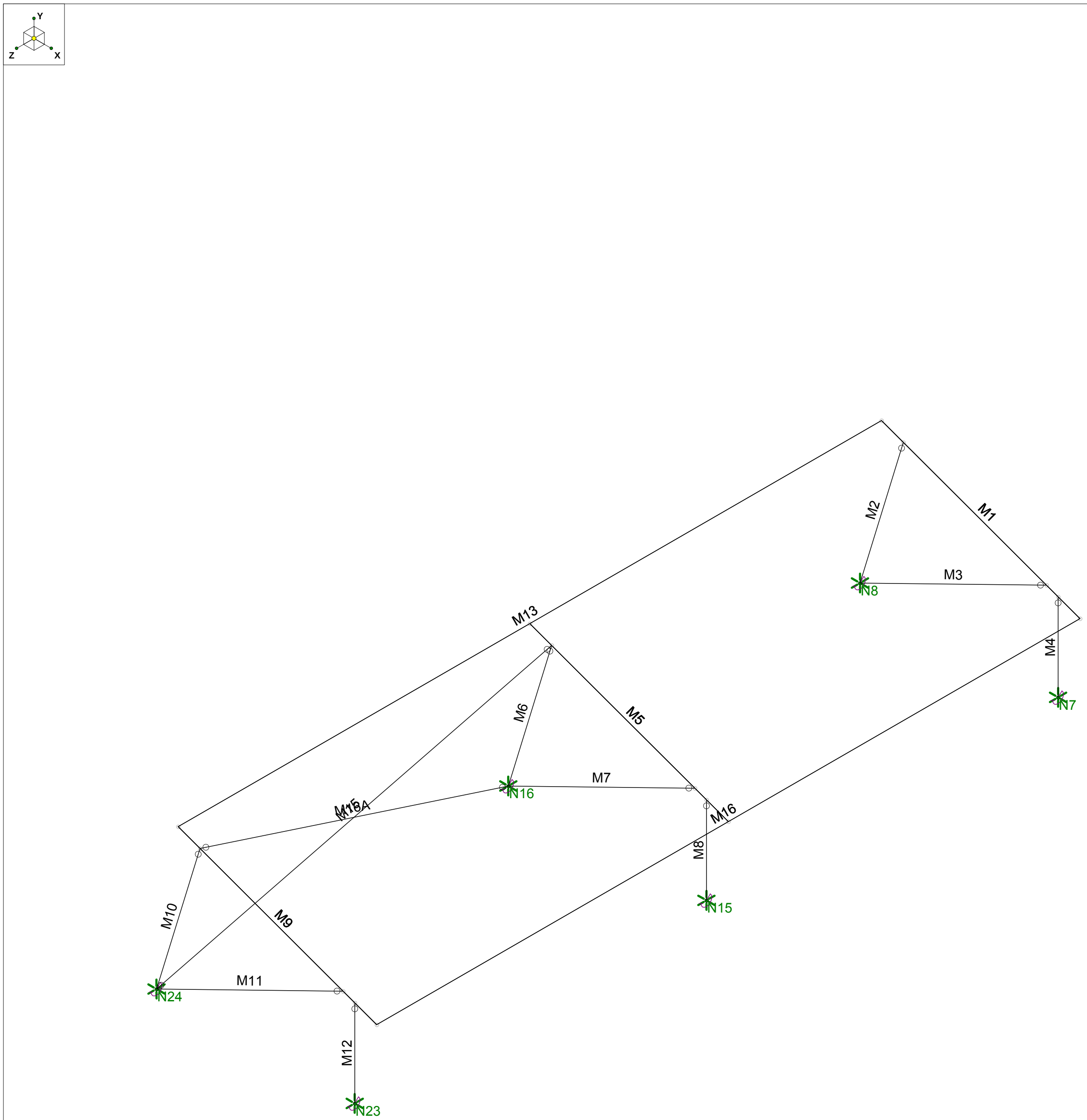


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

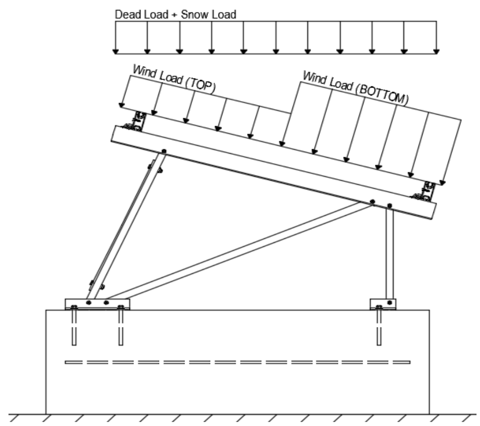
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 20°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes
- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 110 mph — Exposure Category = C
Height ≤ 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.05	*(Pressure)*	
$Cf+_{BOTTOM}$ =	1.65		
$Cf-_{TOP}$ =	-2.12	*(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 + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

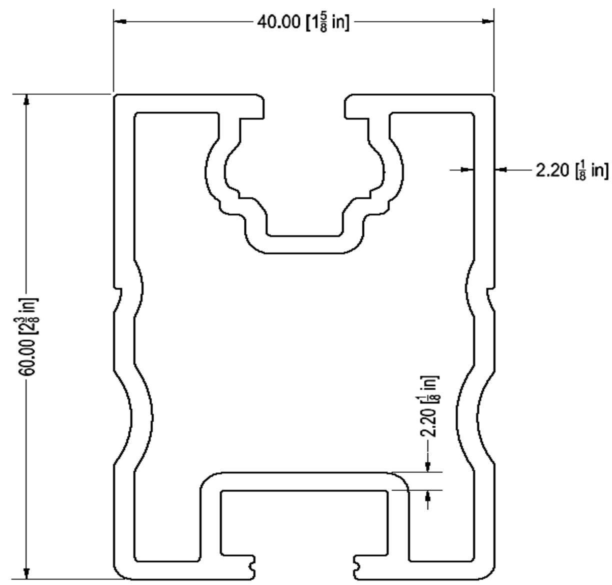
Purlins	Location	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer
Front 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).

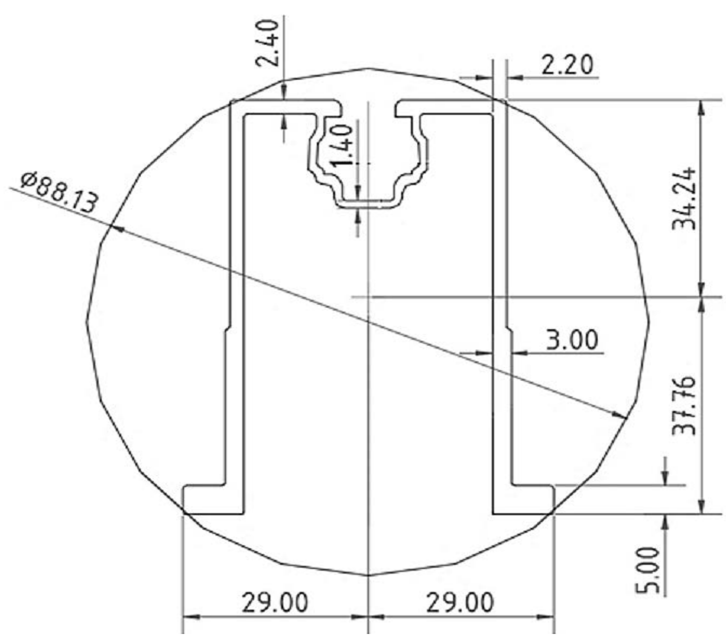
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.251	k-ft
M_z =	0.235	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).

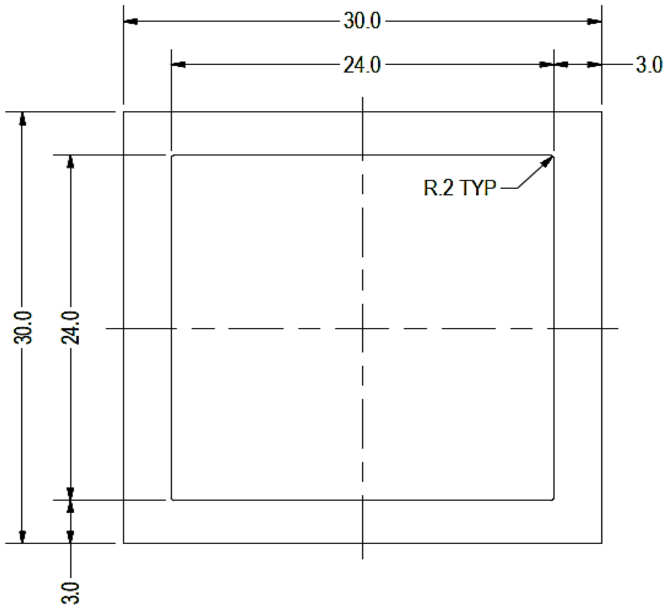
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.82	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.609	k-ft
M_z =	0.000	k-ft
P_n =	0.240	k
$M_{y\ allowable}$ =	1.463	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

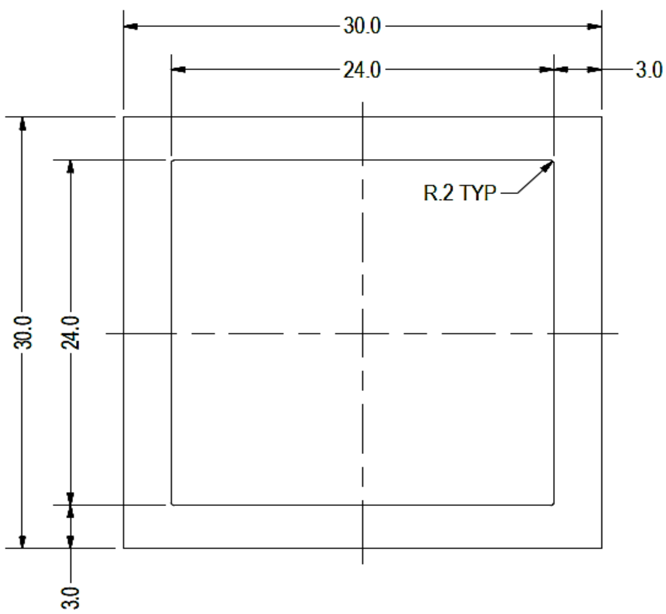
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.059	k-ft
P_n =	0.321	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).

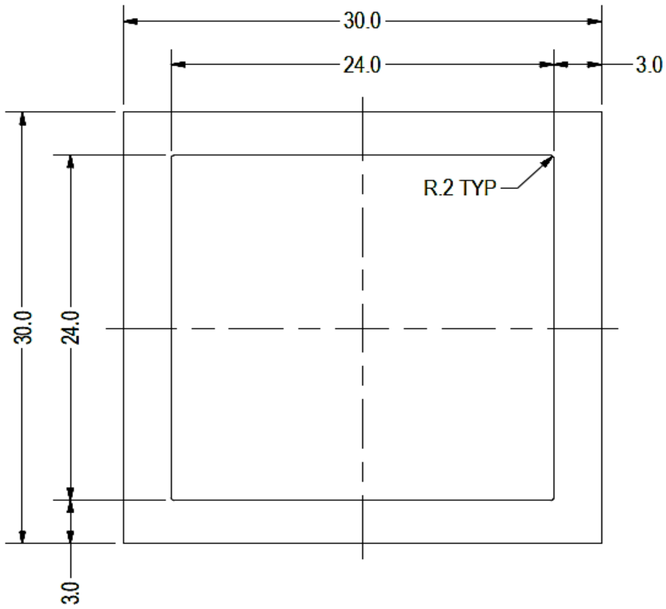
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.327	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	9%	



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).

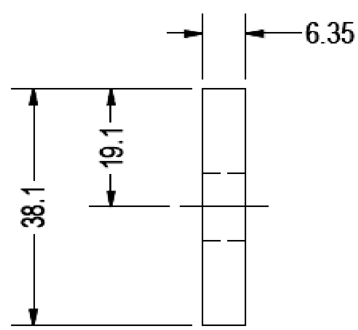
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.322	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	k
Utilization =	19%	



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 =	0.273	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

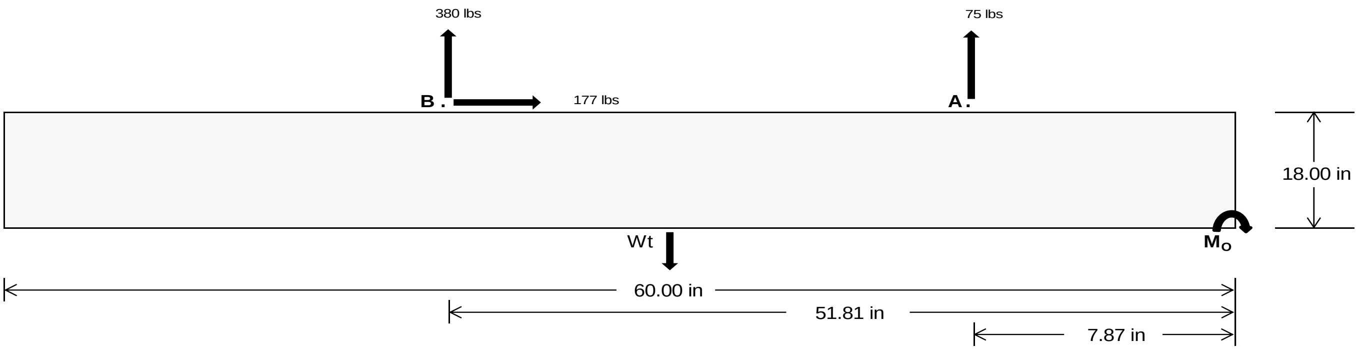
5.1 Helical Pile Foundations

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 =	333.20	1653.89	k
Compressive Load =	2105.72	1632.85	k
Lateral Load =	47.72	768.26	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 table 1806.2 (2012, 2015).



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O =	23466.3 in-lbs
Resisting Force Required =	782.21 lbs
S.F. =	1.67
Weight Required =	1303.69 lbs
Minimum Width =	22 in in
Weight Provided =	1993.75 lbs

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

Sliding

Force =	177.14 lbs
Friction =	0.4
Weight Required =	442.85 lbs
Resisting Weight =	1993.75 lbs
Additional Weight Required =	0 lbs

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

Cohesion

Sliding Force =	177.14 lbs
Cohesion =	130 psf
Area =	9.17 ft^2
Resisting =	996.88 lbs
Additional Weight Required =	0 lbs

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

Shear Key

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	810 lbs	810 lbs	810 lbs	810 lbs	567 lbs	567 lbs	567 lbs	567 lbs	973 lbs	973 lbs	973 lbs	973 lbs	-149 lbs	-149 lbs	-149 lbs	-149 lbs
F_B	595 lbs	595 lbs	595 lbs	595 lbs	499 lbs	499 lbs	499 lbs	499 lbs	775 lbs	775 lbs	775 lbs	775 lbs	-760 lbs	-760 lbs	-760 lbs	-760 lbs
F_V	74 lbs	74 lbs	74 lbs	74 lbs	321 lbs	321 lbs	321 lbs	321 lbs	291 lbs	291 lbs	291 lbs	291 lbs	-354 lbs	-354 lbs	-354 lbs	-354 lbs
P_{total}	3399 lbs	3490 lbs	3580 lbs	3671 lbs	3059 lbs	3150 lbs	3240 lbs	3331 lbs	3741 lbs	3832 lbs	3922 lbs	4013 lbs	287 lbs	341 lbs	396 lbs	450 lbs
M	524 lbs-ft	524 lbs-ft	524 lbs-ft	524 lbs-ft	619 lbs-ft	619 lbs-ft	619 lbs-ft	619 lbs-ft	822 lbs-ft	822 lbs-ft	822 lbs-ft	822 lbs-ft	575 lbs-ft	575 lbs-ft	575 lbs-ft	575 lbs-ft
e	0.15 ft	0.15 ft	0.15 ft	0.14 ft	0.20 ft	0.20 ft	0.19 ft	0.19 ft	0.22 ft	0.21 ft	0.21 ft	0.20 ft	2.00 ft	1.68 ft	1.45 ft	1.28 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}	302.2 psf	298.5 psf	295.2 psf	292.1 psf	252.6 psf	251.1 psf	249.7 psf	248.4 psf	300.6 psf	296.9 psf	293.6 psf	290.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	439.4 psf	429.7 psf	420.9 psf	412.7 psf	414.8 psf	406.2 psf	398.3 psf	391.1 psf	515.7 psf	502.7 psf	490.8 psf	479.9 psf	210.2 psf	145.5 psf	126.0 psf	117.8 psf

Maximum Bearing Pressure = 516 psf
Allowable Bearing Pressure = 1500 psf

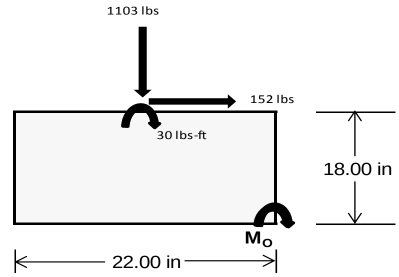
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 753.0 ft-lbs
Resisting Force Required = 821.44 lbs
S.F. = 1.67
Weight Required = 1369.07 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	145 lbs	207 lbs	93 lbs	414 lbs	1103 lbs	373 lbs	79 lbs	22 lbs	29 lbs
F_V	25 lbs	201 lbs	26 lbs	16 lbs	152 lbs	20 lbs	25 lbs	200 lbs	26 lbs
P_{total}	2614 lbs	2675 lbs	2561 lbs	2764 lbs	3453 lbs	2722 lbs	800 lbs	744 lbs	751 lbs
M	72 lbs-ft	341 lbs-ft	78 lbs-ft	48 lbs-ft	258 lbs-ft	61 lbs-ft	73 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	0.09 ft	0.46 ft	0.10 ft
L/6	0.31 ft	1.58 ft	1.77 ft	1.80 ft	1.68 ft	1.79 ft	1.65 ft	0.92 ft	1.63 ft
f_{min}	259.3 sqft	170.1 sqft	251.6 sqft	284.5 sqft	284.5 sqft	275.2 sqft	61.2 sqft	-40.4 sqft	54.2 sqft
f_{max}	311.0 psf	413.5 psf	307.1 psf	318.5 psf	468.8 psf	318.8 psf	113.4 psf	202.7 psf	109.7 psf

Maximum Bearing Pressure = 469 psf
Allowable Bearing Pressure = 1500 psf

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

Foundation Requirements: 60in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

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

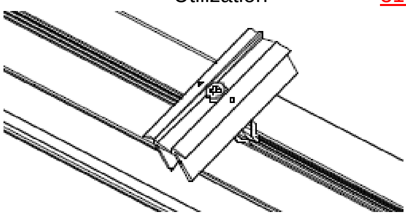
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

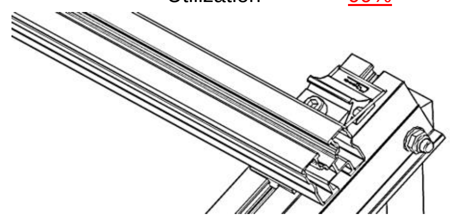
<u>Fastening of Modules to Purlins</u>

Maximum Uplifting Force =	0.372 k
Allowable Uplift =	1.214 k
Utilization =	31%



<u>Fastening of Purlins to Girders</u>

Maximum Uplifting Force =	1.106 k
Allowable Uplift =	1.116 k
Utilization =	99%



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.

<u>Front Strut</u>

Maximum Axial Load =	1.620 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	28%

<u>Rear Strut</u>

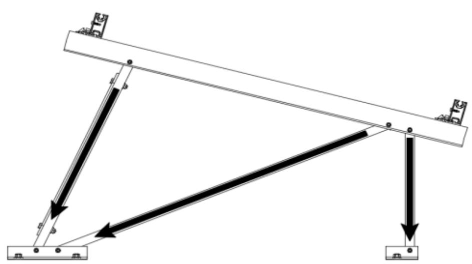
Maximum Axial Load =	1.322 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	23%

<u>Diagonal Strut</u>

Maximum Axial Load =	0.327 k
M8 Bolt Shear Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	6%

<u>Bracing</u>

Maximum Axial Load =	0.273 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

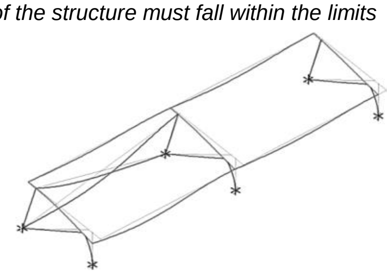
7.1 Seismic Drift

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} =	29.57 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	0.591 in
Max Drift, Δ_{MAX} =	0.125 in

<u>*0.125 ≤ 0.591, OK.*</u>

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 102.00 in

J = 0.427

212.736

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 102.00 in

J = 0.427

231.168

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

S1 = 38.1
m = 0.63
C_0 = 40.784
Cc = 39.216

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.6 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.778 k-ft

3.4.18

h/t = 6.6

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

S1 = 36.9
m = 0.65
C_0 = 20.5
Cc = 20.5

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 22.7 ksi
Iy = 148662 mm^4
0.357 in^4
x = 20.5 mm
Sy = 0.443 in^3
$M_{max}Wk$ = 0.838 k-ft

<u>Compression</u>

3.4.9

b/t = 6.6
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 37.95
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.36

21.0529

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.8 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 = 1.36

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= 29.8 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= 29.8 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.463 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 = 33.07 in

J = 0.16

86.7548

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.4 ksi

3.4.16

b/t = 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= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.4

3.4.16

b/t = 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

$\lambda =$ 1.41804

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.77853

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

$\varphi F_L =$ 13.5508 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

$\varphi F_L =$ 13.55 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 6.80 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	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	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	-55.629	-55.629	0	0
2	M16	y	-87.418	-87.418	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	112.319	112.319	0	0
2	M16	y	52.98	52.98	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 + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

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 + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	135.808	2	341.982	1	.002	10	0	14	0	1	0	1
2		min	-184.889	3	-386.919	3	-2.142	5	0	3	0	1	0	1
3	N7	max	0	5	568.023	1	-.147	12	0	12	0	1	0	1
4		min	-.204	1	-69.173	3	-36.395	4	-.059	4	0	1	0	1
5	N15	max	-.001	15	1619.786	1	.616	1	.001	1	0	1	0	1
6		min	-2.186	1	-256.305	3	-36.707	5	-.059	4	0	1	0	1
7	N16	max	561.79	2	1256.042	1	-.289	10	0	1	0	1	0	1
8		min	-590.97	3	-1272.224	3	-263.009	4	0	3	0	1	0	1
9	N23	max	0	15	567.799	1	4.098	1	.007	1	0	1	0	1
10		min	-.204	1	-68.721	3	-34.067	5	-.054	5	0	1	0	1
11	N24	max	136.31	2	347.831	1	34.96	1	.002	1	0	1	0	1
12		min	-184.941	3	-383.851	3	-3.602	5	0	3	0	1	0	1
13	Totals:	max	831.724	2	4701.464	1	0	3						
14		min	-961.105	3	-2437.193	3	-373.543	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	402.095	1	.639	6	1.214	4	0	12	0	3	0	1
2			min	-366.236	3	.15	15	-.036	3	-.001	1	0	1	0	1
3		2	max	402.202	1	.597	6	1.118	4	0	12	0	4	0	15
4			min	-366.156	3	.14	15	-.036	3	-.001	1	0	10	0	6
5		3	max	402.308	1	.556	6	1.021	4	0	12	0	4	0	15
6			min	-366.077	3	.13	15	-.036	3	-.001	1	0	12	0	6
7		4	max	402.415	1	.515	6	.925	4	0	12	0	4	0	15
8			min	-365.997	3	.12	15	-.036	3	-.001	1	0	3	0	6
9		5	max	402.521	1	.474	6	.872	1	0	12	0	4	0	15
10			min	-365.917	3	.111	15	-.036	3	-.001	1	0	3	0	6
11		6	max	402.628	1	.432	6	.872	1	0	12	0	4	0	15
12			min	-365.837	3	.101	15	-.036	3	-.001	1	0	3	0	6
13		7	max	402.734	1	.391	6	.872	1	0	12	0	4	0	15
14			min	-365.757	3	.091	15	-.036	3	-.001	1	0	3	0	6
15		8	max	402.841	1	.35	6	.872	1	0	12	0	4	0	15
16			min	-365.677	3	.082	15	-.036	3	-.001	1	0	3	0	6
17		9	max	402.948	1	.309	6	.872	1	0	12	0	14	0	15
18			min	-365.597	3	.072	15	-.036	3	-.001	1	0	3	0	6
19		10	max	403.054	1	.267	6	.872	1	0	12	.001	1	0	15
20			min	-365.517	3	.062	15	-.036	3	-.001	1	0	3	0	6
21		11	max	403.161	1	.226	6	.872	1	0	12	.001	1	0	15
22			min	-365.437	3	.053	15	-.036	3	-.001	1	0	3	0	6
23		12	max	403.267	1	.185	6	.872	1	0	12	.001	1	0	15
24			min	-365.357	3	.043	15	-.069	5	-.001	1	0	3	0	6
25		13	max	403.374	1	.144	6	.872	1	0	12	.002	1	0	15
26			min	-365.277	3	.033	15	-.165	5	-.001	1	0	3	0	6
27		14	max	403.48	1	.103	2	.872	1	0	12	.002	1	0	15
28			min	-365.198	3	.023	15	-.262	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	403.587	1	.071	2	.872	1	0	12	.002	1	0	15
30			min	-365.118	3	.014	15	-.358	5	-.001	1	0	3	0	6
31		16	max	403.693	1	.039	2	.872	1	0	12	.002	1	0	15
32			min	-365.038	3	-.006	9	-.454	5	-.001	1	0	3	0	6
33		17	max	403.8	1	.009	10	.872	1	0	12	.002	1	0	15
34			min	-364.958	3	-.034	1	-.551	5	-.001	1	0	3	0	6
35		18	max	403.906	1	-.015	15	.872	1	0	12	.002	1	0	15
36			min	-364.878	3	-.066	1	-.647	5	-.001	1	0	3	0	6
37		19	max	404.013	1	-.025	15	.872	1	0	12	.002	1	0	15
38			min	-364.798	3	-.104	4	-.744	5	-.001	1	0	3	0	6
39	M3	1	max	60.058	2	1.792	6	-.037	12	0	5	.003	1	0	6
40			min	-108.672	9	.421	15	-1.522	4	0	1	0	12	0	15
41		2	max	59.991	2	1.614	6	-.037	12	0	5	.002	1	0	6
42			min	-108.729	9	.379	15	-1.388	4	0	1	0	12	0	15
43		3	max	59.923	2	1.437	6	-.037	12	0	5	.002	1	0	2
44			min	-108.786	9	.337	15	-1.254	4	0	1	0	12	0	9
45		4	max	59.855	2	1.259	6	-.037	12	0	5	.002	1	0	15
46			min	-108.842	9	.296	15	-1.121	4	0	1	0	15	0	4
47		5	max	59.787	2	1.081	6	-.037	12	0	5	.002	1	0	15
48			min	-108.899	9	.254	15	-.987	4	0	1	0	5	0	4
49		6	max	59.719	2	.904	6	-.037	12	0	5	.002	1	0	15
50			min	-108.955	9	.212	15	-.853	4	0	1	0	5	0	4
51		7	max	59.651	2	.726	6	-.037	12	0	5	.001	1	0	15
52			min	-109.012	9	.17	15	-.847	1	0	1	0	5	0	4
53		8	max	59.583	2	.548	6	-.037	12	0	5	.001	1	0	15
54			min	-109.068	9	.128	15	-.847	1	0	1	0	5	-.001	4
55		9	max	59.516	2	.371	6	-.037	12	0	5	.001	1	0	15
56			min	-109.125	9	.087	15	-.847	1	0	1	0	5	-.001	4
57		10	max	59.448	2	.193	6	-.037	12	0	5	0	1	0	15
58			min	-109.181	9	.045	15	-.847	1	0	1	0	5	-.001	4
59		11	max	59.38	2	.029	2	-.01	15	0	5	0	1	0	15
60			min	-109.238	9	-.003	9	-.847	1	0	1	0	5	-.001	4
61		12	max	59.312	2	-.039	15	.116	5	0	5	0	1	0	15
62			min	-109.295	9	-.162	4	-.847	1	0	1	0	5	-.001	4
63		13	max	59.244	2	-.08	15	.25	5	0	5	0	1	0	15
64			min	-109.351	9	-.34	4	-.847	1	0	1	0	5	-.001	4
65		14	max	59.176	2	-.122	15	.384	5	0	5	0	1	0	15
66			min	-109.408	9	-.518	4	-.847	1	0	1	0	5	-.001	4
67		15	max	59.108	2	-.164	15	.517	5	0	5	0	1	0	15
68			min	-109.464	9	-.695	4	-.847	1	0	1	0	5	0	4
69		16	max	59.041	2	-.206	15	.651	5	0	5	0	12	0	15
70			min	-109.521	9	-.873	4	-.847	1	0	1	0	4	0	4
71		17	max	58.973	2	-.247	15	.784	5	0	5	0	12	0	15
72			min	-109.577	9	-1.051	4	-.847	1	0	1	0	1	0	4
73		18	max	58.905	2	-.289	15	.918	5	0	5	0	12	0	15
74			min	-109.634	9	-1.228	4	-.847	1	0	1	0	1	0	4
75		19	max	58.837	2	-.331	15	1.052	5	0	5	0	5	0	1
76			min	-109.69	9	-1.406	4	-.847	1	0	1	0	1	0	1
77	M4	1	max	566.859	1	0	1	-.146	12	0	1	0	5	0	1
78			min	-70.047	3	0	1	-36.169	4	0	1	0	1	0	1
79		2	max	566.923	1	0	1	-.146	12	0	1	0	12	0	1
80			min	-69.998	3	0	1	-36.225	4	0	1	-.003	4	0	1
81		3	max	566.988	1	0	1	-.146	12	0	1	0	12	0	1
82			min	-69.95	3	0	1	-36.281	4	0	1	-.006	4	0	1
83		4	max	567.053	1	0	1	-.146	12	0	1	0	12	0	1
84			min	-69.901	3	0	1	-36.338	4	0	1	-.01	4	0	1
85		5	max	567.118	1	0	1	-.146	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	-69.852	3	0	1	-36.394	4	0	1	-.013	4	0	1
87		6	max	567.182	1	0	1	-.146	12	0	1	0	12	0	1
88			min	-69.804	3	0	1	-36.45	4	0	1	-.016	4	0	1
89		7	max	567.247	1	0	1	-.146	12	0	1	0	12	0	1
90			min	-69.755	3	0	1	-36.506	4	0	1	-.019	4	0	1
91		8	max	567.312	1	0	1	-.146	12	0	1	0	12	0	1
92			min	-69.707	3	0	1	-36.562	4	0	1	-.023	4	0	1
93		9	max	567.376	1	0	1	-.146	12	0	1	0	12	0	1
94			min	-69.658	3	0	1	-36.618	4	0	1	-.026	4	0	1
95		10	max	567.441	1	0	1	-.146	12	0	1	0	12	0	1
96			min	-69.61	3	0	1	-36.674	4	0	1	-.029	4	0	1
97		11	max	567.506	1	0	1	-.146	12	0	1	0	12	0	1
98			min	-69.561	3	0	1	-36.73	4	0	1	-.033	4	0	1
99		12	max	567.57	1	0	1	-.146	12	0	1	0	12	0	1
100			min	-69.513	3	0	1	-36.786	4	0	1	-.036	4	0	1
101		13	max	567.635	1	0	1	-.146	12	0	1	0	12	0	1
102			min	-69.464	3	0	1	-36.842	4	0	1	-.039	4	0	1
103		14	max	567.7	1	0	1	-.146	12	0	1	0	12	0	1
104			min	-69.416	3	0	1	-36.898	4	0	1	-.042	4	0	1
105		15	max	567.765	1	0	1	-.146	12	0	1	0	12	0	1
106			min	-69.367	3	0	1	-36.954	4	0	1	-.046	4	0	1
107		16	max	567.829	1	0	1	-.146	12	0	1	0	12	0	1
108			min	-69.319	3	0	1	-37.011	4	0	1	-.049	4	0	1
109		17	max	567.894	1	0	1	-.146	12	0	1	0	12	0	1
110			min	-69.27	3	0	1	-37.067	4	0	1	-.052	4	0	1
111		18	max	567.959	1	0	1	-.146	12	0	1	0	12	0	1
112			min	-69.222	3	0	1	-37.123	4	0	1	-.056	4	0	1
113		19	max	568.023	1	0	1	-.146	12	0	1	0	12	0	1
114			min	-69.173	3	0	1	-37.179	4	0	1	-.059	4	0	1
115	M6	1	max	1320.16	1	.625	6	1.116	4	0	1	0	4	0	1
116			min	-1200.777	3	.143	15	-.112	3	0	5	0	2	0	1
117		2	max	1320.266	1	.584	6	1.02	4	0	1	0	4	0	15
118			min	-1200.698	3	.134	15	-.112	3	0	5	0	2	0	6
119		3	max	1320.373	1	.543	6	.923	4	0	1	0	4	0	15
120			min	-1200.618	3	.124	15	-.112	3	0	5	0	2	0	6
121		4	max	1320.48	1	.502	6	.827	4	0	1	0	4	0	15
122			min	-1200.538	3	.114	15	-.112	3	0	5	0	12	0	6
123		5	max	1320.586	1	.46	6	.73	4	0	1	0	4	0	15
124			min	-1200.458	3	.105	15	-.112	3	0	5	0	3	0	6
125		6	max	1320.693	1	.419	6	.634	4	0	1	0	4	0	15
126			min	-1200.378	3	.095	15	-.112	3	0	5	0	3	0	6
127		7	max	1320.799	1	.379	2	.537	4	0	1	0	4	0	15
128			min	-1200.298	3	.085	15	-.112	3	0	5	0	3	0	6
129		8	max	1320.906	1	.347	2	.441	4	0	1	0	4	0	15
130			min	-1200.218	3	.075	15	-.112	3	0	5	0	3	0	6
131		9	max	1321.012	1	.315	2	.372	14	0	1	0	4	0	15
132			min	-1200.138	3	.066	15	-.112	3	0	5	0	3	0	6
133		10	max	1321.119	1	.283	2	.323	14	0	1	.001	4	0	15
134			min	-1200.058	3	.056	15	-.112	3	0	5	0	3	0	6
135		11	max	1321.225	1	.251	2	.288	1	0	1	.001	4	0	15
136			min	-1199.978	3	.046	15	-.112	3	0	5	0	3	0	6
137		12	max	1321.332	1	.218	2	.288	1	0	1	.001	4	0	15
138			min	-1199.899	3	.036	12	-.112	3	0	5	0	3	0	6
139		13	max	1321.438	1	.186	2	.288	1	0	1	.001	4	0	15
140			min	-1199.819	3	.02	12	-.151	5	0	5	0	3	0	2
141		14	max	1321.545	1	.154	2	.288	1	0	1	.001	4	0	15
142			min	-1199.739	3	-.001	3	-.247	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1321.652	1	.122	2	.288	1	0	1	.001	4	0	15
144			min	-1199.659	3	-.025	3	-.343	5	0	5	0	3	0	2
145		16	max	1321.758	1	.09	2	.288	1	0	1	0	4	0	15
146			min	-1199.579	3	-.05	3	-.44	5	0	5	0	3	0	2
147		17	max	1321.865	1	.058	2	.288	1	0	1	0	14	0	15
148			min	-1199.499	3	-.074	3	-.536	5	0	5	0	3	0	2
149		18	max	1321.971	1	.026	2	.288	1	0	1	0	14	0	15
150			min	-1199.419	3	-.098	3	-.633	5	0	5	0	3	0	2
151		19	max	1322.078	1	-.007	2	.288	1	0	1	0	14	0	15
152			min	-1199.339	3	-.122	3	-.729	5	0	5	0	3	0	2
153	M7	1	max	327.174	2	1.8	4	.018	1	0	2	0	4	0	2
154			min	-267.715	3	.427	15	-1.447	5	0	5	0	3	0	12
155		2	max	327.106	2	1.623	4	.018	1	0	2	0	4	0	2
156			min	-267.766	3	.386	15	-1.314	5	0	5	0	3	0	3
157		3	max	327.038	2	1.445	4	.018	1	0	2	0	4	0	2
158			min	-267.817	3	.344	15	-1.18	5	0	5	0	3	0	3
159		4	max	326.971	2	1.268	4	.018	1	0	2	0	2	0	2
160			min	-267.868	3	.302	15	-1.046	5	0	5	0	3	0	3
161		5	max	326.903	2	1.09	4	.018	1	0	2	0	2	0	15
162			min	-267.919	3	.26	15	-.913	5	0	5	0	5	0	6
163		6	max	326.835	2	.912	4	.018	1	0	2	0	2	0	15
164			min	-267.969	3	.219	15	-.779	5	0	5	0	5	0	6
165		7	max	326.767	2	.735	4	.018	1	0	2	0	2	0	15
166			min	-268.02	3	.177	15	-.645	5	0	5	0	5	0	6
167		8	max	326.699	2	.557	4	.018	1	0	2	0	2	0	15
168			min	-268.071	3	.135	15	-.512	5	0	5	0	5	0	6
169		9	max	326.631	2	.379	4	.018	1	0	2	0	2	0	15
170			min	-268.122	3	.093	15	-.378	5	0	5	0	5	-.001	6
171		10	max	326.563	2	.216	2	.018	1	0	2	0	2	0	15
172			min	-268.173	3	.043	12	-.245	5	0	5	0	5	-.001	6
173		11	max	326.495	2	.078	2	.018	1	0	2	0	2	0	15
174			min	-268.224	3	-.046	3	-.111	5	0	5	0	5	-.001	6
175		12	max	326.428	2	-.032	15	.029	14	0	2	0	2	0	15
176			min	-268.275	3	-.154	6	-.002	3	0	5	0	5	-.001	6
177		13	max	326.36	2	-.074	15	.161	4	0	2	0	2	0	15
178			min	-268.326	3	-.332	6	-.002	3	0	5	0	5	-.001	6
179		14	max	326.292	2	-.115	15	.294	4	0	2	0	2	0	15
180			min	-268.377	3	-.509	6	-.002	3	0	5	0	5	-.001	6
181		15	max	326.224	2	-.157	15	.428	4	0	2	0	2	0	15
182			min	-268.428	3	-.687	6	-.002	3	0	5	0	5	0	6
183		16	max	326.156	2	-.199	15	.562	4	0	2	0	2	0	15
184			min	-268.478	3	-.865	6	-.002	3	0	5	0	5	0	6
185		17	max	326.088	2	-.241	15	.695	4	0	2	0	2	0	15
186			min	-268.529	3	-1.042	6	-.002	3	0	5	0	5	0	6
187		18	max	326.02	2	-.283	15	.829	4	0	2	0	2	0	15
188			min	-268.58	3	-1.22	6	-.002	3	0	5	0	5	0	6
189		19	max	325.953	2	-.324	15	.963	4	0	2	0	2	0	1
190			min	-268.631	3	-1.398	6	-.002	3	0	5	0	5	0	1
191	M8	1	max	1618.622	1	0	1	.837	1	0	1	0	4	0	1
192			min	-257.179	3	0	1	-36.328	4	0	1	0	1	0	1
193		2	max	1618.686	1	0	1	.837	1	0	1	0	1	0	1
194			min	-257.13	3	0	1	-36.384	4	0	1	-.003	4	0	1
195		3	max	1618.751	1	0	1	.837	1	0	1	0	1	0	1
196			min	-257.082	3	0	1	-36.44	4	0	1	-.006	4	0	1
197		4	max	1618.816	1	0	1	.837	1	0	1	0	1	0	1
198			min	-257.033	3	0	1	-36.496	4	0	1	-.01	4	0	1
199		5	max	1618.881	1	0	1	.837	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	-256.985	3	0	1	-36.552	4	0	1	-.013	4	0	1
201		6	max	1618.945	1	0	1	.837	1	0	1	0	1	0	1
202			min	-256.936	3	0	1	-36.608	4	0	1	-.016	4	0	1
203		7	max	1619.01	1	0	1	.837	1	0	1	0	1	0	1
204			min	-256.888	3	0	1	-36.665	4	0	1	-.02	4	0	1
205		8	max	1619.075	1	0	1	.837	1	0	1	0	1	0	1
206			min	-256.839	3	0	1	-36.721	4	0	1	-.023	4	0	1
207		9	max	1619.139	1	0	1	.837	1	0	1	0	1	0	1
208			min	-256.79	3	0	1	-36.777	4	0	1	-.026	4	0	1
209		10	max	1619.204	1	0	1	.837	1	0	1	0	1	0	1
210			min	-256.742	3	0	1	-36.833	4	0	1	-.029	4	0	1
211		11	max	1619.269	1	0	1	.837	1	0	1	0	1	0	1
212			min	-256.693	3	0	1	-36.889	4	0	1	-.033	4	0	1
213		12	max	1619.334	1	0	1	.837	1	0	1	0	1	0	1
214			min	-256.645	3	0	1	-36.945	4	0	1	-.036	4	0	1
215		13	max	1619.398	1	0	1	.837	1	0	1	0	1	0	1
216			min	-256.596	3	0	1	-37.001	4	0	1	-.039	4	0	1
217		14	max	1619.463	1	0	1	.837	1	0	1	0	1	0	1
218			min	-256.548	3	0	1	-37.057	4	0	1	-.043	4	0	1
219		15	max	1619.528	1	0	1	.837	1	0	1	.001	1	0	1
220			min	-256.499	3	0	1	-37.113	4	0	1	-.046	4	0	1
221		16	max	1619.592	1	0	1	.837	1	0	1	.001	1	0	1
222			min	-256.451	3	0	1	-37.169	4	0	1	-.049	4	0	1
223		17	max	1619.657	1	0	1	.837	1	0	1	.001	1	0	1
224			min	-256.402	3	0	1	-37.225	4	0	1	-.053	4	0	1
225		18	max	1619.722	1	0	1	.837	1	0	1	.001	1	0	1
226			min	-256.354	3	0	1	-37.281	4	0	1	-.056	4	0	1
227		19	max	1619.786	1	0	1	.837	1	0	1	.001	1	0	1
228			min	-256.305	3	0	1	-37.337	4	0	1	-.059	4	0	1
229	M10	1	max	416.596	1	.664	4	1.332	5	.001	1	0	1	0	1
230			min	-354.811	3	.167	15	-.191	1	-.002	5	0	3	0	1
231		2	max	416.703	1	.623	4	1.235	5	.001	1	0	4	0	15
232			min	-354.731	3	.157	15	-.191	1	-.002	5	0	3	0	4
233		3	max	416.81	1	.582	4	1.139	5	.001	1	0	4	0	15
234			min	-354.651	3	.148	15	-.191	1	-.002	5	0	3	0	4
235		4	max	416.916	1	.541	4	1.042	5	.001	1	0	4	0	15
236			min	-354.571	3	.138	15	-.191	1	-.002	5	0	3	0	4
237		5	max	417.023	1	.499	4	.946	5	.001	1	0	4	0	15
238			min	-354.491	3	.128	15	-.191	1	-.002	5	0	3	0	4
239		6	max	417.129	1	.458	4	.849	5	.001	1	0	4	0	15
240			min	-354.411	3	.118	15	-.191	1	-.002	5	0	3	0	4
241		7	max	417.236	1	.417	4	.753	5	.001	1	.001	4	0	15
242			min	-354.331	3	.109	15	-.191	1	-.002	5	0	3	0	4
243		8	max	417.342	1	.376	4	.656	5	.001	1	.001	4	0	15
244			min	-354.251	3	.099	15	-.191	1	-.002	5	0	3	0	4
245		9	max	417.449	1	.334	4	.56	5	.001	1	.001	4	0	15
246			min	-354.172	3	.089	15	-.191	1	-.002	5	0	1	0	4
247		10	max	417.555	1	.293	4	.464	5	.001	1	.001	4	0	15
248			min	-354.092	3	.08	15	-.191	1	-.002	5	0	1	0	4
249		11	max	417.662	1	.252	4	.367	5	.001	1	.001	4	0	15
250			min	-354.012	3	.07	15	-.191	1	-.002	5	0	1	0	4
251		12	max	417.768	1	.211	4	.271	5	.001	1	.001	4	0	15
252			min	-353.932	3	.06	15	-.191	1	-.002	5	0	1	0	4
253		13	max	417.875	1	.169	4	.174	5	.001	1	.001	4	0	15
254			min	-353.852	3	.045	1	-.191	1	-.002	5	0	1	0	4
255		14	max	417.981	1	.128	4	.078	5	.001	1	.001	4	0	15
256			min	-353.772	3	.013	1	-.191	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	418.088	1	.087	4	-.013	15	.001	1	.001	4	0	15
258			min	-353.692	3	-.019	1	-.191	1	-.002	5	0	1	0	4
259		16	max	418.195	1	.045	4	-.018	12	.001	1	.001	4	0	15
260			min	-353.612	3	-.051	1	-.191	1	-.002	5	0	1	0	4
261		17	max	418.301	1	.017	5	-.018	12	.001	1	.001	4	0	15
262			min	-353.532	3	-.083	1	-.216	4	-.002	5	0	1	0	4
263		18	max	418.408	1	.002	5	-.018	12	.001	1	.001	4	0	15
264			min	-353.452	3	-.115	1	-.313	4	-.002	5	0	1	0	4
265		19	max	418.514	1	-.008	15	-.018	12	.001	1	.001	4	0	15
266			min	-353.372	3	-.148	1	-.409	4	-.002	5	0	1	0	4
267	M11	1	max	59.801	2	1.788	6	.98	1	.002	4	.001	5	0	6
268			min	-108.584	9	.418	15	-1.139	5	0	10	-.002	1	0	15
269		2	max	59.733	2	1.611	6	.98	1	.002	4	.001	5	0	2
270			min	-108.64	9	.376	15	-1.005	5	0	10	-.002	1	0	15
271		3	max	59.666	2	1.433	6	.98	1	.002	4	.001	5	0	2
272			min	-108.697	9	.335	15	-.871	5	0	10	-.002	1	0	3
273		4	max	59.598	2	1.255	6	.98	1	.002	4	0	5	0	2
274			min	-108.753	9	.293	15	-.738	5	0	10	-.002	1	0	4
275		5	max	59.53	2	1.078	6	.98	1	.002	4	0	5	0	15
276			min	-108.81	9	.251	15	-.604	5	0	10	-.002	1	0	4
277		6	max	59.462	2	.9	6	.98	1	.002	4	0	5	0	15
278			min	-108.867	9	.209	15	-.47	5	0	10	-.001	1	0	4
279		7	max	59.394	2	.722	6	.98	1	.002	4	0	5	0	15
280			min	-108.923	9	.168	15	-.337	5	0	10	-.001	1	0	4
281		8	max	59.326	2	.545	6	.98	1	.002	4	0	5	0	15
282			min	-108.98	9	.126	15	-.203	5	0	10	-.001	1	-.001	4
283		9	max	59.258	2	.367	6	.98	1	.002	4	0	5	0	15
284			min	-109.036	9	.084	15	-.07	5	0	10	0	1	-.001	4
285		10	max	59.191	2	.189	6	.98	1	.002	4	0	5	0	15
286			min	-109.093	9	.042	15	.023	12	0	10	0	1	-.001	4
287		11	max	59.123	2	.05	2	.98	1	.002	4	0	5	0	15
288			min	-109.149	9	-.021	3	.023	12	0	10	0	1	-.001	4
289		12	max	59.055	2	-.041	15	.98	1	.002	4	0	5	0	15
290			min	-109.206	9	-.166	4	.023	12	0	10	0	1	-.001	4
291		13	max	58.987	2	-.083	15	.98	1	.002	4	0	5	0	15
292			min	-109.262	9	-.344	4	.023	12	0	10	0	2	-.001	4
293		14	max	58.919	2	-.125	15	.98	1	.002	4	0	4	0	15
294			min	-109.319	9	-.522	4	.023	12	0	10	0	10	-.001	4
295		15	max	58.851	2	-.166	15	.98	1	.002	4	0	4	0	15
296			min	-109.375	9	-.699	4	.023	12	0	10	0	10	0	4
297		16	max	58.783	2	-.208	15	1.06	4	.002	4	.001	4	0	15
298			min	-109.432	9	-.877	4	.023	12	0	10	0	10	0	4
299		17	max	58.715	2	-.25	15	1.194	4	.002	4	.001	4	0	15
300			min	-109.489	9	-1.055	4	.023	12	0	10	0	10	0	4
301		18	max	58.648	2	-.292	15	1.327	4	.002	4	.002	4	0	15
302			min	-109.545	9	-1.232	4	.023	12	0	10	0	10	0	4
303		19	max	58.58	2	-.333	15	1.461	4	.002	4	.002	4	0	1
304			min	-109.602	9	-1.41	4	.023	12	0	10	0	10	0	1
305	M12	1	max	566.634	1	0	1	4.52	1	0	1	0	4	0	1
306			min	-69.595	3	0	1	-33.148	5	0	1	0	3	0	1
307		2	max	566.699	1	0	1	4.52	1	0	1	0	1	0	1
308			min	-69.546	3	0	1	-33.204	5	0	1	-.003	5	0	1
309		3	max	566.763	1	0	1	4.52	1	0	1	0	1	0	1
310			min	-69.498	3	0	1	-33.261	5	0	1	-.006	5	0	1
311		4	max	566.828	1	0	1	4.52	1	0	1	.001	1	0	1
312			min	-69.449	3	0	1	-33.317	5	0	1	-.009	5	0	1
313		5	max	566.893	1	0	1	4.52	1	0	1	.002	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-69.401	3	0	1	-33.373	5	0	1	-.012	5	0	1
315		6	max	566.957	1	0	1	4.52	1	0	1	.002	1	0	1
316			min	-69.352	3	0	1	-33.429	5	0	1	-.015	5	0	1
317		7	max	567.022	1	0	1	4.52	1	0	1	.002	1	0	1
318			min	-69.303	3	0	1	-33.485	5	0	1	-.018	5	0	1
319		8	max	567.087	1	0	1	4.52	1	0	1	.003	1	0	1
320			min	-69.255	3	0	1	-33.541	5	0	1	-.021	5	0	1
321		9	max	567.151	1	0	1	4.52	1	0	1	.003	1	0	1
322			min	-69.206	3	0	1	-33.597	5	0	1	-.024	5	0	1
323		10	max	567.216	1	0	1	4.52	1	0	1	.004	1	0	1
324			min	-69.158	3	0	1	-33.653	5	0	1	-.027	5	0	1
325		11	max	567.281	1	0	1	4.52	1	0	1	.004	1	0	1
326			min	-69.109	3	0	1	-33.709	5	0	1	-.03	5	0	1
327		12	max	567.346	1	0	1	4.52	1	0	1	.004	1	0	1
328			min	-69.061	3	0	1	-33.765	5	0	1	-.033	5	0	1
329		13	max	567.41	1	0	1	4.52	1	0	1	.005	1	0	1
330			min	-69.012	3	0	1	-33.821	5	0	1	-.036	5	0	1
331		14	max	567.475	1	0	1	4.52	1	0	1	.005	1	0	1
332			min	-68.964	3	0	1	-33.877	5	0	1	-.039	5	0	1
333		15	max	567.54	1	0	1	4.52	1	0	1	.006	1	0	1
334			min	-68.915	3	0	1	-33.933	5	0	1	-.042	5	0	1
335		16	max	567.604	1	0	1	4.52	1	0	1	.006	1	0	1
336			min	-68.867	3	0	1	-33.99	5	0	1	-.045	5	0	1
337		17	max	567.669	1	0	1	4.52	1	0	1	.007	1	0	1
338			min	-68.818	3	0	1	-34.046	5	0	1	-.048	5	0	1
339		18	max	567.734	1	0	1	4.52	1	0	1	.007	1	0	1
340			min	-68.77	3	0	1	-34.102	5	0	1	-.051	5	0	1
341		19	max	567.799	1	0	1	4.52	1	0	1	.007	1	0	1
342			min	-68.721	3	0	1	-34.158	5	0	1	-.054	5	0	1
343	M1	1	max	143.82	1	344.63	3	-3.368	12	0	1	.175	1	.014	1
344			min	5.12	12	-401.365	1	-88.666	1	0	3	.007	12	-.01	3
345		2	max	143.915	1	344.433	3	-3.368	12	0	1	.156	1	.101	1
346			min	5.168	12	-401.628	1	-88.666	1	0	3	.006	12	-.085	3
347		3	max	121.946	1	7.599	9	-3.388	12	0	15	.135	1	.186	1
348			min	6.489	10	-21.435	3	-88.396	1	0	1	.006	12	-.158	3
349		4	max	122.042	1	7.38	9	-3.388	12	0	15	.116	1	.186	1
350			min	6.568	10	-21.632	3	-88.396	1	0	1	.005	12	-.153	3
351		5	max	122.137	1	7.161	9	-3.388	12	0	15	.097	1	.186	1
352			min	6.648	10	-21.828	3	-88.396	1	0	1	.004	12	-.149	3
353		6	max	122.233	1	6.943	9	-3.388	12	0	15	.078	1	.186	1
354			min	6.728	10	-22.025	3	-88.396	1	0	1	.003	12	-.144	3
355		7	max	122.328	1	6.724	9	-3.388	12	0	15	.059	1	.187	1
356			min	6.807	10	-22.222	3	-88.396	1	0	1	.003	12	-.139	3
357		8	max	122.424	1	6.505	9	-3.388	12	0	15	.039	1	.187	1
358			min	6.887	10	-22.419	3	-88.396	1	0	1	.002	12	-.134	3
359		9	max	122.519	1	6.287	9	-3.388	12	0	15	.02	1	.187	1
360			min	6.966	10	-22.616	3	-88.396	1	0	1	.001	12	-.129	3
361		10	max	122.615	1	6.068	9	-3.388	12	0	15	.003	4	.187	1
362			min	7.046	10	-22.812	3	-88.396	1	0	1	0	10	-.124	3
363		11	max	122.71	1	5.849	9	-3.388	12	0	15	0	15	.188	1
364			min	7.126	10	-23.009	3	-88.396	1	0	1	-.018	1	-.119	3
365		12	max	122.806	1	5.631	9	-3.388	12	0	15	-.001	12	.188	1
366			min	7.205	10	-23.206	3	-88.396	1	0	1	-.037	1	-.114	3
367		13	max	122.901	1	5.412	9	-3.388	12	0	15	-.002	12	.189	1
368			min	7.285	10	-23.403	3	-88.396	1	0	1	-.056	1	-.109	3
369		14	max	122.997	1	5.193	9	-3.388	12	0	15	-.003	12	.189	1
370			min	7.364	10	-23.599	3	-88.396	1	0	1	-.076	1	-.104	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	123.092	1	4.975	9	-3.388	12	0	15	-.003	12	.19	1
372			min	7.444	10	-23.796	3	-88.396	1	0	1	-.095	1	-.099	3
373		16	max	82.945	2	28.025	10	-3.426	12	0	1	-.004	12	.191	1
374			min	-31.353	3	-88.459	3	-89.131	1	0	5	-.115	1	-.093	3
375		17	max	83.04	2	27.807	10	-3.426	12	0	1	-.005	12	.208	1
376			min	-31.282	3	-88.655	3	-89.131	1	0	5	-.134	1	-.074	3
377		18	max	-4.837	12	451.145	1	-3.573	12	0	5	-.006	12	.113	1
378			min	-143.274	1	-154.743	3	-91.328	1	0	1	-.154	1	-.041	3
379		19	max	-4.789	12	450.883	1	-3.573	12	0	5	-.006	12	.015	1
380			min	-143.178	1	-154.94	3	-91.328	1	0	1	-.174	1	-.007	3
381	M5	1	max	314.366	1	1139.817	3	-.109	10	0	1	.05	4	.02	3
382			min	7.604	15	-1328.628	1	-32.003	1	0	5	0	10	-.027	1
383		2	max	314.461	1	1139.62	3	-.109	10	0	1	.043	4	.261	1
384			min	7.633	15	-1328.89	1	-32.003	1	0	5	-.003	3	-.227	3
385		3	max	241.814	1	9.388	9	3.065	3	0	3	.036	4	.543	1
386			min	6.033	15	-71.065	3	-26.76	4	0	4	-.008	3	-.469	3
387		4	max	241.91	1	9.169	9	3.065	3	0	3	.03	4	.548	1
388			min	6.061	15	-71.262	3	-26.518	4	0	4	-.008	3	-.454	3
389		5	max	242.005	1	8.951	9	3.065	3	0	3	.025	4	.552	1
390			min	6.09	15	-71.459	3	-26.276	4	0	4	-.007	3	-.438	3
391		6	max	242.101	1	8.732	9	3.065	3	0	3	.019	4	.557	1
392			min	6.119	15	-71.655	3	-26.034	4	0	4	-.006	1	-.423	3
393		7	max	242.196	1	8.513	9	3.065	3	0	3	.013	4	.561	1
394			min	6.148	15	-71.852	3	-25.792	4	0	4	-.006	1	-.407	3
395		8	max	242.292	1	8.295	9	3.065	3	0	3	.008	4	.566	1
396			min	6.177	15	-72.049	3	-25.55	4	0	4	-.005	1	-.392	3
397		9	max	242.387	1	8.076	9	3.065	3	0	3	.002	5	.57	1
398			min	6.205	15	-72.246	3	-25.308	4	0	4	-.005	1	-.376	3
399		10	max	242.483	1	7.857	9	3.065	3	0	3	0	10	.575	1
400			min	6.234	15	-72.443	3	-25.066	4	0	4	-.004	1	-.36	3
401		11	max	242.578	1	7.639	9	3.065	3	0	3	0	10	.58	1
402			min	6.263	15	-72.639	3	-24.824	4	0	4	-.009	4	-.345	3
403		12	max	242.674	1	7.42	9	3.065	3	0	3	0	10	.584	1
404			min	6.292	15	-72.836	3	-24.582	4	0	4	-.014	4	-.329	3
405		13	max	242.769	1	7.201	9	3.065	3	0	3	0	10	.589	1
406			min	6.321	15	-73.033	3	-24.34	4	0	4	-.019	4	-.313	3
407		14	max	242.865	1	6.983	9	3.065	3	0	3	0	10	.594	1
408			min	6.35	15	-73.23	3	-24.098	4	0	4	-.024	4	-.297	3
409		15	max	242.96	1	6.764	9	3.065	3	0	3	0	10	.599	1
410			min	6.378	15	-73.427	3	-23.856	4	0	4	-.03	4	-.281	3
411		16	max	299.636	2	172.822	2	3.041	3	0	1	0	3	.604	1
412			min	-102.661	3	-267.046	3	-22.667	4	0	4	-.035	4	-.264	3
413		17	max	299.731	2	172.56	2	3.041	3	0	1	0	3	.609	1
414			min	-102.589	3	-267.243	3	-22.425	4	0	4	-.04	4	-.206	3
415		18	max	-9.908	12	1486.95	1	2.912	1	0	4	.001	3	.293	1
416			min	-315.321	1	-509.839	3	-56.973	5	0	1	-.052	4	-.096	3
417		19	max	-9.86	12	1486.688	1	2.912	1	0	4	.002	3	.014	3
418			min	-315.225	1	-510.036	3	-56.731	5	0	1	-.064	4	-.029	1
419	M9	1	max	143.141	1	344.617	3	237.2	4	0	3	-.002	15	.014	1
420			min	2.859	15	-401.343	1	7.762	10	0	1	-.175	1	-.01	3
421		2	max	143.237	1	344.42	3	237.442	4	0	3	.045	5	.101	1
422			min	2.888	15	-401.605	1	7.762	10	0	1	-.149	1	-.085	3
423		3	max	121.903	1	7.573	9	83.048	1	0	1	.089	5	.186	1
424			min	2.667	15	-21.378	3	-34.837	5	0	12	-.121	1	-.158	3
425		4	max	121.998	1	7.355	9	83.048	1	0	1	.082	5	.186	1
426			min	2.696	15	-21.575	3	-34.595	5	0	12	-.103	1	-.153	3
427		5	max	122.094	1	7.136	9	83.048	1	0	1	.074	5	.186	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	2.724	15	-21.772	3	-34.353	5	0	12	-.085	1	-.148	3
429		6	max	122.189	1	6.917	9	83.048	1	0	1	.067	5	.186	1
430			min	2.753	15	-21.969	3	-34.111	5	0	12	-.067	1	-.144	3
431		7	max	122.285	1	6.699	9	83.048	1	0	1	.059	5	.186	1
432			min	2.782	15	-22.165	3	-33.869	5	0	12	-.049	1	-.139	3
433		8	max	122.38	1	6.48	9	83.048	1	0	1	.052	5	.187	1
434			min	2.811	15	-22.362	3	-33.627	5	0	12	-.031	1	-.134	3
435		9	max	122.476	1	6.261	9	83.048	1	0	1	.045	5	.187	1
436			min	2.84	15	-22.559	3	-33.385	5	0	12	-.013	1	-.129	3
437		10	max	122.571	1	6.043	9	83.048	1	0	1	.038	4	.187	1
438			min	2.868	15	-22.756	3	-33.143	5	0	12	0	10	-.124	3
439		11	max	122.667	1	5.824	9	83.048	1	0	1	.034	4	.188	1
440			min	2.897	15	-22.953	3	-32.901	5	0	12	.002	10	-.119	3
441		12	max	122.762	1	5.605	9	83.048	1	0	1	.041	1	.188	1
442			min	2.926	15	-23.149	3	-32.659	5	0	12	.003	10	-.114	3
443		13	max	122.858	1	5.387	9	83.048	1	0	1	.059	1	.189	1
444			min	2.955	15	-23.346	3	-32.417	5	0	12	.004	12	-.109	3
445		14	max	122.953	1	5.168	9	83.048	1	0	1	.077	1	.189	1
446			min	2.984	15	-23.543	3	-32.175	5	0	12	.004	12	-.104	3
447		15	max	123.049	1	4.949	9	83.048	1	0	1	.095	1	.19	1
448			min	3.012	15	-23.74	3	-31.933	5	0	12	.001	15	-.099	3
449		16	max	83.18	2	27.656	10	83.939	1	0	10	.115	1	.191	1
450			min	-31.392	3	-88.882	3	-30.432	5	0	4	-.002	5	-.093	3
451		17	max	83.276	2	27.437	10	83.939	1	0	10	.133	1	.208	1
452			min	-31.32	3	-89.079	3	-30.19	5	0	4	-.009	5	-.074	3
453		18	max	1.904	5	451.145	1	88.433	1	0	1	.152	1	.113	1
454			min	-143.018	1	-154.741	3	-62.986	5	0	3	-.022	5	-.041	3
455		19	max	1.949	5	450.882	1	88.433	1	0	1	.171	1	.015	1
456			min	-142.923	1	-154.938	3	-62.743	5	0	3	-.036	5	-.007	3
457	M13	1	max	237.214	4	400.676	1	-2.859	15	.014	1	.175	1	0	1
458			min	7.765	10	-344.602	3	-143.123	1	-.01	3	.002	15	0	3
459		2	max	227.863	4	282.622	1	-1.746	15	.014	1	.055	1	.277	3
460			min	7.765	10	-242.999	3	-109.716	1	-.01	3	0	5	-.323	1
461		3	max	218.511	4	164.567	1	-.632	15	.014	1	.001	3	.459	3
462			min	7.765	10	-141.397	3	-76.309	1	-.01	3	-.032	1	-.534	1
463		4	max	209.16	4	46.513	1	.636	5	.014	1	-.002	12	.545	3
464			min	7.765	10	-39.795	3	-42.902	1	-.01	3	-.089	1	-.633	1
465		5	max	199.808	4	61.808	3	2.358	5	.014	1	0	15	.534	3
466			min	7.765	10	-71.542	1	-9.495	1	-.01	3	-.113	1	-.622	1
467		6	max	190.457	4	163.41	3	23.912	1	.014	1	.002	5	.428	3
468			min	7.765	10	-189.596	1	.41	12	-.01	3	-.107	1	-.498	1
469		7	max	181.105	4	265.013	3	57.32	1	.014	1	.006	5	.225	3
470			min	7.765	10	-307.651	1	1.496	12	-.01	3	-.068	1	-.264	1
471		8	max	171.753	4	366.615	3	90.727	1	.014	1	.013	4	.083	1
472			min	7.765	10	-425.705	1	2.582	12	-.01	3	0	3	-.073	3
473		9	max	162.402	4	468.218	3	124.134	1	.014	1	.103	1	.541	1
474			min	7.765	10	-543.76	1	3.668	12	-.01	3	.003	12	-.467	3
475		10	max	153.05	4	569.82	3	157.541	1	.011	2	.236	1	1.11	1
476			min	7.765	10	-661.814	1	4.754	12	-.014	1	.007	12	-.957	3
477		11	max	113.264	4	543.76	1	.753	5	.01	3	.098	1	.541	1
478			min	3.369	12	-468.218	3	-123.451	1	-.014	1	-.018	5	-.467	3
479		12	max	103.913	4	425.705	1	2.475	5	.01	3	0	10	.083	1
480			min	3.369	12	-366.615	3	-90.044	1	-.014	1	-.017	4	-.073	3
481		13	max	94.561	4	307.651	1	4.197	5	.01	3	-.003	12	.225	3
482			min	3.369	12	-265.013	3	-56.636	1	-.014	1	-.072	1	-.264	1
483		14	max	88.976	1	189.596	1	5.919	5	.01	3	-.004	12	.428	3
484			min	3.369	12	-163.41	3	-23.229	1	-.014	1	-.11	1	-.498	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	88.976	1	71.542	1	10.178	1	.01	3	-.001	15	.534	3
486			min	3.369	12	-61.808	3	.635	10	-.014	1	-.116	1	-.622	1
487		16	max	88.976	1	39.795	3	43.585	1	.01	3	.006	5	.545	3
488			min	3.369	12	-46.513	1	1.861	12	-.014	1	-.09	1	-.633	1
489		17	max	88.976	1	141.397	3	76.992	1	.01	3	.015	5	.459	3
490			min	3.369	12	-164.567	1	2.948	12	-.014	1	-.033	1	-.534	1
491		18	max	88.976	1	243	3	110.399	1	.01	3	.055	1	.277	3
492			min	3.369	12	-282.622	1	4.034	12	-.014	1	.003	12	-.323	1
493		19	max	88.976	1	344.602	3	143.806	1	.01	3	.175	1	0	1
494			min	3.369	12	-400.676	1	5.12	12	-.014	1	.007	12	0	3
495	M16	1	max	62.737	5	451.592	1	1.949	5	.007	3	.171	1	0	1
496			min	-88.094	1	-154.959	3	-142.937	1	-.015	1	-.036	5	0	3
497		2	max	53.385	5	318.526	1	3.671	5	.007	3	.052	1	.125	3
498			min	-88.094	1	-109.399	3	-109.53	1	-.015	1	-.033	5	-.364	1
499		3	max	44.034	5	185.46	1	5.393	5	.007	3	-.001	12	.207	3
500			min	-88.094	1	-63.839	3	-76.123	1	-.015	1	-.036	4	-.602	1
501		4	max	34.682	5	52.394	1	7.115	5	.007	3	-.003	12	.245	3
502			min	-88.094	1	-18.279	3	-42.716	1	-.015	1	-.092	1	-.714	1
503		5	max	25.331	5	27.281	3	8.837	5	.007	3	-.004	12	.241	3
504			min	-88.094	1	-80.672	1	-9.309	1	-.015	1	-.116	1	-.701	1
505		6	max	15.979	5	72.841	3	24.098	1	.007	3	-.004	12	.194	3
506			min	-88.094	1	-213.738	1	.528	12	-.015	1	-.109	1	-.562	1
507		7	max	6.628	5	118.401	3	57.505	1	.007	3	.004	5	.104	3
508			min	-88.094	1	-346.804	1	1.614	12	-.015	1	-.071	1	-.297	1
509		8	max	-1.732	15	163.961	3	90.912	1	.007	3	.017	4	.094	1
510			min	-88.094	1	-479.87	1	2.7	12	-.015	1	-.002	3	-.03	3
511		9	max	-1.88	12	209.522	3	124.32	1	.007	3	.101	1	.61	1
512			min	-88.094	1	-612.936	1	3.786	12	-.015	1	.002	12	-.206	3
513		10	max	35.336	5	-17.144	15	157.727	1	.005	14	.235	1	1.251	1
514			min	-91.033	1	-746.002	1	-7.461	3	-.015	1	.007	12	-.426	3
515		11	max	25.984	5	612.936	1	.836	5	.015	1	.102	1	.61	1
516			min	-91.033	1	-209.522	3	-124.064	1	-.007	3	-.017	5	-.206	3
517		12	max	16.633	5	479.87	1	2.558	5	.015	1	0	2	.094	1
518			min	-91.033	1	-163.961	3	-90.657	1	-.007	3	-.015	4	-.03	3
519		13	max	7.281	5	346.804	1	4.28	5	.015	1	-.002	12	.104	3
520			min	-91.033	1	-118.401	3	-57.249	1	-.007	3	-.07	1	-.297	1
521		14	max	-1.265	15	213.738	1	6.003	5	.015	1	-.003	12	.194	3
522			min	-91.033	1	-72.841	3	-23.842	1	-.007	3	-.108	1	-.562	1
523		15	max	-3.572	12	80.672	1	9.855	4	.015	1	0	15	.241	3
524			min	-91.033	1	-27.281	3	.444	12	-.007	3	-.115	1	-.701	1
525		16	max	-3.572	12	18.279	3	42.972	1	.015	1	.008	5	.245	3
526			min	-91.033	1	-52.394	1	1.53	12	-.007	3	-.09	1	-.714	1
527		17	max	-3.572	12	63.839	3	76.379	1	.015	1	.018	5	.207	3
528			min	-91.033	1	-185.46	1	2.616	12	-.007	3	-.033	1	-.602	1
529		18	max	-3.572	12	109.399	3	109.786	1	.015	1	.054	1	.125	3
530			min	-91.033	1	-318.526	1	3.702	12	-.007	3	.002	12	-.364	1
531		19	max	-3.572	12	154.959	3	143.193	1	.015	1	.174	1	0	1
532			min	-91.033	1	-451.592	1	4.789	12	-.007	3	.006	12	0	5
533	M15	1	max	0	4	2.305	1	.023	3	0	1	0	1	0	1
534			min	-35.153	1	0	4	-.028	1	0	3	0	3	0	1
535		2	max	0	4	2.049	1	.023	3	0	1	0	1	0	4
536			min	-35.233	1	0	4	-.028	1	0	3	0	3	-.001	1
537		3	max	0	4	1.793	1	.023	3	0	1	0	1	0	4
538			min	-35.312	1	0	4	-.028	1	0	3	0	3	-.002	1
539		4	max	0	4	1.537	1	.023	3	0	1	0	1	0	4
540			min	-35.392	1	0	4	-.028	1	0	3	0	3	-.003	1
541		5	max	0	4	1.281	1	.023	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	-35.472	1	0	4	-.028	1	0	3	0	3	-.004	1
543		6	max	0	4	1.025	1	.023	3	0	1	0	1	0	4
544			min	-35.551	1	0	4	-.028	1	0	3	0	3	-.004	1
545		7	max	0	4	.768	1	.023	3	0	1	0	3	0	4
546			min	-35.631	1	0	4	-.028	1	0	3	0	2	-.005	1
547		8	max	0	4	.512	1	.023	3	0	1	0	3	0	4
548			min	-35.71	1	0	4	-.028	1	0	3	0	1	-.005	1
549		9	max	0	4	.256	1	.023	3	0	1	0	3	0	4
550			min	-35.79	1	0	4	-.028	1	0	3	0	1	-.005	1
551		10	max	0	4	0	1	.023	3	0	1	0	3	0	4
552			min	-35.869	1	0	1	-.028	1	0	3	0	1	-.005	1
553		11	max	0	4	0	4	.023	3	0	1	0	3	0	4
554			min	-35.949	1	-.256	2	-.028	1	0	3	0	1	-.005	1
555		12	max	0	4	0	4	.023	3	0	1	0	3	0	4
556			min	-36.029	1	-.512	2	-.028	1	0	3	0	1	-.005	1
557		13	max	0	4	0	4	.023	3	0	1	0	3	0	4
558			min	-36.108	1	-.768	2	-.028	1	0	3	0	1	-.005	1
559		14	max	0	4	0	4	.023	3	0	1	0	3	0	4
560			min	-36.188	1	-1.025	2	-.028	1	0	3	0	1	-.004	1
561		15	max	0	4	0	4	.023	3	0	1	0	3	0	4
562			min	-36.267	1	-1.281	2	-.028	1	0	3	0	1	-.004	1
563		16	max	0	4	0	4	.023	3	0	1	0	3	0	4
564			min	-36.347	1	-1.537	2	-.028	1	0	3	0	1	-.003	1
565		17	max	0	4	0	4	.023	3	0	1	0	3	0	4
566			min	-36.426	1	-1.793	2	-.028	1	0	3	0	1	-.002	1
567		18	max	0	4	0	4	.023	3	0	1	0	3	0	4
568			min	-36.506	1	-2.049	2	-.028	1	0	3	0	1	-.001	1
569		19	max	0	4	0	4	.023	3	0	1	0	3	0	1
570			min	-36.585	1	-2.305	2	-.028	1	0	3	0	1	0	1
571	M16A	1	max	-.917	10	3.576	4	.225	4	0	3	0	3	0	1
572			min	-271.21	4	1.111	15	-.009	3	0	1	0	4	0	1
573		2	max	-.851	10	3.179	4	.203	4	0	3	0	3	0	15
574			min	-271.329	4	.988	15	-.009	3	0	1	0	4	-.002	4
575		3	max	-.785	10	2.781	4	.181	4	0	3	0	3	0	15
576			min	-271.448	4	.864	15	-.009	3	0	1	0	4	-.003	4
577		4	max	-.718	10	2.384	4	.159	4	0	3	0	3	-.001	15
578			min	-271.567	4	.741	15	-.009	3	0	1	0	4	-.004	4
579		5	max	-.652	10	1.987	4	.138	4	0	3	0	3	-.002	15
580			min	-271.686	4	.617	15	-.009	3	0	1	0	1	-.006	4
581		6	max	-.586	10	1.589	4	.116	4	0	3	0	5	-.002	15
582			min	-271.805	4	.494	15	-.009	3	0	1	0	1	-.006	4
583		7	max	-.519	10	1.192	4	.094	4	0	3	0	5	-.002	15
584			min	-271.923	4	.37	15	-.009	3	0	1	0	1	-.007	4
585		8	max	-.453	10	.795	4	.072	4	0	3	0	5	-.002	15
586			min	-272.042	4	.247	15	-.009	3	0	1	0	1	-.008	4
587		9	max	-.387	10	.397	4	.05	4	0	3	0	5	-.002	15
588			min	-272.161	4	.123	15	-.009	3	0	1	0	1	-.008	4
589		10	max	-.321	10	0	1	.029	4	0	3	0	5	-.002	15
590			min	-272.28	4	0	1	-.009	3	0	1	0	1	-.008	4
591		11	max	-.254	10	-.123	15	.02	1	0	3	0	5	-.002	15
592			min	-272.399	4	-.397	4	-.009	3	0	1	0	1	-.008	4
593		12	max	-.188	10	-.247	15	.02	1	0	3	0	5	-.002	15
594			min	-272.518	4	-.795	4	-.019	5	0	1	0	1	-.008	4
595		13	max	-.122	10	-.37	15	.02	1	0	3	0	5	-.002	15
596			min	-272.637	4	-1.192	4	-.04	5	0	1	0	3	-.007	4
597		14	max	-.055	10	-.494	15	.02	1	0	3	0	4	-.002	15
598			min	-272.756	4	-1.589	4	-.062	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	.011	10	-.617	15	.02	1	0	3	0	4	-.002	15
600			min	-272.875	4	-1.987	4	-.084	5	0	1	0	3	-.006	4
601		16	max	.077	10	-.741	15	.02	1	0	3	0	4	-.001	15
602			min	-272.994	4	-2.384	4	-.106	5	0	1	0	3	-.004	4
603		17	max	.144	10	-.864	15	.02	1	0	3	0	1	0	15
604			min	-273.112	4	-2.781	4	-.128	5	0	1	0	3	-.003	4
605		18	max	.21	10	-.988	15	.02	1	0	3	0	1	0	15
606			min	-273.231	4	-3.179	4	-.149	5	0	1	0	5	-.002	4
607		19	max	.276	10	-1.111	15	.02	1	0	3	0	1	0	1
608			min	-273.35	4	-3.576	4	-.171	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	.008	2	.016	1	2.04e-3	5	NC	3	NC	3
2			min	-.003	3	-.006	3	-.02	5	-1.345e-3	1	4388.4	2	2023.301	1
3		2	max	.003	1	.007	2	.015	1	2.068e-3	5	NC	3	NC	3
4			min	-.003	3	-.006	3	-.019	5	-1.29e-3	1	4756.155	2	2189.494	1
5		3	max	.003	1	.006	2	.014	1	2.095e-3	5	NC	3	NC	3
6			min	-.003	3	-.006	3	-.019	5	-1.235e-3	1	5187.869	2	2385.177	1
7		4	max	.003	1	.006	2	.013	1	2.123e-3	5	NC	3	NC	3
8			min	-.002	3	-.006	3	-.018	5	-1.18e-3	1	5698.011	2	2617.5	1
9		5	max	.003	1	.005	2	.011	1	2.151e-3	5	NC	3	NC	3
10			min	-.002	3	-.005	3	-.017	5	-1.124e-3	1	6305.599	2	2896.003	1
11		6	max	.002	1	.005	2	.01	1	2.178e-3	5	NC	1	NC	3
12			min	-.002	3	-.005	3	-.016	5	-1.069e-3	1	7036.028	2	3233.647	1
13		7	max	.002	1	.004	2	.009	1	2.206e-3	5	NC	1	NC	3
14			min	-.002	3	-.005	3	-.015	5	-1.014e-3	1	7923.844	2	3648.412	1
15		8	max	.002	1	.004	2	.008	1	2.234e-3	5	NC	1	NC	2
16			min	-.002	3	-.005	3	-.014	5	-9.583e-4	1	9017.072	2	4165.843	1
17		9	max	.002	1	.003	2	.007	1	2.261e-3	5	NC	1	NC	2
18			min	-.002	3	-.004	3	-.013	5	-9.03e-4	1	NC	1	4823.261	1
19		10	max	.002	1	.003	2	.006	1	2.289e-3	5	NC	1	NC	2
20			min	-.001	3	-.004	3	-.012	5	-8.478e-4	1	NC	1	5677.022	1
21		11	max	.001	1	.002	2	.005	1	2.317e-3	5	NC	1	NC	2
22			min	-.001	3	-.004	3	-.01	5	-7.925e-4	1	NC	1	6815.648	1
23		12	max	.001	1	.002	2	.004	1	2.344e-3	5	NC	1	NC	2
24			min	-.001	3	-.003	3	-.009	5	-7.372e-4	1	NC	1	8385.075	1
25		13	max	.001	1	.002	2	.003	1	2.372e-3	5	NC	1	NC	1
26			min	0	3	-.003	3	-.008	5	-6.819e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.399e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.007	5	-6.266e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	2.427e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-5.713e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	2.455e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.004	5	-5.16e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.482e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-4.607e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.51e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-4.054e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.538e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.501e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.609e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.167e-3	5	NC	1	NC	1
41		2	max	0	9	0	2	.006	5	2.032e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.175e-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	9	0	2	.012	5	2.455e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	-1.182e-3	5	NC	1	8040.159	14
45		4	max	0	9	0	2	.018	5	2.878e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.001	1	-1.19e-3	5	NC	1	5241.313	14
47		5	max	0	9	0	2	.025	5	3.301e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	-1.198e-3	5	NC	1	3854.555	14
49		6	max	0	9	0	2	.031	4	3.725e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.206e-3	5	NC	1	3031.274	14
51		7	max	0	9	.001	2	.037	4	4.148e-4	1	NC	1	NC	1
52			min	0	2	-.004	3	-.001	1	-1.214e-3	5	NC	1	2488.796	14
53		8	max	0	9	.001	2	.043	4	4.571e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	-1.221e-3	5	NC	1	2106.105	14
55		9	max	0	9	.002	2	.05	4	4.994e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	-1.229e-3	5	NC	1	1822.781	14
57		10	max	0	9	.002	2	.056	4	5.417e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-1.237e-3	5	NC	1	1605.323	14
59		11	max	0	9	.003	2	.062	4	5.84e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.245e-3	5	NC	1	1433.672	14
61		12	max	0	9	.003	2	.068	4	6.263e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	12	-1.253e-3	5	NC	1	1295.099	14
63		13	max	0	9	.004	2	.074	4	6.686e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	12	-1.26e-3	5	NC	1	1181.138	14
65		14	max	0	9	.005	2	.08	4	7.109e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	12	-1.268e-3	5	9439.052	2	1085.947	14
67		15	max	0	9	.006	2	.086	4	7.532e-4	1	NC	3	NC	2
68			min	0	2	-.007	3	0	12	-1.276e-3	5	7983.097	2	1005.366	14
69		16	max	.001	9	.007	2	.092	4	7.955e-4	1	NC	3	NC	2
70			min	0	2	-.008	3	0	12	-1.284e-3	5	6845.188	2	936.35	14
71		17	max	.001	9	.008	2	.098	4	8.378e-4	1	NC	3	NC	2
72			min	0	2	-.008	3	0	12	-1.292e-3	5	5947.645	2	876.626	14
73		18	max	.001	9	.009	2	.103	4	8.801e-4	1	NC	3	NC	2
74			min	0	2	-.008	3	0	12	-1.299e-3	5	5234.021	2	824.456	14
75		19	max	.001	9	.01	2	.109	4	9.224e-4	1	NC	3	NC	2
76			min	0	2	-.008	3	0	12	-1.307e-3	5	4663.081	2	778.492	14
77	M4	1	max	.003	1	.009	2	0	12	5.613e-3	5	NC	1	NC	3
78			min	0	3	-.007	3	-.115	4	-1.115e-3	1	NC	1	167.555	4
79		2	max	.003	1	.008	2	0	12	5.613e-3	5	NC	1	NC	3
80			min	0	3	-.006	3	-.106	4	-1.115e-3	1	NC	1	182.662	4
81		3	max	.002	1	.008	2	0	12	5.613e-3	5	NC	1	NC	3
82			min	0	3	-.006	3	-.096	4	-1.115e-3	1	NC	1	200.644	4
83		4	max	.002	1	.007	2	0	12	5.613e-3	5	NC	1	NC	2
84			min	0	3	-.006	3	-.087	4	-1.115e-3	1	NC	1	222.259	4
85		5	max	.002	1	.007	2	0	12	5.613e-3	5	NC	1	NC	2
86			min	0	3	-.005	3	-.078	4	-1.115e-3	1	NC	1	248.536	4
87		6	max	.002	1	.006	2	0	12	5.613e-3	5	NC	1	NC	2
88			min	0	3	-.005	3	-.069	4	-1.115e-3	1	NC	1	280.912	4
89		7	max	.002	1	.006	2	0	12	5.613e-3	5	NC	1	NC	2
90			min	0	3	-.004	3	-.06	4	-1.115e-3	1	NC	1	321.43	4
91		8	max	.002	1	.005	2	0	12	5.613e-3	5	NC	1	NC	2
92			min	0	3	-.004	3	-.052	4	-1.115e-3	1	NC	1	373.08	4
93		9	max	.002	1	.005	2	0	12	5.613e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.044	4	-1.115e-3	1	NC	1	440.39	4
95		10	max	.001	1	.004	2	0	12	5.613e-3	5	NC	1	NC	2
96			min	0	3	-.003	3	-.036	4	-1.115e-3	1	NC	1	530.472	4
97		11	max	.001	1	.004	2	0	12	5.613e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.03	4	-1.115e-3	1	NC	1	655.043	4
99		12	max	.001	1	.003	2	0	12	5.613e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.003	3	-.023	4	-1.115e-3	1	NC	1	834.542	4
101		13	max	0	1	.003	2	0	12	5.613e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.017	4	-1.115e-3	1	NC	1	1107.305	4
103		14	max	0	1	.002	2	0	12	5.613e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.012	4	-1.115e-3	1	NC	1	1552.41	4
105		15	max	0	1	.002	2	0	12	5.613e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.008	4	-1.115e-3	1	NC	1	2355.646	4
107		16	max	0	1	.001	2	0	12	5.613e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.005	4	-1.115e-3	1	NC	1	4045.174	4
109		17	max	0	1	0	2	0	12	5.613e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-1.115e-3	1	NC	1	8672.292	4
111		18	max	0	1	0	2	0	12	5.613e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-1.115e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.613e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.115e-3	1	NC	1	NC	1
115	M6	1	max	.011	1	.025	2	.005	1	2.26e-3	4	NC	3	NC	2
116			min	-.01	3	-.019	3	-.02	5	4.542e-6	10	1338.034	2	7233.353	1
117		2	max	.01	1	.023	2	.004	1	2.282e-3	4	NC	3	NC	2
118			min	-.009	3	-.018	3	-.02	5	3.598e-6	10	1428.134	2	7859.774	1
119		3	max	.01	1	.022	2	.004	1	2.304e-3	4	NC	3	NC	2
120			min	-.009	3	-.017	3	-.019	5	2.653e-6	10	1530.926	2	8603.764	1
121		4	max	.009	1	.02	2	.004	1	2.326e-3	4	NC	3	NC	2
122			min	-.008	3	-.016	3	-.018	5	1.709e-6	10	1648.945	2	9495.481	1
123		5	max	.008	1	.019	2	.003	1	2.349e-3	4	NC	3	NC	1
124			min	-.008	3	-.015	3	-.017	5	7.646e-7	10	1785.454	2	NC	1
125		6	max	.008	1	.017	2	.003	1	2.371e-3	4	NC	3	NC	1
126			min	-.007	3	-.014	3	-.016	5	-1.797e-7	10	1944.724	2	NC	1
127		7	max	.007	1	.016	2	.002	1	2.393e-3	4	NC	3	NC	1
128			min	-.007	3	-.013	3	-.015	5	-1.124e-6	10	2132.454	2	NC	1
129		8	max	.007	1	.014	2	.002	1	2.416e-3	4	NC	3	NC	1
130			min	-.006	3	-.012	3	-.014	5	-2.068e-6	10	2356.417	2	NC	1
131		9	max	.006	1	.013	2	.002	1	2.438e-3	4	NC	3	NC	1
132			min	-.005	3	-.011	3	-.013	5	-3.013e-6	10	2627.496	2	NC	1
133		10	max	.005	1	.011	2	.002	1	2.46e-3	4	NC	3	NC	1
134			min	-.005	3	-.01	3	-.012	5	-3.957e-6	10	2961.418	2	NC	1
135		11	max	.005	1	.01	2	.001	1	2.483e-3	4	NC	3	NC	1
136			min	-.004	3	-.009	3	-.011	5	-4.901e-6	10	3381.769	2	NC	1
137		12	max	.004	1	.008	2	0	1	2.505e-3	4	NC	3	NC	1
138			min	-.004	3	-.008	3	-.01	5	-8.948e-6	2	3925.614	2	NC	1
139		13	max	.004	1	.007	2	0	1	2.527e-3	4	NC	3	NC	1
140			min	-.003	3	-.007	3	-.008	5	-1.409e-5	2	4654.724	2	NC	1
141		14	max	.003	1	.006	2	0	1	2.549e-3	4	NC	3	NC	1
142			min	-.003	3	-.006	3	-.007	5	-1.924e-5	2	5680.278	2	NC	1
143		15	max	.002	1	.005	2	0	1	2.572e-3	4	NC	3	NC	1
144			min	-.002	3	-.005	3	-.006	5	-2.439e-5	2	7224.627	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.594e-3	4	NC	1	NC	1
146			min	-.002	3	-.003	3	-.004	5	-2.953e-5	2	9806.561	2	NC	1
147		17	max	.001	1	.002	2	0	1	2.616e-3	4	NC	1	NC	1
148			min	-.001	3	-.002	3	-.003	5	-3.468e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.639e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.001	5	-3.982e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.661e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.497e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.037e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.223e-3	4	NC	1	NC	1
155		2	max	0	3	.001	2	.006	4	1.73e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-1.213e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.013	4	1.536e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-1.202e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.019	4	1.667e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.191e-3	4	NC	1	NC	1
161		5	max	0	3	.006	2	.026	4	1.798e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	2	-1.18e-3	4	8301.046	2	NC	1
163		6	max	0	3	.007	2	.032	4	1.929e-5	1	NC	3	NC	1
164			min	-.001	2	-.008	3	0	2	-1.169e-3	4	6651.519	2	NC	1
165		7	max	.001	3	.008	2	.039	4	2.115e-5	3	NC	3	NC	1
166			min	-.001	2	-.009	3	0	2	-1.158e-3	4	5524.683	2	NC	1
167		8	max	.001	3	.01	2	.045	4	3.171e-5	3	NC	3	NC	1
168			min	-.001	2	-.011	3	0	1	-1.147e-3	4	4699.497	2	NC	1
169		9	max	.001	3	.011	2	.051	4	4.227e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	0	1	-1.136e-3	4	4065.794	2	NC	1
171		10	max	.002	3	.013	2	.058	4	5.282e-5	3	NC	3	NC	1
172			min	-.002	2	-.013	3	0	1	-1.125e-3	4	3562.497	2	NC	1
173		11	max	.002	3	.015	2	.064	4	6.338e-5	3	NC	3	NC	1
174			min	-.002	2	-.015	3	-.001	1	-1.114e-3	4	3152.928	2	NC	1
175		12	max	.002	3	.016	2	.07	4	7.393e-5	3	NC	3	NC	1
176			min	-.002	2	-.016	3	-.001	1	-1.104e-3	4	2813.62	2	NC	1
177		13	max	.002	3	.018	2	.076	4	8.449e-5	3	NC	3	NC	1
178			min	-.002	2	-.017	3	-.001	1	-1.093e-3	4	2528.757	2	NC	1
179		14	max	.002	3	.02	2	.082	4	9.504e-5	3	NC	3	NC	1
180			min	-.003	2	-.018	3	-.002	1	-1.082e-3	4	2287.198	2	NC	1
181		15	max	.002	3	.022	2	.087	4	1.056e-4	3	NC	3	NC	1
182			min	-.003	2	-.019	3	-.002	1	-1.071e-3	4	2080.808	2	NC	1
183		16	max	.003	3	.024	2	.093	4	1.162e-4	3	NC	3	NC	1
184			min	-.003	2	-.019	3	-.002	1	-1.06e-3	4	1903.459	2	NC	1
185		17	max	.003	3	.026	2	.099	4	1.267e-4	3	NC	3	NC	1
186			min	-.003	2	-.02	3	-.002	1	-1.049e-3	4	1750.425	2	NC	1
187		18	max	.003	3	.028	2	.104	4	1.373e-4	3	NC	3	NC	1
188			min	-.004	2	-.021	3	-.002	1	-1.038e-3	4	1617.984	2	NC	1
189		19	max	.003	3	.031	2	.11	4	1.478e-4	3	NC	3	NC	1
190			min	-.004	2	-.022	3	-.002	1	-1.027e-3	4	1503.167	2	NC	1
191	M8	1	max	.008	1	.028	2	.003	1	5.375e-3	4	NC	1	NC	2
192			min	-.001	3	-.019	3	-.116	4	-1.609e-4	1	NC	1	166.855	4
193		2	max	.007	1	.027	2	.002	1	5.375e-3	4	NC	1	NC	2
194			min	-.001	3	-.018	3	-.106	4	-1.609e-4	1	NC	1	181.899	4
195		3	max	.007	1	.025	2	.002	1	5.375e-3	4	NC	1	NC	2
196			min	-.001	3	-.017	3	-.097	4	-1.609e-4	1	NC	1	199.805	4
197		4	max	.006	1	.024	2	.002	1	5.375e-3	4	NC	1	NC	2
198			min	-.001	3	-.016	3	-.087	4	-1.609e-4	1	NC	1	221.328	4
199		5	max	.006	1	.022	2	.002	1	5.375e-3	4	NC	1	NC	1
200			min	0	3	-.015	3	-.078	4	-1.609e-4	1	NC	1	247.495	4
201		6	max	.006	1	.021	2	.002	1	5.375e-3	4	NC	1	NC	1
202			min	0	3	-.014	3	-.069	4	-1.609e-4	1	NC	1	279.735	4
203		7	max	.005	1	.019	2	.001	1	5.375e-3	4	NC	1	NC	1
204			min	0	3	-.013	3	-.06	4	-1.609e-4	1	NC	1	320.082	4
205		8	max	.005	1	.017	2	.001	1	5.375e-3	4	NC	1	NC	1
206			min	0	3	-.012	3	-.052	4	-1.609e-4	1	NC	1	371.515	4
207		9	max	.004	1	.016	2	.001	1	5.375e-3	4	NC	1	NC	1
208			min	0	3	-.011	3	-.044	4	-1.609e-4	1	NC	1	438.541	4
209		10	max	.004	1	.014	2	0	1	5.375e-3	4	NC	1	NC	1
210			min	0	3	-.01	3	-.037	4	-1.609e-4	1	NC	1	528.244	4
211		11	max	.003	1	.013	2	0	1	5.375e-3	4	NC	1	NC	1
212			min	0	3	-.009	3	-.03	4	-1.609e-4	1	NC	1	652.291	4
213		12	max	.003	1	.011	2	0	1	5.375e-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	-.008	3	-.023	4	-1.609e-4	1	NC	1	831.034	4
215		13	max	.003	1	.009	2	0	1	5.375e-3	4	NC	1	NC	1
216			min	0	3	-.006	3	-.018	4	-1.609e-4	1	NC	1	1102.648	4
217		14	max	.002	1	.008	2	0	1	5.375e-3	4	NC	1	NC	1
218			min	0	3	-.005	3	-.013	4	-1.609e-4	1	NC	1	1545.879	4
219		15	max	.002	1	.006	2	0	1	5.375e-3	4	NC	1	NC	1
220			min	0	3	-.004	3	-.008	4	-1.609e-4	1	NC	1	2345.732	4
221		16	max	.001	1	.005	2	0	1	5.375e-3	4	NC	1	NC	1
222			min	0	3	-.003	3	-.005	4	-1.609e-4	1	NC	1	4028.143	4
223		17	max	0	1	.003	2	0	1	5.375e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.609e-4	1	NC	1	8635.761	4
225		18	max	0	1	.002	2	0	1	5.375e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-1.609e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.375e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.609e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.008	2	0	3	1.119e-3	1	NC	3	NC	1
230			min	-.003	3	-.006	3	-.009	4	-1.716e-4	3	4393.084	2	NC	1
231		2	max	.003	1	.007	2	0	3	1.06e-3	1	NC	3	NC	1
232			min	-.003	3	-.006	3	-.009	4	-1.671e-4	3	4749.389	2	NC	1
233		3	max	.003	1	.006	2	0	3	1.001e-3	1	NC	3	NC	1
234			min	-.003	3	-.006	3	-.008	4	-1.625e-4	3	5165.569	2	NC	1
235		4	max	.003	1	.006	2	0	3	9.544e-4	14	NC	3	NC	1
236			min	-.002	3	-.006	3	-.008	4	-1.58e-4	3	5654.671	2	NC	1
237		5	max	.003	1	.005	2	0	3	9.77e-4	4	NC	3	NC	1
238			min	-.002	3	-.006	3	-.008	4	-1.535e-4	3	6233.721	2	NC	1
239		6	max	.002	1	.005	2	0	3	1.048e-3	4	NC	1	NC	1
240			min	-.002	3	-.005	3	-.008	4	-1.489e-4	3	6925.281	2	NC	1
241		7	max	.002	1	.004	2	0	3	1.119e-3	4	NC	1	NC	1
242			min	-.002	3	-.005	3	-.008	4	-1.444e-4	3	7759.802	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.19e-3	4	NC	1	NC	1
244			min	-.002	3	-.005	3	-.008	4	-1.398e-4	3	8779.264	2	NC	1
245		9	max	.002	1	.003	2	0	3	1.261e-3	4	NC	1	NC	1
246			min	-.002	3	-.004	3	-.007	4	-1.353e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	1.332e-3	4	NC	1	NC	1
248			min	-.001	3	-.004	3	-.007	4	-1.307e-4	3	NC	1	NC	1
249		11	max	.002	1	.002	2	0	3	1.403e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.006	4	-1.262e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.474e-3	4	NC	1	NC	1
252			min	-.001	3	-.003	3	-.006	4	-1.216e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.545e-3	4	NC	1	NC	1
254			min	0	3	-.003	3	-.005	4	-1.171e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.616e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.005	4	-1.125e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.687e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.004	4	-1.08e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.758e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-1.034e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.829e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-9.889e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.9e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-9.434e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.971e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-8.979e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	4.129e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-9.079e-4	4	NC	1	NC	1
269		2	max	0	9	0	2	.005	4	2.835e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.022e-3	4	NC	1	9649.582	4

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	9	0	2	.01	4	1.54e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.136e-3	4	NC	1	4784.794	4
273		4	max	0	9	0	2	.015	4	2.458e-6	3	NC	1	NC	1
274			min	0	2	-.002	3	0	1	-1.251e-3	4	NC	1	3167.139	4
275		5	max	0	9	0	2	.02	4	-7.409e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	1	-1.365e-3	4	NC	1	2360.798	4
277		6	max	0	9	0	2	.025	4	-1.543e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-1.479e-3	4	NC	1	1878.636	4
279		7	max	0	9	.001	2	.03	5	-2.346e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.003	1	-1.593e-3	4	NC	1	1554.08	5
281		8	max	0	9	.001	2	.035	5	-3.148e-5	12	NC	1	NC	1
282			min	0	2	-.005	3	-.004	1	-1.707e-3	4	NC	1	1322.286	5
283		9	max	0	9	.002	2	.04	5	-3.95e-5	12	NC	1	NC	2
284			min	0	2	-.006	3	-.005	1	-1.822e-3	4	NC	1	1149.289	5
285		10	max	0	9	.002	2	.045	5	-4.753e-5	12	NC	1	NC	2
286			min	0	2	-.006	3	-.006	1	-1.936e-3	4	NC	1	1015.316	5
287		11	max	0	9	.003	2	.051	5	-5.555e-5	12	NC	1	NC	2
288			min	0	2	-.007	3	-.008	1	-2.05e-3	4	NC	1	908.512	5
289		12	max	0	9	.003	2	.056	5	-6.357e-5	12	NC	1	NC	2
290			min	0	2	-.007	3	-.009	1	-2.164e-3	4	NC	1	821.341	5
291		13	max	0	9	.004	2	.061	5	-7.16e-5	12	NC	1	NC	2
292			min	0	2	-.007	3	-.01	1	-2.279e-3	4	NC	1	748.782	5
293		14	max	0	9	.005	2	.067	5	-7.717e-5	10	NC	1	NC	2
294			min	0	2	-.007	3	-.012	1	-2.393e-3	4	9237.765	2	687.367	5
295		15	max	0	9	.006	2	.073	5	-8.265e-5	10	NC	3	NC	2
296			min	0	2	-.008	3	-.013	1	-2.507e-3	4	7865.79	2	634.619	5
297		16	max	.001	9	.007	2	.078	5	-8.814e-5	10	NC	3	NC	3
298			min	0	2	-.008	3	-.014	1	-2.621e-3	4	6780.736	2	588.727	5
299		17	max	.001	9	.008	2	.084	5	-9.363e-5	10	NC	3	NC	3
300			min	0	2	-.008	3	-.015	1	-2.735e-3	4	5916.691	2	548.337	5
301		18	max	.001	9	.009	2	.09	5	-9.912e-5	10	NC	3	NC	3
302			min	0	2	-.008	3	-.016	1	-2.85e-3	4	5224.422	2	512.417	5
303		19	max	.001	9	.01	2	.096	5	-1.046e-4	10	NC	3	NC	3
304			min	0	2	-.008	3	-.017	1	-2.964e-3	4	4667.158	2	480.17	5
305	M12	1	max	.003	1	.009	2	.014	1	7.047e-3	4	NC	1	NC	3
306			min	0	3	-.007	3	-.106	5	9.406e-5	10	NC	1	182.713	5
307		2	max	.003	1	.008	2	.013	1	7.047e-3	4	NC	1	NC	3
308			min	0	3	-.006	3	-.097	5	9.406e-5	10	NC	1	199.183	5
309		3	max	.002	1	.008	2	.012	1	7.047e-3	4	NC	1	NC	3
310			min	0	3	-.006	3	-.088	5	9.406e-5	10	NC	1	218.787	5
311		4	max	.002	1	.007	2	.011	1	7.047e-3	4	NC	1	NC	3
312			min	0	3	-.006	3	-.08	5	9.406e-5	10	NC	1	242.351	5
313		5	max	.002	1	.007	2	.01	1	7.047e-3	4	NC	1	NC	3
314			min	0	3	-.005	3	-.071	5	9.406e-5	10	NC	1	270.999	5
315		6	max	.002	1	.006	2	.009	1	7.047e-3	4	NC	1	NC	3
316			min	0	3	-.005	3	-.063	5	9.406e-5	10	NC	1	306.294	5
317		7	max	.002	1	.006	2	.007	1	7.047e-3	4	NC	1	NC	3
318			min	0	3	-.004	3	-.055	5	9.406e-5	10	NC	1	350.465	5
319		8	max	.002	1	.005	2	.006	1	7.047e-3	4	NC	1	NC	3
320			min	0	3	-.004	3	-.048	5	9.406e-5	10	NC	1	406.772	5
321		9	max	.002	1	.005	2	.005	1	7.047e-3	4	NC	1	NC	3
322			min	0	3	-.004	3	-.04	5	9.406e-5	10	NC	1	480.149	5
323		10	max	.001	1	.004	2	.005	1	7.047e-3	4	NC	1	NC	2
324			min	0	3	-.003	3	-.033	5	9.406e-5	10	NC	1	578.35	5
325		11	max	.001	1	.004	2	.004	1	7.047e-3	4	NC	1	NC	2
326			min	0	3	-.003	3	-.027	5	9.406e-5	10	NC	1	714.147	5
327		12	max	.001	1	.003	2	.003	1	7.047e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.021	5	9.406e-5	10	NC	1	909.819	5
329		13	max	0	1	.003	2	.002	1	7.047e-3	4	NC	1	NC	2
330			min	0	3	-.002	3	-.016	5	9.406e-5	10	NC	1	1207.155	5
331		14	max	0	1	.002	2	.002	1	7.047e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.011	5	9.406e-5	10	NC	1	1692.354	5
333		15	max	0	1	.002	2	.001	1	7.047e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.008	5	9.406e-5	10	NC	1	2567.93	5
335		16	max	0	1	.001	2	0	1	7.047e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	9.406e-5	10	NC	1	4409.594	5
337		17	max	0	1	0	2	0	1	7.047e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	9.406e-5	10	NC	1	9453.287	5
339		18	max	0	1	0	2	0	1	7.047e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	9.406e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	7.047e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	9.406e-5	10	NC	1	NC	1
343	M1	1	max	.006	3	.023	3	.011	5	1.996e-2	1	NC	1	NC	1
344			min	-.007	2	-.03	1	-.005	1	-1.708e-2	3	NC	1	NC	1
345		2	max	.006	3	.013	3	.015	5	9.51e-3	1	NC	4	NC	2
346			min	-.007	2	-.016	1	-.012	1	-8.456e-3	3	3340.165	1	6822.313	1
347		3	max	.006	3	.003	3	.02	5	6.035e-4	5	NC	4	NC	2
348			min	-.007	2	-.003	1	-.016	1	-7.453e-4	1	1727.586	1	4135.471	1
349		4	max	.006	3	.008	1	.026	5	6.07e-4	5	NC	5	NC	3
350			min	-.007	2	-.005	3	-.019	1	-6.206e-4	1	1222.404	1	3135.205	5
351		5	max	.006	3	.017	1	.032	5	6.105e-4	5	NC	5	NC	3
352			min	-.007	2	-.012	3	-.019	1	-4.959e-4	1	979.677	1	2249.958	5
353		6	max	.006	3	.025	1	.038	5	6.139e-4	5	NC	5	NC	3
354			min	-.007	2	-.017	3	-.018	1	-3.712e-4	1	842.57	1	1732.242	5
355		7	max	.006	3	.031	1	.045	5	6.174e-4	5	NC	5	NC	2
356			min	-.007	2	-.021	3	-.016	1	-2.464e-4	1	759.651	1	1396.331	5
357		8	max	.006	3	.035	1	.051	5	6.208e-4	5	NC	5	NC	2
358			min	-.007	2	-.023	3	-.013	1	-1.217e-4	1	709.539	1	1163.046	5
359		9	max	.006	3	.037	1	.058	5	6.243e-4	5	NC	5	NC	1
360			min	-.008	2	-.025	3	-.009	1	-9.087e-6	2	682.257	1	987.125	4
361		10	max	.006	3	.038	1	.065	5	6.448e-4	4	NC	5	NC	1
362			min	-.008	2	-.025	3	-.005	1	1.243e-5	10	673.211	1	845.414	4
363		11	max	.006	3	.037	1	.073	4	6.755e-4	4	NC	5	NC	1
364			min	-.008	2	-.024	3	-.001	1	2.317e-5	10	681.018	1	738.688	4
365		12	max	.006	3	.035	1	.081	4	7.063e-4	4	NC	5	NC	2
366			min	-.008	2	-.022	3	0	10	2.875e-5	12	706.929	1	656.494	4
367		13	max	.006	3	.03	1	.088	4	7.37e-4	4	NC	5	NC	2
368			min	-.008	2	-.019	3	0	12	3.181e-5	12	755.36	1	592.12	4
369		14	max	.006	3	.024	1	.096	4	7.678e-4	4	NC	5	NC	3
370			min	-.008	2	-.015	3	0	12	3.488e-5	12	835.976	1	541.097	4
371		15	max	.006	3	.016	1	.103	4	7.985e-4	4	NC	5	NC	3
372			min	-.008	2	-.01	3	0	12	3.795e-5	12	969.491	1	500.364	4
373		16	max	.006	3	.007	1	.109	4	1.185e-3	4	NC	5	NC	3
374			min	-.008	2	-.004	3	0	12	4.001e-5	12	1205.294	1	467.772	4
375		17	max	.006	3	.002	3	.115	4	1.003e-2	4	NC	4	NC	2
376			min	-.008	2	-.005	1	0	12	1.31e-5	10	1691.764	1	441.823	4
377		18	max	.006	3	.01	3	.12	4	1.119e-2	1	NC	4	NC	2
378			min	-.008	2	-.018	1	0	10	-3.871e-3	3	3260.856	1	421.389	4
379		19	max	.006	3	.018	3	.125	4	2.248e-2	1	NC	1	NC	1
380			min	-.008	2	-.033	1	-.004	1	-7.844e-3	3	NC	1	406.154	4
381	M5	1	max	.018	3	.069	3	.01	5	4.903e-6	4	NC	1	NC	1
382			min	-.024	2	-.092	1	-.006	1	5.655e-8	10	NC	1	NC	1
383		2	max	.018	3	.039	3	.015	5	2.965e-4	5	NC	5	NC	1
384			min	-.024	2	-.05	1	-.005	1	-9.154e-5	1	1115.297	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	.018	3	.01	3	.021	5	5.831e-4	5	NC	5	NC	1
386			min	-.024	2	-.011	1	-.005	1	-1.818e-4	1	574.191	1	NC	1
387		4	max	.018	3	.022	1	.026	5	6.048e-4	5	NC	5	NC	1
388			min	-.024	2	-.013	3	-.004	1	-1.697e-4	1	405.219	1	NC	1
389		5	max	.018	3	.051	1	.033	5	6.264e-4	5	NC	15	NC	1
390			min	-.024	2	-.033	3	-.003	1	-1.575e-4	1	323.983	1	NC	1
391		6	max	.018	3	.074	1	.04	5	6.481e-4	5	NC	15	NC	1
392			min	-.024	2	-.048	3	-.003	1	-1.454e-4	1	278.014	1	NC	1
393		7	max	.018	3	.092	1	.047	5	6.697e-4	5	NC	15	NC	1
394			min	-.024	2	-.06	3	-.003	1	-1.333e-4	1	250.117	1	NC	1
395		8	max	.018	3	.105	1	.054	5	6.914e-4	5	9994.549	15	NC	1
396			min	-.024	2	-.067	3	-.002	1	-1.211e-4	1	233.139	1	NC	1
397		9	max	.018	3	.113	1	.061	5	7.13e-4	5	9638.134	15	NC	1
398			min	-.025	2	-.072	3	-.002	1	-1.09e-4	1	223.739	1	NC	1
399		10	max	.018	3	.116	1	.069	5	7.347e-4	5	9536.836	15	NC	1
400			min	-.025	2	-.072	3	-.002	1	-9.689e-5	1	220.368	1	NC	1
401		11	max	.018	3	.113	1	.076	5	7.563e-4	5	9673.141	15	NC	1
402			min	-.025	2	-.07	3	-.002	1	-8.476e-5	1	222.544	1	NC	1
403		12	max	.018	3	.106	1	.083	5	7.779e-4	5	NC	15	NC	1
404			min	-.025	2	-.064	3	-.002	1	-7.264e-5	1	230.658	1	NC	1
405		13	max	.018	3	.092	1	.091	4	7.996e-4	5	NC	15	NC	1
406			min	-.025	2	-.055	3	-.002	1	-6.051e-5	1	246.139	1	NC	1
407		14	max	.018	3	.074	1	.098	4	8.212e-4	5	NC	15	NC	1
408			min	-.025	2	-.043	3	-.002	1	-4.838e-5	1	272.146	1	9259.72	4
409		15	max	.018	3	.049	1	.104	4	8.429e-4	5	NC	15	NC	1
410			min	-.025	2	-.029	3	-.002	1	-3.903e-5	2	315.484	1	9113.521	4
411		16	max	.018	3	.02	1	.11	4	1.216e-3	5	NC	5	NC	1
412			min	-.025	2	-.012	3	-.002	1	-3.664e-5	2	392.51	1	9830.575	4
413		17	max	.018	3	.007	3	.116	4	1.003e-2	4	NC	5	NC	1
414			min	-.025	2	-.015	1	-.003	1	-2.418e-4	1	553.417	1	NC	1
415		18	max	.018	3	.029	3	.121	4	5.145e-3	4	NC	5	NC	1
416			min	-.025	2	-.057	1	-.003	1	-1.24e-4	1	1072.459	1	NC	1
417		19	max	.018	3	.051	3	.125	4	1.649e-6	5	NC	1	NC	1
418			min	-.025	2	-.101	1	-.003	1	-1.103e-7	3	NC	1	NC	1
419	M9	1	max	.006	3	.023	3	.009	5	1.708e-2	3	NC	1	NC	1
420			min	-.007	2	-.03	1	-.008	1	-1.996e-2	1	NC	1	NC	1
421		2	max	.006	3	.013	3	.008	5	8.464e-3	3	NC	4	NC	2
422			min	-.007	2	-.016	1	-.001	1	-9.817e-3	1	3340.948	1	8112.281	1
423		3	max	.006	3	.003	3	.009	4	1.364e-4	1	NC	5	NC	2
424			min	-.007	2	-.003	1	0	3	6.059e-6	12	1728.001	1	5060.959	1
425		4	max	.006	3	.008	1	.011	4	3.898e-5	5	NC	5	NC	3
426			min	-.007	2	-.005	3	0	3	-1.712e-7	3	1222.694	1	4309.198	1
427		5	max	.006	3	.017	1	.014	4	2.458e-5	5	NC	5	NC	3
428			min	-.007	2	-.012	3	0	3	-7.583e-5	1	979.897	1	4299.353	1
429		6	max	.006	3	.025	1	.018	4	1.017e-5	5	NC	5	NC	2
430			min	-.007	2	-.017	3	-.001	3	-1.819e-4	1	842.745	1	3869.3	14
431		7	max	.006	3	.031	1	.023	4	-2.531e-6	15	NC	5	NC	2
432			min	-.007	2	-.021	3	-.002	3	-2.881e-4	1	759.795	1	2787.812	4
433		8	max	.006	3	.035	1	.029	4	-1.213e-5	15	NC	5	NC	1
434			min	-.007	2	-.023	3	-.002	3	-3.942e-4	1	709.659	1	2087.483	4
435		9	max	.006	3	.037	1	.035	5	-2.173e-5	15	NC	5	NC	1
436			min	-.007	2	-.025	3	-.004	1	-5.003e-4	1	682.359	1	1628.296	4
437		10	max	.006	3	.038	1	.043	5	-3.133e-5	15	NC	5	NC	1
438			min	-.008	2	-.025	3	-.008	1	-6.064e-4	1	673.298	1	1310.944	4
439		11	max	.006	3	.037	1	.051	5	-4.093e-5	15	NC	5	NC	2
440			min	-.008	2	-.024	3	-.011	1	-7.125e-4	1	681.092	1	1082.371	4
441		12	max	.006	3	.035	1	.059	5	-4.826e-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	-.008	2	-.022	3	-.014	1	-8.187e-4	1	706.992	1	912.189	4
443		13	max	.006	3	.03	1	.068	5	-5.43e-5	12	NC	5	NC	2
444			min	-.008	2	-.019	3	-.017	1	-9.248e-4	1	755.413	1	781.992	4
445		14	max	.006	3	.024	1	.078	5	-6.033e-5	12	NC	5	NC	3
446			min	-.008	2	-.015	3	-.018	1	-1.031e-3	1	836.019	1	678.583	5
447		15	max	.006	3	.016	1	.087	5	-6.637e-5	12	NC	5	NC	3
448			min	-.008	2	-.01	3	-.019	1	-1.137e-3	1	969.524	1	597.685	5
449		16	max	.006	3	.007	1	.096	5	2.501e-4	5	NC	5	NC	3
450			min	-.008	2	-.004	3	-.017	1	-1.215e-3	1	1205.32	1	532.966	4
451		17	max	.006	3	.002	3	.106	5	9.758e-3	5	NC	5	NC	2
452			min	-.008	2	-.005	1	-.014	1	-6.304e-4	1	1691.799	1	478.695	4
453		18	max	.006	3	.01	3	.115	5	4.617e-3	5	NC	4	NC	2
454			min	-.008	2	-.018	1	-.009	1	-1.145e-2	1	3260.917	1	433.329	4
455		19	max	.006	3	.018	3	.125	4	7.844e-3	3	NC	1	NC	1
456			min	-.008	2	-.033	1	-.002	1	-2.248e-2	1	NC	1	395.398	4
457	M13	1	max	.008	1	.023	3	.006	3	3.971e-3	3	NC	1	NC	1
458			min	-.009	5	-.03	1	-.007	2	-5.296e-3	1	NC	1	NC	1
459		2	max	.007	1	.21	3	.056	1	4.809e-3	3	NC	5	NC	3
460			min	-.009	5	-.249	1	-.002	5	-6.448e-3	1	934.129	1	3361.316	1
461		3	max	.007	1	.363	3	.141	1	5.647e-3	3	NC	5	NC	3
462			min	-.009	5	-.427	1	-.003	5	-7.601e-3	1	513.956	1	1395.468	1
463		4	max	.007	1	.458	3	.214	1	6.485e-3	3	NC	5	NC	3
464			min	-.009	5	-.539	1	-.006	5	-8.754e-3	1	400.981	1	931.764	1
465		5	max	.007	1	.485	3	.25	1	7.323e-3	3	NC	15	NC	3
466			min	-.009	5	-.572	1	-.01	5	-9.907e-3	1	376.938	1	800.368	1
467		6	max	.007	1	.445	3	.238	1	8.161e-3	3	NC	5	NC	3
468			min	-.01	5	-.526	1	-.014	5	-1.106e-2	1	411.476	1	837.987	1
469		7	max	.007	1	.351	3	.182	1	9.e-3	3	NC	5	NC	3
470			min	-.01	5	-.418	1	-.018	5	-1.221e-2	1	525.565	1	1087.867	1
471		8	max	.007	1	.23	3	.098	1	9.838e-3	3	NC	5	NC	3
472			min	-.01	5	-.279	1	-.018	5	-1.336e-2	1	821.924	1	1970.489	1
473		9	max	.006	1	.12	3	.017	3	1.068e-2	3	NC	5	NC	2
474			min	-.01	5	-.15	1	-.014	5	-1.452e-2	1	1700.72	1	9559.796	1
475		10	max	.006	1	.069	3	.018	3	1.151e-2	3	NC	4	NC	1
476			min	-.01	5	-.092	1	-.024	2	-1.567e-2	1	3310.208	1	NC	1
477		11	max	.006	1	.12	3	.023	14	1.068e-2	3	NC	5	NC	2
478			min	-.01	5	-.15	1	-.009	10	-1.452e-2	1	1700.721	1	7535.666	1
479		12	max	.006	1	.23	3	.108	1	9.838e-3	3	NC	5	NC	3
480			min	-.011	5	-.278	1	0	10	-1.336e-2	1	821.925	1	1806.67	1
481		13	max	.006	1	.351	3	.194	1	9.001e-3	3	NC	5	NC	10
482			min	-.011	5	-.418	1	.008	10	-1.221e-2	1	525.565	1	1026.337	1
483		14	max	.006	1	.445	3	.25	1	8.163e-3	3	NC	5	NC	5
484			min	-.011	5	-.526	1	.011	15	-1.106e-2	1	411.476	1	799.96	1
485		15	max	.006	1	.485	3	.26	1	7.325e-3	3	NC	15	NC	5
486			min	-.011	5	-.571	1	.005	15	-9.906e-3	1	376.938	1	768.258	1
487		16	max	.006	1	.458	3	.223	1	6.487e-3	3	NC	5	NC	3
488			min	-.011	5	-.539	1	-.002	5	-8.753e-3	1	400.981	1	895.916	1
489		17	max	.006	1	.363	3	.147	1	5.649e-3	3	NC	5	NC	3
490			min	-.011	5	-.427	1	-.009	5	-7.6e-3	1	513.956	1	1338.956	1
491		18	max	.005	1	.21	3	.059	1	4.811e-3	3	NC	5	NC	3
492			min	-.011	5	-.249	1	-.01	5	-6.447e-3	1	934.13	1	3195.059	1
493		19	max	.005	1	.023	3	.006	3	3.974e-3	3	NC	1	NC	1
494			min	-.011	5	-.03	1	-.007	2	-5.294e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.018	3	.006	3	5.519e-3	1	NC	1	NC	1
496			min	-.125	4	-.033	1	-.008	2	-3.016e-3	3	NC	1	NC	1
497		2	max	.002	1	.104	3	.06	1	6.759e-3	1	NC	5	NC	3
498			min	-.125	4	-.279	1	.001	10	-3.624e-3	3	829.283	1	3124.035	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	.174	3	.149	1	7.999e-3	1	NC	5	NC	3
500			min	-.125	4	-.48	1	.009	10	-4.231e-3	3	456.295	1	1324.115	1
501		4	max	.002	1	.219	3	.223	1	9.239e-3	1	NC	15	NC	3
502			min	-.125	4	-.606	1	.014	10	-4.839e-3	3	356.031	1	891.535	1
503		5	max	.003	1	.233	3	.26	1	1.048e-2	1	NC	15	NC	12
504			min	-.125	4	-.642	1	.017	10	-5.447e-3	3	334.742	1	768.152	1
505		6	max	.003	1	.216	3	.248	1	1.172e-2	1	NC	5	NC	10
506			min	-.125	4	-.591	1	.014	10	-6.054e-3	3	365.525	1	803.708	1
507		7	max	.003	1	.176	3	.191	1	1.296e-2	1	NC	5	NC	5
508			min	-.125	4	-.469	1	.008	10	-6.662e-3	3	467.146	1	1037.861	1
509		8	max	.003	1	.123	3	.105	1	1.42e-2	1	NC	5	NC	3
510			min	-.125	4	-.312	1	0	10	-7.269e-3	3	731.534	1	1850.362	1
511		9	max	.003	1	.074	3	.021	3	1.544e-2	1	NC	5	NC	2
512			min	-.125	4	-.167	1	-.009	10	-7.877e-3	3	1519.434	1	8207.608	1
513		10	max	.003	1	.051	3	.018	3	1.668e-2	1	NC	4	NC	1
514			min	-.125	4	-.101	1	-.025	2	-8.485e-3	3	2977.857	1	NC	1
515		11	max	.003	1	.074	3	.02	14	1.544e-2	1	NC	5	NC	2
516			min	-.125	4	-.167	1	-.009	10	-7.877e-3	3	1519.434	1	8874.168	1
517		12	max	.003	1	.123	3	.101	1	1.42e-2	1	NC	5	NC	3
518			min	-.125	4	-.312	1	0	10	-7.269e-3	3	731.535	1	1911.177	1
519		13	max	.003	1	.176	3	.186	1	1.296e-2	1	NC	5	NC	3
520			min	-.125	4	-.469	1	.008	10	-6.661e-3	3	467.146	1	1063.953	1
521		14	max	.004	1	.216	3	.243	1	1.172e-2	1	NC	5	NC	3
522			min	-.125	4	-.591	1	.006	15	-6.053e-3	3	365.525	1	822.172	1
523		15	max	.004	1	.233	3	.254	1	1.048e-2	1	NC	15	NC	3
524			min	-.125	4	-.642	1	0	15	-5.445e-3	3	334.742	1	786.044	1
525		16	max	.004	1	.219	3	.218	1	9.241e-3	1	NC	15	NC	3
526			min	-.125	4	-.606	1	-.01	5	-4.837e-3	3	356.031	1	914.517	1
527		17	max	.004	1	.174	3	.144	1	8.001e-3	1	NC	5	NC	3
528			min	-.125	4	-.48	1	-.016	5	-4.229e-3	3	456.296	1	1365.903	1
529		18	max	.004	1	.104	3	.057	1	6.762e-3	1	NC	5	NC	3
530			min	-.125	4	-.279	1	-.014	5	-3.621e-3	3	829.283	1	3265.619	1
531		19	max	.004	1	.018	3	.006	3	5.522e-3	1	NC	1	NC	1
532			min	-.125	4	-.033	1	-.008	2	-3.013e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.166e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.342e-4	5	NC	1	NC	1
535		2	max	0	1	-.003	15	.014	4	8.209e-4	3	NC	5	NC	1
536			min	-.001	5	-.023	6	0	3	-8.074e-4	1	4537.219	6	7739.616	4
537		3	max	0	1	-.005	15	.03	4	1.325e-3	3	NC	5	NC	1
538			min	-.002	5	-.046	6	-.003	3	-1.54e-3	1	2308.836	6	3587.518	4
539		4	max	0	1	-.007	15	.046	4	1.829e-3	3	NC	15	NC	3
540			min	-.003	5	-.067	6	-.006	3	-2.273e-3	1	1583.996	6	2316.238	4
541		5	max	0	1	-.009	15	.061	4	2.334e-3	3	NC	15	NC	9
542			min	-.004	5	-.086	6	-.01	3	-3.006e-3	1	1236.008	6	1742.101	4
543		6	max	0	1	-.011	15	.074	4	2.838e-3	3	8797.406	15	9819.219	10
544			min	-.005	5	-.102	6	-.015	3	-3.739e-3	1	1040.232	6	1440.574	4
545		7	max	0	1	-.012	15	.084	4	3.342e-3	3	7801.712	15	7738.455	10
546			min	-.007	5	-.115	1	-.019	3	-4.472e-3	1	922.498	6	1276.369	4
547		8	max	0	1	-.013	15	.089	4	3.847e-3	3	7204.146	15	6420.344	10
548			min	-.008	5	-.125	1	-.024	3	-5.205e-3	1	851.84	6	1196.24	4
549		9	max	0	1	-.014	15	.09	4	4.351e-3	3	6882.5	15	5553.598	10
550			min	-.009	5	-.131	1	-.028	3	-5.938e-3	1	813.807	6	1178.757	4
551		10	max	0	1	-.014	15	.087	4	4.855e-3	3	6780.747	15	4980.515	10
552			min	-.01	5	-.133	1	-.032	3	-6.671e-3	1	801.776	6	1219.307	4
553		11	max	0	1	-.013	15	.08	4	5.36e-3	3	6882.5	15	4618.002	10
554			min	-.011	5	-.131	1	-.034	3	-7.404e-3	1	813.807	6	1327.128	4
555		12	max	0	1	-.013	15	.069	4	5.864e-3	3	7204.146	15	4425.177	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	-.126	1	-.035	3	-8.137e-3	1	851.84	6	1530.51	4
557		13	max	0	1	-.011	15	.056	4	6.368e-3	3	7801.712	15	4391.323	10
558			min	-.013	5	-.116	1	-.034	3	-8.87e-3	1	922.498	6	1769.884	1
559		14	max	0	1	-.009	15	.041	1	6.873e-3	3	8797.406	15	4945.31	15
560			min	-.014	5	-.104	1	-.032	3	-9.603e-3	1	1040.232	6	1824.469	1
561		15	max	0	1	-.007	15	.035	1	7.377e-3	3	NC	15	9050.349	15
562			min	-.015	5	-.088	1	-.027	3	-1.034e-2	1	1236.008	6	1980.296	1
563		16	max	0	1	-.005	15	.026	1	7.881e-3	3	NC	15	NC	5
564			min	-.016	5	-.07	1	-.02	3	-1.107e-2	1	1583.996	6	2314.226	1
565		17	max	0	1	-.002	15	.014	1	8.385e-3	3	NC	5	NC	4
566			min	-.017	5	-.049	1	-.009	3	-1.18e-2	1	2308.836	6	3067.491	1
567		18	max	0	1	0	15	.004	3	8.89e-3	3	NC	5	NC	4
568			min	-.018	5	-.027	1	-.008	2	-1.253e-2	1	4537.219	6	5460.522	1
569		19	max	.001	1	.006	5	.021	3	9.394e-3	3	NC	1	NC	1
570			min	-.02	5	-.005	1	-.026	2	-1.327e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.007	3	3.164e-3	3	NC	1	NC	1
572			min	-.008	4	-.004	4	-.008	2	-4.023e-3	1	NC	1	NC	1
573		2	max	0	10	-.011	12	.006	1	3.023e-3	3	9653.368	15	NC	2
574			min	-.007	4	-.039	4	-.003	5	-3.828e-3	1	2999.654	4	8653.602	1
575		3	max	0	10	-.022	12	.016	1	2.882e-3	3	4912.269	15	NC	3
576			min	-.007	4	-.073	4	-.013	5	-3.632e-3	1	1526.422	4	4893.606	1
577		4	max	0	10	-.033	12	.024	1	2.741e-3	3	3370.104	15	NC	10
578			min	-.006	4	-.105	4	-.027	5	-3.436e-3	1	1047.214	4	3719.704	1
579		5	max	0	10	-.042	12	.029	1	2.6e-3	3	2629.726	15	NC	10
580			min	-.006	4	-.134	4	-.044	5	-3.241e-3	1	817.152	4	2479.38	5
581		6	max	0	10	-.05	15	.031	1	2.46e-3	3	2213.193	15	NC	10
582			min	-.006	4	-.159	4	-.062	5	-3.045e-3	1	687.72	4	1759.681	5
583		7	max	0	10	-.056	15	.032	1	2.319e-3	3	1962.702	15	NC	10
584			min	-.005	4	-.178	4	-.079	5	-2.849e-3	1	609.883	4	1381.109	5
585		8	max	0	10	-.06	15	.032	1	2.178e-3	3	1812.371	15	NC	10
586			min	-.005	4	-.193	4	-.093	5	-2.654e-3	1	563.17	4	1165.515	5
587		9	max	0	10	-.063	15	.03	1	2.037e-3	3	1731.453	15	NC	10
588			min	-.004	4	-.201	4	-.104	5	-2.458e-3	1	538.026	4	1041.491	5
589		10	max	0	10	-.064	15	.027	1	1.896e-3	3	1705.855	15	NC	10
590			min	-.004	4	-.204	4	-.11	5	-2.262e-3	1	530.071	4	977.162	5
591		11	max	0	10	-.063	15	.024	1	1.756e-3	3	1731.453	15	NC	10
592			min	-.003	4	-.201	4	-.112	5	-2.067e-3	1	538.026	4	958.639	5
593		12	max	0	10	-.06	15	.02	1	1.615e-3	3	1812.371	15	NC	3
594			min	-.003	4	-.192	4	-.11	5	-1.871e-3	1	563.17	4	982.574	5
595		13	max	0	10	-.055	15	.015	1	1.474e-3	3	1962.702	15	NC	3
596			min	-.003	4	-.177	4	-.102	5	-1.675e-3	1	609.883	4	1054.726	5
597		14	max	0	10	-.049	15	.011	1	1.333e-3	3	2213.193	15	NC	2
598			min	-.002	4	-.157	4	-.09	5	-1.48e-3	1	687.72	4	1193.34	5
599		15	max	0	10	-.041	15	.007	1	1.192e-3	3	2629.726	15	NC	1
600			min	-.002	4	-.132	4	-.075	5	-1.284e-3	1	817.152	4	1441.395	5
601		16	max	0	10	-.032	15	.004	1	1.052e-3	3	3370.104	15	NC	1
602			min	-.001	4	-.103	4	-.057	5	-1.088e-3	1	1047.214	4	1906.11	5
603		17	max	0	10	-.022	15	.001	1	9.107e-4	3	4912.269	15	NC	1
604			min	0	4	-.071	4	-.037	5	-8.927e-4	1	1526.422	4	2920.302	5
605		18	max	0	10	-.011	15	0	9	8.19e-4	4	9653.368	15	NC	1
606			min	0	4	-.036	4	-.017	5	-7.262e-4	2	2999.654	4	6181.29	5
607		19	max	0	1	0	1	0	1	9.018e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.634e-4	2	NC	1	NC	1

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-05
Units: Imperial units

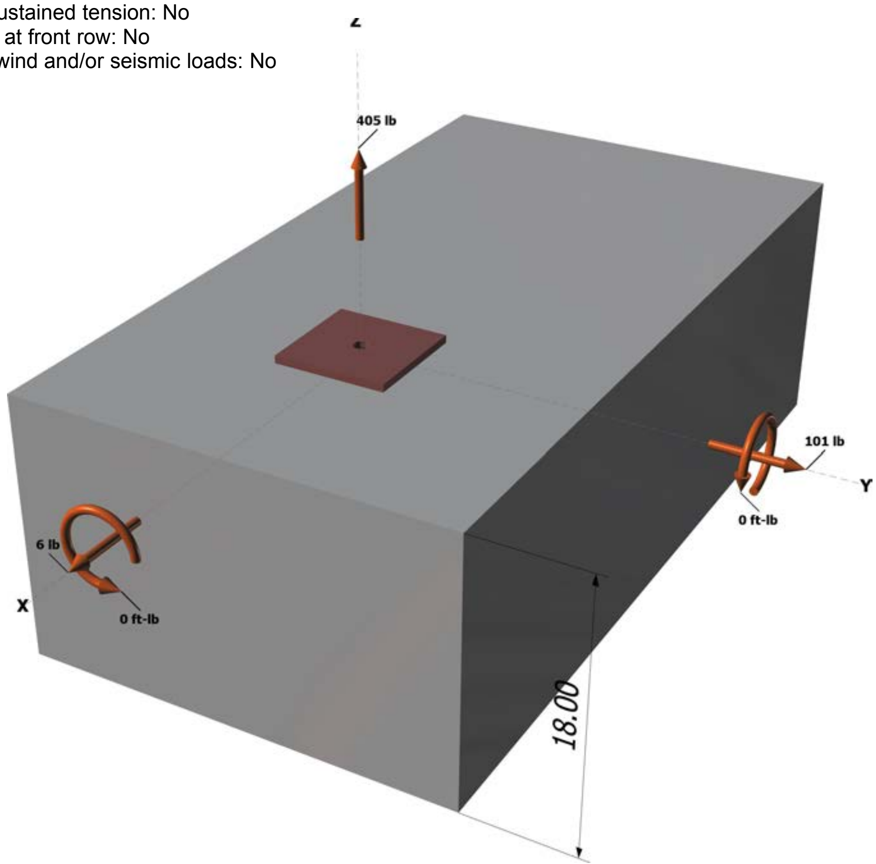
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

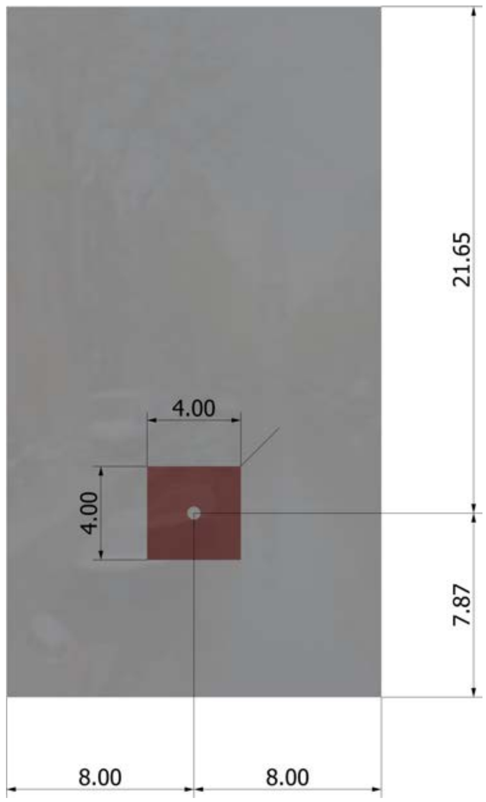
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



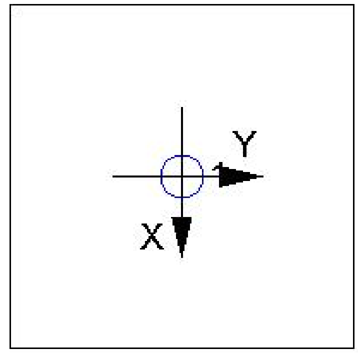
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-4)

A_{Nc} (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

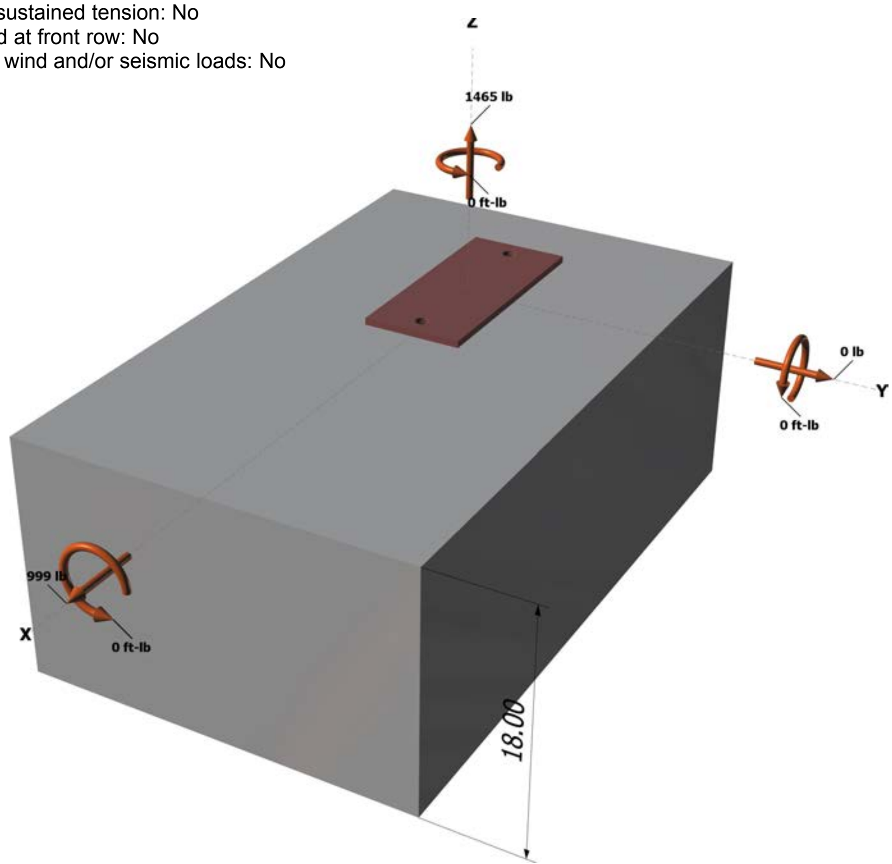
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

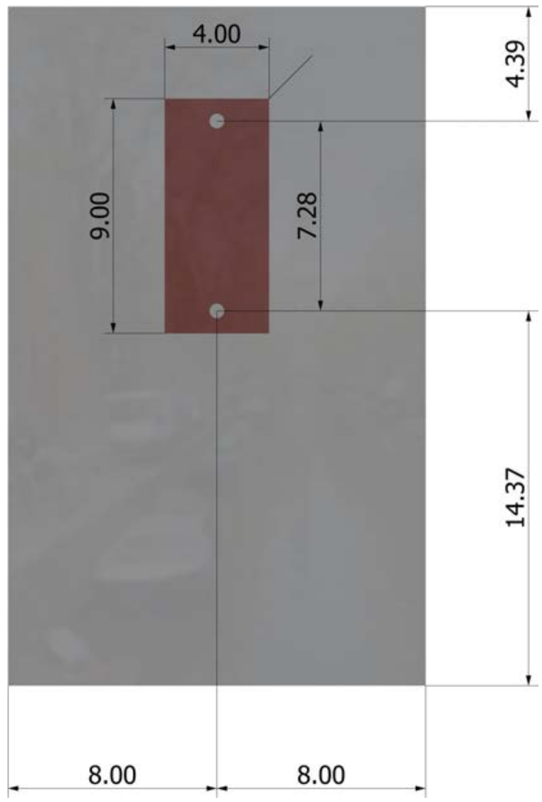
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

Base Plate
Length x Width x Thickness (inch): 9.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



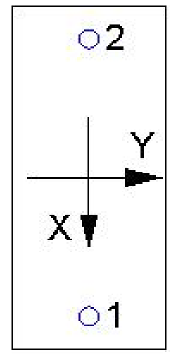
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

$\phi N_{cbg} = \phi\, (A_{Nc} / A_{Nco})\, \Psi_{ec,N}\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-5)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

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

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

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

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

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

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

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

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

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

Shear perpendicular to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

Shear parallel to edge in x-direction:

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

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

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

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

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

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{g,Na}\Psi_{ec,Na}\Psi_{p,Na}N_{a0}\ ;\ k_{cp}(A_{Nc} / A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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