	.198	1
436			min	-4.718	3	-22.504	3	-34.519	5	0	12	-.011	1	-.116	3
437		10	max	134.742	1	5.582	9	68.402	1	0	1	.038	4	.199	1
438			min	-4.664	3	-22.707	3	-34.277	5	0	12	0	10	-.111	3
439		11	max	134.814	1	5.357	9	68.402	1	0	1	.033	4	.199	1
440			min	-4.61	3	-22.909	3	-34.035	5	0	12	.001	10	-.106	3
441		12	max	134.886	1	5.133	9	68.402	1	0	1	.033	1	.199	1
442			min	-4.556	3	-23.111	3	-33.793	5	0	12	.002	10	-.101	3
443		13	max	134.958	1	4.908	9	68.402	1	0	1	.048	1	.199	1
444			min	-4.501	3	-23.314	3	-33.551	5	0	12	.003	12	-.096	3
445		14	max	135.031	1	4.683	9	68.402	1	0	1	.063	1	.199	1
446			min	-4.447	3	-23.516	3	-33.309	5	0	12	.003	12	-.091	3
447		15	max	135.103	1	4.458	9	68.402	1	0	1	.078	1	.2	1
448			min	-4.393	3	-23.718	3	-33.067	5	0	12	0	15	-.086	3
449		16	max	63.796	2	7.566	10	69.279	1	0	10	.095	1	.201	1
450			min	-31.833	3	-89.967	1	-31.532	5	0	4	-.004	5	-.08	3
451		17	max	63.868	2	7.341	10	69.279	1	0	10	.11	1	.22	1
452			min	-31.779	3	-90.237	1	-31.29	5	0	4	-.01	5	-.07	3
453		18	max	3.717	5	477.986	1	72.897	1	0	1	.125	1	.119	1
454			min	-117.833	1	-146.618	3	-64.117	5	0	3	-.024	5	-.038	3
455		19	max	3.751	5	477.716	1	72.897	1	0	1	.141	1	.015	1
456			min	-117.761	1	-146.821	3	-63.875	5	0	3	-.038	5	-.006	3
457	M13	1	max	232.12	4	429.716	1	-1.682	15	.014	1	.144	1	0	1
458			min	5.87	10	-315.081	3	-117.922	1	-.009	3	0	15	0	3
459		2	max	222.768	4	303.074	1	-.839	15	.014	1	.046	1	.254	3
460			min	5.87	10	-222.163	3	-90.393	1	-.009	3	-.002	5	-.346	1
461		3	max	213.417	4	176.433	1	.003	15	.014	1	0	3	.42	3
462			min	5.87	10	-129.245	3	-62.864	1	-.009	3	-.027	1	-.572	1
463		4	max	204.065	4	49.791	1	1.199	5	.014	1	-.001	15	.498	3
464			min	5.87	10	-36.327	3	-35.335	1	-.009	3	-.073	1	-.679	1
465		5	max	194.714	4	56.591	3	2.502	5	.014	1	0	15	.488	3
466			min	5.87	10	-76.851	1	-7.805	1	-.009	3	-.094	1	-.666	1
467		6	max	185.362	4	149.509	3	19.724	1	.014	1	.003	5	.391	3
468			min	5.87	10	-203.492	1	.316	12	-.009	3	-.088	1	-.534	1
469		7	max	176.011	4	242.427	3	47.253	1	.014	1	.007	5	.206	3
470			min	5.87	10	-330.134	1	1.138	12	-.009	3	-.056	1	-.282	1
471		8	max	166.659	4	335.345	3	74.782	1	.014	1	.013	4	.089	1
472			min	5.87	10	-456.776	1	1.96	12	-.009	3	0	12	-.067	3
473		9	max	157.308	4	428.263	3	102.311	1	.014	1	.085	1	.581	1
474			min	5.87	10	-583.417	1	2.782	12	-.009	3	.002	12	-.428	3
475		10	max	147.956	4	521.181	3	129.84	1	.011	2	.195	1	1.191	1
476			min	5.87	10	-710.059	1	3.604	12	-.014	1	.005	12	-.876	3
477		11	max	108.358	4	583.417	1	2.31	5	.009	3	.081	1	.581	1
478			min	2.52	12	-428.263	3	-101.762	1	-.014	1	-.019	5	-.428	3
479		12	max	99.006	4	456.776	1	3.614	5	.009	3	0	10	.089	1
480			min	2.52	12	-335.345	3	-74.233	1	-.014	1	-.017	4	-.067	3
481		13	max	89.655	4	330.134	1	4.917	5	.009	3	-.003	12	.206	3
482			min	2.52	12	-242.427	3	-46.704	1	-.014	1	-.059	1	-.282	1
483		14	max	80.303	4	203.492	1	6.22	5	.009	3	-.003	12	.391	3
484			min	2.52	12	-149.509	3	-19.175	1	-.014	1	-.09	1	-.534	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	73.361	1	76.851	1	9.267	4	.009	3	0	15	.488	3
486			min	2.52	12	-56.591	3	.474	10	-.014	1	-.095	1	-.666	1
487		16	max	73.361	1	36.327	3	35.884	1	.009	3	.007	5	.498	3
488			min	2.52	12	-49.791	1	1.406	12	-.014	1	-.074	1	-.679	1
489		17	max	73.361	1	129.245	3	63.413	1	.009	3	.016	5	.42	3
490			min	2.52	12	-176.433	1	2.228	12	-.014	1	-.028	1	-.572	1
491		18	max	73.361	1	222.163	3	90.942	1	.009	3	.045	1	.254	3
492			min	2.52	12	-303.074	1	3.05	12	-.014	1	.002	12	-.346	1
493		19	max	73.361	1	315.081	3	118.471	1	.009	3	.144	1	0	1
494			min	2.52	12	-429.716	1	3.872	12	-.014	1	.005	12	0	3
495	M16	1	max	63.862	5	478.336	1	3.751	5	.006	3	.141	1	0	1
496			min	-72.668	1	-146.835	3	-117.771	1	-.015	1	-.038	5	0	3
497		2	max	54.511	5	337.353	1	5.054	5	.006	3	.043	1	.118	3
498			min	-72.668	1	-103.632	3	-90.242	1	-.015	1	-.034	5	-.385	1
499		3	max	45.159	5	196.37	1	6.357	5	.006	3	0	12	.196	3
500			min	-72.668	1	-60.43	3	-62.713	1	-.015	1	-.034	4	-.637	1
501		4	max	35.808	5	55.387	1	7.661	5	.006	3	-.002	12	.232	3
502			min	-72.668	1	-17.227	3	-35.184	1	-.015	1	-.075	1	-.756	1
503		5	max	26.456	5	25.975	3	8.964	5	.006	3	-.003	12	.228	3
504			min	-72.668	1	-85.596	1	-7.655	1	-.015	1	-.096	1	-.742	1
505		6	max	17.105	5	69.177	3	19.874	1	.006	3	-.003	12	.183	3
506			min	-72.668	1	-226.578	1	.404	12	-.015	1	-.09	1	-.594	1
507		7	max	7.753	5	112.38	3	47.403	1	.006	3	.005	5	.098	3
508			min	-72.668	1	-367.561	1	1.226	12	-.015	1	-.058	1	-.314	1
509		8	max	-1.005	15	155.582	3	74.932	1	.006	3	.017	4	.1	1
510			min	-72.668	1	-508.544	1	2.048	12	-.015	1	-.001	3	-.029	3
511		9	max	-1.352	12	198.785	3	102.461	1	.006	3	.083	1	.647	1
512			min	-72.668	1	-649.527	1	2.87	12	-.015	1	.002	12	-.196	3
513		10	max	36.483	5	-17.625	15	129.99	1	.006	14	.193	1	1.327	1
514			min	-74.957	1	-790.51	1	-5.666	3	-.015	1	.006	12	-.404	3
515		11	max	27.131	5	649.527	1	2.401	5	.015	1	.084	1	.647	1
516			min	-74.957	1	-198.785	3	-102.244	1	-.006	3	-.018	5	-.196	3
517		12	max	17.78	5	508.544	1	3.704	5	.015	1	0	2	.1	1
518			min	-74.957	1	-155.582	3	-74.715	1	-.006	3	-.015	4	-.029	3
519		13	max	8.428	5	367.561	1	5.007	5	.015	1	-.002	12	.098	3
520			min	-74.957	1	-112.38	3	-47.186	1	-.006	3	-.057	1	-.314	1
521		14	max	-.521	15	226.578	1	6.31	5	.015	1	-.003	12	.183	3
522			min	-74.957	1	-69.177	3	-19.657	1	-.006	3	-.089	1	-.594	1
523		15	max	-2.692	12	85.595	1	9.328	4	.015	1	.001	5	.228	3
524			min	-74.957	1	-25.975	3	.327	12	-.006	3	-.094	1	-.742	1
525		16	max	-2.692	12	17.227	3	35.401	1	.015	1	.009	5	.232	3
526			min	-74.957	1	-55.387	1	1.149	12	-.006	3	-.074	1	-.756	1
527		17	max	-2.692	12	60.43	3	62.93	1	.015	1	.018	5	.196	3
528			min	-74.957	1	-196.37	1	1.971	12	-.006	3	-.028	1	-.637	1
529		18	max	-2.692	12	103.632	3	90.459	1	.015	1	.045	1	.118	3
530			min	-74.957	1	-337.353	1	2.793	12	-.006	3	.002	12	-.385	1
531		19	max	-2.692	12	146.835	3	117.988	1	.015	1	.143	1	0	1
532			min	-74.957	1	-478.336	1	3.615	12	-.006	3	.005	12	0	5
533	M15	1	max	0	4	2.304	1	.019	3	0	1	0	1	0	1
534			min	-27.149	1	0	4	-.028	1	0	3	0	3	0	1
535		2	max	0	4	2.048	1	.019	3	0	1	0	1	0	4
536			min	-27.221	1	0	4	-.028	1	0	3	0	3	-.001	1
537		3	max	0	4	1.792	1	.019	3	0	1	0	1	0	4
538			min	-27.293	1	0	4	-.028	1	0	3	0	3	-.002	1
539		4	max	0	4	1.536	1	.019	3	0	1	0	1	0	4
540			min	-27.365	1	0	4	-.028	1	0	3	0	3	-.003	1
541		5	max	0	4	1.28	1	.019	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	-27.437	1	0	4	-.028	1	0	3	0	3	-.004	1
543		6	max	0	4	1.024	1	.019	3	0	1	0	1	0	4
544			min	-27.509	1	0	4	-.028	1	0	3	0	3	-.004	1
545		7	max	0	4	.768	1	.019	3	0	1	0	3	0	4
546			min	-27.581	1	0	4	-.028	1	0	3	0	1	-.005	1
547		8	max	0	4	.512	1	.019	3	0	1	0	3	0	4
548			min	-27.653	1	0	4	-.028	1	0	3	0	1	-.005	1
549		9	max	0	4	.256	1	.019	3	0	1	0	3	0	4
550			min	-27.725	1	0	4	-.028	1	0	3	0	1	-.005	1
551		10	max	0	4	0	1	.019	3	0	1	0	3	0	4
552			min	-27.797	1	0	1	-.028	1	0	3	0	1	-.005	1
553		11	max	0	4	0	4	.019	3	0	1	0	3	0	4
554			min	-27.869	1	-.256	2	-.028	1	0	3	0	1	-.005	1
555		12	max	0	4	0	4	.019	3	0	1	0	3	0	4
556			min	-27.941	1	-.512	2	-.028	1	0	3	0	1	-.005	1
557		13	max	0	4	0	4	.019	3	0	1	0	3	0	4
558			min	-28.013	1	-.768	2	-.028	1	0	3	0	1	-.005	1
559		14	max	0	4	0	4	.019	3	0	1	0	3	0	4
560			min	-28.085	1	-1.024	2	-.028	1	0	3	0	1	-.004	1
561		15	max	0	4	0	4	.019	3	0	1	0	3	0	4
562			min	-28.157	1	-1.28	2	-.028	1	0	3	0	1	-.004	1
563		16	max	0	4	0	4	.019	3	0	1	0	3	0	4
564			min	-28.229	1	-1.536	2	-.028	1	0	3	0	1	-.003	1
565		17	max	0	4	0	4	.019	3	0	1	0	3	0	4
566			min	-28.301	1	-1.792	2	-.028	1	0	3	0	1	-.002	1
567		18	max	0	4	0	4	.019	3	0	1	0	3	0	4
568			min	-28.373	1	-2.048	2	-.028	1	0	3	0	1	-.001	1
569		19	max	0	4	0	4	.019	3	0	1	0	3	0	1
570			min	-28.445	1	-2.304	2	-.028	1	0	3	0	1	0	1
571	M16A	1	max	-.797	10	3.515	4	.207	4	0	3	0	3	0	1
572			min	-268.248	4	1.071	15	-.008	3	0	1	0	4	0	1
573		2	max	-.737	10	3.125	4	.187	4	0	3	0	3	0	15
574			min	-268.377	4	.952	15	-.008	3	0	1	0	4	-.002	4
575		3	max	-.677	10	2.734	4	.168	4	0	3	0	3	0	15
576			min	-268.506	4	.833	15	-.008	3	0	1	0	4	-.003	4
577		4	max	-.617	10	2.344	4	.148	4	0	3	0	3	-.001	15
578			min	-268.634	4	.714	15	-.008	3	0	1	0	4	-.004	4
579		5	max	-.557	10	1.953	4	.128	4	0	3	0	3	-.002	15
580			min	-268.763	4	.595	15	-.008	3	0	1	0	1	-.005	4
581		6	max	-.497	10	1.562	4	.108	4	0	3	0	5	-.002	15
582			min	-268.892	4	.476	15	-.008	3	0	1	0	1	-.006	4
583		7	max	-.437	10	1.172	4	.088	4	0	3	0	5	-.002	15
584			min	-269.02	4	.357	15	-.008	3	0	1	0	1	-.007	4
585		8	max	-.377	10	.781	4	.068	4	0	3	0	5	-.002	15
586			min	-269.149	4	.238	15	-.008	3	0	1	0	1	-.007	4
587		9	max	-.317	10	.391	4	.049	4	0	3	0	5	-.002	15
588			min	-269.278	4	.119	15	-.008	3	0	1	0	1	-.008	4
589		10	max	-.257	10	0	1	.029	4	0	3	0	5	-.002	15
590			min	-269.406	4	0	1	-.008	3	0	1	0	1	-.008	4
591		11	max	-.198	10	-.119	15	.018	1	0	3	0	5	-.002	15
592			min	-269.535	4	-.391	4	-.008	3	0	1	0	1	-.008	4
593		12	max	-.138	10	-.238	15	.018	1	0	3	0	5	-.002	15
594			min	-269.664	4	-.781	4	-.014	5	0	1	0	1	-.007	4
595		13	max	-.078	10	-.357	15	.018	1	0	3	0	5	-.002	15
596			min	-269.792	4	-1.172	4	-.034	5	0	1	0	3	-.007	4
597		14	max	-.018	10	-.476	15	.018	1	0	3	0	4	-.002	15
598			min	-269.921	4	-1.562	4	-.054	5	0	1	0	3	-.006	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	.042	10	-.595	15	.018	1	0	3	0	4	-.002	15
600			min	-270.05	4	-1.953	4	-.074	5	0	1	0	3	-.005	4
601		16	max	.102	10	-.714	15	.018	1	0	3	0	4	-.001	15
602			min	-270.178	4	-2.344	4	-.094	5	0	1	0	3	-.004	4
603		17	max	.162	10	-.833	15	.018	1	0	3	0	1	0	15
604			min	-270.307	4	-2.734	4	-.113	5	0	1	0	3	-.003	4
605		18	max	.222	10	-.952	15	.018	1	0	3	0	1	0	15
606			min	-270.435	4	-3.125	4	-.133	5	0	1	0	5	-.002	4
607		19	max	.282	10	-1.071	15	.018	1	0	3	0	1	0	1
608			min	-270.564	4	-3.515	4	-.153	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	.006	2	.014	1	2.01e-3	5	NC	3	NC	3
2			min	-.002	3	-.004	3	-.02	5	-1.053e-3	1	5192.393	2	2211.604	1
3		2	max	.003	1	.005	2	.013	1	2.038e-3	5	NC	3	NC	3
4			min	-.002	3	-.004	3	-.019	5	-1.012e-3	1	5627.422	2	2397.472	1
5		3	max	.003	1	.005	2	.012	1	2.067e-3	5	NC	3	NC	3
6			min	-.002	3	-.004	3	-.018	5	-9.703e-4	1	6138.202	2	2616.132	1
7		4	max	.003	1	.004	2	.01	1	2.095e-3	5	NC	3	NC	3
8			min	-.002	3	-.004	3	-.017	5	-9.288e-4	1	6742.008	2	2875.572	1
9		5	max	.002	1	.004	2	.009	1	2.123e-3	5	NC	3	NC	3
10			min	-.002	3	-.004	3	-.016	5	-8.872e-4	1	7461.584	2	3186.453	1
11		6	max	.002	1	.004	2	.008	1	2.151e-3	5	NC	1	NC	3
12			min	-.002	3	-.004	3	-.015	5	-8.457e-4	1	8327.359	2	3563.26	1
13		7	max	.002	1	.003	2	.007	1	2.179e-3	5	NC	1	NC	2
14			min	-.002	3	-.003	3	-.014	5	-8.042e-4	1	9380.818	2	4026.093	1
15		8	max	.002	1	.003	2	.007	1	2.207e-3	5	NC	1	NC	2
16			min	-.002	3	-.003	3	-.013	5	-7.626e-4	1	NC	1	4603.514	1
17		9	max	.002	1	.002	2	.006	1	2.235e-3	5	NC	1	NC	2
18			min	-.001	3	-.003	3	-.012	5	-7.211e-4	1	NC	1	5337.267	1
19		10	max	.002	1	.002	2	.005	1	2.263e-3	5	NC	1	NC	2
20			min	-.001	3	-.003	3	-.011	5	-6.796e-4	1	NC	1	6290.41	1
21		11	max	.001	1	.002	2	.004	1	2.291e-3	5	NC	1	NC	2
22			min	-.001	3	-.003	3	-.01	5	-6.38e-4	1	NC	1	7562.038	1
23		12	max	.001	1	.001	2	.003	1	2.319e-3	5	NC	1	NC	2
24			min	0	3	-.002	3	-.009	5	-5.965e-4	1	NC	1	9315.594	1
25		13	max	.001	1	.001	2	.003	1	2.347e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.008	5	-5.55e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	.002	1	2.375e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.006	5	-5.134e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.403e-3	5	NC	1	NC	1
30			min	0	3	-.001	3	-.005	5	-4.719e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.431e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.004	5	-4.304e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.459e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.003	5	-3.888e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.488e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.473e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.516e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.058e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.39e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.145e-3	5	NC	1	NC	1
41		2	max	0	1	0	2	.006	5	1.773e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	-1.151e-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	1	0	2	.012	5	2.156e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	-.001	1	-1.157e-3	5	NC	1	7935.72	14
45		4	max	0	1	0	2	.018	5	2.538e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	-1.163e-3	5	NC	1	5185.268	14
47		5	max	0	1	0	2	.025	4	2.921e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	-1.168e-3	5	NC	1	3821.548	14
49		6	max	0	1	0	2	.031	4	3.304e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	-1.174e-3	5	NC	1	3011.339	14
51		7	max	0	1	0	2	.037	4	3.686e-4	1	NC	1	NC	1
52			min	0	10	-.004	3	0	1	-1.18e-3	5	NC	1	2477.063	14
53		8	max	0	1	.001	2	.043	4	4.069e-4	1	NC	1	NC	1
54			min	0	10	-.004	3	0	1	-1.186e-3	5	NC	1	2099.869	14
55		9	max	0	1	.001	2	.05	4	4.452e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	-1.192e-3	5	NC	1	1820.408	14
57		10	max	0	1	.002	2	.056	4	4.835e-4	1	NC	1	NC	1
58			min	0	10	-.005	3	0	10	-1.197e-3	5	NC	1	1605.759	14
59		11	max	0	1	.002	1	.062	4	5.217e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	10	-1.203e-3	5	NC	1	1436.211	14
61		12	max	0	1	.003	1	.068	4	5.6e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	12	-1.209e-3	5	NC	1	1299.245	14
63		13	max	.001	1	.004	1	.074	4	5.983e-4	1	NC	1	NC	1
64			min	0	10	-.006	3	0	12	-1.215e-3	5	NC	1	1186.536	14
65		14	max	.001	1	.005	1	.08	4	6.365e-4	1	NC	1	NC	1
66			min	0	10	-.006	3	0	12	-1.221e-3	5	NC	1	1092.335	14
67		15	max	.001	1	.005	1	.086	4	6.748e-4	1	NC	3	NC	1
68			min	0	10	-.006	3	0	12	-1.226e-3	5	8410.33	1	1012.546	14
69		16	max	.001	1	.006	1	.091	4	7.131e-4	1	NC	3	NC	2
70			min	0	10	-.006	3	0	12	-1.232e-3	5	7127.048	1	944.17	14
71		17	max	.001	1	.008	1	.097	4	7.513e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	12	-1.238e-3	5	6135.245	1	884.965	14
73		18	max	.001	1	.009	1	.103	4	7.896e-4	1	NC	3	NC	2
74			min	0	10	-.006	3	0	12	-1.244e-3	5	5359.436	1	833.218	14
75		19	max	.002	1	.01	1	.109	4	8.279e-4	1	NC	3	NC	2
76			min	0	10	-.006	3	0	12	-1.25e-3	5	4746.834	1	787.599	14
77	M4	1	max	.003	1	.007	2	0	12	4.732e-3	5	NC	1	NC	3
78			min	0	3	-.005	3	-.115	4	-9.289e-4	1	NC	1	168.11	4
79		2	max	.003	1	.006	2	0	12	4.732e-3	5	NC	1	NC	2
80			min	0	3	-.005	3	-.105	4	-9.289e-4	1	NC	1	183.268	4
81		3	max	.002	1	.006	2	0	12	4.732e-3	5	NC	1	NC	2
82			min	0	3	-.004	3	-.096	4	-9.289e-4	1	NC	1	201.31	4
83		4	max	.002	1	.006	2	0	12	4.732e-3	5	NC	1	NC	2
84			min	0	3	-.004	3	-.087	4	-9.289e-4	1	NC	1	222.996	4
85		5	max	.002	1	.005	2	0	12	4.732e-3	5	NC	1	NC	2
86			min	0	3	-.004	3	-.078	4	-9.289e-4	1	NC	1	249.361	4
87		6	max	.002	1	.005	2	0	12	4.732e-3	5	NC	1	NC	2
88			min	0	3	-.003	3	-.069	4	-9.289e-4	1	NC	1	281.845	4
89		7	max	.002	1	.005	2	0	12	4.732e-3	5	NC	1	NC	2
90			min	0	3	-.003	3	-.06	4	-9.289e-4	1	NC	1	322.497	4
91		8	max	.002	1	.004	2	0	12	4.732e-3	5	NC	1	NC	2
92			min	0	3	-.003	3	-.052	4	-9.289e-4	1	NC	1	374.32	4
93		9	max	.002	1	.004	2	0	12	4.732e-3	5	NC	1	NC	2
94			min	0	3	-.003	3	-.044	4	-9.289e-4	1	NC	1	441.853	4
95		10	max	.001	1	.003	2	0	12	4.732e-3	5	NC	1	NC	1
96			min	0	3	-.002	3	-.036	4	-9.289e-4	1	NC	1	532.235	4
97		11	max	.001	1	.003	2	0	12	4.732e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.029	4	-9.289e-4	1	NC	1	657.221	4
99		12	max	.001	1	.003	2	0	12	4.732e-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	-.002	3	-.023	4	-9.289e-4	1	NC	1	837.316	4
101		13	max	0	1	.002	2	0	12	4.732e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.017	4	-9.289e-4	1	NC	1	1110.986	4
103		14	max	0	1	.002	2	0	12	4.732e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.012	4	-9.289e-4	1	NC	1	1557.572	4
105		15	max	0	1	.002	2	0	12	4.732e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.008	4	-9.289e-4	1	NC	1	2363.48	4
107		16	max	0	1	.001	2	0	12	4.732e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.005	4	-9.289e-4	1	NC	1	4058.629	4
109		17	max	0	1	0	2	0	12	4.732e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-9.289e-4	1	NC	1	8701.143	4
111		18	max	0	1	0	2	0	12	4.732e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-9.289e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	4.732e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.289e-4	1	NC	1	NC	1
115	M6	1	max	.011	1	.019	2	.004	1	2.217e-3	4	NC	3	NC	2
116			min	-.008	3	-.012	3	-.02	5	4.696e-6	10	1605.253	2	7669.618	1
117		2	max	.01	1	.018	2	.004	1	2.241e-3	4	NC	3	NC	2
118			min	-.008	3	-.012	3	-.019	5	3.883e-6	10	1712.19	2	8320.523	1
119		3	max	.009	1	.016	2	.003	1	2.264e-3	4	NC	3	NC	2
120			min	-.007	3	-.011	3	-.018	5	3.07e-6	10	1834.044	2	9094.021	1
121		4	max	.009	1	.015	2	.003	1	2.288e-3	4	NC	3	NC	1
122			min	-.007	3	-.011	3	-.017	5	2.258e-6	10	1973.789	2	NC	1
123		5	max	.008	1	.014	2	.003	1	2.311e-3	4	NC	3	NC	1
124			min	-.006	3	-.01	3	-.016	5	1.445e-6	10	2135.251	2	NC	1
125		6	max	.008	1	.013	2	.002	1	2.335e-3	4	NC	3	NC	1
126			min	-.006	3	-.009	3	-.015	5	6.32e-7	10	2323.439	2	NC	1
127		7	max	.007	1	.012	2	.002	1	2.359e-3	4	NC	3	NC	1
128			min	-.005	3	-.009	3	-.014	5	-1.807e-7	10	2545.032	2	NC	1
129		8	max	.006	1	.011	2	.002	1	2.382e-3	4	NC	3	NC	1
130			min	-.005	3	-.008	3	-.013	5	-9.935e-7	10	2809.141	2	NC	1
131		9	max	.006	1	.01	2	.002	1	2.406e-3	4	NC	3	NC	1
132			min	-.005	3	-.007	3	-.012	5	-1.806e-6	10	3128.525	2	NC	1
133		10	max	.005	1	.009	2	.001	1	2.429e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.011	5	-2.619e-6	10	3521.613	2	NC	1
135		11	max	.005	1	.007	2	.001	1	2.453e-3	4	NC	3	NC	1
136			min	-.004	3	-.006	3	-.01	5	-3.432e-6	10	4016.048	2	NC	1
137		12	max	.004	1	.006	2	0	1	2.476e-3	4	NC	3	NC	1
138			min	-.003	3	-.005	3	-.009	5	-6.017e-6	2	4655.267	2	NC	1
139		13	max	.004	1	.005	2	0	1	2.5e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.008	5	-1.072e-5	2	5511.66	2	NC	1
141		14	max	.003	1	.004	2	0	1	2.523e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.006	5	-1.542e-5	2	6715.522	2	NC	1
143		15	max	.002	1	.004	2	0	1	2.547e-3	4	NC	3	NC	1
144			min	-.002	3	-.003	3	-.005	5	-2.012e-5	2	8527.425	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.571e-3	4	NC	1	NC	1
146			min	-.001	3	-.002	3	-.004	5	-2.482e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	1	0	1	2.594e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.003	5	-2.952e-5	2	NC	1	NC	1
149		18	max	0	1	0	1	0	1	2.618e-3	4	NC	1	NC	1
150			min	0	3	0	3	-.001	5	-3.423e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.641e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-3.893e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.742e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.203e-3	4	NC	1	NC	1
155		2	max	0	9	.001	1	.006	4	1.481e-5	2	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-1.188e-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	9	.003	1	.013	4	1.367e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-1.173e-3	4	NC	1	NC	1
159		4	max	0	9	.004	1	.019	4	1.406e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	2	-1.158e-3	4	NC	1	NC	1
161		5	max	0	9	.005	1	.026	4	1.444e-5	1	NC	3	NC	1
162			min	0	2	-.005	3	0	2	-1.143e-3	4	9086.935	1	NC	1
163		6	max	0	9	.006	1	.032	4	1.482e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	-1.128e-3	4	7189.832	1	NC	1
165		7	max	0	9	.008	1	.039	4	1.52e-5	1	NC	3	NC	1
166			min	0	2	-.008	3	0	1	-1.113e-3	4	5898.823	1	NC	1
167		8	max	0	9	.009	1	.045	4	2.252e-5	3	NC	3	NC	1
168			min	0	2	-.009	3	0	1	-1.098e-3	4	4959.07	1	NC	1
169		9	max	0	9	.011	1	.051	4	3.062e-5	3	NC	3	NC	1
170			min	0	2	-.01	3	0	1	-1.084e-3	4	4243.065	1	NC	1
171		10	max	.001	9	.013	1	.058	4	3.872e-5	3	NC	3	NC	1
172			min	0	2	-.011	3	0	1	-1.069e-3	4	3679.698	1	NC	1
173		11	max	.001	9	.014	1	.064	4	4.682e-5	3	NC	3	NC	1
174			min	0	2	-.012	3	-.001	1	-1.054e-3	4	3225.952	1	NC	1
175		12	max	.001	9	.016	1	.07	4	5.493e-5	3	NC	3	NC	1
176			min	0	2	-.013	3	-.001	1	-1.039e-3	4	2854.09	1	NC	1
177		13	max	.001	9	.018	1	.076	4	6.303e-5	3	NC	3	NC	1
178			min	-.001	2	-.014	3	-.001	1	-1.024e-3	4	2545.286	1	NC	1
179		14	max	.001	9	.02	1	.082	4	7.113e-5	3	NC	3	NC	1
180			min	-.001	2	-.015	3	-.001	1	-1.009e-3	4	2286.214	1	NC	1
181		15	max	.002	9	.022	1	.088	4	7.923e-5	3	NC	3	NC	1
182			min	-.001	2	-.016	3	-.002	1	-9.943e-4	4	2067.123	1	NC	1
183		16	max	.002	9	.024	1	.093	4	8.733e-5	3	NC	3	NC	1
184			min	-.001	2	-.016	3	-.002	1	-9.794e-4	4	1880.674	1	NC	1
185		17	max	.002	9	.027	1	.099	4	9.543e-5	3	NC	3	NC	1
186			min	-.001	2	-.017	3	-.002	1	-9.645e-4	4	1721.228	1	NC	1
187		18	max	.002	9	.029	1	.105	4	1.035e-4	3	NC	3	NC	1
188			min	-.001	2	-.018	3	-.002	1	-9.497e-4	4	1584.372	1	NC	1
189		19	max	.002	9	.031	1	.11	4	1.116e-4	3	NC	3	NC	1
190			min	-.002	2	-.018	3	-.002	1	-9.348e-4	4	1466.614	1	NC	1
191	M8	1	max	.008	1	.022	1	.002	1	4.468e-3	4	NC	1	NC	2
192			min	-.002	3	-.014	3	-.116	4	-1.103e-4	1	NC	1	166.63	4
193		2	max	.008	1	.021	1	.002	1	4.468e-3	4	NC	1	NC	2
194			min	-.002	3	-.013	3	-.106	4	-1.103e-4	1	NC	1	181.654	4
195		3	max	.007	1	.02	1	.002	1	4.468e-3	4	NC	1	NC	1
196			min	-.002	3	-.012	3	-.097	4	-1.103e-4	1	NC	1	199.536	4
197		4	max	.007	1	.019	1	.002	1	4.468e-3	4	NC	1	NC	1
198			min	-.001	3	-.011	3	-.087	4	-1.103e-4	1	NC	1	221.031	4
199		5	max	.007	1	.017	1	.002	1	4.468e-3	4	NC	1	NC	1
200			min	-.001	3	-.011	3	-.078	4	-1.103e-4	1	NC	1	247.163	4
201		6	max	.006	1	.016	1	.001	1	4.468e-3	4	NC	1	NC	1
202			min	-.001	3	-.01	3	-.069	4	-1.103e-4	1	NC	1	279.36	4
203		7	max	.006	1	.015	1	.001	1	4.468e-3	4	NC	1	NC	1
204			min	-.001	3	-.009	3	-.06	4	-1.103e-4	1	NC	1	319.653	4
205		8	max	.005	1	.014	1	.001	1	4.468e-3	4	NC	1	NC	1
206			min	-.001	3	-.008	3	-.052	4	-1.103e-4	1	NC	1	371.018	4
207		9	max	.005	1	.012	1	0	1	4.468e-3	4	NC	1	NC	1
208			min	0	3	-.008	3	-.044	4	-1.103e-4	1	NC	1	437.955	4
209		10	max	.004	1	.011	1	0	1	4.468e-3	4	NC	1	NC	1
210			min	0	3	-.007	3	-.037	4	-1.103e-4	1	NC	1	527.539	4
211		11	max	.004	1	.01	1	0	1	4.468e-3	4	NC	1	NC	1
212			min	0	3	-.006	3	-.03	4	-1.103e-4	1	NC	1	651.421	4
213		12	max	.003	1	.009	1	0	1	4.468e-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	-.005	3	-.023	4	-1.103e-4	1	NC	1	829.927	4
215		13	max	.003	1	.007	1	0	1	4.468e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.018	4	-1.103e-4	1	NC	1	1101.181	4
217		14	max	.002	1	.006	1	0	1	4.468e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.013	4	-1.103e-4	1	NC	1	1543.825	4
219		15	max	.002	1	.005	1	0	1	4.468e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.008	4	-1.103e-4	1	NC	1	2342.618	4
221		16	max	.001	1	.004	1	0	1	4.468e-3	4	NC	1	NC	1
222			min	0	3	-.002	3	-.005	4	-1.103e-4	1	NC	1	4022.802	4
223		17	max	0	1	.002	1	0	1	4.468e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.103e-4	1	NC	1	8624.326	4
225		18	max	0	1	.001	1	0	1	4.468e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.103e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	4.468e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.103e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.006	2	0	3	9.256e-4	1	NC	3	NC	1
230			min	-.002	3	-.004	3	-.008	4	-1.33e-4	3	5202.877	2	NC	1
231		2	max	.003	1	.005	2	0	3	8.774e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.008	4	-1.297e-4	3	5623.109	2	NC	1
233		3	max	.003	1	.005	2	0	3	8.292e-4	1	NC	3	NC	1
234			min	-.002	3	-.004	3	-.008	4	-1.264e-4	3	6113.758	2	NC	1
235		4	max	.003	1	.004	2	0	3	8.332e-4	4	NC	3	NC	1
236			min	-.002	3	-.004	3	-.008	4	-1.232e-4	3	6690.238	2	NC	1
237		5	max	.003	1	.004	2	0	3	9.033e-4	4	NC	3	NC	1
238			min	-.002	3	-.004	3	-.008	4	-1.199e-4	3	7372.678	2	NC	1
239		6	max	.002	1	.004	2	0	3	9.733e-4	4	NC	1	NC	1
240			min	-.002	3	-.004	3	-.007	4	-1.166e-4	3	8187.781	2	NC	1
241		7	max	.002	1	.003	2	0	3	1.043e-3	4	NC	1	NC	1
242			min	-.002	3	-.004	3	-.007	4	-1.133e-4	3	9171.626	2	NC	1
243		8	max	.002	1	.003	2	0	3	1.113e-3	4	NC	1	NC	1
244			min	-.001	3	-.003	3	-.007	4	-1.101e-4	3	NC	1	NC	1
245		9	max	.002	1	.003	2	0	3	1.183e-3	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.007	4	-1.068e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	1.254e-3	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.006	4	-1.035e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	1.324e-3	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.006	4	-1.002e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.394e-3	4	NC	1	NC	1
252			min	0	3	-.002	3	-.005	4	-9.697e-5	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	1.464e-3	4	NC	1	NC	1
254			min	0	3	-.002	3	-.005	4	-9.37e-5	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	1.534e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.004	4	-9.043e-5	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.604e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.003	4	-8.716e-5	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.674e-3	4	NC	1	NC	1
260			min	0	3	-.001	3	-.003	4	-8.388e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.744e-3	4	NC	1	NC	1
262			min	0	3	0	3	-.002	4	-8.061e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.814e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-7.734e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.884e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-7.407e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	3.375e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-8.592e-4	4	NC	1	NC	1
269		2	max	0	1	0	2	.005	4	2.371e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-9.693e-4	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
271		3	max	0	1	0	2	.009	4	1.367e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.079e-3	4	NC	1	4957.385	4
273		4	max	0	1	0	2	.014	4	3.634e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	1	-1.19e-3	4	NC	1	3271.621	4
275		5	max	0	1	0	2	.019	4	-4.568e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	-.001	1	-1.3e-3	4	NC	1	2431.549	4
277		6	max	0	1	0	2	.024	4	-1.097e-5	12	NC	1	NC	1
278			min	0	10	-.003	3	-.002	1	-1.41e-3	4	NC	1	1929.351	4
279		7	max	0	1	0	2	.029	4	-1.737e-5	12	NC	1	NC	1
280			min	0	10	-.004	3	-.003	1	-1.52e-3	4	NC	1	1595.783	4
281		8	max	0	1	.001	2	.034	5	-2.378e-5	12	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-1.63e-3	4	NC	1	1354.967	5
283		9	max	0	1	.002	1	.039	5	-3.018e-5	12	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-1.74e-3	4	NC	1	1174.962	5
285		10	max	0	1	.002	1	.044	5	-3.658e-5	12	NC	1	NC	2
286			min	0	10	-.005	3	-.005	1	-1.85e-3	4	NC	1	1035.583	5
287		11	max	0	1	.003	1	.05	5	-4.298e-5	12	NC	1	NC	2
288			min	0	10	-.006	3	-.007	1	-1.96e-3	4	NC	1	924.482	5
289		12	max	0	1	.003	1	.055	5	-4.939e-5	12	NC	1	NC	2
290			min	0	10	-.006	3	-.008	1	-2.071e-3	4	NC	1	833.814	5
291		13	max	.001	1	.004	1	.061	5	-5.579e-5	12	NC	1	NC	2
292			min	0	10	-.006	3	-.009	1	-2.181e-3	4	NC	1	758.353	5
293		14	max	.001	1	.005	1	.066	5	-6.219e-5	12	NC	2	NC	2
294			min	0	10	-.006	3	-.01	1	-2.291e-3	4	9796.775	1	694.491	5
295		15	max	.001	1	.006	1	.072	5	-6.684e-5	10	NC	3	NC	2
296			min	0	10	-.007	3	-.011	1	-2.401e-3	4	8240.03	1	639.654	5
297		16	max	.001	1	.007	1	.078	5	-7.128e-5	10	NC	3	NC	2
298			min	0	10	-.007	3	-.012	1	-2.511e-3	4	7034.229	1	591.961	5
299		17	max	.001	1	.008	1	.084	5	-7.571e-5	10	NC	3	NC	2
300			min	0	10	-.007	3	-.013	1	-2.621e-3	4	6090.108	1	550.007	5
301		18	max	.001	1	.009	1	.09	5	-8.015e-5	10	NC	3	NC	3
302			min	0	10	-.007	3	-.014	1	-2.731e-3	4	5343.982	1	512.722	5
303		19	max	.002	1	.01	1	.096	5	-8.459e-5	10	NC	3	NC	3
304			min	0	10	-.006	3	-.014	1	-2.841e-3	4	4750.022	1	479.279	5
305	M12	1	max	.003	1	.007	2	.012	1	6.101e-3	4	NC	1	NC	3
306			min	0	3	-.005	3	-.106	5	7.428e-5	10	NC	1	182.56	5
307		2	max	.003	1	.006	2	.011	1	6.101e-3	4	NC	1	NC	3
308			min	0	3	-.005	3	-.097	5	7.428e-5	10	NC	1	199.017	5
309		3	max	.002	1	.006	2	.01	1	6.101e-3	4	NC	1	NC	3
310			min	0	3	-.004	3	-.088	5	7.428e-5	10	NC	1	218.605	5
311		4	max	.002	1	.006	2	.009	1	6.101e-3	4	NC	1	NC	3
312			min	0	3	-.004	3	-.08	5	7.428e-5	10	NC	1	242.15	5
313		5	max	.002	1	.005	2	.008	1	6.101e-3	4	NC	1	NC	3
314			min	0	3	-.004	3	-.071	5	7.428e-5	10	NC	1	270.774	5
315		6	max	.002	1	.005	2	.007	1	6.101e-3	4	NC	1	NC	3
316			min	0	3	-.003	3	-.063	5	7.428e-5	10	NC	1	306.041	5
317		7	max	.002	1	.005	2	.006	1	6.101e-3	4	NC	1	NC	3
318			min	0	3	-.003	3	-.055	5	7.428e-5	10	NC	1	350.176	5
319		8	max	.002	1	.004	2	.005	1	6.101e-3	4	NC	1	NC	3
320			min	0	3	-.003	3	-.048	5	7.428e-5	10	NC	1	406.438	5
321		9	max	.002	1	.004	2	.004	1	6.101e-3	4	NC	1	NC	2
322			min	0	3	-.003	3	-.04	5	7.428e-5	10	NC	1	479.755	5
323		10	max	.001	1	.003	2	.004	1	6.101e-3	4	NC	1	NC	2
324			min	0	3	-.002	3	-.033	5	7.428e-5	10	NC	1	577.876	5
325		11	max	.001	1	.003	2	.003	1	6.101e-3	4	NC	1	NC	2
326			min	0	3	-.002	3	-.027	5	7.428e-5	10	NC	1	713.564	5
327		12	max	.001	1	.003	2	.002	1	6.101e-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	-.002	3	-.021	5	7.428e-5	10	NC	1	909.077	5
329		13	max	0	1	.002	2	.002	1	6.101e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.016	5	7.428e-5	10	NC	1	1206.173	5
331		14	max	0	1	.002	2	.001	1	6.101e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.011	5	7.428e-5	10	NC	1	1690.98	5
333		15	max	0	1	.002	2	0	1	6.101e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.008	5	7.428e-5	10	NC	1	2565.85	5
335		16	max	0	1	.001	2	0	1	6.101e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.004	5	7.428e-5	10	NC	1	4406.029	5
337		17	max	0	1	0	2	0	1	6.101e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	7.428e-5	10	NC	1	9445.664	5
339		18	max	0	1	0	2	0	1	6.101e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	7.428e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	6.101e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	7.428e-5	10	NC	1	NC	1
343	M1	1	max	.005	3	.02	3	.011	5	2.137e-2	1	NC	1	NC	1
344			min	-.006	2	-.031	1	-.004	1	-1.559e-2	3	NC	1	NC	1
345		2	max	.004	3	.011	3	.015	5	1.028e-2	1	NC	4	NC	2
346			min	-.006	2	-.017	1	-.01	1	-7.715e-3	3	3138.913	1	8285.438	1
347		3	max	.004	3	.002	3	.02	5	5.153e-4	5	NC	5	NC	2
348			min	-.006	2	-.003	1	-.014	1	-5.914e-4	1	1623.801	1	4867.357	5
349		4	max	.004	3	.009	1	.026	5	5.112e-4	5	NC	5	NC	2
350			min	-.006	2	-.005	3	-.016	1	-4.855e-4	1	1149.439	1	3094.679	5
351		5	max	.005	3	.019	1	.032	5	5.072e-4	5	NC	5	NC	2
352			min	-.006	2	-.011	3	-.016	1	-3.795e-4	1	921.6	1	2227.264	5
353		6	max	.005	3	.027	1	.038	5	5.031e-4	5	NC	5	NC	2
354			min	-.006	2	-.016	3	-.015	1	-2.736e-4	1	792.972	1	1718.89	5
355		7	max	.005	3	.033	1	.045	5	4.991e-4	5	NC	5	NC	2
356			min	-.006	2	-.019	3	-.013	1	-1.676e-4	1	715.252	1	1388.339	5
357		8	max	.005	3	.038	1	.051	5	4.95e-4	5	NC	5	NC	2
358			min	-.006	2	-.022	3	-.011	1	-6.167e-5	1	668.367	1	1158.298	5
359		9	max	.005	3	.04	1	.058	5	4.91e-4	5	NC	5	NC	1
360			min	-.006	2	-.023	3	-.008	1	5.207e-6	10	642.955	1	982.161	4
361		10	max	.005	3	.041	1	.065	5	5.077e-4	4	NC	5	NC	1
362			min	-.006	2	-.023	3	-.004	1	1.352e-5	10	634.711	1	844.927	4
363		11	max	.005	3	.04	1	.073	4	5.264e-4	4	NC	5	NC	1
364			min	-.006	2	-.022	3	-.001	1	2.183e-5	10	642.352	1	740.742	4
365		12	max	.005	3	.037	1	.08	4	5.45e-4	4	NC	5	NC	2
366			min	-.006	2	-.02	3	0	10	2.544e-5	12	667.079	1	659.895	4
367		13	max	.005	3	.033	1	.088	4	5.636e-4	4	NC	5	NC	2
368			min	-.006	2	-.018	3	0	12	2.749e-5	12	713.076	1	596.097	4
369		14	max	.005	3	.026	1	.095	4	5.823e-4	4	NC	5	NC	2
370			min	-.006	2	-.014	3	0	12	2.954e-5	12	789.489	1	545.129	4
371		15	max	.005	3	.018	1	.102	4	6.8e-4	1	NC	5	NC	2
372			min	-.006	2	-.01	3	0	12	3.159e-5	12	915.903	1	504.073	4
373		16	max	.005	3	.008	1	.109	4	9.655e-4	4	NC	5	NC	2
374			min	-.006	2	-.004	3	0	12	3.291e-5	12	1138.975	1	470.868	4
375		17	max	.005	3	.002	3	.115	4	9.562e-3	4	NC	5	NC	2
376			min	-.006	2	-.004	1	0	12	1.686e-5	12	1598.628	1	444.055	4
377		18	max	.005	3	.008	3	.12	4	1.185e-2	1	NC	4	NC	2
378			min	-.006	2	-.018	1	0	10	-3.649e-3	3	3081.485	1	422.515	4
379		19	max	.005	3	.015	3	.125	4	2.377e-2	1	NC	1	NC	1
380			min	-.006	2	-.034	1	-.003	1	-7.393e-3	3	NC	1	405.917	4
381	M5	1	max	.013	3	.061	3	.01	5	3.887e-6	4	NC	1	NC	1
382			min	-.019	2	-.095	1	-.005	1	5.594e-8	10	NC	1	NC	1
383		2	max	.013	3	.033	3	.015	5	2.438e-4	5	NC	5	NC	1
384			min	-.019	2	-.051	1	-.005	1	-9.602e-5	1	1055.273	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	.013	3	.007	3	.02	5	4.798e-4	5	NC	5	NC	1
386			min	-.019	2	-.009	1	-.004	1	-1.904e-4	1	543.548	1	NC	1
387		4	max	.013	3	.026	1	.026	5	4.977e-4	5	NC	5	NC	1
388			min	-.019	2	-.014	3	-.003	1	-1.774e-4	1	383.961	1	NC	1
389		5	max	.013	3	.056	1	.033	5	5.155e-4	5	NC	15	NC	1
390			min	-.019	2	-.031	3	-.003	1	-1.644e-4	1	307.293	1	NC	1
391		6	max	.013	3	.081	1	.039	5	5.334e-4	5	NC	15	NC	1
392			min	-.019	2	-.045	3	-.003	1	-1.513e-4	1	263.957	1	NC	1
393		7	max	.013	3	.1	1	.047	5	5.513e-4	5	NC	15	NC	1
394			min	-.019	2	-.055	3	-.002	1	-1.383e-4	1	237.708	1	NC	1
395		8	max	.013	3	.114	1	.054	5	5.692e-4	5	9746.004	15	NC	1
396			min	-.019	2	-.062	3	-.002	1	-1.252e-4	1	221.792	1	NC	1
397		9	max	.013	3	.122	1	.061	5	5.871e-4	5	9399.27	15	NC	1
398			min	-.019	2	-.066	3	-.002	1	-1.122e-4	1	213.056	1	NC	1
399		10	max	.013	3	.125	1	.069	5	6.05e-4	5	9301.25	15	NC	1
400			min	-.019	2	-.066	3	-.002	1	-9.913e-5	1	210.045	1	NC	1
401		11	max	.013	3	.122	1	.076	4	6.229e-4	5	9434.915	15	NC	1
402			min	-.019	2	-.064	3	-.002	1	-8.609e-5	1	212.314	1	NC	1
403		12	max	.013	3	.113	1	.084	4	6.408e-4	5	9819.518	15	NC	1
404			min	-.019	2	-.058	3	-.002	1	-7.305e-5	1	220.245	1	NC	1
405		13	max	.013	3	.099	1	.091	4	6.587e-4	5	NC	15	NC	1
406			min	-.019	2	-.051	3	-.002	1	-6.e-5	1	235.216	1	NC	1
407		14	max	.013	3	.08	1	.098	4	6.766e-4	5	NC	15	NC	1
408			min	-.019	2	-.04	3	-.002	1	-4.696e-5	1	260.25	1	9310.462	4
409		15	max	.013	3	.054	1	.104	4	6.945e-4	5	NC	15	NC	1
410			min	-.019	2	-.027	3	-.002	1	-3.391e-5	1	301.848	1	9156.116	4
411		16	max	.013	3	.024	1	.11	4	1.053e-3	5	NC	5	NC	1
412			min	-.019	2	-.012	3	-.002	1	-2.998e-5	2	375.589	1	9868.907	4
413		17	max	.013	3	.005	3	.116	4	9.599e-3	4	NC	5	NC	1
414			min	-.02	2	-.013	1	-.002	1	-1.934e-4	1	528.918	1	NC	1
415		18	max	.013	3	.024	3	.121	4	4.925e-3	4	NC	5	NC	1
416			min	-.02	2	-.056	1	-.002	1	-9.92e-5	1	1024.474	1	NC	1
417		19	max	.013	3	.044	3	.125	4	1.437e-6	5	NC	1	NC	1
418			min	-.019	2	-.103	1	-.003	1	-7.745e-8	3	NC	1	NC	1
419	M9	1	max	.005	3	.02	3	.008	5	1.559e-2	3	NC	1	NC	1
420			min	-.006	2	-.032	1	-.006	1	-2.137e-2	1	NC	1	NC	1
421		2	max	.005	3	.011	3	.008	5	7.731e-3	3	NC	4	NC	2
422			min	-.006	2	-.017	1	-.001	1	-1.056e-2	1	3139.752	1	9778.62	1
423		3	max	.005	3	.002	3	.008	4	4.999e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	7.756e-6	10	1624.247	1	6091.715	1
425		4	max	.005	3	.009	1	.01	4	1.85e-5	5	NC	5	NC	2
426			min	-.006	2	-.005	3	0	3	-3.858e-5	1	1149.757	1	5178.312	1
427		5	max	.005	3	.019	1	.014	4	1.249e-6	3	NC	5	NC	2
428			min	-.006	2	-.011	3	0	3	-1.272e-4	1	921.847	1	5154	1
429		6	max	.005	3	.027	1	.018	4	-4.894e-6	12	NC	5	NC	2
430			min	-.006	2	-.016	3	0	3	-2.157e-4	1	793.174	1	4158.234	4
431		7	max	.005	3	.033	1	.023	4	-1.035e-5	12	NC	5	NC	2
432			min	-.006	2	-.019	3	-.001	3	-3.043e-4	1	715.425	1	2878.918	4
433		8	max	.005	3	.038	1	.029	4	-1.58e-5	12	NC	5	NC	1
434			min	-.006	2	-.022	3	-.001	3	-3.929e-4	1	668.519	1	2122.622	4
435		9	max	.005	3	.04	1	.035	4	-2.125e-5	12	NC	5	NC	1
436			min	-.006	2	-.023	3	-.004	1	-4.814e-4	1	643.09	1	1638.68	4
437		10	max	.005	3	.041	1	.043	5	-2.67e-5	12	NC	5	NC	1
438			min	-.006	2	-.023	3	-.006	1	-5.7e-4	1	634.835	1	1310.207	4
439		11	max	.005	3	.04	1	.051	5	-3.215e-5	12	NC	5	NC	2
440			min	-.006	2	-.022	3	-.009	1	-6.586e-4	1	642.467	1	1076.895	4
441		12	max	.005	3	.037	1	.059	5	-3.76e-5	12	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	-.006	2	-.02	3	-.012	1	-7.471e-4	1	667.187	1	905.106	4
443		13	max	.005	3	.033	1	.068	5	-4.305e-5	12	NC	5	NC	2
444			min	-.006	2	-.018	3	-.014	1	-8.357e-4	1	713.181	1	774.88	4
445		14	max	.005	3	.026	1	.078	5	-4.85e-5	12	NC	5	NC	2
446			min	-.006	2	-.014	3	-.015	1	-9.243e-4	1	789.593	1	673.767	4
447		15	max	.005	3	.018	1	.087	5	-5.396e-5	12	NC	5	NC	2
448			min	-.006	2	-.01	3	-.015	1	-1.013e-3	1	916.01	1	593.673	4
449		16	max	.005	3	.008	1	.096	5	3.217e-5	5	NC	5	NC	2
450			min	-.006	2	-.004	3	-.014	1	-1.079e-3	1	1139.092	1	529.152	4
451		17	max	.005	3	.002	3	.106	5	9.198e-3	4	NC	5	NC	2
452			min	-.006	2	-.004	1	-.012	1	-6.18e-4	1	1598.782	1	476.307	4
453		18	max	.005	3	.008	3	.115	4	4.317e-3	5	NC	4	NC	2
454			min	-.006	2	-.018	1	-.008	1	-1.208e-2	1	3081.768	1	432.377	4
455		19	max	.005	3	.015	3	.125	4	7.393e-3	3	NC	1	NC	1
456			min	-.006	2	-.034	1	-.002	1	-2.377e-2	1	NC	1	395.867	4
457	M13	1	max	.006	1	.02	3	.005	3	3.58e-3	3	NC	1	NC	1
458			min	-.008	5	-.032	1	-.006	2	-5.642e-3	1	NC	1	NC	1
459		2	max	.006	1	.191	3	.045	1	4.336e-3	3	NC	5	NC	2
460			min	-.009	5	-.265	1	-.002	5	-6.859e-3	1	872.682	1	4070.362	1
461		3	max	.006	1	.33	3	.116	1	5.093e-3	3	NC	5	NC	3
462			min	-.009	5	-.456	1	-.005	5	-8.076e-3	1	480.238	1	1691.21	1
463		4	max	.006	1	.417	3	.176	1	5.849e-3	3	NC	15	NC	3
464			min	-.009	5	-.576	1	-.009	5	-9.293e-3	1	374.804	1	1129.697	1
465		5	max	.006	1	.441	3	.206	1	6.605e-3	3	NC	15	NC	3
466			min	-.009	5	-.61	1	-.013	5	-1.051e-2	1	352.537	1	970.674	1
467		6	max	.006	1	.404	3	.196	1	7.361e-3	3	NC	5	NC	3
468			min	-.009	5	-.561	1	-.017	5	-1.173e-2	1	385.234	1	1016.611	1
469		7	max	.006	1	.319	3	.15	1	8.118e-3	3	NC	5	NC	3
470			min	-.01	5	-.445	1	-.02	5	-1.294e-2	1	493.017	1	1320.424	1
471		8	max	.005	1	.208	3	.081	1	8.874e-3	3	NC	5	NC	3
472			min	-.01	5	-.295	1	-.02	5	-1.416e-2	1	774.491	1	2395.204	1
473		9	max	.005	1	.107	3	.013	9	9.63e-3	3	NC	5	NC	1
474			min	-.01	5	-.157	1	-.014	5	-1.538e-2	1	1623.357	1	NC	1
475		10	max	.005	1	.061	3	.013	3	1.039e-2	3	NC	4	NC	1
476			min	-.01	5	-.095	1	-.019	2	-1.659e-2	1	3235.697	1	NC	1
477		11	max	.005	1	.107	3	.019	4	9.631e-3	3	NC	5	NC	2
478			min	-.01	5	-.157	1	-.007	10	-1.538e-2	1	1623.358	1	9340.083	1
479		12	max	.005	1	.208	3	.088	1	8.874e-3	3	NC	5	NC	3
480			min	-.01	5	-.295	1	0	10	-1.416e-2	1	774.491	1	2204.015	1
481		13	max	.005	1	.319	3	.159	1	8.118e-3	3	NC	5	NC	3
482			min	-.01	5	-.445	1	.006	10	-1.294e-2	1	493.017	1	1249.006	1
483		14	max	.005	1	.404	3	.205	1	7.362e-3	3	NC	5	NC	3
484			min	-.01	5	-.561	1	.009	15	-1.173e-2	1	385.234	1	972.616	1
485		15	max	.005	1	.441	3	.214	1	6.606e-3	3	NC	15	NC	3
486			min	-.011	5	-.61	1	.003	15	-1.051e-2	1	352.537	1	933.633	1
487		16	max	.005	1	.417	3	.183	1	5.85e-3	3	NC	15	NC	3
488			min	-.011	5	-.576	1	-.005	5	-9.292e-3	1	374.804	1	1088.472	1
489		17	max	.005	1	.33	3	.121	1	5.094e-3	3	NC	5	NC	3
490			min	-.011	5	-.456	1	-.011	5	-8.075e-3	1	480.239	1	1626.457	1
491		18	max	.005	1	.191	3	.048	1	4.338e-3	3	NC	5	NC	2
492			min	-.011	5	-.265	1	-.011	5	-6.858e-3	1	872.683	1	3880.76	1
493		19	max	.004	1	.02	3	.005	3	3.582e-3	3	NC	1	NC	1
494			min	-.011	5	-.031	1	-.006	2	-5.641e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.015	3	.005	3	5.832e-3	1	NC	1	NC	1
496			min	-.125	4	-.034	1	-.006	2	-2.683e-3	3	NC	1	NC	1
497		2	max	.002	1	.096	3	.049	1	7.12e-3	1	NC	5	NC	2
498			min	-.125	4	-.294	1	0	10	-3.224e-3	3	784.52	1	3799.917	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	.002	1	.163	3	.122	1	8.408e-3	1	NC	5	NC	3
500			min	-.125	4	-.506	1	.006	10	-3.766e-3	3	431.752	1	1610.044	1
501		4	max	.002	1	.204	3	.183	1	9.696e-3	1	NC	15	NC	3
502			min	-.125	4	-.639	1	.011	10	-4.307e-3	3	337.005	1	1084.057	1
503		5	max	.002	1	.217	3	.213	1	1.098e-2	1	NC	15	NC	3
504			min	-.125	4	-.677	1	.012	10	-4.848e-3	3	317.05	1	934.255	1
505		6	max	.002	1	.201	3	.203	1	1.227e-2	1	NC	5	NC	3
506			min	-.125	4	-.622	1	.01	10	-5.389e-3	3	346.583	1	978.049	1
507		7	max	.002	1	.162	3	.156	1	1.356e-2	1	NC	5	NC	3
508			min	-.125	4	-.493	1	.006	10	-5.931e-3	3	443.868	1	1264.592	1
509		8	max	.002	1	.112	3	.085	1	1.485e-2	1	NC	5	NC	3
510			min	-.125	4	-.326	1	-.002	5	-6.472e-3	3	698.417	1	2262.861	1
511		9	max	.003	1	.065	3	.015	3	1.614e-2	1	NC	5	NC	1
512			min	-.125	4	-.172	1	-.008	5	-7.013e-3	3	1470.836	1	NC	1
513		10	max	.003	1	.044	3	.013	3	1.742e-2	1	NC	4	NC	1
514			min	-.125	4	-.103	1	-.019	2	-7.554e-3	3	2958.032	1	NC	1
515		11	max	.003	1	.065	3	.016	14	1.614e-2	1	NC	5	NC	1
516			min	-.125	4	-.172	1	-.007	10	-7.013e-3	3	1470.836	1	NC	1
517		12	max	.003	1	.112	3	.082	1	1.485e-2	1	NC	5	NC	3
518			min	-.125	4	-.326	1	0	10	-6.471e-3	3	698.417	1	2333.126	1
519		13	max	.003	1	.162	3	.152	1	1.356e-2	1	NC	5	NC	3
520			min	-.125	4	-.493	1	.006	10	-5.93e-3	3	443.868	1	1294.716	1
521		14	max	.003	1	.201	3	.199	1	1.227e-2	1	NC	5	NC	3
522			min	-.125	4	-.622	1	.003	15	-5.388e-3	3	346.583	1	999.43	1
523		15	max	.003	1	.217	3	.208	1	1.099e-2	1	NC	15	NC	3
524			min	-.125	4	-.677	1	-.004	5	-4.847e-3	3	317.05	1	955.048	1
525		16	max	.003	1	.204	3	.179	1	9.698e-3	1	NC	15	NC	3
526			min	-.125	4	-.639	1	-.013	5	-4.305e-3	3	337.005	1	1110.865	1
527		17	max	.003	1	.162	3	.118	1	8.41e-3	1	NC	5	NC	3
528			min	-.125	4	-.506	1	-.017	5	-3.764e-3	3	431.753	1	1658.964	1
529		18	max	.003	1	.096	3	.046	1	7.122e-3	1	NC	5	NC	2
530			min	-.125	4	-.294	1	-.015	5	-3.222e-3	3	784.521	1	3966.277	1
531		19	max	.003	1	.015	3	.005	3	5.835e-3	1	NC	1	NC	1
532			min	-.125	4	-.034	1	-.006	2	-2.68e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.656e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-4.648e-4	5	NC	1	NC	1
535		2	max	0	1	-.003	15	.013	4	7.254e-4	3	NC	5	NC	1
536			min	-.001	5	-.023	6	0	3	-8.643e-4	1	4513.402	6	8222.544	4
537		3	max	0	1	-.006	15	.027	4	1.185e-3	3	NC	5	NC	1
538			min	-.002	5	-.046	6	-.003	3	-1.644e-3	1	2296.716	6	3861.482	4
539		4	max	0	1	-.008	15	.042	4	1.645e-3	3	NC	15	NC	2
540			min	-.003	5	-.067	6	-.005	3	-2.424e-3	1	1575.682	6	2517.062	4
541		5	max	0	1	-.011	15	.055	4	2.105e-3	3	9335.674	15	NC	9
542			min	-.004	5	-.086	6	-.009	3	-3.204e-3	1	1229.52	6	1907.489	4
543		6	max	0	1	-.013	15	.067	4	2.565e-3	3	7856.956	15	NC	10
544			min	-.005	5	-.102	6	-.013	3	-3.984e-3	1	1034.771	6	1587.412	4
545		7	max	0	1	-.014	15	.075	4	3.024e-3	3	6967.703	15	9022.431	10
546			min	-.007	5	-.115	6	-.017	3	-4.764e-3	1	917.655	6	1414.528	4
547		8	max	0	1	-.015	15	.079	4	3.484e-3	3	6434.017	15	7465.217	10
548			min	-.008	5	-.124	6	-.02	3	-5.544e-3	1	847.368	6	1332.968	4
549		9	max	0	1	-.016	15	.08	4	3.944e-3	3	6146.756	15	6443.41	10
550			min	-.009	5	-.13	6	-.024	3	-6.324e-3	1	809.536	6	1320.769	4
551		10	max	0	1	-.016	15	.077	4	4.404e-3	3	6055.88	15	5768.3	10
552			min	-.01	5	-.132	6	-.027	3	-7.103e-3	1	797.567	6	1374.412	4
553		11	max	0	1	-.015	15	.07	4	4.864e-3	3	6146.756	15	5340.603	10
554			min	-.011	5	-.129	6	-.029	3	-7.883e-3	1	809.536	6	1506.401	4
555		12	max	0	1	-.014	15	.06	4	5.323e-3	3	6434.017	15	5111.274	10

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	-.123	6	-.03	3	-8.663e-3	1	847.368	6	1752.537	4
557		13	max	0	1	-.013	15	.048	4	5.783e-3	3	6967.703	15	5066.806	10
558			min	-.013	5	-.114	1	-.03	3	-9.443e-3	1	917.655	6	1815.54	1
559		14	max	0	1	-.011	15	.042	1	6.243e-3	3	7856.956	15	6104.955	15
560			min	-.014	5	-.102	1	-.028	3	-1.022e-2	1	1034.771	6	1869.654	1
561		15	max	0	1	-.009	15	.037	1	6.703e-3	3	9335.674	15	NC	15
562			min	-.015	5	-.087	1	-.024	3	-1.1e-2	1	1229.52	6	2027.569	1
563		16	max	0	1	-.006	15	.028	1	7.163e-3	3	NC	15	NC	4
564			min	-.016	5	-.069	1	-.018	3	-1.178e-2	1	1575.682	6	2367.655	1
565		17	max	0	1	-.003	15	.016	1	7.622e-3	3	NC	5	NC	4
566			min	-.017	5	-.049	1	-.01	3	-1.256e-2	1	2296.716	6	3136.185	1
567		18	max	0	1	0	15	.002	9	8.082e-3	3	NC	5	NC	4
568			min	-.018	5	-.027	1	-.006	5	-1.334e-2	1	4513.402	6	5579.435	1
569		19	max	0	1	.005	5	.014	3	8.542e-3	3	NC	1	NC	1
570			min	-.02	5	-.005	1	-.02	1	-1.412e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	2.882e-3	3	NC	1	NC	1
572			min	-.008	4	-.003	4	-.006	2	-4.431e-3	1	NC	1	NC	1
573		2	max	0	10	-.011	12	.006	1	2.749e-3	3	NC	15	NC	2
574			min	-.007	4	-.037	4	-.003	5	-4.212e-3	1	3105.132	4	9447.225	1
575		3	max	0	10	-.022	12	.015	1	2.617e-3	3	5185.08	15	NC	3
576			min	-.007	4	-.07	4	-.011	5	-3.993e-3	1	1580.096	4	5341.426	1
577		4	max	0	10	-.031	15	.022	1	2.485e-3	3	3557.268	15	NC	10
578			min	-.006	4	-.101	4	-.024	5	-3.774e-3	1	1084.038	4	4059.257	1
579		5	max	0	10	-.04	15	.026	1	2.353e-3	3	2775.772	15	NC	10
580			min	-.006	4	-.128	4	-.04	5	-3.555e-3	1	845.886	4	2734.411	5
581		6	max	0	10	-.047	15	.029	1	2.221e-3	3	2336.106	15	NC	10
582			min	-.005	4	-.152	4	-.056	5	-3.337e-3	1	711.902	4	1932.128	5
583		7	max	0	10	-.053	15	.03	1	2.089e-3	3	2071.704	15	NC	10
584			min	-.005	4	-.171	4	-.071	5	-3.118e-3	1	631.329	4	1511.042	5
585		8	max	0	10	-.057	15	.029	1	1.957e-3	3	1913.024	15	NC	10
586			min	-.005	4	-.184	4	-.084	5	-2.899e-3	1	582.973	4	1271.025	5
587		9	max	0	10	-.059	15	.028	1	1.825e-3	3	1827.612	15	NC	10
588			min	-.004	4	-.193	4	-.095	5	-2.68e-3	1	556.945	4	1132.147	5
589		10	max	0	10	-.06	15	.025	1	1.693e-3	3	1800.592	15	NC	10
590			min	-.004	4	-.195	4	-.101	5	-2.461e-3	1	548.711	4	1058.692	5
591		11	max	0	10	-.059	15	.022	1	1.561e-3	3	1827.612	15	NC	3
592			min	-.003	4	-.192	4	-.103	5	-2.242e-3	1	556.945	4	1034.886	5
593		12	max	0	10	-.056	15	.018	1	1.429e-3	3	1913.024	15	NC	3
594			min	-.003	4	-.184	4	-.101	5	-2.023e-3	1	582.973	4	1056.45	5
595		13	max	0	10	-.052	15	.014	1	1.297e-3	3	2071.704	15	NC	2
596			min	-.003	4	-.17	4	-.095	5	-1.804e-3	1	631.329	4	1128.757	5
597		14	max	0	10	-.046	15	.01	1	1.164e-3	3	2336.106	15	NC	2
598			min	-.002	4	-.15	4	-.084	5	-1.585e-3	1	711.902	4	1270.072	5
599		15	max	0	10	-.039	15	.007	1	1.032e-3	3	2775.772	15	NC	1
600			min	-.002	4	-.126	4	-.07	5	-1.366e-3	1	845.886	4	1523.797	5
601		16	max	0	10	-.03	15	.004	1	9.003e-4	3	3557.268	15	NC	1
602			min	-.001	4	-.099	4	-.053	5	-1.147e-3	1	1084.038	4	1998.116	5
603		17	max	0	10	-.021	15	.001	1	7.682e-4	3	5185.08	15	NC	1
604			min	0	4	-.068	4	-.035	5	-9.284e-4	1	1580.096	4	3027.69	5
605		18	max	0	10	-.011	15	0	9	7.319e-4	5	NC	15	NC	1
606			min	0	4	-.034	4	-.017	5	-7.095e-4	1	3105.132	4	6312.698	5
607		19	max	0	1	0	1	0	1	8.116e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.905e-4	1	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

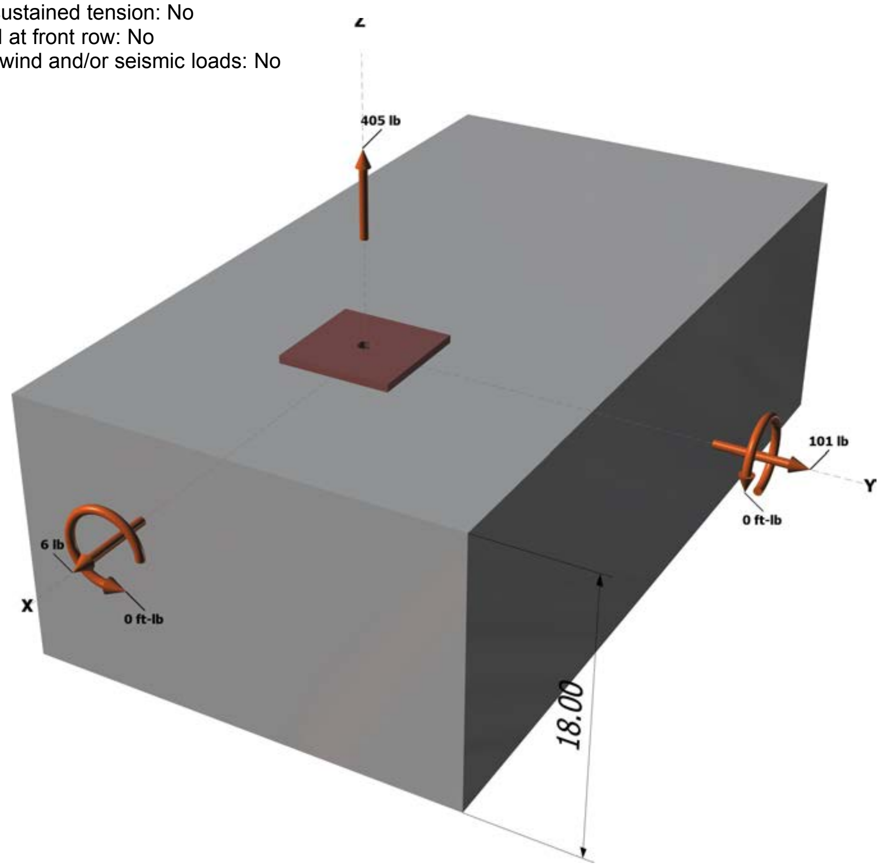
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

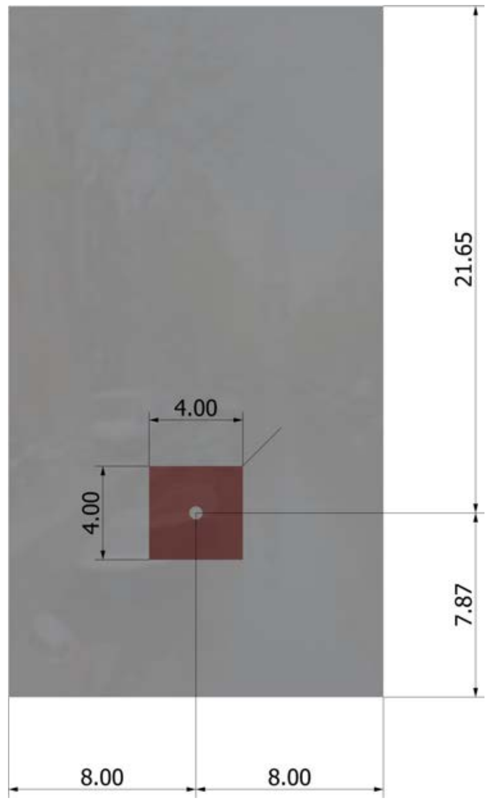
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



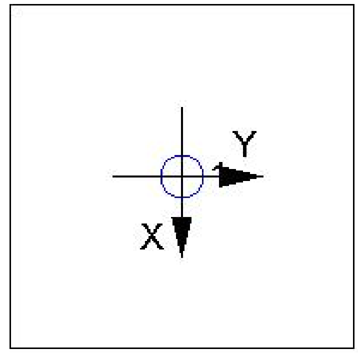
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

Shear parallel to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

Shear parallel to edge in y-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, 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

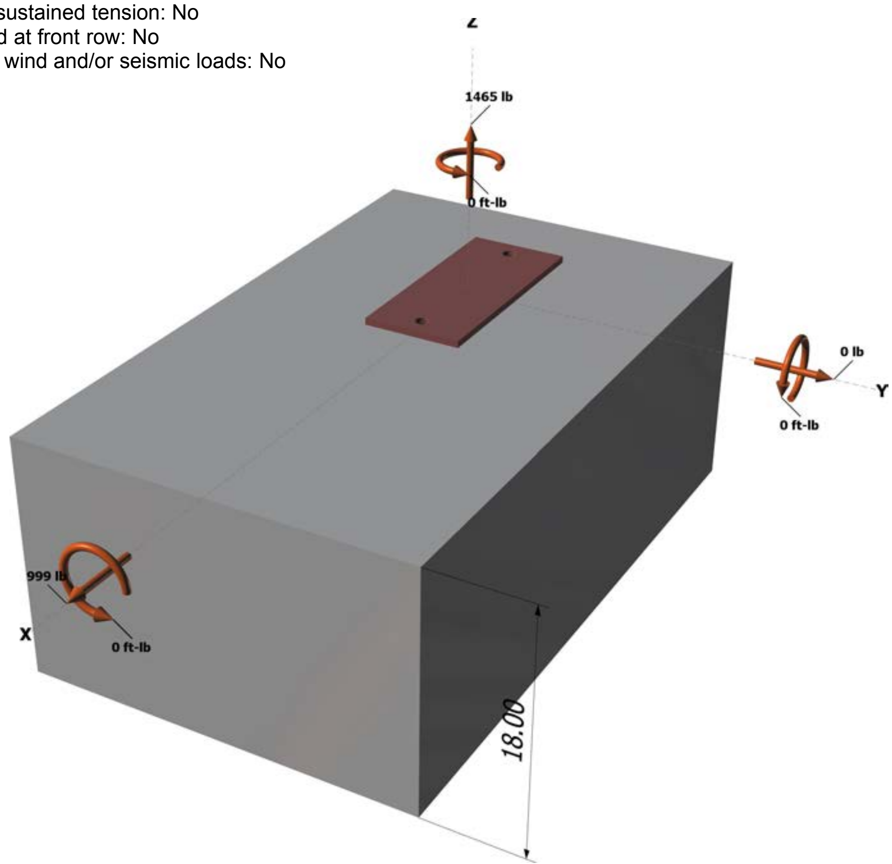
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

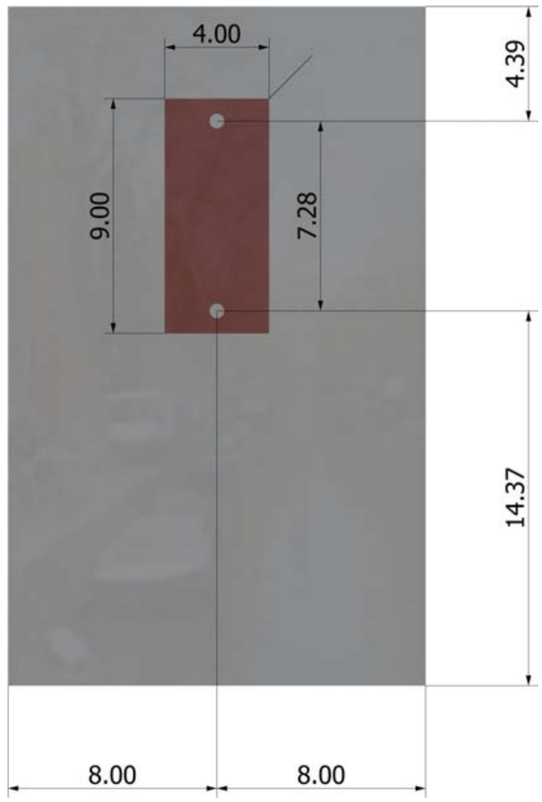
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



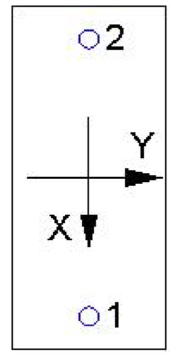
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, ϕN_n (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.