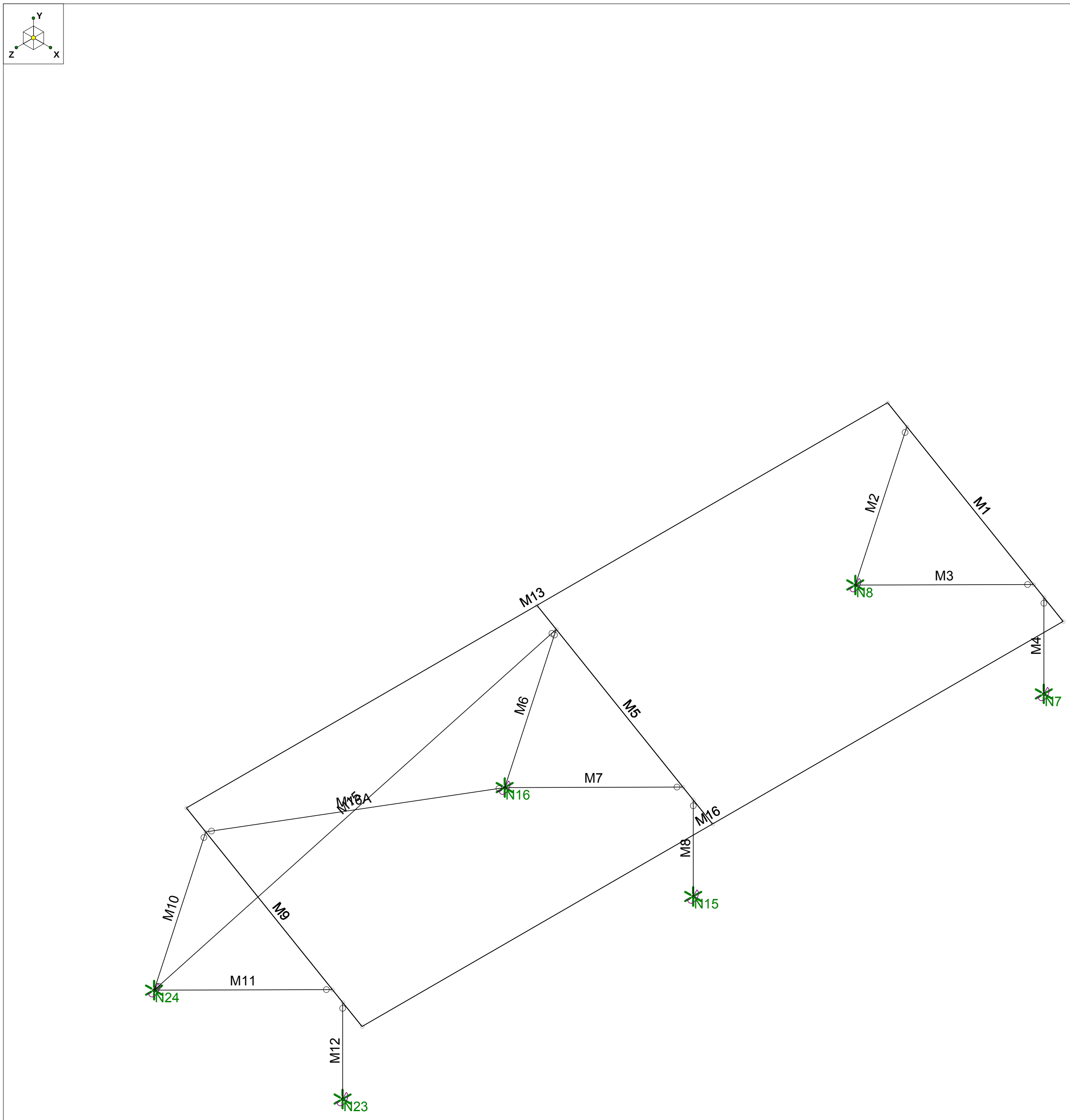


Schletter, Inc.		30° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

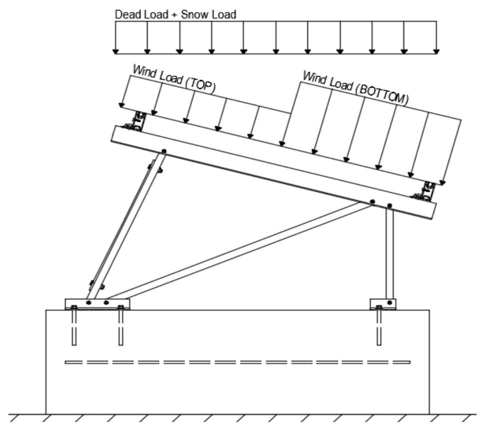
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 30°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 130 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 26.53 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.15	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.85	
$Cf-_{TOP}$	=	-2.3	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.1	

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M16	Bottom

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

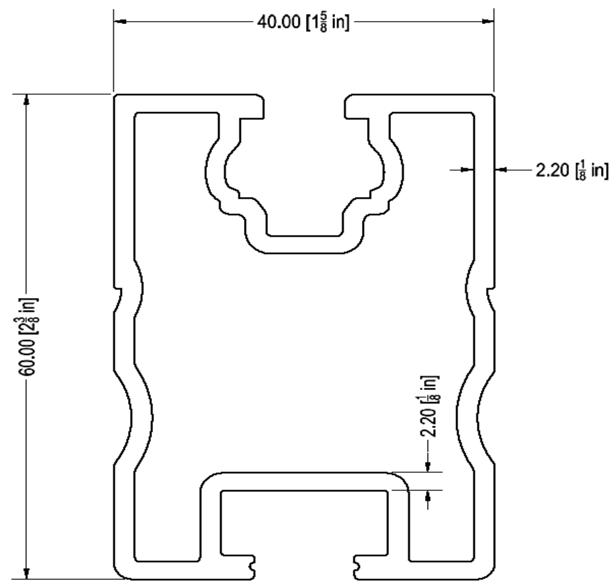
Bracing
M15
M16A

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

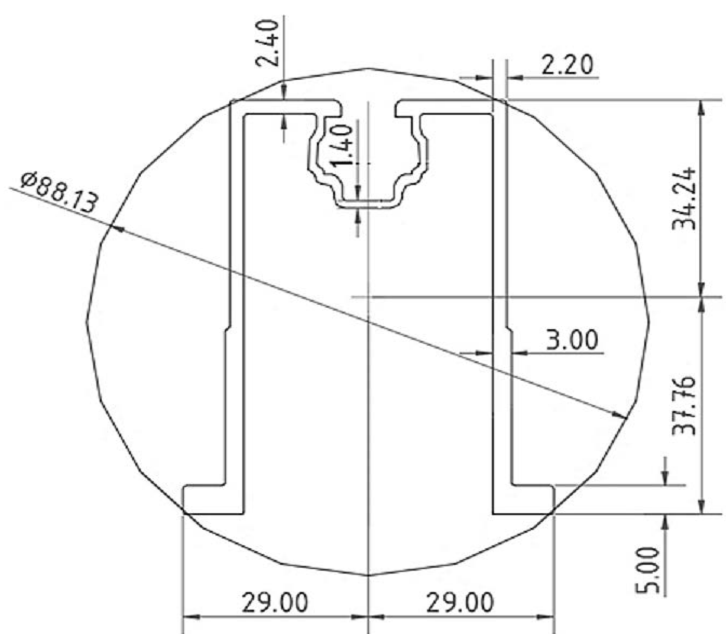
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	30.12	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	-0.303	k-ft
M_z =	-0.021	k-ft
$M_{y\ allowable}$ =	1.281	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	26%	



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).

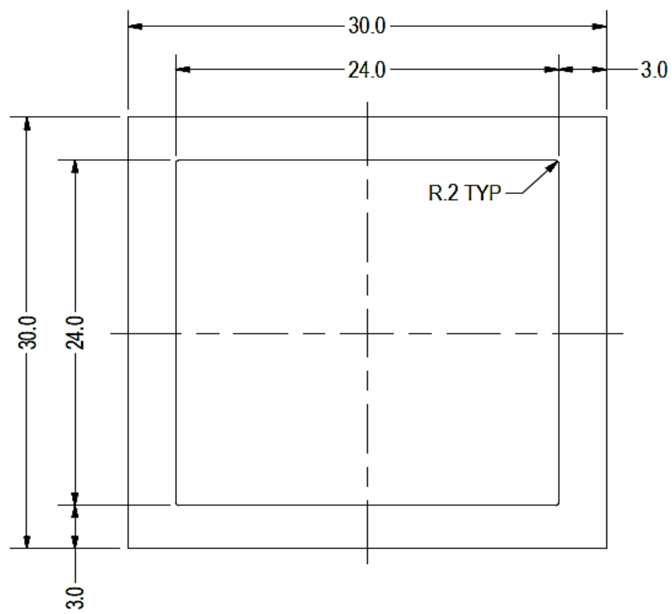
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	-0.453	k-ft
M_z =	-0.024	k-ft
P_n =	0.232	k
$M_{y\ allowable}$ =	1.460	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	38%	



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).

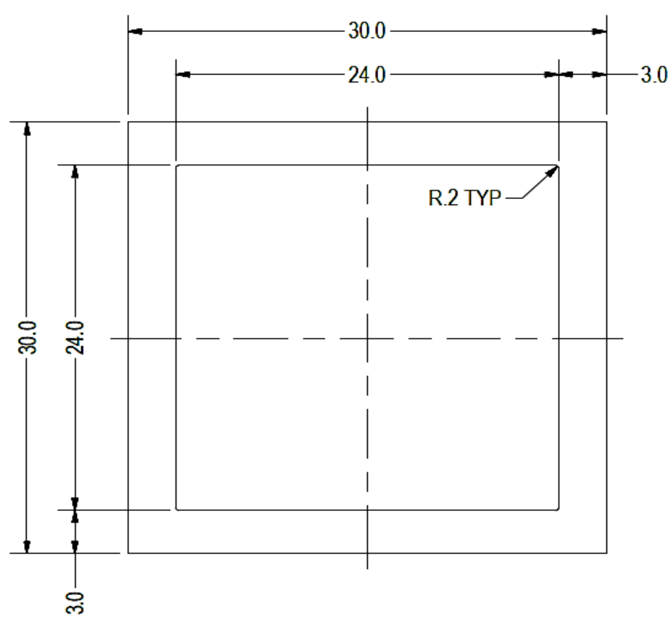
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.021	k-ft
P_n =	0.115	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	6%	



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).

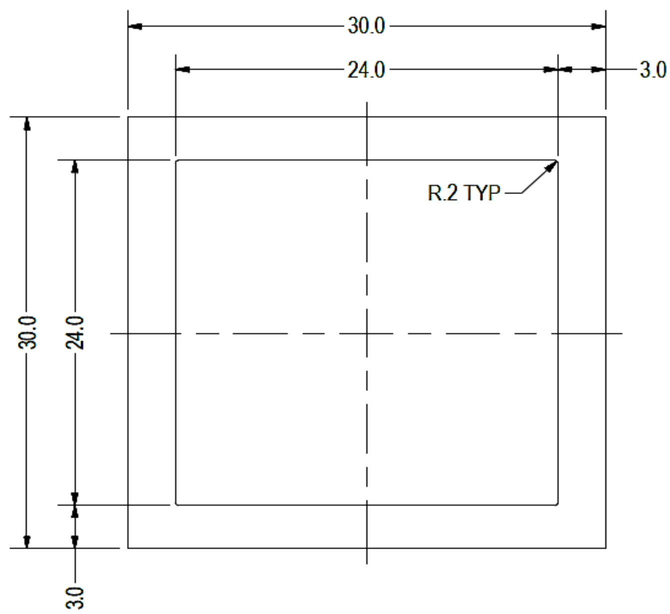
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.567	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	15%	



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).

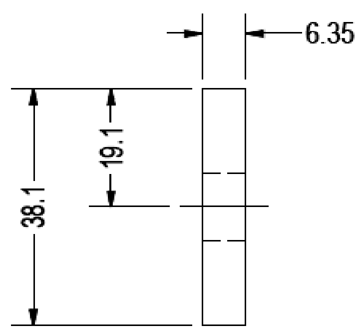
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.586	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	12%	



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 =	0.002	k-ft
P_n =	0.161	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	6%	



A cross brace kit is required every 34 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

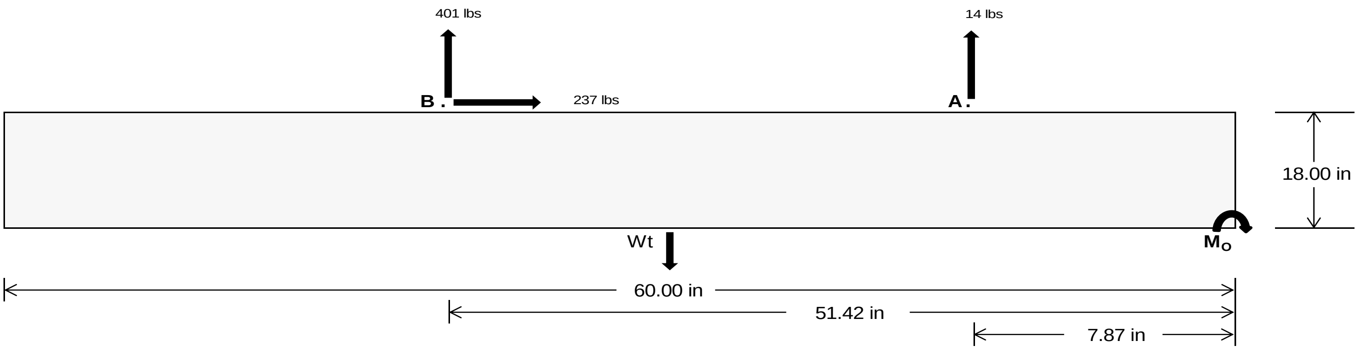
5.1 Helical Pile Foundations

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 =	62.58	1669.69	k
Compressive Load =	884.15	1061.31	k
Lateral Load =	17.68	987.89	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>

M_O = 25007.9 in-lbs
Resisting Force Required = 833.60 lbs
S.F. = 1.67
Weight Required = 1389.33 lbs
Minimum Width = <u>21 in</u> in
Weight Provided = 1903.13 lbs

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

<u>Sliding</u>

Force = 237.45 lbs
Friction = 0.4
Weight Required = 593.62 lbs
Resisting Weight = 1903.13 lbs
Additional Weight Required = 0 lbs

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

<u>Cohesion</u>

Sliding Force = 237.45 lbs
Cohesion = 130 psf
Area = 8.75 ft^2
Resisting = 951.56 lbs
Additional Weight Required = 0 lbs

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

<u>Shear Key</u>

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

Shear key is not required.

<u>Bearing Pressure</u>

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	264 lbs	264 lbs	264 lbs	264 lbs	371 lbs	371 lbs	371 lbs	371 lbs	451 lbs	451 lbs	451 lbs	451 lbs	-29 lbs	-29 lbs	-29 lbs	-29 lbs
F_B	173 lbs	173 lbs	173 lbs	173 lbs	475 lbs	475 lbs	475 lbs	475 lbs	469 lbs	469 lbs	469 lbs	469 lbs	-802 lbs	-802 lbs	-802 lbs	-802 lbs
F_V	18 lbs	18 lbs	18 lbs	18 lbs	422 lbs	422 lbs	422 lbs	422 lbs	329 lbs	329 lbs	329 lbs	329 lbs	-475 lbs	-475 lbs	-475 lbs	-475 lbs
P_{total}	2341 lbs	2431 lbs	2522 lbs	2612 lbs	2749 lbs	2840 lbs	2930 lbs	3021 lbs	2824 lbs	2914 lbs	3005 lbs	3096 lbs	311 lbs	365 lbs	420 lbs	474 lbs
M	206 lbs-ft	206 lbs-ft	206 lbs-ft	206 lbs-ft	468 lbs-ft	468 lbs-ft	468 lbs-ft	468 lbs-ft	488 lbs-ft	488 lbs-ft	488 lbs-ft	488 lbs-ft	666 lbs-ft	666 lbs-ft	666 lbs-ft	666 lbs-ft
e	0.09 ft	0.08 ft	0.08 ft	0.08 ft	0.17 ft	0.16 ft	0.16 ft	0.15 ft	0.17 ft	0.17 ft	0.16 ft	0.16 ft	2.14 ft	1.82 ft	1.59 ft	1.41 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}	239.2 psf	238.2 psf	237.3 psf	236.5 psf	250.0 psf	248.5 psf	247.1 psf	245.9 psf	255.7 psf	254.0 psf	252.4 psf	250.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	295.8 psf	292.2 psf	289.0 psf	286.0 psf	378.4 psf	371.1 psf	364.4 psf	358.3 psf	389.7 psf	381.9 psf	374.7 psf	368.2 psf	330.9 psf	196.3 psf	159.9 psf	144.3 psf

Maximum Bearing Pressure = 390 psf
Allowable Bearing Pressure = 1500 psf

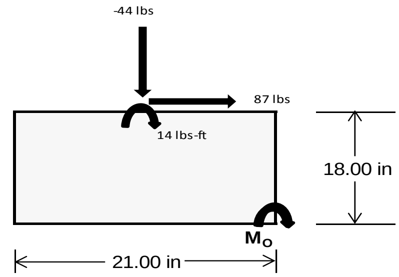
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 183.6 ft-lbs
Resisting Force Required = 209.85 lbs
S.F. = 1.67
Weight Required = 349.74 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	113 lbs	30 lbs	49 lbs	186 lbs	308 lbs	137 lbs	81 lbs	-44 lbs	19 lbs
F_V	11 lbs	87 lbs	11 lbs	8 lbs	66 lbs	8 lbs	11 lbs	87 lbs	11 lbs
P_{total}	2469 lbs	2386 lbs	2405 lbs	2429 lbs	2551 lbs	2380 lbs	770 lbs	645 lbs	708 lbs
M	29 lbs-ft	145 lbs-ft	30 lbs-ft	22 lbs-ft	109 lbs-ft	23 lbs-ft	29 lbs-ft	145 lbs-ft	30 lbs-ft
e	0.01 ft	0.06 ft	0.01 ft	0.01 ft	0.04 ft	0.01 ft	0.04 ft	0.22 ft	0.04 ft
L/6	0.29 ft	1.63 ft	1.73 ft	1.73 ft	1.66 ft	1.73 ft	1.67 ft	1.30 ft	1.67 ft
f_{min}	270.8 sqft	215.8 sqft	263.2 sqft	269.1 sqft	248.7 sqft	263.0 sqft	76.6 sqft	16.9 sqft	69.3 sqft
f_{max}	293.6 psf	329.5 psf	286.6 psf	286.1 psf	334.4 psf	281.1 psf	99.5 psf	130.6 psf	92.6 psf

Maximum Bearing Pressure = 334 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

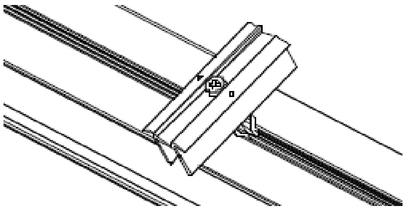
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

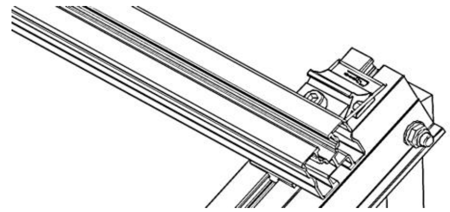
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

Fastening of Modules to Purlins		Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.923 k	Maximum Uplifting Force =	1.075 k
Allowable Uplift =	1.214 k	Allowable Uplift =	1.116 k
Utilization =	76%	Utilization =	96%



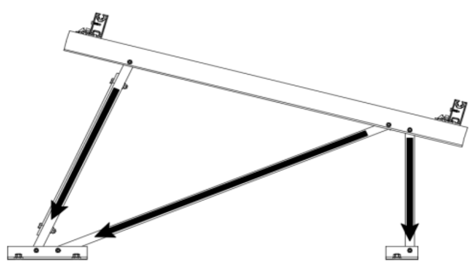


6.2 Bolted Connections

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

Front Strut		Rear Strut	
Maximum Axial Load =	0.680 k	Maximum Axial Load =	1.031 k
M8 Bolt Capacity =	5.692 k	M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k	Strut Bearing Capacity =	7.952 k
Utilization =	12%	Utilization =	18%

Diagonal Strut		Bracing	
Maximum Axial Load =	0.567 k	Maximum Axial Load =	0.161 k
M8 Bolt Shear Capacity =	5.692 k	M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k	Strut Bearing Capacity =	7.952 k
Utilization =	10%	Utilization =	2%



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).

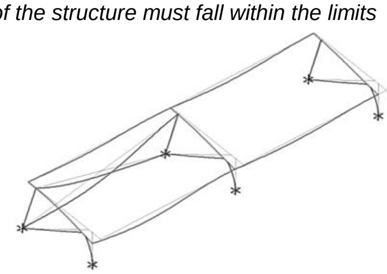
Mean Height, h_{sx} = 32.32 in

Allowable Story Drift for All Other Structures, Δ = { $0.020h_{sx}$; 0.646 in

Max Drift, Δ_{MAX} = 0.043 in

$0.043 \leq 0.646$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 39.00 in

J = 0.255

101.554

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

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= 30.1 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 39.00 in

J = 0.255

105.457

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

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= 30.1

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9
m = 0.65
C_0 = 30
Cc = 30

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 30.1 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.281 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9
m = 0.65
C_0 = 20
Cc = 20

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi
Iy = 120291 mm^4
0.289 in^4
x = 20 mm
Sy = 0.367 in^3
$M_{max}Wk$ = 0.871 k-ft

Compression

3.4.9

b/t = 7.4
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 23.9
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 28.47 ksi
A = 578.06 mm^2
0.90 in^2
P_{max} = 25.51 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.32

21.4323

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

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 = 1.32

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 = 1.460 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

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 = 39.29 in

J = 0.16

103.073

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

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= 30.1 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= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1

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

$\lambda =$ 1.68476

r = 0.437 in

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

$S1^{*} =$ 0.33515

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

$S2^{*} =$ 1.23671

$\varphi cc =$ 0.81587

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

$\varphi F_L =$ 10.0603 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

$\varphi F_L =$ 10.06 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 5.05 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	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	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	-85.097	-85.097	0	0
2	M16	y	-136.895	-136.895	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	170.194	170.194	0	0
2	M16	y	81.397	81.397	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	236.718	2	278.287	2	.007	10	0	10	0	1	0	1
2		min	-273.669	3	-425.534	3	-2.38	4	0	3	0	1	0	1
3	N7	max	.002	3	232.264	1	.081	10	0	10	0	1	0	1
4		min	-.12	2	3.92	12	-13.292	4	-.021	4	0	1	0	1
5	N15	max	0	15	680.118	2	.05	9	0	9	0	1	0	1
6		min	-1.13	2	-48.142	3	-13.597	5	-.021	4	0	1	0	1
7	N16	max	682.293	2	816.396	2	0	11	0	9	0	1	0	1
8		min	-759.916	3	-1284.378	3	-116.477	4	0	3	0	1	0	1
9	N23	max	.003	3	232.604	1	.447	3	0	3	0	1	0	1
10		min	-.12	2	-.947	15	-12.712	5	-.02	5	0	1	0	1
11	N24	max	236.718	2	280.442	2	100.766	3	0	9	0	1	0	1
12		min	-274.626	3	-425.525	3	-3.331	5	0	3	0	1	0	1
13	Totals:	max	1154.358	2	2484.745	2	0	9						
14		min	-1308.273	3	-2172.055	3	-161.502	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	194.136	2	.654	6	1.016	4	0	10	0	10	0	1
2			min	-362.554	3	.152	15	-.081	3	0	4	0	4	0	1
3		2	max	194.262	2	.602	6	.902	4	0	10	0	5	0	15
4			min	-362.46	3	.14	15	-.081	3	0	4	0	3	0	6
5		3	max	194.388	2	.551	6	.788	4	0	10	0	5	0	15
6			min	-362.366	3	.128	15	-.081	3	0	4	0	3	0	6
7		4	max	194.514	2	.5	6	.673	4	0	10	0	5	0	15
8			min	-362.271	3	.116	15	-.081	3	0	4	0	3	0	6
9		5	max	194.64	2	.449	6	.559	4	0	10	0	4	0	15
10			min	-362.177	3	.104	15	-.081	3	0	4	0	3	0	6
11		6	max	194.765	2	.398	6	.444	4	0	10	0	4	0	15
12			min	-362.082	3	.092	15	-.081	3	0	4	0	3	0	6
13		7	max	194.891	2	.347	6	.33	4	0	10	0	4	0	15
14			min	-361.988	3	.08	15	-.081	3	0	4	0	3	0	6
15		8	max	195.017	2	.296	6	.215	4	0	10	0	4	0	15
16			min	-361.894	3	.068	15	-.081	3	0	4	0	3	0	6
17		9	max	195.143	2	.244	6	.101	4	0	10	0	4	0	15
18			min	-361.799	3	.056	15	-.081	3	0	4	0	3	0	6
19		10	max	195.269	2	.193	6	.051	1	0	10	0	4	0	15
20			min	-361.705	3	.044	15	-.081	3	0	4	0	3	0	6
21		11	max	195.395	2	.145	2	.051	1	0	10	0	4	0	15
22			min	-361.61	3	.032	12	-.145	5	0	4	0	3	0	6
23		12	max	195.521	2	.105	2	.051	1	0	10	0	4	0	15
24			min	-361.516	3	.012	12	-.259	5	0	4	0	3	0	6
25		13	max	195.646	2	.065	2	.051	1	0	10	0	4	0	15
26			min	-361.422	3	-.015	3	-.374	5	0	4	0	3	0	6
27		14	max	195.772	2	.025	2	.051	1	0	10	0	4	0	15
28			min	-361.327	3	-.044	3	-.488	5	0	4	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	195.898	2	-.015	2	.051	1	0	10	0	4	0	15
30			min	-361.233	3	-.074	3	-.602	5	0	4	0	3	0	6
31		16	max	196.024	2	-.028	15	.051	1	0	10	0	4	0	15
32			min	-361.138	3	-.114	4	-.717	5	0	4	0	3	0	6
33		17	max	196.15	2	-.04	15	.051	1	0	10	0	4	0	15
34			min	-361.044	3	-.165	4	-.831	5	0	4	0	3	0	6
35		18	max	196.276	2	-.052	15	.051	1	0	10	0	9	0	15
36			min	-360.95	3	-.216	4	-.946	5	0	4	0	3	0	6
37		19	max	196.402	2	-.064	15	.051	1	0	10	0	9	0	15
38			min	-360.855	3	-.267	4	-1.06	5	0	4	0	3	0	6
39	M3	1	max	199.584	2	1.757	6	.016	10	0	5	0	4	0	6
40			min	-183.604	3	.412	15	-1.315	4	0	1	0	10	0	15
41		2	max	199.514	2	1.58	6	.016	10	0	5	0	1	0	2
42			min	-183.656	3	.37	15	-1.181	4	0	1	0	10	0	12
43		3	max	199.445	2	1.403	6	.016	10	0	5	0	1	0	2
44			min	-183.708	3	.329	15	-1.048	4	0	1	0	5	0	3
45		4	max	199.376	2	1.226	6	.016	10	0	5	0	1	0	15
46			min	-183.76	3	.287	15	-.914	4	0	1	0	5	0	4
47		5	max	199.306	2	1.05	6	.016	10	0	5	0	1	0	15
48			min	-183.812	3	.246	15	-.78	4	0	1	0	5	0	4
49		6	max	199.237	2	.873	6	.016	10	0	5	0	1	0	15
50			min	-183.863	3	.204	15	-.647	4	0	1	0	5	0	4
51		7	max	199.168	2	.696	6	.016	10	0	5	0	1	0	15
52			min	-183.915	3	.163	15	-.513	4	0	1	0	5	0	4
53		8	max	199.098	2	.519	6	.016	10	0	5	0	1	0	15
54			min	-183.967	3	.121	15	-.379	4	0	1	0	5	-.001	4
55		9	max	199.029	2	.342	6	.016	10	0	5	0	1	0	15
56			min	-184.019	3	.079	15	-.246	4	0	1	0	5	-.001	4
57		10	max	198.96	2	.165	6	.016	10	0	5	0	1	0	15
58			min	-184.071	3	.038	15	-.112	4	0	1	0	5	-.001	4
59		11	max	198.89	2	.02	2	.043	5	0	5	0	1	0	15
60			min	-184.123	3	-.039	3	-.077	1	0	1	0	5	-.001	4
61		12	max	198.821	2	-.045	15	.177	5	0	5	0	1	0	15
62			min	-184.175	3	-.188	4	-.077	1	0	1	0	5	-.001	4
63		13	max	198.752	2	-.087	15	.311	5	0	5	0	1	0	15
64			min	-184.227	3	-.365	4	-.077	1	0	1	0	5	-.001	4
65		14	max	198.682	2	-.128	15	.444	5	0	5	0	1	0	15
66			min	-184.279	3	-.542	4	-.077	1	0	1	0	5	-.001	4
67		15	max	198.613	2	-.17	15	.578	5	0	5	0	9	0	15
68			min	-184.331	3	-.719	4	-.077	1	0	1	0	5	0	4
69		16	max	198.544	2	-.211	15	.712	5	0	5	0	10	0	15
70			min	-184.383	3	-.896	4	-.077	1	0	1	0	5	0	4
71		17	max	198.474	2	-.253	15	.845	5	0	5	0	10	0	15
72			min	-184.435	3	-1.073	4	-.077	1	0	1	0	4	0	4
73		18	max	198.405	2	-.295	15	.979	5	0	5	0	10	0	15
74			min	-184.487	3	-1.249	4	-.077	1	0	1	0	4	0	4
75		19	max	198.336	2	-.336	15	1.113	5	0	5	0	5	0	1
76			min	-184.539	3	-1.426	4	-.077	1	0	1	0	1	0	1
77	M4	1	max	231.099	1	0	1	.082	10	0	1	0	5	0	1
78			min	3.337	12	0	1	-12.423	4	0	1	0	2	0	1
79		2	max	231.164	1	0	1	.082	10	0	1	0	10	0	1
80			min	3.37	12	0	1	-12.479	4	0	1	-.001	4	0	1
81		3	max	231.228	1	0	1	.082	10	0	1	0	10	0	1
82			min	3.402	12	0	1	-12.535	4	0	1	-.002	4	0	1
83		4	max	231.293	1	0	1	.082	10	0	1	0	10	0	1
84			min	3.435	12	0	1	-12.591	4	0	1	-.003	4	0	1
85		5	max	231.358	1	0	1	.082	10	0	1	0	10	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	3.467	12	0	1	-12.647	4	0	1	-.004	4	0	1
87		6	max	231.423	1	0	1	.082	10	0	1	0	10	0	1
88			min	3.499	12	0	1	-12.703	4	0	1	-.006	4	0	1
89		7	max	231.487	1	0	1	.082	10	0	1	0	10	0	1
90			min	3.532	12	0	1	-12.76	4	0	1	-.007	4	0	1
91		8	max	231.552	1	0	1	.082	10	0	1	0	10	0	1
92			min	3.564	12	0	1	-12.816	4	0	1	-.008	4	0	1
93		9	max	231.617	1	0	1	.082	10	0	1	0	10	0	1
94			min	3.596	12	0	1	-12.872	4	0	1	-.009	4	0	1
95		10	max	231.681	1	0	1	.082	10	0	1	0	10	0	1
96			min	3.629	12	0	1	-12.928	4	0	1	-.01	4	0	1
97		11	max	231.746	1	0	1	.082	10	0	1	0	10	0	1
98			min	3.661	12	0	1	-12.984	4	0	1	-.011	4	0	1
99		12	max	231.811	1	0	1	.082	10	0	1	0	10	0	1
100			min	3.693	12	0	1	-13.04	4	0	1	-.013	4	0	1
101		13	max	231.876	1	0	1	.082	10	0	1	0	10	0	1
102			min	3.726	12	0	1	-13.096	4	0	1	-.014	4	0	1
103		14	max	231.94	1	0	1	.082	10	0	1	0	10	0	1
104			min	3.758	12	0	1	-13.152	4	0	1	-.015	4	0	1
105		15	max	232.005	1	0	1	.082	10	0	1	0	10	0	1
106			min	3.79	12	0	1	-13.208	4	0	1	-.016	4	0	1
107		16	max	232.07	1	0	1	.082	10	0	1	0	10	0	1
108			min	3.823	12	0	1	-13.264	4	0	1	-.017	4	0	1
109		17	max	232.134	1	0	1	.082	10	0	1	0	10	0	1
110			min	3.855	12	0	1	-13.32	4	0	1	-.018	4	0	1
111		18	max	232.199	1	0	1	.082	10	0	1	0	10	0	1
112			min	3.887	12	0	1	-13.376	4	0	1	-.02	4	0	1
113		19	max	232.264	1	0	1	.082	10	0	1	0	10	0	1
114			min	3.92	12	0	1	-13.433	4	0	1	-.021	4	0	1
115	M6	1	max	583.493	2	.636	6	.969	4	0	3	0	3	0	1
116			min	-1030.514	3	.141	15	-.317	3	0	5	0	1	0	1
117		2	max	583.619	2	.585	6	.854	4	0	3	0	3	0	15
118			min	-1030.42	3	.129	15	-.317	3	0	5	0	1	0	6
119		3	max	583.745	2	.534	6	.74	4	0	3	0	4	0	15
120			min	-1030.326	3	.117	15	-.317	3	0	5	0	1	0	6
121		4	max	583.871	2	.483	6	.626	4	0	3	0	4	0	15
122			min	-1030.231	3	.105	15	-.317	3	0	5	0	1	0	6
123		5	max	583.997	2	.441	2	.511	4	0	3	0	4	0	15
124			min	-1030.137	3	.092	15	-.317	3	0	5	0	1	0	6
125		6	max	584.123	2	.401	2	.397	4	0	3	0	4	0	15
126			min	-1030.042	3	.08	15	-.317	3	0	5	0	1	0	6
127		7	max	584.248	2	.361	2	.282	4	0	3	0	4	0	15
128			min	-1029.948	3	.066	12	-.317	3	0	5	0	1	0	6
129		8	max	584.374	2	.322	2	.168	4	0	3	0	4	0	15
130			min	-1029.853	3	.046	12	-.317	3	0	5	0	3	0	2
131		9	max	584.5	2	.282	2	.053	4	0	3	0	4	0	15
132			min	-1029.759	3	.026	12	-.317	3	0	5	0	3	0	2
133		10	max	584.626	2	.242	2	.006	9	0	3	0	4	0	15
134			min	-1029.665	3	.002	3	-.317	3	0	5	0	3	0	2
135		11	max	584.752	2	.202	2	.006	9	0	3	0	4	0	15
136			min	-1029.57	3	-.028	3	-.317	3	0	5	0	3	0	2
137		12	max	584.878	2	.162	2	.006	9	0	3	0	4	0	15
138			min	-1029.476	3	-.058	3	-.317	3	0	5	0	3	0	2
139		13	max	585.004	2	.122	2	.006	9	0	3	0	4	0	12
140			min	-1029.381	3	-.088	3	-.407	5	0	5	0	3	0	2
141		14	max	585.129	2	.082	2	.006	9	0	3	0	4	0	12
142			min	-1029.287	3	-.118	3	-.521	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	585.255	2	.043	2	.006	9	0	3	0	4	0	12
144			min	-1029.193	3	-.148	3	-.636	5	0	5	0	3	0	2
145		16	max	585.381	2	.003	2	.006	9	0	3	0	4	0	12
146			min	-1029.098	3	-.177	3	-.75	5	0	5	0	3	0	2
147		17	max	585.507	2	-.037	2	.006	9	0	3	0	4	0	12
148			min	-1029.004	3	-.207	3	-.865	5	0	5	0	3	0	2
149		18	max	585.633	2	-.064	15	.006	9	0	3	0	14	0	12
150			min	-1028.909	3	-.237	3	-.979	5	0	5	0	3	0	2
151		19	max	585.759	2	-.076	15	.006	9	0	3	0	9	0	3
152			min	-1028.815	3	-.285	4	-1.094	5	0	5	0	3	0	2
153	M7	1	max	567.317	2	1.777	4	.043	3	0	9	0	4	0	2
154			min	-467.543	3	.425	15	-1.319	4	0	3	0	3	0	12
155		2	max	567.247	2	1.6	4	.043	3	0	9	0	4	0	2
156			min	-467.595	3	.383	15	-1.185	4	0	3	0	3	0	3
157		3	max	567.178	2	1.423	4	.043	3	0	9	0	9	0	2
158			min	-467.647	3	.342	15	-1.051	4	0	3	0	3	0	3
159		4	max	567.109	2	1.247	4	.043	3	0	9	0	9	0	2
160			min	-467.699	3	.3	15	-.918	4	0	3	0	3	0	3
161		5	max	567.039	2	1.07	4	.043	3	0	9	0	9	0	15
162			min	-467.751	3	.259	15	-.784	4	0	3	0	5	0	3
163		6	max	566.97	2	.893	4	.043	3	0	9	0	9	0	15
164			min	-467.803	3	.217	15	-.65	4	0	3	0	5	0	6
165		7	max	566.901	2	.716	4	.043	3	0	9	0	9	0	15
166			min	-467.855	3	.176	15	-.516	4	0	3	0	5	0	6
167		8	max	566.831	2	.539	4	.043	3	0	9	0	9	0	15
168			min	-467.907	3	.134	15	-.383	4	0	3	0	5	-.001	6
169		9	max	566.762	2	.362	4	.043	3	0	9	0	9	0	15
170			min	-467.959	3	.081	12	-.249	4	0	3	0	5	-.001	6
171		10	max	566.693	2	.207	2	.043	3	0	9	0	9	0	15
172			min	-468.011	3	.012	12	-.115	4	0	3	-.001	5	-.001	6
173		11	max	566.623	2	.069	2	.043	3	0	9	0	9	0	15
174			min	-468.063	3	-.09	3	-.003	9	0	3	-.001	5	-.001	6
175		12	max	566.554	2	-.032	15	.153	5	0	9	0	9	0	15
176			min	-468.115	3	-.193	3	-.003	9	0	3	0	5	-.001	6
177		13	max	566.485	2	-.074	15	.287	5	0	9	0	9	0	15
178			min	-468.167	3	-.346	6	-.003	9	0	3	0	5	-.001	6
179		14	max	566.415	2	-.115	15	.42	5	0	9	0	9	0	15
180			min	-468.219	3	-.522	6	-.003	9	0	3	0	5	-.001	6
181		15	max	566.346	2	-.157	15	.554	5	0	9	0	9	0	15
182			min	-468.271	3	-.699	6	-.003	9	0	3	0	5	0	6
183		16	max	566.277	2	-.199	15	.688	5	0	9	0	9	0	15
184			min	-468.323	3	-.876	6	-.003	9	0	3	0	5	0	6
185		17	max	566.207	2	-.24	15	.821	5	0	9	0	9	0	15
186			min	-468.375	3	-1.053	6	-.003	9	0	3	0	5	0	6
187		18	max	566.138	2	-.282	15	.955	5	0	9	0	9	0	15
188			min	-468.427	3	-1.23	6	-.003	9	0	3	0	3	0	6
189		19	max	566.069	2	-.323	15	1.089	5	0	9	0	9	0	1
190			min	-468.479	3	-1.407	6	-.003	9	0	3	0	3	0	1
191	M8	1	max	678.954	2	0	1	.053	9	0	1	0	4	0	1
192			min	-49.016	3	0	1	-12.681	4	0	1	0	3	0	1
193		2	max	679.018	2	0	1	.053	9	0	1	0	9	0	1
194			min	-48.967	3	0	1	-12.737	4	0	1	-.001	4	0	1
195		3	max	679.083	2	0	1	.053	9	0	1	0	9	0	1
196			min	-48.919	3	0	1	-12.794	4	0	1	-.002	4	0	1
197		4	max	679.148	2	0	1	.053	9	0	1	0	9	0	1
198			min	-48.87	3	0	1	-12.85	4	0	1	-.003	4	0	1
199		5	max	679.213	2	0	1	.053	9	0	1	0	9	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	-48.821	3	0	1	-12.906	4	0	1	-.005	4	0	1
201		6	max	679.277	2	0	1	.053	9	0	1	0	9	0	1
202			min	-48.773	3	0	1	-12.962	4	0	1	-.006	4	0	1
203		7	max	679.342	2	0	1	.053	9	0	1	0	9	0	1
204			min	-48.724	3	0	1	-13.018	4	0	1	-.007	4	0	1
205		8	max	679.407	2	0	1	.053	9	0	1	0	9	0	1
206			min	-48.676	3	0	1	-13.074	4	0	1	-.008	4	0	1
207		9	max	679.471	2	0	1	.053	9	0	1	0	9	0	1
208			min	-48.627	3	0	1	-13.13	4	0	1	-.009	4	0	1
209		10	max	679.536	2	0	1	.053	9	0	1	0	9	0	1
210			min	-48.579	3	0	1	-13.186	4	0	1	-.01	4	0	1
211		11	max	679.601	2	0	1	.053	9	0	1	0	9	0	1
212			min	-48.53	3	0	1	-13.242	4	0	1	-.012	4	0	1
213		12	max	679.666	2	0	1	.053	9	0	1	0	9	0	1
214			min	-48.482	3	0	1	-13.298	4	0	1	-.013	4	0	1
215		13	max	679.73	2	0	1	.053	9	0	1	0	9	0	1
216			min	-48.433	3	0	1	-13.354	4	0	1	-.014	4	0	1
217		14	max	679.795	2	0	1	.053	9	0	1	0	9	0	1
218			min	-48.385	3	0	1	-13.41	4	0	1	-.015	4	0	1
219		15	max	679.86	2	0	1	.053	9	0	1	0	9	0	1
220			min	-48.336	3	0	1	-13.466	4	0	1	-.016	4	0	1
221		16	max	679.924	2	0	1	.053	9	0	1	0	9	0	1
222			min	-48.288	3	0	1	-13.523	4	0	1	-.018	4	0	1
223		17	max	679.989	2	0	1	.053	9	0	1	0	9	0	1
224			min	-48.239	3	0	1	-13.579	4	0	1	-.019	4	0	1
225		18	max	680.054	2	0	1	.053	9	0	1	0	9	0	1
226			min	-48.191	3	0	1	-13.635	4	0	1	-.02	4	0	1
227		19	max	680.118	2	0	1	.053	9	0	1	0	9	0	1
228			min	-48.142	3	0	1	-13.691	4	0	1	-.021	4	0	1
229	M10	1	max	195.267	2	.688	4	1.06	5	0	1	0	9	0	1
230			min	-261.088	3	.176	15	-.051	1	0	5	0	3	0	1
231		2	max	195.393	2	.637	4	.945	5	0	1	0	4	0	15
232			min	-260.994	3	.164	15	-.051	1	0	5	0	3	0	4
233		3	max	195.519	2	.586	4	.831	5	0	1	0	4	0	15
234			min	-260.899	3	.152	15	-.051	1	0	5	0	3	0	4
235		4	max	195.645	2	.535	4	.716	5	0	1	0	4	0	15
236			min	-260.805	3	.14	15	-.051	1	0	5	0	3	0	4
237		5	max	195.771	2	.484	4	.602	5	0	1	0	4	0	15
238			min	-260.71	3	.128	15	-.051	1	0	5	0	3	0	4
239		6	max	195.897	2	.432	4	.487	5	0	1	0	4	0	15
240			min	-260.616	3	.116	15	-.051	1	0	5	0	3	0	4
241		7	max	196.023	2	.381	4	.373	5	0	1	0	4	0	15
242			min	-260.522	3	.104	15	-.051	1	0	5	0	3	0	4
243		8	max	196.149	2	.33	4	.259	5	0	1	0	5	0	15
244			min	-260.427	3	.092	15	-.051	1	0	5	0	3	0	4
245		9	max	196.274	2	.279	4	.144	5	0	1	0	5	0	15
246			min	-260.333	3	.075	12	-.051	1	0	5	0	3	0	4
247		10	max	196.4	2	.228	4	.03	5	0	1	0	5	0	15
248			min	-260.238	3	.055	12	-.051	1	0	5	0	3	0	4
249		11	max	196.526	2	.177	4	.009	10	0	1	0	5	0	15
250			min	-260.144	3	.035	12	-.097	4	0	5	0	3	0	4
251		12	max	196.652	2	.126	4	.009	10	0	1	0	5	0	15
252			min	-260.05	3	.015	12	-.211	4	0	5	0	3	0	4
253		13	max	196.778	2	.074	4	.009	10	0	1	0	5	0	15
254			min	-259.955	3	-.009	3	-.326	4	0	5	0	3	0	4
255		14	max	196.904	2	.029	5	.009	10	0	1	0	5	0	15
256			min	-259.861	3	-.039	3	-.44	4	0	5	0	3	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	197.03	2	.01	5	.009	10	0	1	0	5	0	15
258			min	-259.766	3	-.069	3	-.555	4	0	5	0	3	0	4
259		16	max	197.155	2	-.004	15	.009	10	0	1	0	5	0	12
260			min	-259.672	3	-.099	3	-.669	4	0	5	0	3	0	4
261		17	max	197.281	2	-.016	15	.009	10	0	1	0	5	0	12
262			min	-259.578	3	-.131	6	-.784	4	0	5	0	3	0	4
263		18	max	197.407	2	-.029	15	.009	10	0	1	0	5	0	12
264			min	-259.483	3	-.182	6	-.898	4	0	5	0	3	0	4
265		19	max	197.533	2	-.041	15	.009	10	0	1	0	5	0	12
266			min	-259.389	3	-.234	6	-1.012	4	0	5	0	3	0	4
267	M11	1	max	199.202	2	1.746	6	.077	1	0	4	0	5	0	2
268			min	-184.662	3	.404	15	-1.272	5	0	10	0	1	0	15
269		2	max	199.133	2	1.569	6	.077	1	0	4	0	3	0	2
270			min	-184.714	3	.363	15	-1.139	5	0	10	0	1	0	15
271		3	max	199.063	2	1.392	6	.077	1	0	4	0	3	0	2
272			min	-184.766	3	.321	15	-1.005	5	0	10	0	1	0	3
273		4	max	198.994	2	1.216	6	.077	1	0	4	0	3	0	15
274			min	-184.818	3	.28	15	-.871	5	0	10	0	1	0	4
275		5	max	198.925	2	1.039	6	.077	1	0	4	0	3	0	15
276			min	-184.87	3	.238	15	-.738	5	0	10	0	4	0	4
277		6	max	198.855	2	.862	6	.077	1	0	4	0	3	0	15
278			min	-184.922	3	.197	15	-.604	5	0	10	0	4	0	4
279		7	max	198.786	2	.685	6	.077	1	0	4	0	3	0	15
280			min	-184.974	3	.155	15	-.47	5	0	10	0	4	0	4
281		8	max	198.717	2	.508	6	.077	1	0	4	0	3	0	15
282			min	-185.026	3	.113	15	-.337	5	0	10	0	4	-.001	4
283		9	max	198.647	2	.331	6	.077	1	0	4	0	3	0	15
284			min	-185.078	3	.072	15	-.203	5	0	10	0	4	-.001	4
285		10	max	198.578	2	.158	2	.077	1	0	4	0	3	0	15
286			min	-185.13	3	.03	15	-.069	5	0	10	0	4	-.001	4
287		11	max	198.509	2	.02	2	.086	4	0	4	0	3	0	15
288			min	-185.182	3	-.037	3	-.062	3	0	10	0	4	-.001	4
289		12	max	198.44	2	-.053	15	.22	4	0	4	0	3	0	15
290			min	-185.234	3	-.2	4	-.062	3	0	10	0	4	-.001	4
291		13	max	198.37	2	-.094	15	.354	4	0	4	0	3	0	15
292			min	-185.286	3	-.377	4	-.062	3	0	10	0	4	-.001	4
293		14	max	198.301	2	-.136	15	.487	4	0	4	0	3	0	15
294			min	-185.338	3	-.553	4	-.062	3	0	10	0	4	-.001	4
295		15	max	198.232	2	-.178	15	.621	4	0	4	0	3	0	15
296			min	-185.39	3	-.73	4	-.062	3	0	10	0	4	0	4
297		16	max	198.162	2	-.219	15	.755	4	0	4	0	3	0	15
298			min	-185.442	3	-.907	4	-.062	3	0	10	0	5	0	4
299		17	max	198.093	2	-.261	15	.888	4	0	4	0	3	0	15
300			min	-185.494	3	-1.084	4	-.062	3	0	10	0	5	0	4
301		18	max	198.024	2	-.302	15	1.022	4	0	4	0	3	0	15
302			min	-185.546	3	-1.261	4	-.062	3	0	10	0	10	0	4
303		19	max	197.954	2	-.344	15	1.156	4	0	4	0	4	0	1
304			min	-185.598	3	-1.438	4	-.062	3	0	10	0	10	0	1
305	M12	1	max	231.44	1	0	1	.447	3	0	1	0	4	0	1
306			min	-1.465	5	0	1	-11.7	5	0	1	0	3	0	1
307		2	max	231.504	1	0	1	.447	3	0	1	0	1	0	1
308			min	-1.435	5	0	1	-11.756	5	0	1	-.001	5	0	1
309		3	max	231.569	1	0	1	.447	3	0	1	0	3	0	1
310			min	-1.405	5	0	1	-11.812	5	0	1	-.002	5	0	1
311		4	max	231.634	1	0	1	.447	3	0	1	0	3	0	1
312			min	-1.375	5	0	1	-11.868	5	0	1	-.003	5	0	1
313		5	max	231.699	1	0	1	.447	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-1.344	5	0	1	-11.924	5	0	1	-.004	5	0	1
315		6	max	231.763	1	0	1	.447	3	0	1	0	3	0	1
316			min	-1.314	5	0	1	-11.98	5	0	1	-.005	5	0	1
317		7	max	231.828	1	0	1	.447	3	0	1	0	3	0	1
318			min	-1.284	5	0	1	-12.036	5	0	1	-.006	5	0	1
319		8	max	231.893	1	0	1	.447	3	0	1	0	3	0	1
320			min	-1.254	5	0	1	-12.092	5	0	1	-.007	5	0	1
321		9	max	231.957	1	0	1	.447	3	0	1	0	3	0	1
322			min	-1.224	5	0	1	-12.149	5	0	1	-.009	5	0	1
323		10	max	232.022	1	0	1	.447	3	0	1	0	3	0	1
324			min	-1.193	5	0	1	-12.205	5	0	1	-.01	5	0	1
325		11	max	232.087	1	0	1	.447	3	0	1	0	3	0	1
326			min	-1.163	5	0	1	-12.261	5	0	1	-.011	5	0	1
327		12	max	232.152	1	0	1	.447	3	0	1	0	3	0	1
328			min	-1.133	5	0	1	-12.317	5	0	1	-.012	5	0	1
329		13	max	232.216	1	0	1	.447	3	0	1	0	3	0	1
330			min	-1.103	5	0	1	-12.373	5	0	1	-.013	5	0	1
331		14	max	232.281	1	0	1	.447	3	0	1	0	3	0	1
332			min	-1.073	5	0	1	-12.429	5	0	1	-.014	5	0	1
333		15	max	232.346	1	0	1	.447	3	0	1	0	3	0	1
334			min	-1.042	5	0	1	-12.485	5	0	1	-.015	5	0	1
335		16	max	232.41	1	0	1	.447	3	0	1	0	3	0	1
336			min	-1.012	5	0	1	-12.541	5	0	1	-.016	5	0	1
337		17	max	232.475	1	0	1	.447	3	0	1	0	3	0	1
338			min	-.986	15	0	1	-12.597	5	0	1	-.017	5	0	1
339		18	max	232.54	1	0	1	.447	3	0	1	0	3	0	1
340			min	-.967	15	0	1	-12.653	5	0	1	-.019	5	0	1
341		19	max	232.604	1	0	1	.447	3	0	1	0	3	0	1
342			min	-.947	15	0	1	-12.709	5	0	1	-.02	5	0	1
343	M1	1	max	58.832	1	342.375	3	2.036	10	0	2	.024	4	0	2
344			min	2.368	10	-214.964	2	-14.018	4	0	3	-.004	10	0	3
345		2	max	58.971	1	342.193	3	2.036	10	0	2	.021	4	.047	2
346			min	2.484	10	-215.206	2	-13.776	4	0	3	-.004	10	-.075	3
347		3	max	93.095	3	4.445	4	2.027	10	0	10	.018	4	.093	2
348			min	-23.105	2	-25.695	2	-12.517	4	0	1	-.003	10	-.147	3
349		4	max	93.199	3	4.135	4	2.027	10	0	10	.015	4	.099	2
350			min	-22.966	2	-25.937	2	-12.275	4	0	1	-.003	10	-.145	3
351		5	max	93.304	3	3.825	4	2.027	10	0	10	.012	4	.104	2
352			min	-22.826	2	-26.179	2	-12.033	4	0	1	-.002	10	-.142	3
353		6	max	93.409	3	3.514	4	2.027	10	0	10	.01	4	.11	2
354			min	-22.687	2	-26.42	2	-11.791	4	0	1	-.002	10	-.139	3
355		7	max	93.514	3	3.204	4	2.027	10	0	10	.007	4	.116	2
356			min	-22.547	2	-26.662	2	-11.549	4	0	1	-.001	10	-.137	3
357		8	max	93.618	3	2.913	14	2.027	10	0	10	.005	4	.121	2
358			min	-22.407	2	-26.904	2	-11.307	4	0	1	0	10	-.134	3
359		9	max	93.723	3	2.676	14	2.027	10	0	10	.003	3	.127	2
360			min	-22.268	2	-27.146	2	-11.065	4	0	1	0	10	-.131	3
361		10	max	93.828	3	2.438	14	2.027	10	0	10	.002	3	.133	2
362			min	-22.128	2	-27.388	2	-10.823	4	0	1	0	10	-.128	3
363		11	max	93.932	3	2.201	14	2.027	10	0	10	0	3	.139	2
364			min	-21.988	2	-27.63	2	-10.581	4	0	1	-.002	4	-.125	3
365		12	max	94.037	3	1.963	14	2.027	10	0	10	0	10	.145	2
366			min	-21.849	2	-27.871	2	-10.339	4	0	1	-.005	4	-.122	3
367		13	max	94.142	3	1.725	14	2.027	10	0	10	.001	10	.151	2
368			min	-21.709	2	-28.113	2	-10.097	4	0	1	-.007	4	-.119	3
369		14	max	94.247	3	1.488	14	2.027	10	0	10	.002	10	.157	2
370			min	-21.57	2	-28.355	2	-9.855	4	0	1	-.009	4	-.116	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	94.351	3	1.25	14	2.027	10	0	10	.002	10	.164	2
372			min	-21.43	2	-28.597	2	-9.726	14	0	1	-.011	4	-.113	3
373		16	max	88.455	2	136.668	2	2.042	10	0	1	.003	10	.168	2
374			min	-6.149	3	-169.089	3	-9.548	1	0	5	-.013	4	-.109	3
375		17	max	88.595	2	136.427	2	2.042	10	0	1	.003	10	.139	2
376			min	-6.045	3	-169.271	3	-9.548	1	0	5	-.015	14	-.072	3
377		18	max	-2.497	10	320.572	2	2.124	10	0	5	.004	10	.07	2
378			min	-58.954	1	-165.584	3	-20.071	4	0	2	-.019	4	-.036	3
379		19	max	-2.38	10	320.33	2	2.124	10	0	5	.004	10	0	2
380			min	-58.815	1	-165.765	3	-19.829	4	0	2	-.023	4	0	3
381	M5	1	max	158.362	1	1057.359	3	0	1	0	9	.026	4	0	3
382			min	-11.832	3	-649.18	2	-90.812	3	0	3	0	11	0	2
383		2	max	158.501	1	1057.178	3	0	1	0	9	.022	4	.14	2
384			min	-11.727	3	-649.422	2	-90.812	3	0	3	-.005	3	-.229	3
385		3	max	232.308	3	4.538	9	9.545	3	0	3	.018	4	.279	2
386			min	-48.803	2	-80.139	2	-14.294	4	0	4	-.024	3	-.453	3
387		4	max	232.413	3	4.337	9	9.545	3	0	3	.015	4	.296	2
388			min	-48.663	2	-80.38	2	-14.052	4	0	4	-.022	3	-.442	3
389		5	max	232.517	3	4.135	9	9.545	3	0	3	.012	4	.314	2
390			min	-48.524	2	-80.622	2	-13.81	4	0	4	-.02	3	-.431	3
391		6	max	232.622	3	3.934	9	9.545	3	0	3	.009	4	.331	2
392			min	-48.384	2	-80.864	2	-13.568	4	0	4	-.018	3	-.421	3
393		7	max	232.727	3	3.732	9	9.545	3	0	3	.006	4	.349	2
394			min	-48.245	2	-81.106	2	-13.326	4	0	4	-.016	3	-.41	3
395		8	max	232.832	3	3.531	9	9.545	3	0	3	.003	4	.366	2
396			min	-48.105	2	-81.348	2	-13.084	4	0	4	-.014	3	-.399	3
397		9	max	232.936	3	3.329	9	9.545	3	0	3	0	4	.384	2
398			min	-47.965	2	-81.589	2	-12.842	4	0	4	-.012	3	-.388	3
399		10	max	233.041	3	3.128	9	9.545	3	0	3	0	1	.402	2
400			min	-47.826	2	-81.831	2	-12.6	4	0	4	-.01	3	-.377	3
401		11	max	233.146	3	2.926	9	9.545	3	0	3	0	1	.42	2
402			min	-47.686	2	-82.073	2	-12.358	4	0	4	-.007	3	-.366	3
403		12	max	233.25	3	2.725	9	9.545	3	0	3	0	1	.437	2
404			min	-47.546	2	-82.315	2	-12.116	4	0	4	-.008	4	-.355	3
405		13	max	233.355	3	2.523	9	9.545	3	0	3	0	1	.455	2
406			min	-47.407	2	-82.557	2	-11.874	4	0	4	-.01	4	-.344	3
407		14	max	233.46	3	2.322	9	9.545	3	0	3	0	1	.473	2
408			min	-47.267	2	-82.799	2	-11.632	4	0	4	-.013	4	-.333	3
409		15	max	233.565	3	2.12	9	9.545	3	0	3	0	3	.491	2
410			min	-47.128	2	-83.04	2	-11.39	4	0	4	-.015	4	-.321	3
411		16	max	264.334	2	392.179	2	9.521	3	0	3	.002	3	.505	2
412			min	-22.935	3	-443.74	3	-10.065	4	0	4	-.018	4	-.307	3
413		17	max	264.474	2	391.937	2	9.521	3	0	3	.004	3	.42	2
414			min	-22.83	3	-443.921	3	-9.823	4	0	4	-.02	4	-.21	3
415		18	max	1.724	3	975.472	2	8.759	3	0	4	.006	3	.211	2
416			min	-158.535	1	-486.787	3	-22.064	5	0	9	-.025	4	-.105	3
417		19	max	1.829	3	975.23	2	8.759	3	0	4	.008	3	0	3
418			min	-158.395	1	-486.968	3	-21.822	5	0	9	-.03	4	0	2
419	M9	1	max	58.831	1	342.252	3	96.45	3	0	3	.004	10	0	2
420			min	.553	15	-214.964	2	-2.036	10	0	2	-.024	3	0	3
421		2	max	58.971	1	342.071	3	96.45	3	0	3	.019	5	.047	2
422			min	.595	15	-215.206	2	-2.036	10	0	2	-.017	1	-.075	3
423		3	max	92.235	3	3.578	9	9.479	1	0	1	.038	5	.093	2
424			min	-22.726	2	-25.671	2	-18.268	5	0	5	-.014	1	-.147	3
425		4	max	92.339	3	3.377	9	9.479	1	0	1	.034	5	.099	2
426			min	-22.586	2	-25.913	2	-18.026	5	0	5	-.012	1	-.145	3
427		5	max	92.444	3	3.175	9	9.479	1	0	1	.03	5	.104	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
428			min	-22.446	2	-26.155	2	-17.784	5	0	5	-.01	1	-.142	3
429		6	max	92.549	3	2.974	9	9.479	1	0	1	.026	5	.11	2
430			min	-22.307	2	-26.396	2	-17.542	5	0	5	-.008	1	-.139	3
431		7	max	92.653	3	2.772	9	9.479	1	0	1	.023	5	.116	2
432			min	-22.167	2	-26.638	2	-17.3	5	0	5	-.006	1	-.137	3
433		8	max	92.758	3	2.571	9	9.479	1	0	1	.019	5	.121	2
434			min	-22.028	2	-26.88	2	-17.058	5	0	5	-.004	1	-.134	3
435		9	max	92.863	3	2.369	9	9.479	1	0	1	.015	5	.127	2
436			min	-21.888	2	-27.122	2	-16.816	5	0	5	-.002	1	-.131	3
437		10	max	92.968	3	2.168	9	9.479	1	0	1	.012	3	.133	2
438			min	-21.748	2	-27.364	2	-16.574	5	0	5	0	1	-.128	3
439		11	max	93.072	3	1.966	9	9.479	1	0	1	.012	3	.139	2
440			min	-21.609	2	-27.606	2	-16.332	5	0	5	0	10	-.125	3
441		12	max	93.177	3	1.765	9	9.479	1	0	1	.011	3	.145	2
442			min	-21.469	2	-27.847	2	-16.09	5	0	5	0	10	-.122	3
443		13	max	93.282	3	1.563	9	9.479	1	0	1	.01	3	.151	2
444			min	-21.329	2	-28.089	2	-15.848	5	0	5	-.001	10	-.119	3
445		14	max	93.386	3	1.362	9	9.479	1	0	1	.01	3	.157	2
446			min	-21.19	2	-28.331	2	-15.606	5	0	5	-.002	5	-.116	3
447		15	max	93.491	3	1.16	9	9.479	1	0	1	.01	1	.164	2
448			min	-21.05	2	-28.573	2	-15.364	5	0	5	-.006	5	-.113	3
449		16	max	88.626	2	136.374	2	9.548	1	0	10	.012	1	.168	2
450			min	-7.593	3	-169.825	3	-13.987	5	0	4	-.008	5	-.109	3
451		17	max	88.765	2	136.132	2	9.548	1	0	10	.014	1	.139	2
452			min	-7.488	3	-170.006	3	-13.745	5	0	4	-.011	5	-.072	3
453		18	max	8.492	5	320.572	2	9.905	1	0	2	.017	1	.07	2
454			min	-58.954	1	-165.568	3	-25.205	5	0	3	-.017	5	-.036	3
455		19	max	8.557	5	320.33	2	9.905	1	0	2	.019	1	0	2
456			min	-58.814	1	-165.75	3	-24.963	5	0	3	-.022	5	0	3
457	M13	1	max	96.442	3	214.906	2	-.553	15	0	2	.024	3	0	2
458			min	-2.036	10	-342.326	3	-58.829	1	0	3	-.004	10	0	3
459		2	max	96.442	3	155.002	2	.065	15	0	2	.02	3	.106	3
460			min	-2.036	10	-245.547	3	-43.494	1	0	3	-.006	2	-.067	2
461		3	max	96.442	3	95.099	2	1.042	10	0	2	.015	3	.177	3
462			min	-2.036	10	-148.769	3	-28.159	1	0	3	-.013	1	-.112	2
463		4	max	96.442	3	35.195	2	2.747	10	0	2	.011	3	.214	3
464			min	-2.036	10	-51.99	3	-12.825	1	0	3	-.02	1	-.135	2
465		5	max	96.442	3	44.788	3	6.871	2	0	2	.008	3	.215	3
466			min	-2.036	10	-24.709	2	-9.86	3	0	3	-.022	1	-.137	2
467		6	max	96.442	3	141.567	3	17.845	1	0	2	.004	3	.181	3
468			min	-2.036	10	-84.613	2	-8.962	3	0	3	-.018	1	-.118	2
469		7	max	96.442	3	238.345	3	33.18	1	0	2	.005	5	.113	3
470			min	-2.036	10	-144.517	2	-8.064	3	0	3	-.009	1	-.076	2
471		8	max	96.442	3	335.124	3	48.514	1	0	2	.009	2	.009	3
472			min	-2.036	10	-204.42	2	-7.165	3	0	3	-.002	3	-.013	2
473		9	max	96.442	3	431.902	3	63.849	1	0	2	.026	1	.071	2
474			min	-2.036	10	-264.324	2	-6.267	3	0	3	-.004	3	-.129	3
475		10	max	96.442	3	-5.937	15	79.184	1	0	2	.052	1	.178	2
476			min	-2.036	10	-528.681	3	3.883	12	0	3	-.021	3	-.303	3
477		11	max	42.377	4	264.324	2	7.401	3	0	3	.026	1	.071	2
478			min	-2.036	10	-431.902	3	-63.849	1	0	2	-.018	3	-.129	3
479		12	max	38.831	4	204.42	2	8.3	3	0	3	.009	2	.009	3
480			min	-2.036	10	-335.124	3	-48.514	1	0	2	-.015	3	-.013	2
481		13	max	35.284	4	144.517	2	9.198	3	0	3	.002	10	.113	3
482			min	-2.036	10	-238.345	3	-33.179	1	0	2	-.012	3	-.076	2
483		14	max	31.737	4	84.613	2	10.096	3	0	3	0	10	.181	3
484			min	-2.036	10	-141.567	3	-17.845	1	0	2	-.018	1	-.118	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
485		15	max	28.19	4	24.709	2	10.994	3	0	3	0	5	.215	3
486			min	-2.036	10	-44.788	3	-6.87	2	0	2	-.022	1	-.137	2
487		16	max	24.644	4	51.99	3	15.163	4	0	3	.005	5	.214	3
488			min	-2.036	10	-35.195	2	-2.747	10	0	2	-.02	1	-.135	2
489		17	max	21.097	4	148.769	3	28.16	1	0	3	.009	5	.177	3
490			min	-2.036	10	-95.099	2	-1.042	10	0	2	-.013	1	-.112	2
491		18	max	17.55	4	245.547	3	43.494	1	0	3	.015	4	.106	3
492			min	-2.036	10	-155.002	2	.663	10	0	2	-.006	2	-.067	2
493		19	max	14.004	4	342.326	3	58.829	1	0	3	.024	4	0	2
494			min	-2.036	10	-214.906	2	2.368	10	0	2	-.004	10	0	3
495	M16	1	max	24.955	5	320.405	2	8.557	5	0	3	.019	1	0	2
496			min	-9.891	1	-165.784	3	-58.817	1	0	2	-.022	5	0	3
497		2	max	21.408	5	230.573	2	9.512	5	0	3	.004	3	.052	3
498			min	-9.891	1	-120.31	3	-43.483	1	0	2	-.019	5	-.099	2
499		3	max	17.861	5	140.741	2	10.467	5	0	3	0	3	.087	3
500			min	-9.891	1	-74.837	3	-28.148	1	0	2	-.018	4	-.167	2
501		4	max	14.315	5	50.91	2	11.422	5	0	3	-.001	12	.106	3
502			min	-9.891	1	-29.363	3	-12.813	1	0	2	-.02	1	-.201	2
503		5	max	10.768	5	16.11	3	12.377	5	0	3	-.003	10	.108	3
504			min	-9.891	1	-38.922	2	-6.344	3	0	2	-.022	1	-.203	2
505		6	max	7.221	5	61.584	3	17.856	1	0	3	0	10	.094	3
506			min	-9.891	1	-128.753	2	-5.446	3	0	2	-.018	1	-.173	2
507		7	max	3.675	5	107.058	3	33.191	1	0	3	.002	5	.064	3
508			min	-9.891	1	-218.585	2	-4.548	3	0	2	-.009	1	-.11	2
509		8	max	2.508	3	152.531	3	48.526	1	0	3	.009	2	.017	3
510			min	-9.891	1	-308.416	2	-3.649	3	0	2	-.01	3	-.015	2
511		9	max	2.508	3	198.005	3	63.861	1	0	3	.026	1	.112	2
512			min	-9.891	1	-398.248	2	-2.751	3	0	2	-.011	3	-.047	3
513		10	max	14.862	5	243.478	3	79.195	1	0	14	.052	1	.272	2
514			min	-9.916	14	-488.079	2	-1.853	3	0	2	-.012	3	-.126	3
515		11	max	11.315	5	398.248	2	5.33	5	0	2	.026	1	.112	2
516			min	-9.891	1	-198.005	3	-63.86	1	0	3	-.008	5	-.047	3
517		12	max	7.768	5	308.416	2	6.285	5	0	2	.009	2	.017	3
518			min	-9.891	1	-152.531	3	-48.526	1	0	3	-.006	5	-.015	2
519		13	max	4.222	5	218.585	2	7.24	5	0	2	.002	10	.064	3
520			min	-9.891	1	-107.057	3	-33.191	1	0	3	-.009	1	-.11	2
521		14	max	2.124	10	128.753	2	8.194	5	0	2	0	15	.094	3
522			min	-9.891	1	-61.584	3	-17.856	1	0	3	-.018	1	-.173	2
523		15	max	2.124	10	38.922	2	9.443	4	0	2	.002	5	.108	3
524			min	-9.891	1	-16.11	3	-6.858	2	0	3	-.022	1	-.203	2
525		16	max	2.124	10	29.363	3	13.73	4	0	2	.006	5	.106	3
526			min	-9.891	1	-50.91	2	-2.735	10	0	3	-.02	1	-.201	2
527		17	max	2.124	10	74.837	3	28.148	1	0	2	.009	5	.087	3
528			min	-12.751	4	-140.741	2	-1.03	10	0	3	-.013	1	-.167	2
529		18	max	2.124	10	120.31	3	43.483	1	0	2	.015	4	.052	3
530			min	-16.298	4	-230.573	2	.675	10	0	3	-.006	2	-.099	2
531		19	max	2.124	10	165.784	3	58.817	1	0	2	.023	4	0	2
532			min	-19.845	4	-320.405	2	2.38	10	0	3	-.004	10	0	5
533	M15	1	max	0	1	.688	3	.182	3	0	1	0	1	0	1
534			min	-142.729	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.612	3	.182	3	0	1	0	1	0	1
536			min	-142.799	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.535	3	.182	3	0	1	0	1	0	1
538			min	-142.87	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.459	3	.182	3	0	1	0	1	0	1
540			min	-142.94	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.382	3	.182	3	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
542			min	-143.011	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.306	3	.182	3	0	1	0	1	0	1
544			min	-143.081	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.229	3	.182	3	0	1	0	3	0	1
546			min	-143.152	3	0	1	0	1	0	3	0	1	0	3
547		8	max	0	1	.153	3	.182	3	0	1	0	3	0	1
548			min	-143.222	3	0	1	0	1	0	3	0	1	0	3
549		9	max	0	1	.076	3	.182	3	0	1	0	3	0	1
550			min	-143.293	3	0	1	0	1	0	3	0	1	0	3
551		10	max	0	1	0	1	.182	3	0	1	0	3	0	1
552			min	-143.363	3	0	1	0	1	0	3	0	1	0	3
553		11	max	0	1	0	1	.182	3	0	1	0	3	0	1
554			min	-143.434	3	-.076	3	0	1	0	3	0	1	0	3
555		12	max	0	1	0	1	.182	3	0	1	0	3	0	1
556			min	-143.504	3	-.153	3	0	1	0	3	0	1	0	3
557		13	max	0	1	0	1	.182	3	0	1	0	3	0	1
558			min	-143.575	3	-.229	3	0	1	0	3	0	1	0	3
559		14	max	0	1	0	1	.182	3	0	1	0	3	0	1
560			min	-143.645	3	-.306	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.182	3	0	1	0	3	0	1
562			min	-143.716	3	-.382	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.182	3	0	1	0	3	0	1
564			min	-143.786	3	-.459	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.182	3	0	1	0	3	0	1
566			min	-143.857	3	-.535	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.182	3	0	1	0	3	0	1
568			min	-143.927	3	-.612	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.182	3	0	1	0	3	0	1
570			min	-143.998	3	-.688	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	1	1.879	4	.344	4	0	3	0	3	0	1
572			min	-161.008	4	0	1	-.076	3	0	4	0	4	0	1
573		2	max	0	1	1.67	4	.308	4	0	3	0	3	0	1
574			min	-160.972	4	0	1	-.076	3	0	4	0	4	0	4
575		3	max	0	1	1.461	4	.273	4	0	3	0	3	0	1
576			min	-160.935	4	0	1	-.076	3	0	4	0	4	0	4
577		4	max	0	1	1.252	4	.238	4	0	3	0	3	0	1
578			min	-160.899	4	0	1	-.076	3	0	4	0	4	-.001	4
579		5	max	0	1	1.044	4	.203	4	0	3	0	3	0	1
580			min	-160.863	4	0	1	-.076	3	0	4	0	9	-.002	4
581		6	max	0	1	.835	4	.168	4	0	3	0	3	0	1
582			min	-160.827	4	0	1	-.076	3	0	4	0	9	-.002	4
583		7	max	0	1	.626	4	.133	4	0	3	0	3	0	1
584			min	-160.791	4	0	1	-.076	3	0	4	0	9	-.002	4
585		8	max	0	1	.417	4	.098	4	0	3	0	5	0	1
586			min	-160.755	4	0	1	-.076	3	0	4	0	9	-.002	4
587		9	max	0	1	.209	4	.063	4	0	3	0	5	0	1
588			min	-160.719	4	0	1	-.076	3	0	4	0	9	-.002	4
589		10	max	0	1	0	1	.028	4	0	3	0	5	0	1
590			min	-160.683	4	0	1	-.076	3	0	4	0	9	-.002	4
591		11	max	0	1	0	1	.012	9	0	3	0	5	0	1
592			min	-160.647	4	-.209	4	-.076	3	0	4	0	9	-.002	4
593		12	max	0	1	0	1	.012	9	0	3	0	5	0	1
594			min	-160.61	4	-.417	4	-.076	3	0	4	0	9	-.002	4
595		13	max	0	1	0	1	.012	9	0	3	0	5	0	1
596			min	-160.574	4	-.626	4	-.08	5	0	4	0	3	-.002	4
597		14	max	.07	9	0	1	.012	9	0	3	0	5	0	1
598			min	-160.538	4	-.835	4	-.115	5	0	4	0	3	-.002	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	.149	9	0	1	.012	9	0	3	0	5	0	1
600			min	-160.574	5	-1.044	4	-.15	5	0	4	0	3	-.002	4
601		16	max	.227	9	0	1	.012	9	0	3	0	5	0	1
602			min	-160.615	5	-1.252	4	-.185	5	0	4	0	3	-.001	4
603		17	max	.305	9	0	1	.012	9	0	3	0	9	0	1
604			min	-160.655	5	-1.461	4	-.22	5	0	4	0	3	0	4
605		18	max	.383	9	0	1	.012	9	0	3	0	9	0	1
606			min	-160.696	5	-1.67	4	-.255	5	0	4	0	3	0	4
607		19	max	.462	9	0	1	.012	9	0	3	0	9	0	1
608			min	-160.737	5	-1.879	4	-.29	5	0	4	0	4	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	.002	2	.01	2	.001	9	7.008e-4	5	NC	3	NC	1
2			min	-.004	3	-.01	3	-.009	5	-2.286e-4	3	4118.847	2	NC	1
3		2	max	.002	2	.009	2	.001	9	7.215e-4	5	NC	3	NC	1
4			min	-.003	3	-.009	3	-.008	5	-2.164e-4	3	4493.289	2	NC	1
5		3	max	.002	2	.008	2	.001	9	7.422e-4	5	NC	3	NC	1
6			min	-.003	3	-.009	3	-.008	5	-2.041e-4	3	4938.244	2	NC	1
7		4	max	.002	2	.007	2	0	9	7.628e-4	5	NC	1	NC	1
8			min	-.003	3	-.008	3	-.008	5	-1.919e-4	3	5470.638	2	NC	1
9		5	max	.001	2	.006	2	0	9	7.835e-4	5	NC	1	NC	1
10			min	-.003	3	-.008	3	-.008	5	-1.796e-4	3	6113.001	2	NC	1
11		6	max	.001	2	.006	2	0	9	8.041e-4	5	NC	1	NC	1
12			min	-.003	3	-.008	3	-.007	5	-1.674e-4	3	6895.811	2	NC	1
13		7	max	.001	2	.005	2	0	9	8.248e-4	5	NC	1	NC	1
14			min	-.002	3	-.007	3	-.007	5	-1.551e-4	3	7861.088	2	NC	1
15		8	max	.001	2	.004	2	0	9	8.454e-4	5	NC	1	NC	1
16			min	-.002	3	-.007	3	-.007	5	-1.429e-4	3	9068.045	2	NC	1
17		9	max	.001	2	.004	2	0	9	8.661e-4	5	NC	1	NC	1
18			min	-.002	3	-.006	3	-.006	5	-1.306e-4	3	NC	1	NC	1
19		10	max	0	2	.003	2	0	9	8.867e-4	5	NC	1	NC	1
20			min	-.002	3	-.006	3	-.006	5	-1.184e-4	3	NC	1	NC	1
21		11	max	0	2	.003	2	0	9	9.074e-4	5	NC	1	NC	1
22			min	-.002	3	-.005	3	-.005	5	-1.062e-4	3	NC	1	NC	1
23		12	max	0	2	.002	2	0	9	9.28e-4	5	NC	1	NC	1
24			min	-.001	3	-.005	3	-.005	5	-9.391e-5	3	NC	1	NC	1
25		13	max	0	2	.002	2	0	9	9.487e-4	5	NC	1	NC	1
26			min	-.001	3	-.004	3	-.004	5	-8.167e-5	3	NC	1	NC	1
27		14	max	0	2	.001	2	0	9	9.693e-4	5	NC	1	NC	1
28			min	0	3	-.003	3	-.004	5	-6.943e-5	3	NC	1	NC	1
29		15	max	0	2	0	2	0	9	9.9e-4	5	NC	1	NC	1
30			min	0	3	-.003	3	-.003	5	-5.718e-5	3	NC	1	NC	1
31		16	max	0	2	0	2	0	9	1.011e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.002	5	-4.494e-5	3	NC	1	NC	1
33		17	max	0	2	0	2	0	9	1.031e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.002	5	-3.737e-5	1	NC	1	NC	1
35		18	max	0	2	0	2	0	9	1.052e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-3.011e-5	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.073e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.374e-5	9	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.123e-5	9	NC	1	NC	1
40			min	0	1	0	1	0	1	-5.053e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.003	5	1.552e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	9	-5.066e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.005	5	2.02e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	9	-5.079e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.008	4	2.488e-5	1	NC	1	NC	1
46			min	0	2	-.003	3	0	9	-5.091e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.01	4	2.956e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	9	-5.104e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.013	4	3.424e-5	1	NC	1	NC	1
50			min	0	2	-.004	3	0	9	-5.117e-4	5	NC	1	NC	1
51		7	max	0	3	0	2	.015	4	3.892e-5	1	NC	1	NC	1
52			min	0	2	-.005	3	0	9	-5.13e-4	5	NC	1	NC	1
53		8	max	0	3	0	2	.018	4	4.359e-5	1	NC	1	NC	1
54			min	0	2	-.006	3	0	10	-5.143e-4	5	NC	1	NC	1
55		9	max	0	3	.001	2	.02	4	4.827e-5	1	NC	1	NC	1
56			min	-.001	2	-.006	3	0	10	-5.155e-4	5	NC	1	NC	1
57		10	max	.001	3	.002	2	.022	4	5.295e-5	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	10	-5.168e-4	5	NC	1	NC	1
59		11	max	.001	3	.002	2	.024	4	5.763e-5	1	NC	1	NC	1
60			min	-.001	2	-.007	3	0	10	-5.181e-4	5	NC	1	NC	1
61		12	max	.001	3	.003	2	.026	4	6.231e-5	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	10	-5.194e-4	5	NC	1	NC	1
63		13	max	.001	3	.004	2	.028	4	6.699e-5	1	NC	1	NC	1
64			min	-.002	2	-.008	3	0	10	-5.206e-4	5	NC	1	NC	1
65		14	max	.002	3	.004	2	.03	4	7.167e-5	1	NC	1	NC	1
66			min	-.002	2	-.008	3	0	10	-5.219e-4	5	NC	1	NC	1
67		15	max	.002	3	.005	2	.032	4	7.635e-5	1	NC	1	NC	1
68			min	-.002	2	-.008	3	0	10	-5.232e-4	5	8956.516	2	NC	1
69		16	max	.002	3	.006	2	.034	4	8.103e-5	1	NC	1	NC	1
70			min	-.002	2	-.008	3	0	10	-5.245e-4	5	7592.405	2	NC	1
71		17	max	.002	3	.007	2	.035	4	8.57e-5	1	NC	1	NC	1
72			min	-.002	2	-.009	3	0	10	-5.258e-4	5	6535.92	2	NC	1
73		18	max	.002	3	.008	2	.037	4	9.038e-5	1	NC	1	NC	1
74			min	-.002	2	-.009	3	0	10	-5.27e-4	5	5708.617	2	NC	1
75		19	max	.002	3	.009	2	.038	4	9.506e-5	1	NC	3	NC	1
76			min	-.002	2	-.009	3	0	10	-5.283e-4	5	5055.148	2	NC	1
77	M4	1	max	.001	1	.011	2	0	10	2.582e-3	5	NC	1	NC	1
78			min	0	12	-.01	3	-.04	4	-1.087e-4	1	NC	1	478.473	4
79		2	max	.001	1	.01	2	0	10	2.582e-3	5	NC	1	NC	1
80			min	0	12	-.009	3	-.037	4	-1.087e-4	1	NC	1	521.508	4
81		3	max	0	1	.01	2	0	10	2.582e-3	5	NC	1	NC	1
82			min	0	12	-.009	3	-.034	4	-1.087e-4	1	NC	1	572.717	4
83		4	max	0	1	.009	2	0	10	2.582e-3	5	NC	1	NC	1
84			min	0	12	-.008	3	-.03	4	-1.087e-4	1	NC	1	634.252	4
85		5	max	0	1	.008	2	0	10	2.582e-3	5	NC	1	NC	1
86			min	0	12	-.007	3	-.027	4	-1.087e-4	1	NC	1	709.045	4
87		6	max	0	1	.008	2	0	10	2.582e-3	5	NC	1	NC	1
88			min	0	12	-.007	3	-.024	4	-1.087e-4	1	NC	1	801.172	4
89		7	max	0	1	.007	2	0	10	2.582e-3	5	NC	1	NC	1
90			min	0	12	-.006	3	-.021	4	-1.087e-4	1	NC	1	916.439	4
91		8	max	0	1	.007	2	0	10	2.582e-3	5	NC	1	NC	1
92			min	0	12	-.006	3	-.018	4	-1.087e-4	1	NC	1	1063.348	4
93		9	max	0	1	.006	2	0	10	2.582e-3	5	NC	1	NC	1
94			min	0	12	-.005	3	-.015	4	-1.087e-4	1	NC	1	1254.752	4
95		10	max	0	1	.005	2	0	10	2.582e-3	5	NC	1	NC	1
96			min	0	12	-.005	3	-.013	4	-1.087e-4	1	NC	1	1510.86	4
97		11	max	0	1	.005	2	0	10	2.582e-3	5	NC	1	NC	1
98			min	0	12	-.004	3	-.01	4	-1.087e-4	1	NC	1	1864.947	4
99		12	max	0	1	.004	2	0	10	2.582e-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	12	-.004	3	-.008	4	-1.087e-4	1	NC	1	2375.053	4
101		13	max	0	1	.004	2	0	10	2.582e-3	5	NC	1	NC	1
102			min	0	12	-.003	3	-.006	4	-1.087e-4	1	NC	1	3150.036	4
103		14	max	0	1	.003	2	0	10	2.582e-3	5	NC	1	NC	1
104			min	0	12	-.003	3	-.004	4	-1.087e-4	1	NC	1	4414.414	4
105		15	max	0	1	.002	2	0	10	2.582e-3	5	NC	1	NC	1
106			min	0	12	-.002	3	-.003	4	-1.087e-4	1	NC	1	6695.606	4
107		16	max	0	1	.002	2	0	10	2.582e-3	5	NC	1	NC	1
108			min	0	12	-.002	3	-.002	4	-1.087e-4	1	NC	1	NC	1
109		17	max	0	1	.001	2	0	10	2.582e-3	5	NC	1	NC	1
110			min	0	12	-.001	3	0	4	-1.087e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	2.582e-3	5	NC	1	NC	1
112			min	0	12	0	3	0	4	-1.087e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	2.582e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.087e-4	1	NC	1	NC	1
115	M6	1	max	.006	2	.028	2	0	9	7.353e-4	4	NC	3	NC	1
116			min	-.01	3	-.027	3	-.008	5	-9.394e-8	1	1398.234	2	5528.977	3
117		2	max	.005	2	.026	2	0	9	7.568e-4	4	NC	3	NC	1
118			min	-.009	3	-.025	3	-.008	5	-3.207e-7	9	1497.79	2	5861.572	3
119		3	max	.005	2	.024	2	0	9	7.784e-4	4	NC	3	NC	1
120			min	-.009	3	-.024	3	-.008	5	-8.159e-7	9	1612.093	2	6258.537	3
121		4	max	.005	2	.023	2	0	9	7.999e-4	4	NC	3	NC	1
122			min	-.008	3	-.023	3	-.008	5	-1.311e-6	9	1744.11	2	6733.467	3
123		5	max	.004	2	.021	2	0	9	8.214e-4	4	NC	3	NC	1
124			min	-.008	3	-.021	3	-.008	5	-1.806e-6	9	1897.666	2	7304.467	3
125		6	max	.004	2	.019	2	0	9	8.429e-4	4	NC	3	NC	1
126			min	-.007	3	-.02	3	-.008	5	-2.302e-6	9	2077.772	2	7995.966	3
127		7	max	.004	2	.017	2	0	9	8.645e-4	4	NC	3	NC	1
128			min	-.007	3	-.018	3	-.007	5	-2.797e-6	9	2291.117	2	8841.502	3
129		8	max	.003	2	.015	2	0	9	8.86e-4	4	NC	3	NC	1
130			min	-.006	3	-.017	3	-.007	5	-3.292e-6	9	2546.827	2	9888.106	3
131		9	max	.003	2	.014	2	0	9	9.075e-4	4	NC	3	NC	1
132			min	-.006	3	-.015	3	-.007	5	-3.787e-6	9	2857.685	2	NC	1
133		10	max	.003	2	.012	2	0	9	9.29e-4	4	NC	3	NC	1
134			min	-.005	3	-.014	3	-.006	5	-4.283e-6	9	3242.155	2	NC	1
135		11	max	.003	2	.011	2	0	9	9.505e-4	4	NC	3	NC	1
136			min	-.004	3	-.012	3	-.006	5	-4.778e-6	9	3727.929	2	NC	1
137		12	max	.002	2	.009	2	0	9	9.721e-4	4	NC	3	NC	1
138			min	-.004	3	-.011	3	-.005	5	-5.273e-6	9	4358.517	2	NC	1
139		13	max	.002	2	.008	2	0	9	9.936e-4	4	NC	3	NC	1
140			min	-.003	3	-.009	3	-.004	5	-5.768e-6	9	5206.414	2	NC	1
141		14	max	.002	2	.006	2	0	9	1.015e-3	4	NC	1	NC	1
142			min	-.003	3	-.008	3	-.004	5	-6.263e-6	9	6402.076	2	NC	1
143		15	max	.001	2	.005	2	0	9	1.037e-3	4	NC	1	NC	1
144			min	-.002	3	-.006	3	-.003	5	-6.759e-6	9	8206.357	2	NC	1
145		16	max	0	2	.004	2	0	9	1.058e-3	4	NC	1	NC	1
146			min	-.002	3	-.005	3	-.002	4	-7.254e-6	9	NC	1	NC	1
147		17	max	0	2	.002	2	0	9	1.08e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.002	4	-7.749e-6	9	NC	1	NC	1
149		18	max	0	2	.001	2	0	9	1.101e-3	4	NC	1	NC	1
150			min	0	3	-.002	3	0	4	-8.244e-6	9	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.123e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-8.74e-6	9	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	4.105e-6	9	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.288e-4	4	NC	1	NC	1
155		2	max	0	3	.001	2	.003	4	3.69e-6	9	NC	1	NC	1
156			min	0	2	-.002	3	0	9	-5.216e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.002	2	.005	4	3.275e-6	9	NC	1	NC	1
158			min	0	2	-.004	3	0	9	-5.144e-4	4	NC	1	NC	1
159		4	max	0	3	.004	2	.008	4	2.86e-6	9	NC	1	NC	1
160			min	-.001	2	-.005	3	0	9	-5.072e-4	4	NC	1	NC	1
161		5	max	.001	3	.005	2	.011	4	2.446e-6	9	NC	1	NC	1
162			min	-.001	2	-.007	3	0	9	-5.e-4	4	9797.753	2	NC	1
163		6	max	.001	3	.006	2	.013	4	2.34e-5	3	NC	1	NC	1
164			min	-.002	2	-.009	3	0	9	-4.928e-4	4	7844.36	2	NC	1
165		7	max	.002	3	.007	2	.016	4	5.039e-5	3	NC	1	NC	1
166			min	-.002	2	-.011	3	0	9	-4.856e-4	4	6504.851	2	NC	1
167		8	max	.002	3	.008	2	.018	4	7.737e-5	3	NC	1	NC	1
168			min	-.003	2	-.012	3	0	9	-4.784e-4	4	5520.52	2	NC	1
169		9	max	.002	3	.01	2	.021	4	1.044e-4	3	NC	3	NC	1
170			min	-.003	2	-.014	3	0	9	-4.711e-4	4	4762.531	2	NC	1
171		10	max	.003	3	.011	2	.023	4	1.313e-4	3	NC	3	NC	1
172			min	-.003	2	-.015	3	0	9	-4.639e-4	4	4159.454	2	NC	1
173		11	max	.003	3	.013	2	.025	4	1.583e-4	3	NC	3	NC	1
174			min	-.004	2	-.016	3	0	9	-4.567e-4	4	3668.333	2	NC	1
175		12	max	.003	3	.014	2	.027	4	1.853e-4	3	NC	3	NC	1
176			min	-.004	2	-.018	3	0	9	-4.495e-4	4	3261.587	2	NC	1
177		13	max	.004	3	.016	2	.029	4	2.123e-4	3	NC	3	NC	1
178			min	-.004	2	-.019	3	0	9	-4.423e-4	4	2920.53	2	NC	1
179		14	max	.004	3	.018	2	.031	4	2.393e-4	3	NC	3	NC	1
180			min	-.005	2	-.02	3	0	9	-4.351e-4	4	2631.912	2	NC	1
181		15	max	.004	3	.019	2	.033	4	2.663e-4	3	NC	3	NC	1
182			min	-.005	2	-.021	3	0	9	-4.279e-4	4	2385.981	2	NC	1
183		16	max	.004	3	.021	2	.035	4	2.933e-4	3	NC	3	NC	1
184			min	-.005	2	-.022	3	0	9	-4.207e-4	4	2175.342	2	NC	1
185		17	max	.005	3	.023	2	.036	4	3.202e-4	3	NC	3	NC	1
186			min	-.006	2	-.022	3	0	9	-4.134e-4	4	1994.25	2	NC	1
187		18	max	.005	3	.025	2	.038	4	3.472e-4	3	NC	3	NC	1
188			min	-.006	2	-.023	3	0	9	-4.062e-4	4	1838.159	2	NC	1
189		19	max	.005	3	.027	2	.04	4	3.742e-4	3	NC	3	NC	1
190			min	-.006	2	-.024	3	0	9	-3.99e-4	4	1703.427	2	NC	1
191	M8	1	max	.003	2	.032	2	0	9	2.457e-3	4	NC	1	NC	1
192			min	0	3	-.027	3	-.041	4	-2.665e-4	3	NC	1	469.024	4
193		2	max	.003	2	.03	2	0	9	2.457e-3	4	NC	1	NC	1
194			min	0	3	-.025	3	-.038	4	-2.665e-4	3	NC	1	511.212	4
195		3	max	.003	2	.029	2	0	9	2.457e-3	4	NC	1	NC	1
196			min	0	3	-.024	3	-.034	4	-2.665e-4	3	NC	1	561.413	4
197		4	max	.003	2	.027	2	0	9	2.457e-3	4	NC	1	NC	1
198			min	0	3	-.022	3	-.031	4	-2.665e-4	3	NC	1	621.738	4
199		5	max	.003	2	.025	2	0	9	2.457e-3	4	NC	1	NC	1
200			min	0	3	-.021	3	-.028	4	-2.665e-4	3	NC	1	695.06	4
201		6	max	.002	2	.023	2	0	9	2.457e-3	4	NC	1	NC	1
202			min	0	3	-.019	3	-.025	4	-2.665e-4	3	NC	1	785.377	4
203		7	max	.002	2	.021	2	0	9	2.457e-3	4	NC	1	NC	1
204			min	0	3	-.018	3	-.022	4	-2.665e-4	3	NC	1	898.38	4
205		8	max	.002	2	.02	2	0	9	2.457e-3	4	NC	1	NC	1
206			min	0	3	-.016	3	-.019	4	-2.665e-4	3	NC	1	1042.403	4
207		9	max	.002	2	.018	2	0	9	2.457e-3	4	NC	1	NC	1
208			min	0	3	-.015	3	-.016	4	-2.665e-4	3	NC	1	1230.049	4
209		10	max	.002	2	.016	2	0	9	2.457e-3	4	NC	1	NC	1
210			min	0	3	-.013	3	-.013	4	-2.665e-4	3	NC	1	1481.13	4
211		11	max	.001	2	.014	2	0	9	2.457e-3	4	NC	1	NC	1
212			min	0	3	-.012	3	-.011	4	-2.665e-4	3	NC	1	1828.269	4
213		12	max	.001	2	.013	2	0	9	2.457e-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	-.01	3	-.008	4	-2.665e-4	3	NC	1	2328.37	4
215		13	max	.001	2	.011	2	0	9	2.457e-3	4	NC	1	NC	1
216			min	0	3	-.009	3	-.006	4	-2.665e-4	3	NC	1	3088.157	4
217		14	max	0	2	.009	2	0	9	2.457e-3	4	NC	1	NC	1
218			min	0	3	-.007	3	-.004	4	-2.665e-4	3	NC	1	4327.749	4
219		15	max	0	2	.007	2	0	9	2.457e-3	4	NC	1	NC	1
220			min	0	3	-.006	3	-.003	4	-2.665e-4	3	NC	1	6564.238	4
221		16	max	0	2	.005	2	0	9	2.457e-3	4	NC	1	NC	1
222			min	0	3	-.004	3	-.002	4	-2.665e-4	3	NC	1	NC	1
223		17	max	0	2	.004	2	0	9	2.457e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	0	4	-2.665e-4	3	NC	1	NC	1
225		18	max	0	2	.002	2	0	9	2.457e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-2.665e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	2.457e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.665e-4	3	NC	1	NC	1
229	M10	1	max	.002	2	.01	2	0	10	1.534e-4	1	NC	3	NC	1
230			min	-.003	3	-.009	3	-.005	4	-6.112e-4	3	4122.393	2	NC	1
231		2	max	.002	2	.009	2	0	10	1.495e-4	14	NC	3	NC	1
232			min	-.002	3	-.009	3	-.005	4	-5.9e-4	3	4497.265	2	NC	1
233		3	max	.002	2	.008	2	0	10	1.931e-4	4	NC	3	NC	1
234			min	-.002	3	-.009	3	-.005	4	-5.689e-4	3	4942.752	2	NC	1
235		4	max	.002	2	.007	2	0	10	2.385e-4	4	NC	1	NC	1
236			min	-.002	3	-.008	3	-.005	4	-5.477e-4	3	5475.81	2	NC	1
237		5	max	.001	2	.006	2	0	3	2.839e-4	4	NC	1	NC	1
238			min	-.002	3	-.008	3	-.005	4	-5.266e-4	3	6119.009	2	NC	1
239		6	max	.001	2	.006	2	0	3	3.292e-4	4	NC	1	NC	1
240			min	-.002	3	-.008	3	-.005	4	-5.054e-4	3	6902.886	2	NC	1
241		7	max	.001	2	.005	2	0	3	3.746e-4	4	NC	1	NC	1
242			min	-.002	3	-.007	3	-.005	4	-4.843e-4	3	7869.544	2	NC	1
243		8	max	.001	2	.004	2	0	3	4.2e-4	4	NC	1	NC	1
244			min	-.002	3	-.007	3	-.005	4	-4.631e-4	3	9078.318	2	NC	1
245		9	max	.001	2	.004	2	0	3	4.653e-4	4	NC	1	NC	1
246			min	-.001	3	-.006	3	-.005	4	-4.42e-4	3	NC	1	NC	1
247		10	max	0	2	.003	2	0	3	5.107e-4	4	NC	1	NC	1
248			min	-.001	3	-.006	3	-.004	4	-4.208e-4	3	NC	1	NC	1
249		11	max	0	2	.003	2	0	3	5.561e-4	4	NC	1	NC	1
250			min	-.001	3	-.005	3	-.004	4	-3.997e-4	3	NC	1	NC	1
251		12	max	0	2	.002	2	0	3	6.014e-4	4	NC	1	NC	1
252			min	0	3	-.005	3	-.004	4	-3.785e-4	3	NC	1	NC	1
253		13	max	0	2	.002	2	0	3	6.468e-4	4	NC	1	NC	1
254			min	0	3	-.004	3	-.003	4	-3.574e-4	3	NC	1	NC	1
255		14	max	0	2	.001	2	0	3	6.921e-4	4	NC	1	NC	1
256			min	0	3	-.003	3	-.003	4	-3.362e-4	3	NC	1	NC	1
257		15	max	0	2	0	2	0	3	7.375e-4	4	NC	1	NC	1
258			min	0	3	-.003	3	-.002	4	-3.15e-4	3	NC	1	NC	1
259		16	max	0	2	0	2	0	3	7.829e-4	4	NC	1	NC	1
260			min	0	3	-.002	3	-.002	4	-2.939e-4	3	NC	1	NC	1
261		17	max	0	2	0	2	0	3	8.282e-4	4	NC	1	NC	1
262			min	0	3	-.001	3	-.001	4	-2.727e-4	3	NC	1	NC	1
263		18	max	0	2	0	2	0	3	8.736e-4	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-2.516e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	9.19e-4	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.304e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	1.088e-4	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-4.331e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.002	4	8.295e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-4.626e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.004	4	5.71e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-4.92e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.007	4	3.125e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-5.214e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.009	4	6.278e-6	10	NC	1	NC	1
276			min	0	2	-.003	3	-.002	3	-5.508e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.011	4	7.27e-6	10	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-5.803e-4	4	NC	1	NC	1
279		7	max	0	3	0	2	.013	4	8.263e-6	10	NC	1	NC	1
280			min	0	2	-.005	3	-.002	3	-6.097e-4	4	NC	1	NC	1
281		8	max	0	3	0	2	.015	4	9.256e-6	10	NC	1	NC	1
282			min	0	2	-.006	3	-.003	3	-6.391e-4	4	NC	1	NC	1
283		9	max	0	3	.001	2	.018	5	1.025e-5	10	NC	1	NC	1
284			min	-.001	2	-.006	3	-.003	3	-6.686e-4	4	NC	1	NC	1
285		10	max	.001	3	.002	2	.02	5	1.124e-5	10	NC	1	NC	1
286			min	-.001	2	-.007	3	-.003	3	-6.98e-4	4	NC	1	NC	1
287		11	max	.001	3	.002	2	.022	5	1.223e-5	10	NC	1	NC	1
288			min	-.001	2	-.007	3	-.003	3	-7.274e-4	4	NC	1	NC	1
289		12	max	.001	3	.003	2	.023	5	1.323e-5	10	NC	1	NC	1
290			min	-.001	2	-.008	3	-.003	3	-7.569e-4	4	NC	1	NC	1
291		13	max	.001	3	.004	2	.025	5	1.422e-5	10	NC	1	NC	1
292			min	-.002	2	-.008	3	-.003	3	-7.863e-4	4	NC	1	NC	1
293		14	max	.002	3	.004	2	.027	5	1.521e-5	10	NC	1	NC	1
294			min	-.002	2	-.008	3	-.003	3	-8.157e-4	4	NC	1	NC	1
295		15	max	.002	3	.005	2	.029	5	1.621e-5	10	NC	1	NC	1
296			min	-.002	2	-.008	3	-.003	3	-8.451e-4	4	8967.407	2	NC	1
297		16	max	.002	3	.006	2	.03	5	1.72e-5	10	NC	1	NC	1
298			min	-.002	2	-.009	3	-.003	3	-8.746e-4	4	7600.752	2	NC	1
299		17	max	.002	3	.007	2	.032	5	1.819e-5	10	NC	1	NC	1
300			min	-.002	2	-.009	3	-.003	3	-9.04e-4	4	6542.49	2	NC	1
301		18	max	.002	3	.008	2	.033	5	1.918e-5	10	NC	1	NC	1
302			min	-.002	2	-.009	3	-.003	3	-9.334e-4	4	5713.922	2	NC	1
303		19	max	.002	3	.009	2	.035	5	2.018e-5	10	NC	3	NC	1
304			min	-.002	2	-.009	3	-.002	3	-9.629e-4	4	5059.538	2	NC	1
305	M12	1	max	.001	1	.011	2	.001	3	2.957e-3	4	NC	1	NC	1
306			min	0	5	-.01	3	-.038	5	-2.353e-5	10	NC	1	507.228	5
307		2	max	.001	1	.01	2	.001	3	2.957e-3	4	NC	1	NC	1
308			min	0	5	-.009	3	-.035	5	-2.353e-5	10	NC	1	552.837	5
309		3	max	0	1	.01	2	.001	3	2.957e-3	4	NC	1	NC	1
310			min	0	5	-.009	3	-.032	5	-2.353e-5	10	NC	1	607.106	5
311		4	max	0	1	.009	2	.001	3	2.957e-3	4	NC	1	NC	1
312			min	0	5	-.008	3	-.029	5	-2.353e-5	10	NC	1	672.317	5
313		5	max	0	1	.008	2	0	3	2.957e-3	4	NC	1	NC	1
314			min	0	5	-.008	3	-.026	5	-2.353e-5	10	NC	1	751.576	5
315		6	max	0	1	.008	2	0	3	2.957e-3	4	NC	1	NC	1
316			min	0	5	-.007	3	-.023	5	-2.353e-5	10	NC	1	849.203	5
317		7	max	0	1	.007	2	0	3	2.957e-3	4	NC	1	NC	1
318			min	0	5	-.006	3	-.02	5	-2.353e-5	10	NC	1	971.349	5
319		8	max	0	1	.007	2	0	3	2.957e-3	4	NC	1	NC	1
320			min	0	5	-.006	3	-.017	5	-2.353e-5	10	NC	1	1127.02	5
321		9	max	0	1	.006	2	0	3	2.957e-3	4	NC	1	NC	1
322			min	0	5	-.005	3	-.015	5	-2.353e-5	10	NC	1	1329.838	5
323		10	max	0	1	.005	2	0	3	2.957e-3	4	NC	1	NC	1
324			min	0	5	-.005	3	-.012	5	-2.353e-5	10	NC	1	1601.211	5
325		11	max	0	1	.005	2	0	3	2.957e-3	4	NC	1	NC	1
326			min	0	5	-.004	3	-.01	5	-2.353e-5	10	NC	1	1976.397	5
327		12	max	0	1	.004	2	0	3	2.957e-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
328			min	0	5	-.004	3	-.008	5	-2.353e-5	10	NC	1	2516.888	5
329		13	max	0	1	.004	2	0	3	2.957e-3	4	NC	1	NC	1
330			min	0	5	-.003	3	-.006	5	-2.353e-5	10	NC	1	3338.017	5
331		14	max	0	1	.003	2	0	3	2.957e-3	4	NC	1	NC	1
332			min	0	5	-.003	3	-.004	5	-2.353e-5	10	NC	1	4677.652	5
333		15	max	0	1	.002	2	0	3	2.957e-3	4	NC	1	NC	1
334			min	0	5	-.002	3	-.003	5	-2.353e-5	10	NC	1	7094.572	5
335		16	max	0	1	.002	2	0	3	2.957e-3	4	NC	1	NC	1
336			min	0	5	-.002	3	-.002	5	-2.353e-5	10	NC	1	NC	1
337		17	max	0	1	.001	2	0	3	2.957e-3	4	NC	1	NC	1
338			min	0	5	-.001	3	0	5	-2.353e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	3	2.957e-3	4	NC	1	NC	1
340			min	0	5	0	3	0	5	-2.353e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	2.957e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	-2.353e-5	10	NC	1	NC	1
343	M1	1	max	.009	3	.025	3	.006	5	4.387e-3	2	NC	1	NC	1
344			min	-.009	2	-.02	2	0	9	-6.466e-3	3	NC	1	NC	1
345		2	max	.009	3	.015	3	.007	5	2.176e-3	2	NC	4	NC	1
346			min	-.009	2	-.012	2	0	9	-3.175e-3	3	4682.487	3	NC	1
347		3	max	.009	3	.005	3	.009	5	2.312e-4	5	NC	4	NC	1
348			min	-.009	2	-.004	2	-.001	9	-6.662e-5	1	2425.122	3	NC	1
349		4	max	.009	3	.003	2	.01	5	2.296e-4	5	NC	4	NC	1
350			min	-.009	2	-.003	3	-.001	9	-5.589e-5	9	1727.342	3	9643.925	5
351		5	max	.009	3	.01	2	.012	5	2.28e-4	5	NC	4	NC	1
352			min	-.009	2	-.009	3	-.002	9	-4.528e-5	9	1394.493	3	6808.228	5
353		6	max	.009	3	.015	2	.015	5	2.264e-4	5	NC	4	NC	1
354			min	-.009	2	-.015	3	-.001	9	-3.467e-5	9	1208.627	3	5175.929	5
355		7	max	.009	3	.019	2	.017	5	2.248e-4	5	NC	4	NC	1
356			min	-.009	2	-.019	3	-.001	9	-2.405e-5	9	1098.505	3	4132.354	5
357		8	max	.009	3	.022	2	.019	5	2.232e-4	5	NC	4	NC	1
358			min	-.009	2	-.022	3	0	9	-1.344e-5	9	1034.69	3	3417.477	5
359		9	max	.008	3	.024	2	.022	5	2.225e-4	4	NC	4	NC	1
360			min	-.009	2	-.023	3	0	9	-2.824e-6	9	983.364	2	2903.252	5
361		10	max	.008	3	.025	2	.024	4	2.245e-4	4	NC	4	NC	1
362			min	-.009	2	-.024	3	0	9	-3.365e-6	10	957.729	2	2507.374	4
363		11	max	.008	3	.025	2	.027	4	2.265e-4	4	NC	4	NC	1
364			min	-.009	2	-.023	3	0	10	-6.021e-6	10	956.726	2	2202.231	4
365		12	max	.008	3	.023	2	.029	4	2.285e-4	4	NC	4	NC	1
366			min	-.009	2	-.021	3	0	10	-8.676e-6	10	981.323	2	1966.177	4
367		13	max	.008	3	.02	2	.032	4	2.305e-4	4	NC	4	NC	1
368			min	-.009	2	-.018	3	0	10	-1.133e-5	10	1036.957	2	1780.545	4
369		14	max	.008	3	.016	2	.034	4	2.324e-4	4	NC	4	NC	1
370			min	-.009	2	-.014	3	0	10	-1.399e-5	10	1136.333	2	1632.84	4
371		15	max	.008	3	.01	2	.036	4	2.344e-4	4	NC	4	NC	1
372			min	-.009	2	-.009	3	0	10	-1.664e-5	10	1307.493	2	1514.461	4
373		16	max	.008	3	.003	2	.038	4	3.782e-4	4	NC	4	NC	1
374			min	-.009	2	-.003	3	0	10	-1.861e-5	10	1619.419	2	1419.342	4
375		17	max	.008	3	.005	3	.04	4	3.895e-3	4	NC	4	NC	1
376			min	-.009	2	-.006	2	0	10	-4.315e-6	10	2295.936	2	1343.255	4
377		18	max	.008	3	.013	3	.042	4	3.143e-3	2	NC	4	NC	1
378			min	-.009	2	-.016	2	0	10	-1.769e-3	3	4451.185	2	1282.806	4
379		19	max	.008	3	.021	3	.043	4	6.346e-3	2	NC	1	NC	1
380			min	-.009	2	-.027	2	0	9	-3.663e-3	3	NC	1	1237.133	4
381	M5	1	max	.024	3	.074	3	.005	5	2.175e-5	4	NC	1	NC	1
382			min	-.026	2	-.061	2	0	9	8.116e-8	11	NC	1	NC	1
383		2	max	.024	3	.044	3	.007	5	1.52e-4	3	NC	4	NC	1
384			min	-.026	2	-.035	2	0	9	-4.843e-6	9	1564.72	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.024	3	.015	3	.008	5	2.865e-4	3	NC	5	NC	1
386			min	-.026	2	-.011	2	0	9	-9.67e-6	9	811.08	3	NC	1
387		4	max	.024	3	.01	2	.01	5	2.765e-4	3	NC	5	NC	1
388			min	-.026	2	-.009	3	0	9	-9.109e-6	9	578.839	3	NC	1
389		5	max	.024	3	.029	2	.013	5	2.665e-4	3	NC	5	NC	1
390			min	-.026	2	-.029	3	0	9	-8.549e-6	9	468.261	3	8682.252	3
391		6	max	.024	3	.045	2	.015	5	2.565e-4	3	NC	5	NC	1
392			min	-.026	2	-.045	3	0	9	-7.989e-6	9	406.697	3	7852.586	3
393		7	max	.024	3	.057	2	.018	5	2.465e-4	3	NC	5	NC	1
394			min	-.026	2	-.057	3	0	9	-7.428e-6	9	370.419	3	7481.498	3
395		8	max	.024	3	.067	2	.02	4	2.395e-4	5	NC	5	NC	1
396			min	-.026	2	-.065	3	0	9	-6.868e-6	9	344.087	2	7417.95	3
397		9	max	.024	3	.073	2	.023	4	2.457e-4	5	NC	5	NC	1
398			min	-.026	2	-.07	3	0	9	-6.307e-6	9	326.437	2	7606.705	3
399		10	max	.023	3	.076	2	.026	4	2.521e-4	4	NC	5	NC	1
400			min	-.026	2	-.071	3	0	9	-5.747e-6	9	317.945	2	8044.483	3
401		11	max	.023	3	.075	2	.028	4	2.586e-4	4	NC	5	NC	1
402			min	-.026	2	-.068	3	0	9	-5.186e-6	9	317.639	2	8769.866	3
403		12	max	.023	3	.07	2	.031	4	2.651e-4	4	NC	5	NC	1
404			min	-.026	2	-.063	3	0	9	-4.626e-6	9	325.841	2	9871.839	3
405		13	max	.023	3	.061	2	.033	4	2.716e-4	4	NC	5	NC	1
406			min	-.026	2	-.054	3	0	9	-4.066e-6	9	344.357	2	NC	1
407		14	max	.023	3	.048	2	.036	4	2.781e-4	4	NC	5	NC	1
408			min	-.026	2	-.041	3	0	9	-3.505e-6	9	377.406	2	NC	1
409		15	max	.023	3	.03	2	.038	4	2.846e-4	4	NC	5	NC	1
410			min	-.026	2	-.026	3	0	9	-2.945e-6	9	434.296	2	NC	1
411		16	max	.023	3	.008	2	.04	4	4.307e-4	4	NC	5	NC	1
412			min	-.026	2	-.008	3	0	9	-2.835e-6	9	537.904	2	NC	1
413		17	max	.023	3	.013	3	.041	4	3.898e-3	4	NC	4	NC	1
414			min	-.026	2	-.018	2	0	9	-1.345e-5	9	762.317	2	NC	1
415		18	max	.023	3	.036	3	.042	4	2.003e-3	4	NC	4	NC	1
416			min	-.026	2	-.049	2	0	9	-6.934e-6	9	1477.873	2	NC	1
417		19	max	.023	3	.06	3	.043	4	7.233e-6	5	NC	1	NC	1
418			min	-.026	2	-.082	2	0	9	-2.474e-6	3	NC	1	NC	1
419	M9	1	max	.009	3	.024	3	.005	5	6.495e-3	3	NC	1	NC	1
420			min	-.009	2	-.02	2	0	9	-4.387e-3	2	NC	1	NC	1
421		2	max	.009	3	.014	3	.005	4	3.193e-3	3	NC	4	NC	1
422			min	-.009	2	-.012	2	0	10	-2.175e-3	2	4685.074	3	NC	1
423		3	max	.009	3	.004	3	.005	4	6.686e-5	1	NC	4	NC	1
424			min	-.009	2	-.004	2	0	10	-4.858e-5	3	2426.48	3	NC	1
425		4	max	.009	3	.003	2	.005	4	5.471e-5	1	NC	4	NC	1
426			min	-.009	2	-.004	3	-.001	3	-5.463e-5	3	1728.276	3	NC	1
427		5	max	.009	3	.01	2	.006	4	4.256e-5	1	NC	4	NC	1
428			min	-.009	2	-.01	3	-.002	3	-6.068e-5	3	1395.184	3	8527.891	3
429		6	max	.009	3	.015	2	.008	4	3.04e-5	1	NC	4	NC	1
430			min	-.009	2	-.016	3	-.003	3	-6.673e-5	3	1209.158	3	7413.209	3
431		7	max	.009	3	.019	2	.01	4	1.825e-5	1	NC	4	NC	1
432			min	-.009	2	-.02	3	-.004	3	-7.278e-5	3	1098.921	3	6770.113	3
433		8	max	.009	3	.022	2	.012	4	6.099e-6	1	NC	4	NC	1
434			min	-.009	2	-.022	3	-.005	3	-7.883e-5	3	1035.015	3	6413.962	3
435		9	max	.009	3	.024	2	.014	4	8.527e-7	10	NC	4	NC	1
436			min	-.009	2	-.024	3	-.005	3	-8.488e-5	3	983.61	2	5080.641	4
437		10	max	.009	3	.025	2	.017	4	3.499e-6	10	NC	4	NC	1
438			min	-.009	2	-.024	3	-.005	3	-9.093e-5	3	957.977	2	3947.458	4
439		11	max	.009	3	.025	2	.02	5	6.146e-6	10	NC	4	NC	1
440			min	-.009	2	-.024	3	-.005	3	-9.697e-5	3	956.98	2	3188.478	4
441		12	max	.008	3	.023	2	.023	5	8.792e-6	10	NC	4	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
442			min	-.009	2	-.022	3	-.005	3	-1.03e-4	3	981.59	2	2643.576	5
443		13	max	.008	3	.02	2	.026	5	1.144e-5	10	NC	4	NC	1
444			min	-.009	2	-.018	3	-.004	3	-1.091e-4	3	1037.245	2	2248.068	5
445		14	max	.008	3	.016	2	.029	5	1.409e-5	10	NC	4	NC	1
446			min	-.009	2	-.014	3	-.004	3	-1.151e-4	3	1136.653	2	1954.252	5
447		15	max	.008	3	.01	2	.032	5	1.673e-5	10	NC	4	NC	1
448			min	-.009	2	-.009	3	-.003	3	-1.212e-4	3	1307.864	2	1730.738	5
449		16	max	.008	3	.003	2	.035	5	1.716e-4	5	NC	4	NC	1
450			min	-.009	2	-.003	3	-.002	3	-1.181e-4	3	1619.872	2	1557.691	5
451		17	max	.008	3	.005	3	.038	5	3.923e-3	4	NC	4	NC	1
452			min	-.009	2	-.006	2	-.001	3	-3.241e-5	9	2296.535	2	1421.978	5
453		18	max	.008	3	.013	3	.041	5	1.954e-3	5	NC	4	NC	1
454			min	-.009	2	-.016	2	0	9	-3.143e-3	2	4452.309	2	1313.014	4
455		19	max	.008	3	.021	3	.043	4	3.658e-3	3	NC	1	NC	1
456			min	-.009	2	-.027	2	0	9	-6.346e-3	2	NC	1	1222.363	4
457	M13	1	max	0	9	.024	3	.009	3	3.847e-3	3	NC	1	NC	1
458			min	-.005	5	-.02	2	-.009	2	-3.22e-3	2	NC	1	NC	1
459		2	max	0	9	.051	3	.007	3	4.711e-3	3	NC	4	NC	1
460			min	-.005	5	-.039	2	-.009	2	-3.939e-3	2	2861.693	3	NC	1
461		3	max	0	9	.075	3	.007	3	5.575e-3	3	NC	4	NC	1
462			min	-.005	5	-.055	2	-.01	2	-4.658e-3	2	1538.449	3	NC	1
463		4	max	0	9	.092	3	.008	3	6.439e-3	3	NC	4	NC	1
464			min	-.005	5	-.067	2	-.011	2	-5.377e-3	2	1152.113	3	NC	1
465		5	max	0	9	.101	3	.01	3	7.303e-3	3	NC	4	NC	1
466			min	-.005	5	-.074	2	-.013	2	-6.096e-3	2	1014.02	3	NC	1
467		6	max	0	9	.103	3	.013	3	8.167e-3	3	NC	4	NC	1
468			min	-.005	5	-.076	2	-.016	2	-6.815e-3	2	996.018	3	NC	1
469		7	max	0	9	.097	3	.016	3	9.031e-3	3	NC	4	NC	1
470			min	-.005	5	-.074	2	-.019	2	-7.534e-3	2	1066.805	3	7385.002	2
471		8	max	0	9	.088	3	.019	3	9.894e-3	3	NC	4	NC	1
472			min	-.005	5	-.069	2	-.023	2	-8.253e-3	2	1221.301	3	5666.724	2
473		9	max	0	9	.079	3	.021	3	1.076e-2	3	NC	4	NC	4
474			min	-.005	5	-.064	2	-.025	2	-8.972e-3	2	1434.119	3	4787.482	2
475		10	max	0	9	.074	3	.024	3	1.162e-2	3	NC	4	NC	4
476			min	-.005	5	-.061	2	-.026	2	-9.691e-3	2	1566.313	3	4495.843	2
477		11	max	0	9	.079	3	.025	3	1.076e-2	3	NC	4	NC	4
478			min	-.005	5	-.064	2	-.025	2	-8.972e-3	2	1434.118	3	4651.997	3
479		12	max	0	9	.089	3	.026	3	9.901e-3	3	NC	4	NC	1
480			min	-.005	5	-.069	2	-.023	2	-8.253e-3	2	1221.3	3	4619.707	3
481		13	max	0	9	.098	3	.025	3	9.041e-3	3	NC	4	NC	1
482			min	-.005	5	-.074	2	-.019	2	-7.534e-3	2	1066.803	3	4930.875	3
483		14	max	0	9	.103	3	.022	3	8.18e-3	3	NC	4	NC	1
484			min	-.005	5	-.076	2	-.016	2	-6.815e-3	2	996.017	3	5646.28	3
485		15	max	0	9	.102	3	.02	3	7.32e-3	3	NC	4	NC	1
486			min	-.005	5	-.074	2	-.013	2	-6.096e-3	2	1014.019	3	7001.638	3
487		16	max	0	9	.093	3	.017	3	6.46e-3	3	NC	4	NC	1
488			min	-.006	5	-.067	2	-.011	2	-5.377e-3	2	1152.112	3	9641.293	3
489		17	max	0	9	.076	3	.014	3	5.599e-3	3	NC	4	NC	1
490			min	-.006	5	-.055	2	-.01	2	-4.658e-3	2	1538.447	3	NC	1
491		18	max	0	9	.052	3	.011	3	4.739e-3	3	NC	4	NC	1
492			min	-.006	5	-.039	2	-.009	2	-3.94e-3	2	2861.691	3	NC	1
493		19	max	0	9	.025	3	.009	3	3.878e-3	3	NC	1	NC	1
494			min	-.006	5	-.02	2	-.009	2	-3.221e-3	2	NC	1	NC	1
495	M16	1	max	0	9	.021	3	.008	3	4.139e-3	2	NC	1	NC	1
496			min	-.043	4	-.027	2	-.009	2	-3.189e-3	3	NC	1	NC	1
497		2	max	0	9	.037	3	.011	3	5.065e-3	2	NC	4	NC	1
498			min	-.043	4	-.054	2	-.009	2	-3.854e-3	3	2918.088	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	9	.05	3	.013	3	5.99e-3	2	NC	4	NC	1
500			min	-.043	4	-.077	2	-.01	2	-4.52e-3	3	1563.589	2	NC	1
501		4	max	0	9	.061	3	.016	3	6.915e-3	2	NC	4	NC	1
502			min	-.043	4	-.094	2	-.011	2	-5.185e-3	3	1164.356	2	NC	1
503		5	max	0	9	.067	3	.019	3	7.841e-3	2	NC	4	NC	1
504			min	-.043	4	-.104	2	-.013	2	-5.851e-3	3	1016.082	2	7616.395	3
505		6	max	0	9	.07	3	.021	3	8.766e-3	2	NC	4	NC	1
506			min	-.043	4	-.106	2	-.016	2	-6.516e-3	3	985.693	2	6276.912	3
507		7	max	0	9	.069	3	.022	3	9.691e-3	2	NC	4	NC	1
508			min	-.043	4	-.103	2	-.019	2	-7.181e-3	3	1037.122	2	5533.582	3
509		8	max	0	9	.066	3	.023	3	1.062e-2	2	NC	4	NC	1
510			min	-.043	4	-.095	2	-.023	2	-7.847e-3	3	1158.819	2	5162.299	3
511		9	max	0	9	.062	3	.024	3	1.154e-2	2	NC	4	NC	4
512			min	-.043	4	-.086	2	-.025	2	-8.512e-3	3	1323.104	2	4799.915	2
513		10	max	0	9	.06	3	.023	3	1.247e-2	2	NC	4	NC	4
514			min	-.043	4	-.082	2	-.026	2	-9.178e-3	3	1422.11	2	4507.072	2
515		11	max	0	9	.062	3	.022	3	1.154e-2	2	NC	4	NC	4
516			min	-.043	4	-.086	2	-.025	2	-8.509e-3	3	1323.104	2	4799.92	2
517		12	max	0	9	.066	3	.02	3	1.062e-2	2	NC	4	NC	1
518			min	-.043	4	-.095	2	-.023	2	-7.84e-3	3	1158.819	2	5682.994	2
519		13	max	0	9	.069	3	.019	3	9.692e-3	2	NC	4	NC	1
520			min	-.043	4	-.103	2	-.019	2	-7.172e-3	3	1037.122	2	7409.664	2
521		14	max	0	9	.07	3	.017	3	8.767e-3	2	NC	4	NC	1
522			min	-.043	4	-.106	2	-.016	2	-6.503e-3	3	985.693	2	9340.417	3
523		15	max	0	9	.067	3	.015	3	7.842e-3	2	NC	4	NC	1
524			min	-.043	4	-.104	2	-.013	2	-5.834e-3	3	1016.082	2	NC	1
525		16	max	0	9	.06	3	.013	3	6.916e-3	2	NC	4	NC	1
526			min	-.043	4	-.094	2	-.011	2	-5.166e-3	3	1164.356	2	NC	1
527		17	max	0	9	.05	3	.011	3	5.991e-3	2	NC	4	NC	1
528			min	-.043	4	-.077	2	-.01	2	-4.497e-3	3	1563.589	2	NC	1
529		18	max	0	9	.036	3	.009	3	5.066e-3	2	NC	4	NC	1
530			min	-.043	4	-.054	2	-.009	2	-3.828e-3	3	2918.088	2	NC	1
531		19	max	0	9	.021	3	.008	3	4.141e-3	2	NC	1	NC	1
532			min	-.043	4	-.027	2	-.009	2	-3.16e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.029e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.878e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.003	4	7.52e-4	3	NC	1	NC	1
536			min	0	4	-.001	9	0	3	-5.913e-4	5	NC	1	NC	1
537		3	max	0	3	.001	5	.007	4	1.101e-3	3	NC	1	NC	1
538			min	0	4	-.002	9	-.003	3	-7.17e-4	2	NC	1	8118.028	4
539		4	max	0	3	.002	5	.011	4	1.45e-3	3	NC	1	NC	9
540			min	-.001	4	-.003	9	-.006	3	-1.055e-3	2	NC	1	4898.496	3
541		5	max	0	3	.003	5	.015	4	1.8e-3	3	NC	1	NC	9
542			min	-.001	4	-.004	9	-.011	3	-1.394e-3	2	NC	1	3218.588	3
543		6	max	0	3	.003	5	.019	4	2.149e-3	3	NC	1	NC	9
544			min	-.002	4	-.005	9	-.015	3	-1.732e-3	2	NC	1	2345.317	3
545		7	max	0	3	.004	5	.021	4	2.498e-3	3	NC	2	9118.507	9
546			min	-.002	4	-.005	9	-.02	3	-2.071e-3	2	8894.354	1	1834.411	3
547		8	max	0	3	.004	5	.023	4	2.847e-3	3	NC	2	7625.89	9
548			min	-.003	4	-.006	9	-.025	3	-2.409e-3	2	8213.097	1	1513.127	3
549		9	max	0	3	.005	5	.025	4	3.196e-3	3	NC	2	6638.772	9
550			min	-.003	4	-.006	9	-.03	3	-2.747e-3	2	7846.405	1	1302.832	3
551		10	max	.001	3	.005	5	.025	2	3.546e-3	3	NC	2	5985.086	9
552			min	-.003	4	-.006	9	-.033	3	-3.086e-3	2	7730.401	1	1164.02	3
553		11	max	.001	3	.005	5	.027	2	3.895e-3	3	NC	2	5573.88	9
554			min	-.004	4	-.006	9	-.035	3	-3.424e-3	2	7846.405	1	1075.948	3
555		12	max	.001	3	.005	5	.027	2	4.244e-3	3	NC	2	5361.073	9

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.004	4	-.006	9	-.036	3	-3.762e-3	2	8213.097	1	1028.328	3
557		13	max	.001	3	.006	5	.026	2	4.593e-3	3	NC	2	5793.455	15
558			min	-.004	4	-.006	9	-.035	3	-4.101e-3	2	8894.354	1	1018.185	3
559		14	max	.002	3	.006	5	.023	2	4.942e-3	3	NC	1	7520.666	15
560			min	-.005	4	-.005	9	-.032	3	-4.439e-3	2	NC	1	1049.971	3
561		15	max	.002	3	.006	5	.018	2	5.291e-3	3	NC	1	NC	15
562			min	-.005	4	-.004	9	-.026	3	-4.777e-3	2	NC	1	1140.011	3
563		16	max	.002	3	.006	5	.012	1	5.641e-3	3	NC	1	NC	5
564			min	-.005	4	-.003	9	-.017	3	-5.116e-3	2	NC	1	1332.619	3
565		17	max	.002	3	.006	5	.005	1	5.99e-3	3	NC	1	NC	4
566			min	-.006	4	-.002	9	-.005	3	-5.454e-3	2	NC	1	1766.815	3
567		18	max	.002	3	.006	2	.01	3	6.339e-3	3	NC	1	NC	4
568			min	-.006	4	-.001	9	-.012	2	-5.793e-3	2	8903.446	2	3145.849	3
569		19	max	.002	3	.008	2	.029	3	6.688e-3	3	NC	1	NC	1
570			min	-.007	4	0	9	-.027	2	-6.131e-3	2	6986.814	2	NC	1
571	M16A	1	max	.001	2	.003	2	.009	3	1.907e-3	3	NC	1	NC	1
572			min	-.002	4	-.004	4	-.009	2	-2.042e-3	2	NC	1	NC	1
573		2	max	.001	2	.001	2	.002	3	1.839e-3	3	NC	1	NC	1
574			min	-.002	4	-.006	4	-.004	2	-1.948e-3	2	NC	1	8617.222	3
575		3	max	.001	2	0	2	.002	1	1.771e-3	3	NC	1	NC	4
576			min	-.002	4	-.008	4	-.005	5	-1.853e-3	2	NC	1	4880.381	3
577		4	max	.001	2	-.001	2	.004	1	1.703e-3	3	NC	1	NC	4
578			min	-.002	4	-.011	4	-.008	5	-1.759e-3	2	7458.675	4	3716.027	3
579		5	max	.001	2	-.002	10	.006	1	1.634e-3	3	NC	1	NC	9
580			min	-.002	4	-.012	4	-.012	5	-1.665e-3	2	5820.08	4	3213.441	3
581		6	max	.001	2	-.003	10	.007	1	1.566e-3	3	NC	1	NC	9
582			min	-.002	4	-.014	4	-.015	5	-1.571e-3	2	4898.212	4	2996.655	3
583		7	max	0	2	-.004	10	.008	1	1.498e-3	3	NC	3	NC	9
584			min	-.002	4	-.015	4	-.018	5	-1.477e-3	2	4343.831	4	2948.281	3
585		8	max	0	2	-.004	12	.008	1	1.429e-3	3	NC	3	NC	9
586			min	-.001	4	-.016	4	-.021	5	-1.382e-3	2	4011.118	4	2803.313	5
587		9	max	0	2	-.004	12	.007	1	1.361e-3	3	NC	3	NC	9
588			min	-.001	4	-.017	4	-.023	5	-1.288e-3	2	3832.033	4	2539.544	5
589		10	max	0	2	-.004	12	.007	1	1.293e-3	3	NC	3	NC	9
590			min	-.001	4	-.017	4	-.024	5	-1.194e-3	2	3775.379	4	2414.166	5
591		11	max	0	2	-.004	12	.006	1	1.225e-3	3	NC	3	NC	9
592			min	-.001	4	-.016	4	-.024	5	-1.1e-3	2	3832.033	4	2400.223	5
593		12	max	0	2	-.004	12	.005	1	1.156e-3	3	NC	3	NC	9
594			min	0	4	-.015	4	-.023	5	-1.006e-3	2	4011.118	4	2495.512	5
595		13	max	0	2	-.004	12	.004	1	1.088e-3	3	NC	3	NC	1
596			min	0	4	-.014	4	-.021	5	-9.116e-4	2	4343.831	4	2721.848	5
597		14	max	0	2	-.003	12	.002	1	1.02e-3	3	NC	1	NC	1
598			min	0	4	-.012	4	-.018	5	-8.174e-4	2	4898.212	4	3137.389	5
599		15	max	0	2	-.003	12	.001	1	9.515e-4	3	NC	1	NC	1
600			min	0	4	-.01	4	-.015	5	-7.232e-4	2	5820.08	4	3876.234	5
601		16	max	0	2	-.002	12	0	9	8.832e-4	3	NC	1	NC	1
602			min	0	4	-.008	4	-.011	5	-6.29e-4	2	7458.675	4	5275.536	5
603		17	max	0	2	-.001	12	0	9	8.149e-4	3	NC	1	NC	1
604			min	0	4	-.006	4	-.007	5	-5.348e-4	2	NC	1	8400.308	5
605		18	max	0	2	0	12	0	3	8.588e-4	4	NC	1	NC	1
606			min	0	4	-.003	4	-.003	5	-4.407e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	9.166e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.465e-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

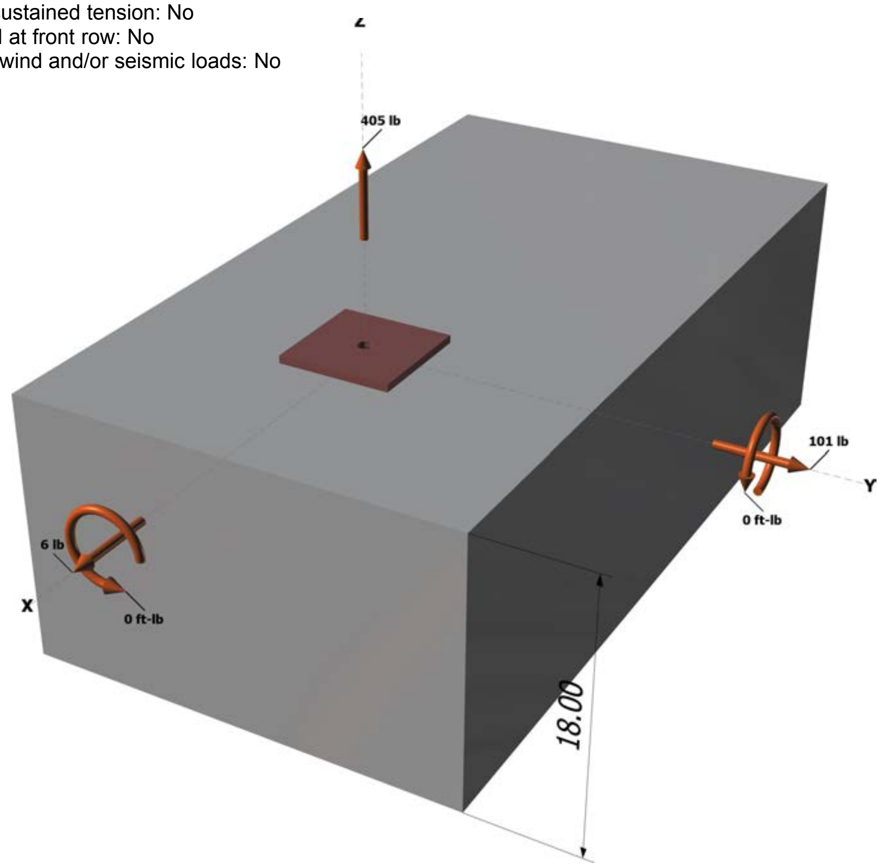
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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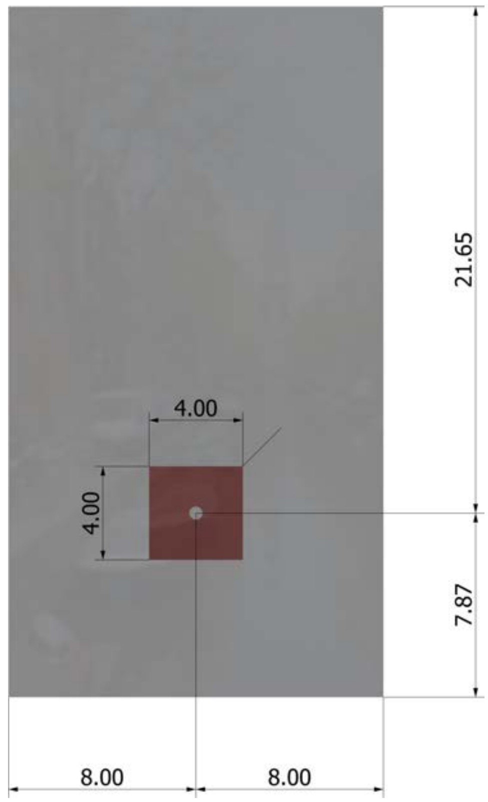


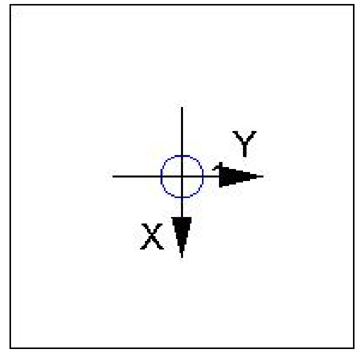
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

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

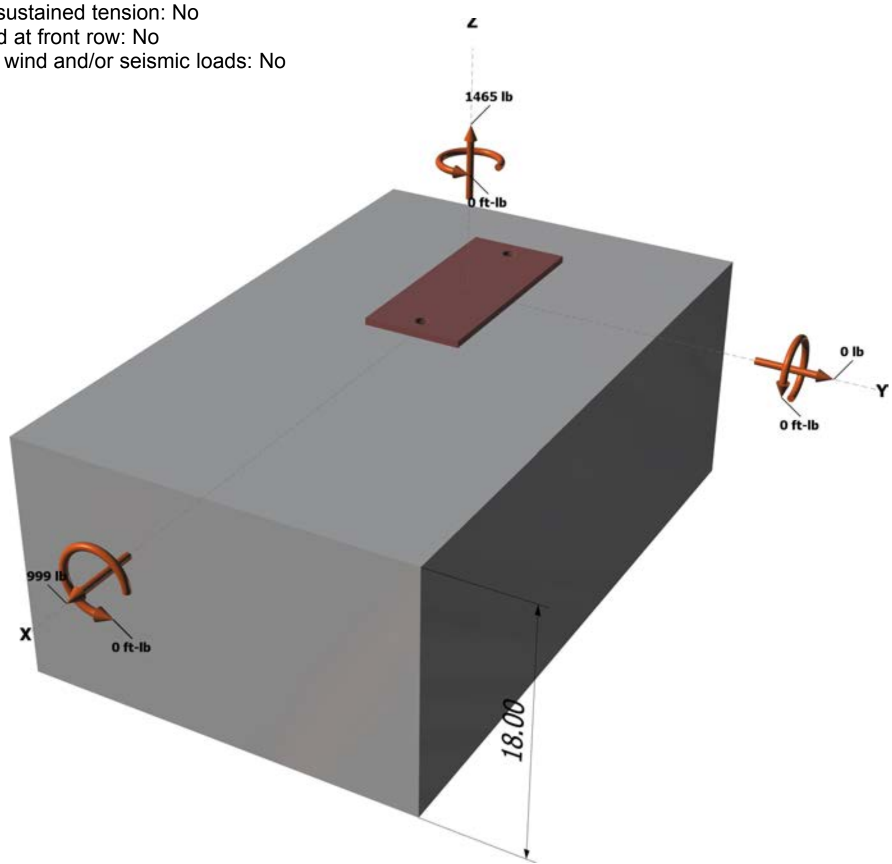
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

<Figure 1>

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

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



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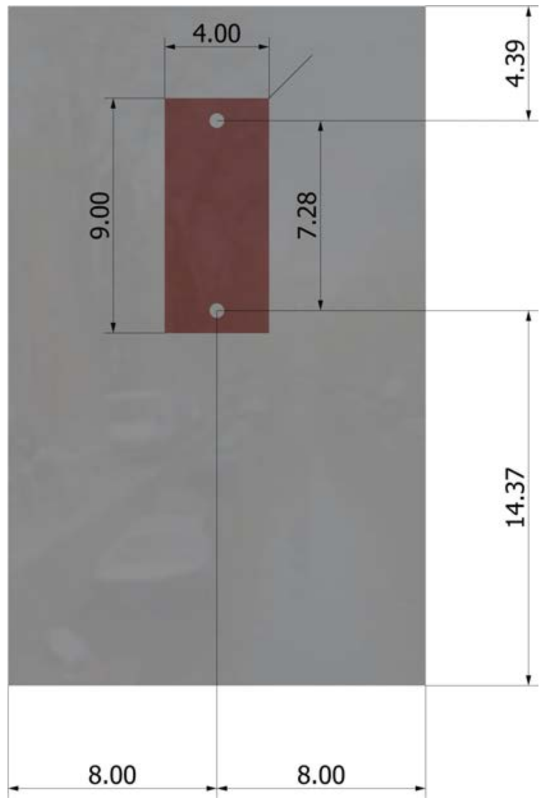


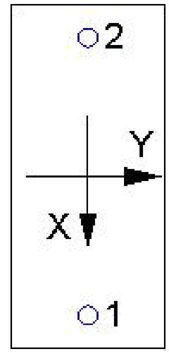
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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