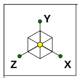
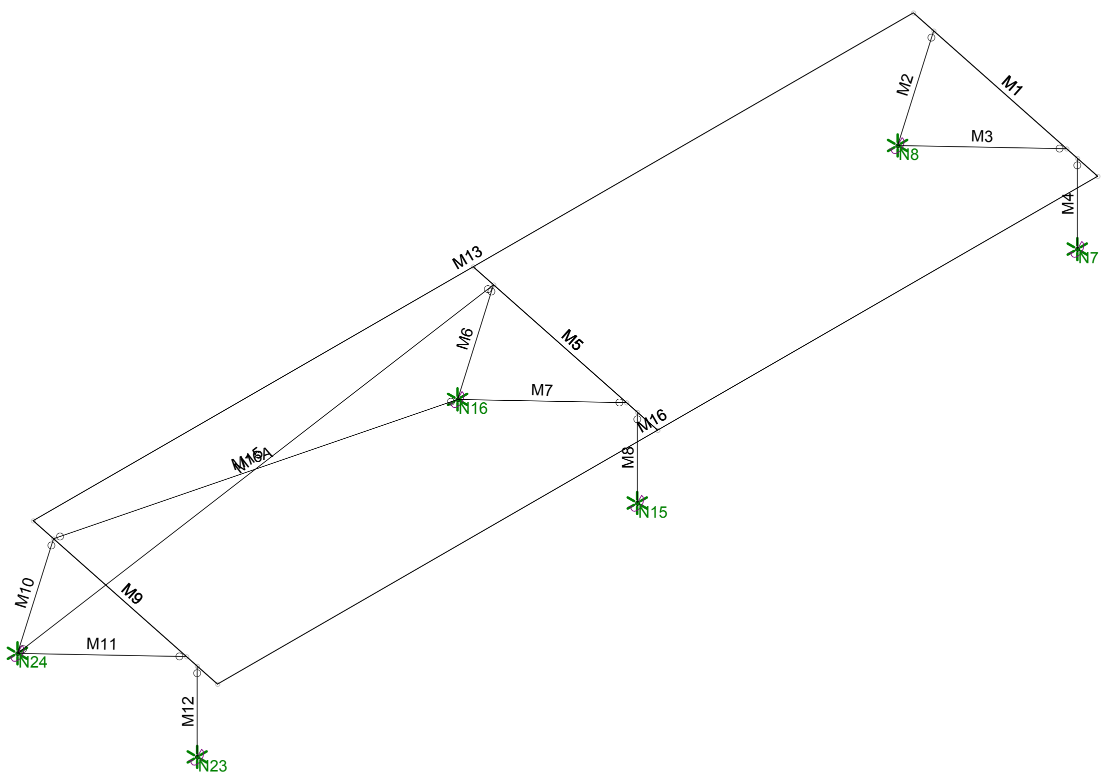




Schletter, Inc.		15° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

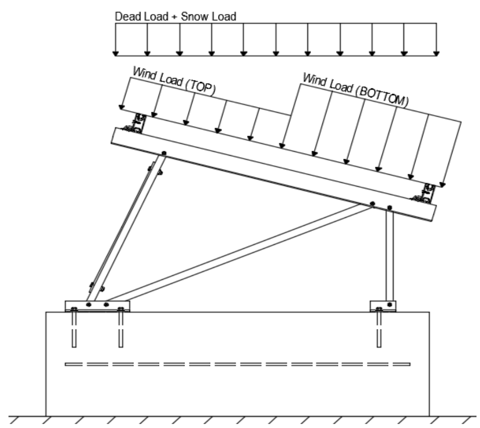
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 15°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 100 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer

Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

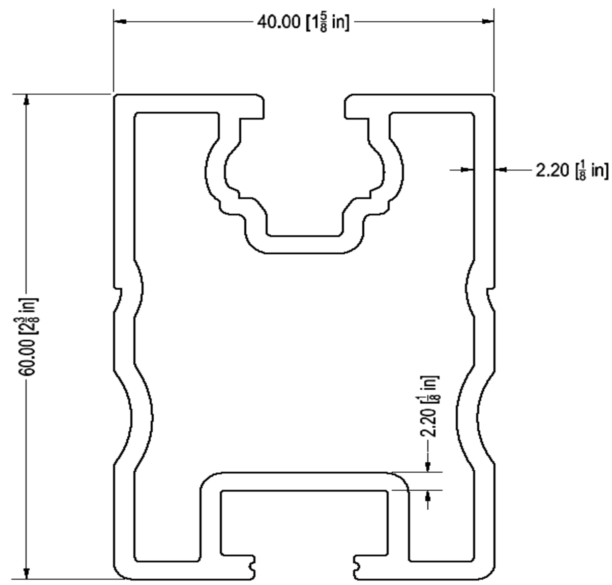
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

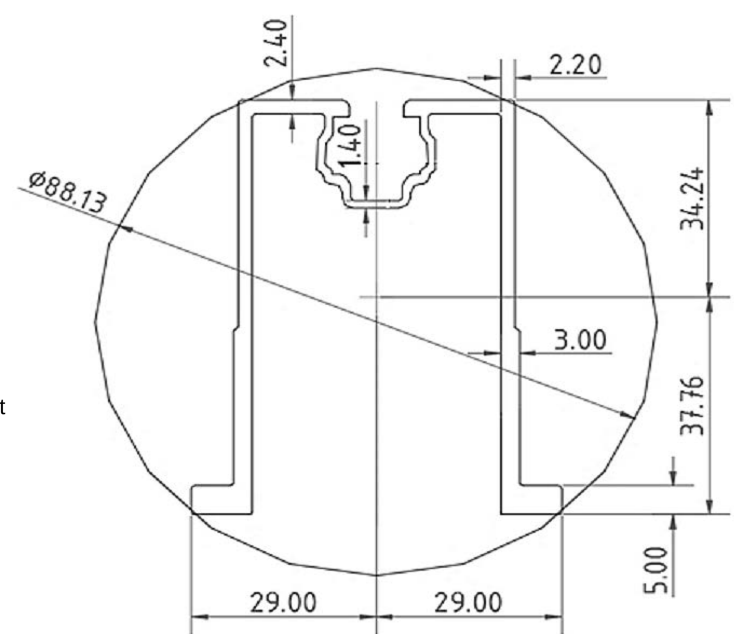
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	75	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.81	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.787	k-ft
M_z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



4.2 Girder Design

Loads from purlins are transferred using an inclined girder, which is connected to a set of aluminum struts. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

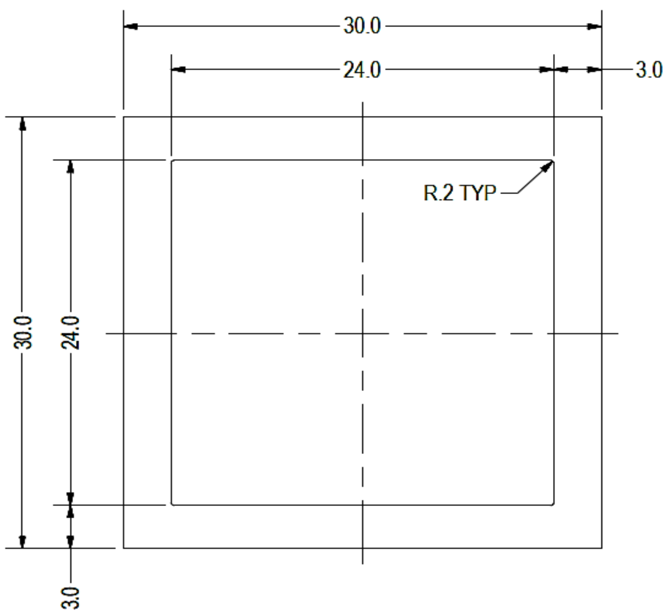
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.50	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2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



4.3 Front Strut Design

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

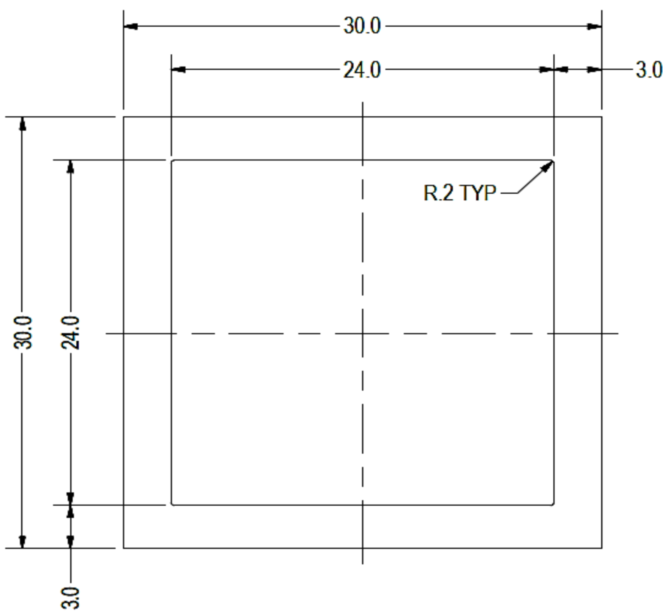
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.043	k-ft
P_n =	0.248	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	12%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

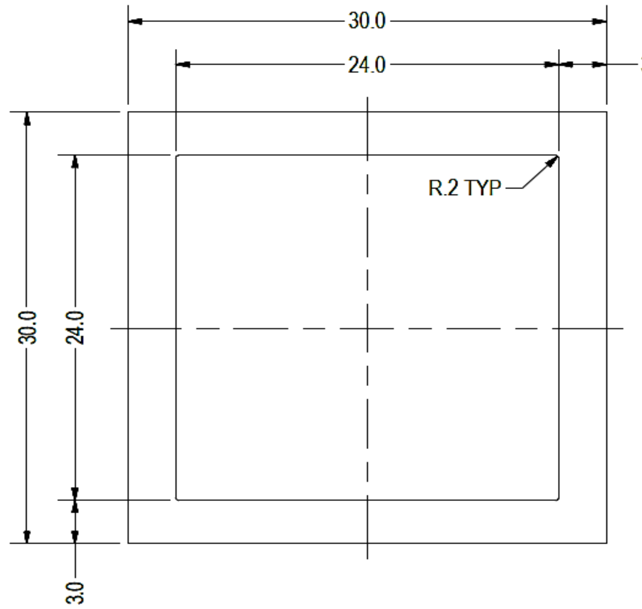
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.169	k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



4.5 Rear Strut Design

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

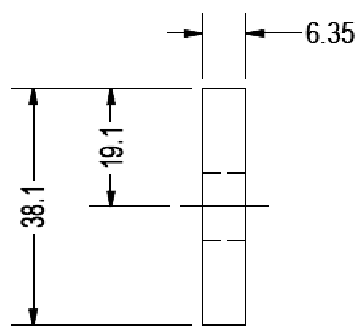
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.106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



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.005	k-ft
P_n =	0.210	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	13%	



A cross brace kit is required every 15 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

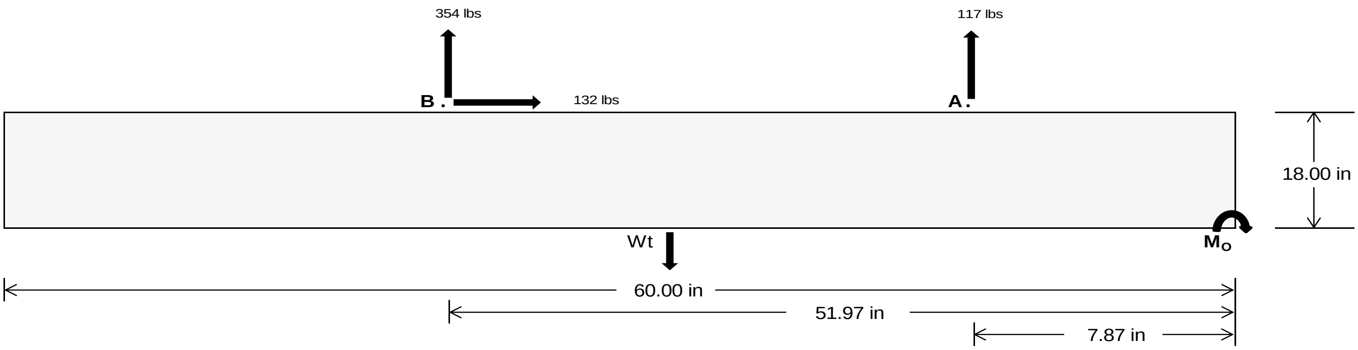
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	491.27	1475.84	k
Compressive Load =	1826.76	1333.22	k
Lateral Load =	34.86	549.06	k
Moment (Weak Axis) =	0.06	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

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

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

Sliding

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

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

Cohesion

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

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

Shear Key

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

Shear key is not required.

Bearing Pressure

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

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

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

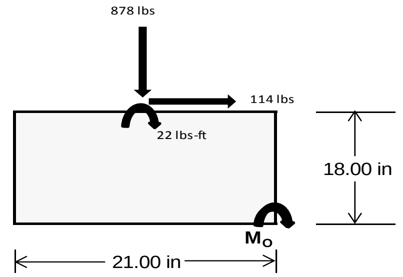
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 575.4 ft-lbs
Resisting Force Required = 657.59 lbs
S.F. = 1.67
Weight Required = 1095.99 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	119 lbs	145 lbs	70 lbs	332 lbs	878 lbs	294 lbs	68 lbs	7 lbs	22 lbs
F_V	19 lbs	151 lbs	19 lbs	13 lbs	114 lbs	15 lbs	19 lbs	150 lbs	19 lbs
P_{total}	2475 lbs	2501 lbs	2426 lbs	2575 lbs	3120 lbs	2537 lbs	757 lbs	696 lbs	711 lbs
M	54 lbs-ft	255 lbs-ft	57 lbs-ft	37 lbs-ft	192 lbs-ft	44 lbs-ft	54 lbs-ft	255 lbs-ft	57 lbs-ft
e	0.02 ft	0.10 ft	0.02 ft	0.01 ft	0.06 ft	0.02 ft	0.07 ft	0.37 ft	0.08 ft
L/6	0.29 ft	1.55 ft	1.70 ft	1.72 ft	1.63 ft	1.72 ft	1.61 ft	1.02 ft	1.59 ft
f_{min}	261.7 sqft	185.9 sqft	255.0 sqft	279.6 sqft	281.2 sqft	272.7 sqft	65.3 sqft	-20.3 sqft	59.1 sqft
f_{max}	304.0 psf	385.6 psf	299.5 psf	308.9 psf	432.0 psf	307.1 psf	107.8 psf	179.3 psf	103.5 psf

Maximum Bearing Pressure = 432 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

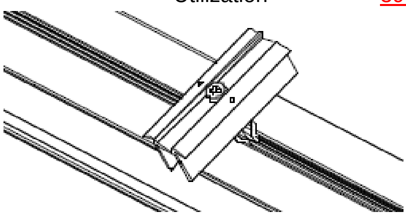
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

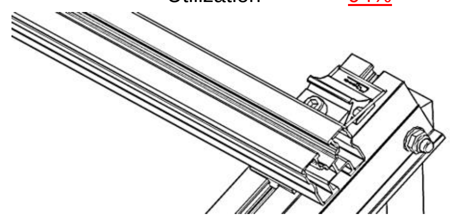
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

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



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



6.2 Bolted Connections

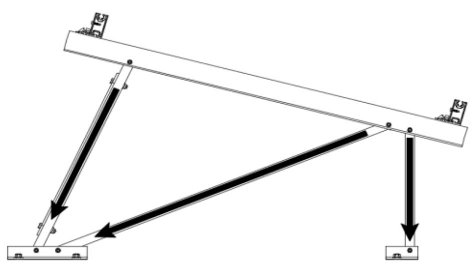
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

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

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

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

Bracing		
Maximum Axial Load =	0.210	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



Bolt and bearing capacities are accounting for double shear (ASCE 8-02, Eq. 5.3.4-1). Struts under compression are shown to demonstrate the load transfer from the girder. Single M8 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

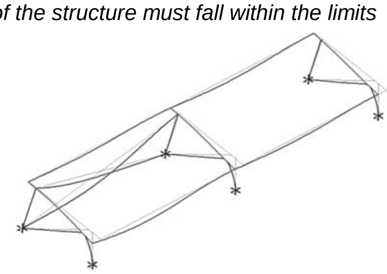
7.1 Seismic Drift

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.09	in

0.09 ≤ 0.568, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

$L_b =$ 75.00 in

J = 0.255

195.296

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L =$ φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

$\varphi F_L =$ 28.8 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

$\varphi F_L =$ φyFcy

$\varphi F_L =$ 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

$\varphi F_L =$ 1.17φyFcy

$\varphi F_L =$ 38.9 ksi

Weak Axis:

3.4.14

$L_b =$ 75.00 in

J = 0.255

202.803

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L =$ φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]

$\varphi F_L =$ 28.7

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

$\varphi F_L =$ φb[Bp-1.6Dp*b/t]

$\varphi F_L =$ 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.8 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.226 k-ft

3.4.18

h/t = 7.4

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.15

22.8869

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.5 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.15

24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.5 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

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

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.5 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.448 k-ft

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)

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in
J = 0.16
121.663

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0
φF_L= 1.17φyFcy
φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 29.8 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in
J = 0.16
121.663

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 33.3 ksi
Iy = 39958.2 mm^4
0.096 in^4
x = 15 mm
Sy = 0.163 in^3
M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.5 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.28467

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.75985

φF_L= (φccFcy)/(λ²)

φF_L= 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.8			4		

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M16	Y	-8.366	-8.366	0	0

Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-43.785	-43.785	0	0
2	M16	y	-70.057	-70.057	0	0

Member Distributed Loads (BLC 5 : Wind Load - Suction)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	89.322	89.322	0	0
2	M16	y	43.785	43.785	0	0

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	100.036	2	290.431	1	.038	1	0	1	0	1	0	1
2		min	-133.102	3	-344.439	3	-2.065	5	0	3	0	1	0	1
3	N7	max	0	5	468.274	1	-.073	10	0	10	0	1	0	1
4		min	-.12	2	-108.918	3	-26.384	4	-.042	4	0	1	0	1
5	N15	max	0	15	1405.202	1	.409	1	0	1	0	1	0	1
6		min	-1.428	1	-377.9	3	-26.813	5	-.043	4	0	1	0	1
7	N16	max	390.568	2	1025.552	1	0	10	0	1	0	1	0	1
8		min	-422.357	3	-1135.261	3	-197.747	4	0	3	0	1	0	1
9	N23	max	0	15	468.154	1	1.76	1	.003	1	0	1	0	1
10		min	-.119	2	-108.558	3	-24.915	5	-.039	5	0	1	0	1
11	N24	max	100.253	2	294.834	1	33.155	3	.001	4	0	1	0	1
12		min	-133.214	3	-342.274	3	-3.122	5	0	3	0	1	0	1
13	Totals:	max	589.29	2	3952.448	1	0	3						
14		min	-689.013	3	-2417.351	3	-279.869	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	339.383	1	.658	6	.981	4	0	10	0	3	0	1
2			min	-346.527	3	.154	15	-.087	3	0	4	0	2	0	1
3		2	max	339.479	1	.621	6	.893	4	0	10	0	4	0	15
4			min	-346.455	3	.145	15	-.087	3	0	4	0	10	0	6
5		3	max	339.576	1	.583	6	.806	4	0	10	0	4	0	15
6			min	-346.383	3	.136	15	-.087	3	0	4	0	10	0	6
7		4	max	339.672	1	.545	6	.719	4	0	10	0	4	0	15
8			min	-346.31	3	.127	15	-.087	3	0	4	0	3	0	6
9		5	max	339.769	1	.507	6	.631	4	0	10	0	4	0	15
10			min	-346.238	3	.118	15	-.087	3	0	4	0	3	0	6
11		6	max	339.865	1	.469	6	.544	4	0	10	0	4	0	15
12			min	-346.166	3	.109	15	-.087	3	0	4	0	3	0	6
13		7	max	339.961	1	.431	6	.538	1	0	10	0	4	0	15
14			min	-346.093	3	.1	15	-.087	3	0	4	0	3	0	6
15		8	max	340.058	1	.394	6	.538	1	0	10	0	4	0	15
16			min	-346.021	3	.091	15	-.087	3	0	4	0	3	0	6
17		9	max	340.154	1	.356	6	.538	1	0	10	0	4	0	15
18			min	-345.949	3	.082	15	-.087	3	0	4	0	3	0	6
19		10	max	340.25	1	.318	6	.538	1	0	10	0	4	0	15
20			min	-345.877	3	.074	15	-.087	3	0	4	0	3	0	6
21		11	max	340.347	1	.28	6	.538	1	0	10	0	4	0	15
22			min	-345.804	3	.065	15	-.087	3	0	4	0	3	0	6
23		12	max	340.443	1	.242	6	.538	1	0	10	0	1	0	15
24			min	-345.732	3	.056	15	-.097	5	0	4	0	3	0	6
25		13	max	340.54	1	.205	6	.538	1	0	10	0	1	0	15
26			min	-345.66	3	.047	15	-.185	5	0	4	0	3	0	6
27		14	max	340.636	1	.167	6	.538	1	0	10	0	1	0	15
28			min	-345.588	3	.038	15	-.272	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	340.732	1	.129	6	.538	1	0	10	.001	1	0	15
30			min	-345.515	3	.029	15	-.359	5	0	4	0	3	0	6
31		16	max	340.829	1	.091	6	.538	1	0	10	.001	1	0	15
32			min	-345.443	3	.02	15	-.447	5	0	4	0	3	0	6
33		17	max	340.925	1	.057	2	.538	1	0	10	.001	1	0	15
34			min	-345.371	3	.011	15	-.534	5	0	4	0	3	0	6
35		18	max	341.021	1	.03	10	.538	1	0	10	.001	1	0	15
36			min	-345.298	3	-.014	1	-.621	5	0	4	0	3	0	6
37		19	max	341.118	1	.006	10	.538	1	0	10	.001	1	0	15
38			min	-345.226	3	-.043	1	-.709	5	0	4	0	3	0	6
39	M3	1	max	37.465	10	1.81	6	-.024	12	0	5	.001	1	0	6
40			min	-85.055	1	.425	15	-1.405	4	0	1	0	12	0	15
41		2	max	37.409	10	1.632	6	-.024	12	0	5	.001	1	0	6
42			min	-85.122	1	.383	15	-1.272	4	0	1	0	12	0	15
43		3	max	37.353	10	1.454	6	-.024	12	0	5	0	1	0	2
44			min	-85.189	1	.341	15	-1.138	4	0	1	0	12	0	9
45		4	max	37.297	10	1.276	6	-.024	12	0	5	0	1	0	15
46			min	-85.256	1	.299	15	-1.004	4	0	1	0	5	0	1
47		5	max	37.241	10	1.098	6	-.024	12	0	5	0	1	0	15
48			min	-85.323	1	.257	15	-.871	4	0	1	0	5	0	4
49		6	max	37.186	10	.92	6	-.024	12	0	5	0	1	0	15
50			min	-85.39	1	.215	15	-.737	4	0	1	0	5	0	4
51		7	max	37.13	10	.742	6	-.024	12	0	5	0	1	0	15
52			min	-85.457	1	.174	15	-.604	4	0	1	0	5	0	4
53		8	max	37.074	10	.564	6	-.024	12	0	5	0	1	0	15
54			min	-85.524	1	.132	15	-.47	4	0	1	0	5	0	4
55		9	max	37.018	10	.386	6	-.024	12	0	5	0	1	0	15
56			min	-85.592	1	.09	15	-.405	1	0	1	0	5	-.001	4
57		10	max	36.962	10	.208	6	-.024	12	0	5	0	1	0	15
58			min	-85.659	1	.048	15	-.405	1	0	1	0	5	-.001	4
59		11	max	36.906	10	.033	2	.011	5	0	5	0	1	0	15
60			min	-85.726	1	.006	9	-.405	1	0	1	0	5	-.001	4
61		12	max	36.85	10	-.036	15	.144	5	0	5	0	1	0	15
62			min	-85.793	1	-.148	4	-.405	1	0	1	0	5	-.001	4
63		13	max	36.794	10	-.077	15	.278	5	0	5	0	1	0	15
64			min	-85.86	1	-.326	4	-.405	1	0	1	0	5	-.001	4
65		14	max	36.738	10	-.119	15	.411	5	0	5	0	1	0	15
66			min	-85.927	1	-.504	4	-.405	1	0	1	0	5	-.001	4
67		15	max	36.682	10	-.161	15	.545	5	0	5	0	12	0	15
68			min	-85.994	1	-.682	4	-.405	1	0	1	0	4	0	4
69		16	max	36.626	10	-.203	15	.678	5	0	5	0	12	0	15
70			min	-86.061	1	-.86	4	-.405	1	0	1	0	4	0	4
71		17	max	36.571	10	-.245	15	.812	5	0	5	0	12	0	15
72			min	-86.128	1	-1.038	4	-.405	1	0	1	0	4	0	4
73		18	max	36.515	10	-.287	15	.945	5	0	5	0	12	0	15
74			min	-86.195	1	-1.216	4	-.405	1	0	1	0	1	0	4
75		19	max	36.459	10	-.329	15	1.079	5	0	5	0	5	0	1
76			min	-86.263	1	-1.394	4	-.405	1	0	1	0	1	0	1
77	M4	1	max	467.11	1	0	1	-.076	10	0	1	0	5	0	1
78			min	-109.791	3	0	1	-25.801	4	0	1	0	1	0	1
79		2	max	467.174	1	0	1	-.076	10	0	1	0	12	0	1
80			min	-109.743	3	0	1	-25.857	4	0	1	-.002	4	0	1
81		3	max	467.239	1	0	1	-.076	10	0	1	0	12	0	1
82			min	-109.694	3	0	1	-25.913	4	0	1	-.005	4	0	1
83		4	max	467.304	1	0	1	-.076	10	0	1	0	12	0	1
84			min	-109.646	3	0	1	-25.969	4	0	1	-.007	4	0	1
85		5	max	467.368	1	0	1	-.076	10	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-109.597	3	0	1	-26.025	4	0	1	-.009	4	0	1
87		6	max	467.433	1	0	1	-.076	10	0	1	0	12	0	1
88			min	-109.549	3	0	1	-26.081	4	0	1	-.012	4	0	1
89		7	max	467.498	1	0	1	-.076	10	0	1	0	12	0	1
90			min	-109.5	3	0	1	-26.137	4	0	1	-.014	4	0	1
91		8	max	467.563	1	0	1	-.076	10	0	1	0	12	0	1
92			min	-109.452	3	0	1	-26.194	4	0	1	-.016	4	0	1
93		9	max	467.627	1	0	1	-.076	10	0	1	0	12	0	1
94			min	-109.403	3	0	1	-26.25	4	0	1	-.019	4	0	1
95		10	max	467.692	1	0	1	-.076	10	0	1	0	12	0	1
96			min	-109.355	3	0	1	-26.306	4	0	1	-.021	4	0	1
97		11	max	467.757	1	0	1	-.076	10	0	1	0	10	0	1
98			min	-109.306	3	0	1	-26.362	4	0	1	-.023	4	0	1
99		12	max	467.821	1	0	1	-.076	10	0	1	0	10	0	1
100			min	-109.258	3	0	1	-26.418	4	0	1	-.026	4	0	1
101		13	max	467.886	1	0	1	-.076	10	0	1	0	10	0	1
102			min	-109.209	3	0	1	-26.474	4	0	1	-.028	4	0	1
103		14	max	467.951	1	0	1	-.076	10	0	1	0	10	0	1
104			min	-109.161	3	0	1	-26.53	4	0	1	-.03	4	0	1
105		15	max	468.016	1	0	1	-.076	10	0	1	0	10	0	1
106			min	-109.112	3	0	1	-26.586	4	0	1	-.033	4	0	1
107		16	max	468.08	1	0	1	-.076	10	0	1	0	10	0	1
108			min	-109.063	3	0	1	-26.642	4	0	1	-.035	4	0	1
109		17	max	468.145	1	0	1	-.076	10	0	1	0	10	0	1
110			min	-109.015	3	0	1	-26.698	4	0	1	-.038	4	0	1
111		18	max	468.21	1	0	1	-.076	10	0	1	0	10	0	1
112			min	-108.966	3	0	1	-26.754	4	0	1	-.04	4	0	1
113		19	max	468.274	1	0	1	-.076	10	0	1	0	10	0	1
114			min	-108.918	3	0	1	-26.81	4	0	1	-.042	4	0	1
115	M6	1	max	1104.588	1	.641	6	.96	4	0	1	0	5	0	1
116			min	-1134.445	3	.149	15	-.165	3	0	5	0	1	0	1
117		2	max	1104.685	1	.604	6	.872	4	0	1	0	4	0	15
118			min	-1134.373	3	.14	15	-.165	3	0	5	0	1	0	6
119		3	max	1104.781	1	.566	6	.785	4	0	1	0	4	0	15
120			min	-1134.301	3	.132	15	-.165	3	0	5	0	1	0	6
121		4	max	1104.878	1	.528	6	.698	4	0	1	0	4	0	15
122			min	-1134.228	3	.123	15	-.165	3	0	5	0	3	0	6
123		5	max	1104.974	1	.49	6	.61	4	0	1	0	4	0	15
124			min	-1134.156	3	.114	15	-.165	3	0	5	0	3	0	6
125		6	max	1105.07	1	.452	6	.523	4	0	1	0	4	0	15
126			min	-1134.084	3	.105	15	-.165	3	0	5	0	3	0	6
127		7	max	1105.167	1	.415	6	.436	4	0	1	0	4	0	15
128			min	-1134.012	3	.096	15	-.165	3	0	5	0	3	0	6
129		8	max	1105.263	1	.377	6	.348	4	0	1	0	4	0	15
130			min	-1133.939	3	.087	15	-.165	3	0	5	0	3	0	6
131		9	max	1105.359	1	.339	6	.274	1	0	1	0	4	0	15
132			min	-1133.867	3	.078	15	-.165	3	0	5	0	3	0	6
133		10	max	1105.456	1	.301	6	.274	1	0	1	0	4	0	15
134			min	-1133.795	3	.069	15	-.165	3	0	5	0	3	0	6
135		11	max	1105.552	1	.263	6	.274	1	0	1	0	4	0	15
136			min	-1133.723	3	.06	15	-.165	3	0	5	0	3	0	6
137		12	max	1105.648	1	.225	6	.274	1	0	1	0	4	0	15
138			min	-1133.65	3	.051	15	-.165	3	0	5	0	3	0	6
139		13	max	1105.745	1	.191	2	.274	1	0	1	0	4	0	15
140			min	-1133.578	3	.043	15	-.165	3	0	5	0	3	0	6
141		14	max	1105.841	1	.162	2	.274	1	0	1	0	4	0	15
142			min	-1133.506	3	.034	15	-.234	5	0	5	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1105.938	1	.132	2	.274	1	0	1	0	4	0	15
144			min	-1133.433	3	.025	15	-.322	5	0	5	0	3	0	6
145		16	max	1106.034	1	.103	2	.274	1	0	1	0	4	0	15
146			min	-1133.361	3	.004	9	-.409	5	0	5	0	3	0	6
147		17	max	1106.13	1	.078	10	.274	1	0	1	0	4	0	15
148			min	-1133.289	3	-.02	9	-.496	5	0	5	0	3	0	6
149		18	max	1106.227	1	.054	10	.274	1	0	1	0	4	0	15
150			min	-1133.217	3	-.047	1	-.584	5	0	5	0	3	0	6
151		19	max	1106.323	1	.029	10	.274	1	0	1	0	1	0	15
152			min	-1133.144	3	-.077	1	-.671	5	0	5	0	3	0	6
153	M7	1	max	168.932	2	1.813	4	.009	1	0	1	0	4	0	4
154			min	-131.961	9	.43	15	-1.444	4	0	3	0	3	0	15
155		2	max	168.865	2	1.635	4	.009	1	0	1	0	4	0	2
156			min	-132.017	9	.388	15	-1.311	4	0	3	0	3	0	15
157		3	max	168.798	2	1.457	4	.009	1	0	1	0	4	0	2
158			min	-132.073	9	.346	15	-1.177	4	0	3	0	3	0	9
159		4	max	168.731	2	1.279	4	.009	1	0	1	0	1	0	15
160			min	-132.129	9	.305	15	-1.044	4	0	3	0	3	0	1
161		5	max	168.664	2	1.101	4	.009	1	0	1	0	1	0	15
162			min	-132.185	9	.263	15	-.91	4	0	3	0	5	0	6
163		6	max	168.597	2	.923	4	.009	1	0	1	0	1	0	15
164			min	-132.241	9	.221	15	-.777	4	0	3	0	5	0	6
165		7	max	168.529	2	.745	4	.009	1	0	1	0	1	0	15
166			min	-132.297	9	.179	15	-.643	4	0	3	0	5	0	6
167		8	max	168.462	2	.567	4	.009	1	0	1	0	1	0	15
168			min	-132.353	9	.137	15	-.509	4	0	3	0	5	0	6
169		9	max	168.395	2	.389	4	.009	1	0	1	0	1	0	15
170			min	-132.409	9	.095	15	-.376	4	0	3	0	5	-.001	6
171		10	max	168.328	2	.211	4	.009	1	0	1	0	1	0	15
172			min	-132.464	9	.054	15	-.242	4	0	3	0	5	-.001	6
173		11	max	168.261	2	.056	2	.009	1	0	1	0	1	0	15
174			min	-132.52	9	-.01	9	-.109	4	0	3	0	5	-.001	6
175		12	max	168.194	2	-.03	15	.025	5	0	1	0	1	0	15
176			min	-132.576	9	-.145	6	-.008	3	0	3	0	5	-.001	6
177		13	max	168.127	2	-.072	15	.158	5	0	1	0	1	0	15
178			min	-132.632	9	-.323	6	-.008	3	0	3	0	5	-.001	6
179		14	max	168.06	2	-.114	15	.292	5	0	1	0	1	0	15
180			min	-132.688	9	-.501	6	-.008	3	0	3	0	5	-.001	6
181		15	max	167.993	2	-.156	15	.425	5	0	1	0	1	0	15
182			min	-132.744	9	-.679	6	-.008	3	0	3	0	5	0	6
183		16	max	167.926	2	-.198	15	.559	5	0	1	0	1	0	15
184			min	-132.8	9	-.857	6	-.008	3	0	3	0	5	0	6
185		17	max	167.859	2	-.239	15	.692	5	0	1	0	1	0	15
186			min	-132.856	9	-1.035	6	-.008	3	0	3	0	5	0	6
187		18	max	167.791	2	-.281	15	.826	5	0	1	0	1	0	15
188			min	-132.912	9	-1.213	6	-.008	3	0	3	0	5	0	6
189		19	max	167.724	2	-.323	15	.96	5	0	1	0	1	0	1
190			min	-132.968	9	-1.391	6	-.008	3	0	3	0	3	0	1
191	M8	1	max	1404.037	1	0	1	.53	1	0	1	0	4	0	1
192			min	-378.774	3	0	1	-26.181	4	0	1	0	1	0	1
193		2	max	1404.102	1	0	1	.53	1	0	1	0	1	0	1
194			min	-378.725	3	0	1	-26.237	4	0	1	-.002	4	0	1
195		3	max	1404.167	1	0	1	.53	1	0	1	0	1	0	1
196			min	-378.677	3	0	1	-26.293	4	0	1	-.005	4	0	1
197		4	max	1404.231	1	0	1	.53	1	0	1	0	1	0	1
198			min	-378.628	3	0	1	-26.349	4	0	1	-.007	4	0	1
199		5	max	1404.296	1	0	1	.53	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-378.58	3	0	1	-26.405	4	0	1	-.009	4	0	1
201		6	max	1404.361	1	0	1	.53	1	0	1	0	1	0	1
202			min	-378.531	3	0	1	-26.462	4	0	1	-.012	4	0	1
203		7	max	1404.426	1	0	1	.53	1	0	1	0	1	0	1
204			min	-378.482	3	0	1	-26.518	4	0	1	-.014	4	0	1
205		8	max	1404.49	1	0	1	.53	1	0	1	0	1	0	1
206			min	-378.434	3	0	1	-26.574	4	0	1	-.016	4	0	1
207		9	max	1404.555	1	0	1	.53	1	0	1	0	1	0	1
208			min	-378.385	3	0	1	-26.63	4	0	1	-.019	4	0	1
209		10	max	1404.62	1	0	1	.53	1	0	1	0	1	0	1
210			min	-378.337	3	0	1	-26.686	4	0	1	-.021	4	0	1
211		11	max	1404.684	1	0	1	.53	1	0	1	0	1	0	1
212			min	-378.288	3	0	1	-26.742	4	0	1	-.024	4	0	1
213		12	max	1404.749	1	0	1	.53	1	0	1	0	1	0	1
214			min	-378.24	3	0	1	-26.798	4	0	1	-.026	4	0	1
215		13	max	1404.814	1	0	1	.53	1	0	1	0	1	0	1
216			min	-378.191	3	0	1	-26.854	4	0	1	-.028	4	0	1
217		14	max	1404.879	1	0	1	.53	1	0	1	0	1	0	1
218			min	-378.143	3	0	1	-26.91	4	0	1	-.031	4	0	1
219		15	max	1404.943	1	0	1	.53	1	0	1	0	1	0	1
220			min	-378.094	3	0	1	-26.966	4	0	1	-.033	4	0	1
221		16	max	1405.008	1	0	1	.53	1	0	1	0	1	0	1
222			min	-378.046	3	0	1	-27.022	4	0	1	-.036	4	0	1
223		17	max	1405.073	1	0	1	.53	1	0	1	0	1	0	1
224			min	-377.997	3	0	1	-27.078	4	0	1	-.038	4	0	1
225		18	max	1405.137	1	0	1	.53	1	0	1	0	1	0	1
226			min	-377.949	3	0	1	-27.134	4	0	1	-.041	4	0	1
227		19	max	1405.202	1	0	1	.53	1	0	1	0	1	0	1
228			min	-377.9	3	0	1	-27.191	4	0	1	-.043	4	0	1
229	M10	1	max	342.094	1	.685	4	1.155	5	0	1	0	4	0	1
230			min	-332.062	3	.172	15	-.068	2	-.002	5	0	3	0	1
231		2	max	342.19	1	.647	4	1.068	5	0	1	0	4	0	15
232			min	-331.989	3	.163	15	-.068	2	-.002	5	0	3	0	4
233		3	max	342.287	1	.61	4	.98	5	0	1	0	4	0	15
234			min	-331.917	3	.154	15	-.068	2	-.002	5	0	3	0	4
235		4	max	342.383	1	.572	4	.893	5	0	1	0	4	0	15
236			min	-331.845	3	.145	15	-.068	2	-.002	5	0	3	0	4
237		5	max	342.48	1	.534	4	.806	5	0	1	0	4	0	15
238			min	-331.773	3	.136	15	-.068	2	-.002	5	0	3	0	4
239		6	max	342.576	1	.496	4	.718	5	0	1	0	4	0	15
240			min	-331.7	3	.127	15	-.068	2	-.002	5	0	3	0	4
241		7	max	342.672	1	.458	4	.631	5	0	1	0	4	0	15
242			min	-331.628	3	.118	15	-.068	2	-.002	5	0	3	0	4
243		8	max	342.769	1	.42	4	.544	5	0	1	0	4	0	15
244			min	-331.556	3	.109	15	-.068	2	-.002	5	0	3	0	4
245		9	max	342.865	1	.383	4	.456	5	0	1	.001	4	0	15
246			min	-331.484	3	.101	15	-.068	2	-.002	5	0	3	0	4
247		10	max	342.961	1	.345	4	.369	5	0	1	.001	4	0	15
248			min	-331.411	3	.092	15	-.068	2	-.002	5	0	3	0	4
249		11	max	343.058	1	.307	4	.282	5	0	1	.001	4	0	15
250			min	-331.339	3	.083	15	-.068	2	-.002	5	0	3	0	4
251		12	max	343.154	1	.269	4	.194	5	0	1	.001	4	0	15
252			min	-331.267	3	.074	15	-.068	2	-.002	5	0	3	0	4
253		13	max	343.25	1	.231	4	.107	5	0	1	.001	4	0	15
254			min	-331.194	3	.065	15	-.068	2	-.002	5	0	3	0	4
255		14	max	343.347	1	.193	4	.02	5	0	1	.001	4	0	15
256			min	-331.122	3	.045	1	-.068	2	-.002	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	343.443	1	.156	4	-.025	10	0	1	.001	4	0	15
258			min	-331.05	3	.015	1	-.068	4	-.002	5	0	3	0	4
259		16	max	343.54	1	.118	4	-.025	10	0	1	.001	4	0	15
260			min	-330.978	3	-.014	1	-.155	4	-.002	5	0	3	0	4
261		17	max	343.636	1	.08	4	-.025	10	0	1	.001	4	0	15
262			min	-330.905	3	-.044	1	-.243	4	-.002	5	0	3	0	4
263		18	max	343.732	1	.057	3	-.025	10	0	1	.001	4	0	15
264			min	-330.833	3	-.073	1	-.33	4	-.002	5	0	3	0	4
265		19	max	343.829	1	.035	3	-.025	10	0	1	.001	4	0	15
266			min	-330.761	3	-.103	1	-.417	4	-.002	5	0	3	0	4
267	M11	1	max	36.982	10	1.809	6	.507	1	.001	4	.001	5	0	6
268			min	-84.831	1	.424	15	-1.156	5	0	10	-.001	1	0	15
269		2	max	36.926	10	1.631	6	.507	1	.001	4	.001	5	0	6
270			min	-84.898	1	.382	15	-1.022	5	0	10	-.001	1	0	15
271		3	max	36.87	10	1.453	6	.507	1	.001	4	0	5	0	2
272			min	-84.965	1	.34	15	-.888	5	0	10	-.001	1	0	3
273		4	max	36.814	10	1.275	6	.507	1	.001	4	0	5	0	15
274			min	-85.032	1	.298	15	-.755	5	0	10	0	1	0	4
275		5	max	36.758	10	1.097	6	.507	1	.001	4	0	5	0	15
276			min	-85.099	1	.256	15	-.621	5	0	10	0	1	0	4
277		6	max	36.702	10	.919	6	.507	1	.001	4	0	5	0	15
278			min	-85.166	1	.215	15	-.488	5	0	10	0	1	0	4
279		7	max	36.647	10	.741	6	.507	1	.001	4	0	5	0	15
280			min	-85.233	1	.173	15	-.354	5	0	10	0	1	0	4
281		8	max	36.591	10	.563	6	.507	1	.001	4	0	5	0	15
282			min	-85.3	1	.131	15	-.221	5	0	10	0	1	0	4
283		9	max	36.535	10	.385	6	.507	1	.001	4	0	5	0	15
284			min	-85.367	1	.089	15	-.087	5	0	10	0	1	-.001	4
285		10	max	36.479	10	.207	6	.507	1	.001	4	0	5	0	15
286			min	-85.434	1	.047	15	.005	12	0	10	0	1	-.001	4
287		11	max	36.423	10	.033	2	.507	1	.001	4	0	5	0	15
288			min	-85.502	1	.001	3	.005	12	0	10	0	1	-.001	4
289		12	max	36.367	10	-.037	15	.507	1	.001	4	0	5	0	15
290			min	-85.569	1	-.15	4	.005	12	0	10	0	1	-.001	4
291		13	max	36.311	10	-.078	15	.539	4	.001	4	0	4	0	15
292			min	-85.636	1	-.328	4	.005	12	0	10	0	1	-.001	4
293		14	max	36.255	10	-.12	15	.673	4	.001	4	0	4	0	15
294			min	-85.703	1	-.506	4	.005	12	0	10	0	10	-.001	4
295		15	max	36.199	10	-.162	15	.806	4	.001	4	0	4	0	15
296			min	-85.77	1	-.684	4	.005	12	0	10	0	10	0	4
297		16	max	36.143	10	-.204	15	.94	4	.001	4	0	4	0	15
298			min	-85.837	1	-.862	4	.005	12	0	10	0	10	0	4
299		17	max	36.087	10	-.246	15	1.073	4	.001	4	.001	4	0	15
300			min	-85.904	1	-1.04	4	.005	12	0	10	0	10	0	4
301		18	max	36.031	10	-.288	15	1.207	4	.001	4	.001	4	0	15
302			min	-85.971	1	-1.218	4	.005	12	0	10	0	10	0	4
303		19	max	35.976	10	-.329	15	1.34	4	.001	4	.002	4	0	1
304			min	-86.038	1	-1.396	4	.005	12	0	10	0	10	0	1
305	M12	1	max	466.989	1	0	1	1.908	1	0	1	0	4	0	1
306			min	-109.432	3	0	1	-23.945	5	0	1	0	3	0	1
307		2	max	467.054	1	0	1	1.908	1	0	1	0	1	0	1
308			min	-109.383	3	0	1	-24.001	5	0	1	-.002	5	0	1
309		3	max	467.118	1	0	1	1.908	1	0	1	0	1	0	1
310			min	-109.335	3	0	1	-24.057	5	0	1	-.004	5	0	1
311		4	max	467.183	1	0	1	1.908	1	0	1	0	1	0	1
312			min	-109.286	3	0	1	-24.113	5	0	1	-.006	5	0	1
313		5	max	467.248	1	0	1	1.908	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-109.238	3	0	1	-24.169	5	0	1	-.009	5	0	1
315		6	max	467.312	1	0	1	1.908	1	0	1	0	1	0	1
316			min	-109.189	3	0	1	-24.225	5	0	1	-.011	5	0	1
317		7	max	467.377	1	0	1	1.908	1	0	1	.001	1	0	1
318			min	-109.141	3	0	1	-24.281	5	0	1	-.013	5	0	1
319		8	max	467.442	1	0	1	1.908	1	0	1	.001	1	0	1
320			min	-109.092	3	0	1	-24.337	5	0	1	-.015	5	0	1
321		9	max	467.507	1	0	1	1.908	1	0	1	.001	1	0	1
322			min	-109.044	3	0	1	-24.393	5	0	1	-.017	5	0	1
323		10	max	467.571	1	0	1	1.908	1	0	1	.002	1	0	1
324			min	-108.995	3	0	1	-24.449	5	0	1	-.019	5	0	1
325		11	max	467.636	1	0	1	1.908	1	0	1	.002	1	0	1
326			min	-108.947	3	0	1	-24.506	5	0	1	-.022	5	0	1
327		12	max	467.701	1	0	1	1.908	1	0	1	.002	1	0	1
328			min	-108.898	3	0	1	-24.562	5	0	1	-.024	5	0	1
329		13	max	467.765	1	0	1	1.908	1	0	1	.002	1	0	1
330			min	-108.85	3	0	1	-24.618	5	0	1	-.026	5	0	1
331		14	max	467.83	1	0	1	1.908	1	0	1	.002	1	0	1
332			min	-108.801	3	0	1	-24.674	5	0	1	-.028	5	0	1
333		15	max	467.895	1	0	1	1.908	1	0	1	.002	1	0	1
334			min	-108.752	3	0	1	-24.73	5	0	1	-.03	5	0	1
335		16	max	467.96	1	0	1	1.908	1	0	1	.003	1	0	1
336			min	-108.704	3	0	1	-24.786	5	0	1	-.033	5	0	1
337		17	max	468.024	1	0	1	1.908	1	0	1	.003	1	0	1
338			min	-108.655	3	0	1	-24.842	5	0	1	-.035	5	0	1
339		18	max	468.089	1	0	1	1.908	1	0	1	.003	1	0	1
340			min	-108.607	3	0	1	-24.898	5	0	1	-.037	5	0	1
341		19	max	468.154	1	0	1	1.908	1	0	1	.003	1	0	1
342			min	-108.558	3	0	1	-24.954	5	0	1	-.039	5	0	1
343	M1	1	max	85.986	1	325.773	3	-1.695	12	0	1	.075	1	0	1
344			min	3.287	12	-339.662	1	-38.156	1	0	3	.004	12	0	3
345		2	max	86.058	1	325.571	3	-1.695	12	0	1	.066	1	.074	1
346			min	3.323	12	-339.931	1	-38.156	1	0	3	.004	12	-.071	3
347		3	max	98.466	1	5.65	9	-1.752	12	0	5	.058	1	.146	1
348			min	-6.687	3	-20.976	3	-37.816	1	0	1	.003	12	-.14	3
349		4	max	98.538	1	5.425	9	-1.752	12	0	5	.049	1	.147	1
350			min	-6.633	3	-21.178	3	-37.816	1	0	1	.003	12	-.135	3
351		5	max	98.61	1	5.2	9	-1.752	12	0	5	.041	1	.147	1
352			min	-6.579	3	-21.38	3	-37.816	1	0	1	.002	12	-.131	3
353		6	max	98.683	1	4.975	9	-1.752	12	0	5	.033	1	.147	1
354			min	-6.525	3	-21.583	3	-37.816	1	0	1	.002	12	-.126	3
355		7	max	98.755	1	4.75	9	-1.752	12	0	5	.025	1	.147	1
356			min	-6.47	3	-21.785	3	-37.816	1	0	1	.002	12	-.121	3
357		8	max	98.827	1	4.526	9	-1.752	12	0	5	.017	1	.148	1
358			min	-6.416	3	-21.987	3	-37.816	1	0	1	.001	10	-.117	3
359		9	max	98.899	1	4.301	9	-1.752	12	0	5	.008	1	.148	1
360			min	-6.362	3	-22.19	3	-37.816	1	0	1	0	10	-.112	3
361		10	max	98.972	1	4.076	9	-1.752	12	0	5	.002	4	.149	1
362			min	-6.308	3	-22.392	3	-37.816	1	0	1	0	10	-.107	3
363		11	max	99.044	1	3.851	9	-1.752	12	0	5	0	3	.149	1
364			min	-6.253	3	-22.594	3	-37.816	1	0	1	-.008	1	-.102	3
365		12	max	99.116	1	3.627	9	-1.752	12	0	5	0	12	.15	1
366			min	-6.199	3	-22.796	3	-37.816	1	0	1	-.016	1	-.097	3
367		13	max	99.188	1	3.402	9	-1.752	12	0	5	0	12	.151	1
368			min	-6.145	3	-22.999	3	-37.816	1	0	1	-.024	1	-.092	3
369		14	max	99.261	1	3.177	9	-1.752	12	0	5	-.001	12	.152	1
370			min	-6.091	3	-23.201	3	-37.816	1	0	1	-.033	1	-.087	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	99.333	1	2.952	9	-1.752	12	0	5	-.001	12	.153	2
372			min	-6.037	3	-23.403	3	-37.816	1	0	1	-.041	1	-.082	3
373		16	max	64.869	2	11.383	10	-1.776	12	0	1	-.002	12	.156	2
374			min	-32.713	3	-61.301	1	-38.183	1	0	4	-.05	1	-.077	3
375		17	max	64.942	2	11.158	10	-1.776	12	0	1	-.002	12	.167	1
376			min	-32.658	3	-61.571	1	-38.183	1	0	4	-.058	1	-.067	3
377		18	max	-2.795	12	388.833	1	-1.882	12	0	3	-.003	12	.085	1
378			min	-86.017	1	-154.205	3	-41.765	4	0	1	-.066	1	-.034	3
379		19	max	-2.759	12	388.563	1	-1.882	12	0	3	-.003	12	0	1
380			min	-85.945	1	-154.407	3	-41.523	4	0	1	-.075	1	0	3
381	M5	1	max	192.409	1	1074.948	3	0	10	0	1	.039	4	0	3
382			min	2.685	15	-1120.542	1	-29.558	3	0	5	0	10	0	1
383		2	max	192.482	1	1074.746	3	0	10	0	1	.033	4	.243	1
384			min	2.707	15	-1120.812	1	-29.558	3	0	5	-.003	3	-.233	3
385		3	max	231.525	1	8.337	9	3.378	3	0	3	.028	4	.481	1
386			min	-33.493	3	-73.915	3	-21.061	4	0	4	-.009	3	-.461	3
387		4	max	231.597	1	8.112	9	3.378	3	0	3	.023	4	.485	1
388			min	-33.438	3	-74.118	3	-20.819	4	0	4	-.008	3	-.445	3
389		5	max	231.67	1	7.887	9	3.378	3	0	3	.019	4	.488	1
390			min	-33.384	3	-74.32	3	-20.577	4	0	4	-.008	3	-.429	3
391		6	max	231.742	1	7.663	9	3.378	3	0	3	.014	4	.492	1
392			min	-33.33	3	-74.522	3	-20.335	4	0	4	-.007	3	-.413	3
393		7	max	231.814	1	7.438	9	3.378	3	0	3	.01	4	.496	1
394			min	-33.276	3	-74.724	3	-20.093	4	0	4	-.006	3	-.396	3
395		8	max	231.887	1	7.213	9	3.378	3	0	3	.006	4	.5	1
396			min	-33.222	3	-74.927	3	-19.851	4	0	4	-.005	3	-.38	3
397		9	max	231.959	1	6.988	9	3.378	3	0	3	.001	5	.504	1
398			min	-33.167	3	-75.129	3	-19.609	4	0	4	-.005	3	-.364	3
399		10	max	232.031	1	6.764	9	3.378	3	0	3	0	10	.508	1
400			min	-33.113	3	-75.331	3	-19.367	4	0	4	-.004	3	-.348	3
401		11	max	232.103	1	6.539	9	3.378	3	0	3	0	10	.512	1
402			min	-33.059	3	-75.534	3	-19.125	4	0	4	-.007	4	-.331	3
403		12	max	232.176	1	6.314	9	3.378	3	0	3	0	10	.516	1
404			min	-33.005	3	-75.736	3	-18.883	4	0	4	-.011	4	-.315	3
405		13	max	232.248	1	6.089	9	3.378	3	0	3	0	10	.52	1
406			min	-32.951	3	-75.938	3	-18.641	4	0	4	-.015	4	-.298	3
407		14	max	232.32	1	5.864	9	3.378	3	0	3	0	10	.524	1
408			min	-32.896	3	-76.141	3	-18.399	4	0	4	-.019	4	-.282	3
409		15	max	232.392	1	5.64	9	3.378	3	0	3	0	10	.528	1
410			min	-32.842	3	-76.343	3	-18.157	4	0	4	-.023	4	-.265	3
411		16	max	232.526	2	55.619	2	3.354	3	0	1	0	3	.533	1
412			min	-105.391	3	-139.496	3	-16.962	4	0	4	-.027	4	-.248	3
413		17	max	232.598	2	55.35	2	3.354	3	0	1	0	3	.549	1
414			min	-105.337	3	-139.699	3	-16.72	4	0	4	-.031	4	-.218	3
415		18	max	-5.059	12	1278.837	1	3.071	3	0	4	.002	3	.277	1
416			min	-192.542	1	-506.535	3	-41.83	5	0	1	-.04	4	-.11	3
417		19	max	-5.023	12	1278.568	1	3.071	3	0	4	.002	3	0	3
418			min	-192.47	1	-506.737	3	-41.588	5	0	1	-.049	4	0	1
419	M9	1	max	85.66	1	325.755	3	169.313	4	0	3	.001	5	0	1
420			min	.595	15	-339.659	1	2.481	10	0	1	-.074	1	0	3
421		2	max	85.732	1	325.553	3	169.555	4	0	3	.036	5	.074	1
422			min	.617	15	-339.929	1	2.481	10	0	1	-.065	1	-.071	3
423		3	max	98.586	1	5.63	9	36.787	1	0	1	.069	5	.146	1
424			min	-6.458	3	-20.916	3	-28.663	5	0	10	-.056	1	-.14	3
425		4	max	98.658	1	5.405	9	36.787	1	0	1	.063	5	.146	1
426			min	-6.404	3	-21.119	3	-28.421	5	0	10	-.048	1	-.135	3
427		5	max	98.73	1	5.18	9	36.787	1	0	1	.057	5	.147	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-6.35	3	-21.321	3	-28.179	5	0	10	-.04	1	-.131	3
429		6	max	98.803	1	4.956	9	36.787	1	0	1	.051	5	.147	1
430			min	-6.295	3	-21.523	3	-27.937	5	0	10	-.032	1	-.126	3
431		7	max	98.875	1	4.731	9	36.787	1	0	1	.045	5	.147	1
432			min	-6.241	3	-21.726	3	-27.695	5	0	10	-.024	1	-.121	3
433		8	max	98.947	1	4.506	9	36.787	1	0	1	.039	5	.148	1
434			min	-6.187	3	-21.928	3	-27.453	5	0	10	-.016	1	-.117	3
435		9	max	99.02	1	4.281	9	36.787	1	0	1	.033	5	.148	1
436			min	-6.133	3	-22.13	3	-27.211	5	0	10	-.008	1	-.112	3
437		10	max	99.092	1	4.057	9	36.787	1	0	1	.027	4	.149	1
438			min	-6.079	3	-22.332	3	-26.969	5	0	10	0	1	-.107	3
439		11	max	99.164	1	3.832	9	36.787	1	0	1	.023	4	.149	1
440			min	-6.024	3	-22.535	3	-26.727	5	0	10	0	10	-.102	3
441		12	max	99.236	1	3.607	9	36.787	1	0	1	.018	4	.15	1
442			min	-5.97	3	-22.737	3	-26.485	5	0	10	.001	10	-.097	3
443		13	max	99.309	1	3.382	9	36.787	1	0	1	.024	1	.151	1
444			min	-5.916	3	-22.939	3	-26.243	5	0	10	.002	10	-.092	3
445		14	max	99.381	1	3.158	9	36.787	1	0	1	.032	1	.152	1
446			min	-5.862	3	-23.142	3	-26.001	5	0	10	.002	10	-.087	3
447		15	max	99.453	1	2.933	9	36.787	1	0	1	.04	1	.153	2
448			min	-5.808	3	-23.344	3	-25.759	5	0	10	-.002	5	-.082	3
449		16	max	65.014	2	11.091	10	37.268	1	0	10	.049	1	.156	2
450			min	-32.924	3	-61.184	1	-24.275	5	0	4	-.005	5	-.077	3
451		17	max	65.087	2	10.866	10	37.268	1	0	10	.057	1	.167	1
452			min	-32.869	3	-61.453	1	-24.033	5	0	4	-.011	5	-.067	3
453		18	max	5.719	5	388.834	1	39.123	1	0	1	.065	1	.085	1
454			min	-85.712	1	-154.203	3	-47.689	5	0	3	-.021	5	-.034	3
455		19	max	5.752	5	388.564	1	39.123	1	0	1	.074	1	0	1
456			min	-85.64	1	-154.405	3	-47.447	5	0	3	-.031	5	0	3
457	M13	1	max	169.315	4	339.338	1	-.595	15	0	1	.074	1	0	1
458			min	2.481	10	-325.758	3	-85.653	1	0	3	-.001	5	0	3
459		2	max	162.495	4	239.531	1	.019	15	0	1	.021	1	.193	3
460			min	2.481	10	-229.848	3	-65.428	1	0	3	-.002	5	-.201	1
461		3	max	155.674	4	139.724	1	.863	5	0	1	.003	3	.319	3
462			min	2.481	10	-133.939	3	-45.203	1	0	3	-.017	1	-.333	1
463		4	max	148.853	4	39.917	1	1.814	5	0	1	0	3	.379	3
464			min	2.481	10	-38.029	3	-24.977	1	0	3	-.041	1	-.395	1
465		5	max	142.033	4	57.88	3	2.764	5	0	1	.001	5	.372	3
466			min	2.481	10	-59.89	1	-4.752	1	0	3	-.052	1	-.388	1
467		6	max	135.212	4	153.79	3	15.473	1	0	1	.003	5	.299	3
468			min	2.481	10	-159.697	1	-.303	3	0	3	-.048	1	-.312	1
469		7	max	128.392	4	249.7	3	35.699	1	0	1	.006	5	.158	3
470			min	2.481	10	-259.504	1	.434	12	0	3	-.03	1	-.166	1
471		8	max	121.571	4	345.609	3	55.924	1	0	1	.01	4	.049	1
472			min	2.481	10	-359.311	1	1.031	12	0	3	0	3	-.048	3
473		9	max	114.751	4	441.519	3	76.149	1	0	1	.047	1	.333	1
474			min	2.481	10	-459.118	1	1.627	12	0	3	0	12	-.322	3
475		10	max	107.93	4	537.429	3	96.375	1	0	1	.107	1	.686	1
476			min	2.481	10	-558.925	1	2.223	12	0	3	-.013	15	-.661	3
477		11	max	77.036	4	459.118	1	4.123	5	0	3	.047	1	.333	1
478			min	1.696	12	-441.519	3	-75.823	1	0	1	-.016	5	-.322	3
479		12	max	70.216	4	359.311	1	5.073	5	0	3	.002	2	.049	1
480			min	1.696	12	-345.609	3	-55.598	1	0	1	-.013	4	-.048	3
481		13	max	63.395	4	259.504	1	6.024	5	0	3	-.002	10	.158	3
482			min	1.696	12	-249.7	3	-35.372	1	0	1	-.031	1	-.166	1
483		14	max	56.574	4	159.697	1	6.974	5	0	3	-.002	12	.299	3
484			min	1.696	12	-153.79	3	-15.147	1	0	1	-.048	1	-.312	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	49.754	4	59.89	1	9.085	4	0	3	0	5	.372	3
486			min	1.696	12	-57.88	3	-.045	10	0	1	-.052	1	-.388	1
487		16	max	42.933	4	38.029	3	25.304	1	0	3	.006	5	.379	3
488			min	1.696	12	-39.917	1	1.499	12	0	1	-.041	1	-.395	1
489		17	max	38.233	1	133.939	3	45.529	1	0	3	.013	5	.319	3
490			min	1.696	12	-139.724	1	2.095	12	0	1	-.017	1	-.333	1
491		18	max	38.233	1	229.848	3	65.754	1	0	3	.025	4	.193	3
492			min	1.696	12	-239.531	1	2.691	12	0	1	0	10	-.201	1
493		19	max	38.233	1	325.758	3	85.98	1	0	3	.075	1	0	1
494			min	1.696	12	-339.338	1	3.287	12	0	1	.004	12	0	3
495	M16	1	max	47.433	5	388.9	1	5.752	5	0	3	.074	1	0	1
496			min	-39.042	1	-154.416	3	-85.647	1	0	1	-.031	5	0	3
497		2	max	40.612	5	274.498	1	6.703	5	0	3	.021	1	.091	3
498			min	-39.042	1	-109.103	3	-65.422	1	0	1	-.027	5	-.23	1
499		3	max	33.792	5	160.095	1	7.653	5	0	3	0	12	.152	3
500			min	-39.042	1	-63.791	3	-45.197	1	0	1	-.025	4	-.381	1
501		4	max	26.971	5	45.693	1	8.604	5	0	3	-.001	12	.18	3
502			min	-39.042	1	-18.478	3	-24.971	1	0	1	-.042	1	-.453	1
503		5	max	20.15	5	26.835	3	9.554	5	0	3	-.002	12	.177	3
504			min	-39.042	1	-68.71	1	-4.746	1	0	1	-.052	1	-.445	1
505		6	max	13.33	5	72.148	3	15.479	1	0	3	-.002	15	.143	3
506			min	-39.042	1	-183.113	1	.008	3	0	1	-.048	1	-.357	1
507		7	max	6.509	5	117.461	3	35.705	1	0	3	.005	5	.077	3
508			min	-39.042	1	-297.515	1	.629	12	0	1	-.03	1	-.19	1
509		8	max	.179	3	162.774	3	55.93	1	0	3	.013	4	.056	1
510			min	-39.042	1	-411.918	1	1.225	12	0	1	-.002	3	-.02	3
511		9	max	.179	3	208.087	3	76.155	1	0	3	.047	1	.382	1
512			min	-39.042	1	-526.32	1	1.821	12	0	1	0	3	-.149	3
513		10	max	27.649	5	-12.838	15	96.381	1	0	14	.107	1	.787	1
514			min	-39.042	1	-640.723	1	-3.889	3	0	1	.003	12	-.309	3
515		11	max	20.829	5	526.32	1	3.988	5	0	1	.047	1	.382	1
516			min	-38.941	1	-208.087	3	-75.851	1	0	3	-.014	5	-.149	3
517		12	max	14.008	5	411.918	1	4.939	5	0	1	.002	2	.056	1
518			min	-38.941	1	-162.774	3	-55.626	1	0	3	-.011	4	-.02	3
519		13	max	7.187	5	297.515	1	5.889	5	0	1	0	12	.077	3
520			min	-38.941	1	-117.461	3	-35.4	1	0	3	-.031	1	-.19	1
521		14	max	.367	5	183.112	1	6.84	5	0	1	-.001	12	.143	3
522			min	-38.941	1	-72.148	3	-15.175	1	0	3	-.048	1	-.357	1
523		15	max	-1.882	12	68.71	1	8.926	4	0	1	.002	5	.177	3
524			min	-38.941	1	-26.835	3	-.048	10	0	3	-.052	1	-.445	1
525		16	max	-1.882	12	18.478	3	25.276	1	0	1	.008	5	.18	3
526			min	-38.941	1	-45.693	1	.97	12	0	3	-.041	1	-.453	1
527		17	max	-1.882	12	63.791	3	45.501	1	0	1	.014	5	.152	3
528			min	-38.941	1	-160.095	1	1.566	12	0	3	-.017	1	-.381	1
529		18	max	-1.882	12	109.103	3	65.726	1	0	1	.026	4	.091	3
530			min	-38.941	1	-274.498	1	2.163	12	0	3	0	10	-.23	1
531		19	max	-1.882	12	154.416	3	85.952	1	0	1	.075	1	0	1
532			min	-41.563	4	-388.9	1	2.759	12	0	3	.003	12	0	3
533	M15	1	max	.237	1	1.699	1	.046	3	0	1	0	1	0	1
534			min	-35.281	3	0	2	-.055	1	0	3	0	3	0	1
535		2	max	.165	1	1.51	1	.046	3	0	1	0	1	0	2
536			min	-35.335	3	0	2	-.055	1	0	3	0	3	0	1
537		3	max	.093	1	1.322	1	.046	3	0	1	0	1	0	2
538			min	-35.389	3	0	2	-.055	1	0	3	0	3	-.001	1
539		4	max	.021	1	1.133	1	.046	3	0	1	0	1	0	2
540			min	-35.443	3	0	2	-.055	1	0	3	0	3	-.002	1
541		5	max	0	2	.944	1	.046	3	0	1	0	1	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
542			min	-35.497	3	0	2	-.055	1	0	3	0	3	-.002	1
543		6	max	0	2	.755	1	.046	3	0	1	0	1	0	2
544			min	-35.55	3	0	2	-.055	1	0	3	0	3	-.002	1
545		7	max	0	2	.566	1	.046	3	0	1	0	3	0	2
546			min	-35.604	3	0	2	-.055	1	0	3	0	1	-.003	1
547		8	max	0	2	.378	1	.046	3	0	1	0	3	0	2
548			min	-35.658	3	0	2	-.055	1	0	3	0	1	-.003	1
549		9	max	0	2	.189	1	.046	3	0	1	0	3	0	2
550			min	-35.712	3	0	2	-.055	1	0	3	0	1	-.003	1
551		10	max	0	2	0	1	.046	3	0	1	0	3	0	2
552			min	-35.766	3	0	1	-.055	1	0	3	0	1	-.003	1
553		11	max	0	2	0	2	.046	3	0	1	0	3	0	2
554			min	-35.82	3	-.189	1	-.055	1	0	3	0	1	-.003	1
555		12	max	0	2	0	2	.046	3	0	1	0	3	0	2
556			min	-35.874	3	-.378	1	-.055	1	0	3	0	1	-.003	1
557		13	max	0	2	0	2	.046	3	0	1	0	3	0	2
558			min	-35.928	3	-.566	1	-.055	1	0	3	0	1	-.003	1
559		14	max	0	2	0	2	.046	3	0	1	0	3	0	2
560			min	-35.982	3	-.755	1	-.055	1	0	3	0	1	-.002	1
561		15	max	0	2	0	2	.046	3	0	1	0	3	0	2
562			min	-36.036	3	-.944	1	-.055	1	0	3	0	1	-.002	1
563		16	max	0	2	0	2	.046	3	0	1	0	3	0	2
564			min	-36.09	3	-1.133	1	-.055	1	0	3	0	1	-.002	1
565		17	max	0	2	0	2	.046	3	0	1	0	3	0	2
566			min	-36.144	3	-1.322	1	-.055	1	0	3	0	1	-.001	1
567		18	max	0	2	0	2	.046	3	0	1	0	3	0	2
568			min	-36.198	3	-1.51	1	-.055	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.046	3	0	1	0	3	0	1
570			min	-36.252	3	-1.699	1	-.055	1	0	3	0	1	0	1
571	M16A	1	max	0	10	2.738	4	.219	4	0	3	0	3	0	1
572			min	-208.542	4	0	10	-.018	3	0	1	0	4	0	1
573		2	max	0	10	2.434	4	.198	4	0	3	0	3	0	10
574			min	-208.613	4	0	10	-.018	3	0	1	0	4	0	4
575		3	max	0	10	2.13	4	.178	4	0	3	0	3	0	10
576			min	-208.683	4	0	10	-.018	3	0	1	0	4	-.002	4
577		4	max	0	10	1.825	4	.157	4	0	3	0	3	0	10
578			min	-208.753	4	0	10	-.018	3	0	1	0	4	-.003	4
579		5	max	0	10	1.521	4	.137	4	0	3	0	3	0	10
580			min	-208.823	4	0	10	-.018	3	0	1	0	1	-.003	4
581		6	max	0	10	1.217	4	.117	4	0	3	0	3	0	10
582			min	-208.893	4	0	10	-.018	3	0	1	0	1	-.004	4
583		7	max	0	10	.913	4	.096	4	0	3	0	5	0	10
584			min	-208.963	4	0	10	-.018	3	0	1	0	1	-.004	4
585		8	max	0	10	.608	4	.076	4	0	3	0	5	0	10
586			min	-209.033	4	0	10	-.018	3	0	1	0	1	-.004	4
587		9	max	0	10	.304	4	.055	4	0	3	0	5	0	10
588			min	-209.104	4	0	10	-.018	3	0	1	0	1	-.005	4
589		10	max	0	10	0	1	.035	4	0	3	0	5	0	10
590			min	-209.174	4	0	1	-.018	3	0	1	0	1	-.005	4
591		11	max	0	10	0	10	.026	1	0	3	0	5	0	10
592			min	-209.244	4	-.304	4	-.018	3	0	1	0	1	-.005	4
593		12	max	0	10	0	10	.026	1	0	3	0	5	0	10
594			min	-209.314	4	-.608	4	-.018	3	0	1	0	1	-.004	4
595		13	max	0	10	0	10	.026	1	0	3	0	5	0	10
596			min	-209.384	4	-.913	4	-.03	5	0	1	0	3	-.004	4
597		14	max	0	10	0	10	.026	1	0	3	0	4	0	10
598			min	-209.454	4	-1.217	4	-.051	5	0	1	0	3	-.004	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	0	10	0	10	.026	1	0	3	0	4	0	10
600			min	-209.525	4	-1.521	4	-.071	5	0	1	0	3	-.003	4
601		16	max	0	10	0	10	.026	1	0	3	0	4	0	10
602			min	-209.595	4	-1.825	4	-.091	5	0	1	0	3	-.003	4
603		17	max	0	10	0	10	.026	1	0	3	0	1	0	10
604			min	-209.665	4	-2.13	4	-.112	5	0	1	0	3	-.002	4
605		18	max	.034	2	0	10	.026	1	0	3	0	1	0	10
606			min	-209.735	4	-2.434	4	-.132	5	0	1	0	3	0	4
607		19	max	.106	2	0	10	.026	1	0	3	0	1	0	1
608			min	-209.805	4	-2.738	4	-.153	5	0	1	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.005	2	.008	1	1.488e-3	5	NC	3	NC	2
2			min	-.003	3	-.004	3	-.014	5	-5.201e-4	1	5751.503	2	3867.158	1
3		2	max	.002	1	.005	2	.007	1	1.51e-3	5	NC	3	NC	2
4			min	-.002	3	-.004	3	-.013	5	-5.002e-4	1	6252.54	2	4192.637	1
5		3	max	.002	1	.004	2	.007	1	1.531e-3	5	NC	1	NC	2
6			min	-.002	3	-.004	3	-.013	5	-4.804e-4	1	6844.39	2	4575.948	1
7		4	max	.002	1	.004	2	.006	1	1.553e-3	5	NC	1	NC	2
8			min	-.002	3	-.004	3	-.012	5	-4.605e-4	1	7548.597	2	5031.252	1
9		5	max	.002	1	.004	2	.005	1	1.575e-3	5	NC	1	NC	2
10			min	-.002	3	-.004	3	-.011	5	-4.406e-4	1	8393.768	2	5577.473	1
11		6	max	.002	1	.003	2	.005	1	1.596e-3	5	NC	1	NC	2
12			min	-.002	3	-.003	3	-.011	5	-4.208e-4	1	9418.539	2	6240.367	1
13		7	max	.002	1	.003	2	.004	1	1.618e-3	5	NC	1	NC	2
14			min	-.002	3	-.003	3	-.01	5	-4.009e-4	1	NC	1	7055.731	1
15		8	max	.002	1	.002	2	.004	1	1.64e-3	5	NC	1	NC	2
16			min	-.002	3	-.003	3	-.009	5	-3.81e-4	1	NC	1	8074.539	1
17		9	max	.001	1	.002	2	.003	1	1.661e-3	5	NC	1	NC	2
18			min	-.001	3	-.003	3	-.009	5	-3.611e-4	1	NC	1	9371.452	1
19		10	max	.001	1	.002	2	.003	1	1.683e-3	5	NC	1	NC	1
20			min	-.001	3	-.003	3	-.008	5	-3.413e-4	1	NC	1	NC	1
21		11	max	.001	1	.001	2	.002	1	1.704e-3	5	NC	1	NC	1
22			min	-.001	3	-.002	3	-.007	5	-3.214e-4	1	NC	1	NC	1
23		12	max	0	1	.001	2	.002	1	1.726e-3	5	NC	1	NC	1
24			min	0	3	-.002	3	-.006	5	-3.015e-4	1	NC	1	NC	1
25		13	max	0	1	0	2	.001	1	1.748e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.005	5	-2.817e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	.001	1	1.769e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.005	5	-2.618e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.791e-3	5	NC	1	NC	1
30			min	0	3	-.001	3	-.004	5	-2.419e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.813e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.003	5	-2.221e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.834e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.002	5	-2.022e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.856e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-1.823e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.877e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.625e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	7.375e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-8.548e-4	5	NC	1	NC	1
41		2	max	0	1	0	2	.005	5	9.297e-5	1	NC	1	NC	1
42			min	0	10	0	3	0	1	-8.612e-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	1	0	2	.009	5	1.122e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	-8.677e-4	5	NC	1	NC	1
45		4	max	0	1	0	2	.014	5	1.314e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	0	1	-8.741e-4	5	NC	1	NC	1
47		5	max	0	1	0	2	.018	4	1.506e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	0	1	-8.805e-4	5	NC	1	NC	1
49		6	max	0	1	0	2	.023	4	1.699e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	0	1	-8.87e-4	5	NC	1	NC	1
51		7	max	0	1	0	2	.028	4	1.891e-4	1	NC	1	NC	1
52			min	0	10	-.004	3	0	1	-8.934e-4	5	NC	1	NC	1
53		8	max	0	1	0	2	.032	4	2.083e-4	1	NC	1	NC	1
54			min	0	10	-.004	3	0	1	-8.999e-4	5	NC	1	NC	1
55		9	max	0	1	0	2	.037	4	2.275e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	1	-9.063e-4	5	NC	1	NC	1
57		10	max	0	1	.001	2	.041	4	2.467e-4	1	NC	1	NC	1
58			min	0	10	-.005	3	0	10	-9.127e-4	5	NC	1	NC	1
59		11	max	0	1	.002	2	.045	4	2.66e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	10	-9.192e-4	5	NC	1	NC	1
61		12	max	0	1	.002	2	.05	4	2.852e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	10	-9.256e-4	5	NC	1	NC	1
63		13	max	0	1	.003	2	.054	4	3.044e-4	1	NC	1	NC	1
64			min	0	10	-.006	3	0	10	-9.32e-4	5	NC	1	NC	1
65		14	max	0	1	.004	2	.058	4	3.236e-4	1	NC	1	NC	1
66			min	0	10	-.006	3	0	10	-9.385e-4	5	NC	1	NC	1
67		15	max	0	1	.004	2	.062	4	3.428e-4	1	NC	1	NC	1
68			min	0	10	-.006	3	0	10	-9.449e-4	5	NC	1	NC	1
69		16	max	0	1	.005	2	.066	4	3.621e-4	1	NC	1	NC	1
70			min	0	10	-.006	3	0	10	-9.514e-4	5	8946.438	2	NC	1
71		17	max	0	1	.006	2	.07	4	3.813e-4	1	NC	3	NC	1
72			min	0	10	-.006	3	0	10	-9.578e-4	5	7608.949	2	NC	1
73		18	max	0	1	.007	2	.074	4	4.005e-4	1	NC	3	NC	1
74			min	0	10	-.006	3	0	10	-9.642e-4	5	6581.238	2	NC	1
75		19	max	0	1	.008	2	.078	4	4.197e-4	1	NC	3	NC	1
76			min	0	10	-.006	3	0	10	-9.707e-4	5	5782.439	2	NC	1
77	M4	1	max	.002	1	.006	2	0	10	3.417e-3	5	NC	1	NC	2
78			min	0	3	-.005	3	-.083	4	-4.804e-4	1	NC	1	233.892	4
79		2	max	.002	1	.006	2	0	10	3.417e-3	5	NC	1	NC	2
80			min	0	3	-.004	3	-.076	4	-4.804e-4	1	NC	1	254.971	4
81		3	max	.002	1	.005	2	0	10	3.417e-3	5	NC	1	NC	2
82			min	0	3	-.004	3	-.069	4	-4.804e-4	1	NC	1	280.059	4
83		4	max	.002	1	.005	2	0	10	3.417e-3	5	NC	1	NC	2
84			min	0	3	-.004	3	-.062	4	-4.804e-4	1	NC	1	310.212	4
85		5	max	.002	1	.005	2	0	10	3.417e-3	5	NC	1	NC	1
86			min	0	3	-.004	3	-.056	4	-4.804e-4	1	NC	1	346.869	4
87		6	max	.002	1	.004	2	0	10	3.417e-3	5	NC	1	NC	1
88			min	0	3	-.003	3	-.049	4	-4.804e-4	1	NC	1	392.031	4
89		7	max	.001	1	.004	2	0	10	3.417e-3	5	NC	1	NC	1
90			min	0	3	-.003	3	-.043	4	-4.804e-4	1	NC	1	448.547	4
91		8	max	.001	1	.004	2	0	10	3.417e-3	5	NC	1	NC	1
92			min	0	3	-.003	3	-.037	4	-4.804e-4	1	NC	1	520.589	4
93		9	max	.001	1	.003	2	0	10	3.417e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.031	4	-4.804e-4	1	NC	1	614.467	4
95		10	max	.001	1	.003	2	0	10	3.417e-3	5	NC	1	NC	1
96			min	0	3	-.002	3	-.026	4	-4.804e-4	1	NC	1	740.101	4
97		11	max	0	1	.003	2	0	10	3.417e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.021	4	-4.804e-4	1	NC	1	913.827	4
99		12	max	0	1	.002	2	0	10	3.417e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.002	3	-.017	4	-4.804e-4	1	NC	1	1164.144	4
101		13	max	0	1	.002	2	0	10	3.417e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.013	4	-4.804e-4	1	NC	1	1544.504	4
103		14	max	0	1	.002	2	0	10	3.417e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.009	4	-4.804e-4	1	NC	1	2165.163	4
105		15	max	0	1	.001	2	0	10	3.417e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.006	4	-4.804e-4	1	NC	1	3285.15	4
107		16	max	0	1	.001	2	0	10	3.417e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.003	4	-4.804e-4	1	NC	1	5640.825	4
109		17	max	0	1	0	2	0	10	3.417e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-4.804e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	3.417e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-4.804e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	3.417e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-4.804e-4	1	NC	1	NC	1
115	M6	1	max	.008	1	.019	2	.003	1	1.608e-3	4	NC	3	NC	2
116			min	-.008	3	-.013	3	-.014	5	-6.337e-8	10	1597.828	2	9120.291	1
117		2	max	.008	1	.018	2	.003	1	1.628e-3	4	NC	3	NC	2
118			min	-.008	3	-.013	3	-.013	5	-6.003e-8	10	1704.665	2	9841.428	1
119		3	max	.007	1	.016	2	.003	1	1.647e-3	4	NC	3	NC	1
120			min	-.007	3	-.012	3	-.013	5	-5.669e-8	10	1826.459	2	NC	1
121		4	max	.007	1	.015	2	.003	1	1.667e-3	4	NC	3	NC	1
122			min	-.007	3	-.011	3	-.012	5	-5.335e-8	10	1966.197	2	NC	1
123		5	max	.006	1	.014	2	.002	1	1.687e-3	4	NC	3	NC	1
124			min	-.007	3	-.011	3	-.011	5	-5.001e-8	10	2127.723	2	NC	1
125		6	max	.006	1	.013	2	.002	1	1.706e-3	4	NC	3	NC	1
126			min	-.006	3	-.01	3	-.011	5	-4.488e-7	2	2316.07	2	NC	1
127		7	max	.005	1	.012	2	.002	1	1.726e-3	4	NC	3	NC	1
128			min	-.006	3	-.009	3	-.01	5	-2.377e-6	2	2537.952	2	NC	1
129		8	max	.005	1	.011	2	.002	1	1.745e-3	4	NC	3	NC	1
130			min	-.005	3	-.009	3	-.009	5	-4.306e-6	2	2802.526	2	NC	1
131		9	max	.005	1	.01	2	.001	1	1.765e-3	4	NC	3	NC	1
132			min	-.005	3	-.008	3	-.009	5	-6.261e-6	1	3122.618	2	NC	1
133		10	max	.004	1	.009	2	.001	1	1.785e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.008	5	-1.258e-5	1	3516.756	2	NC	1
135		11	max	.004	1	.008	2	0	1	1.804e-3	4	NC	3	NC	1
136			min	-.004	3	-.007	3	-.007	5	-1.889e-5	1	4012.731	2	NC	1
137		12	max	.003	1	.006	2	0	1	1.824e-3	4	NC	3	NC	1
138			min	-.003	3	-.006	3	-.006	5	-2.521e-5	1	4654.219	2	NC	1
139		13	max	.003	1	.005	2	0	1	1.843e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.006	5	-3.152e-5	1	5514.007	2	NC	1
141		14	max	.002	1	.004	2	0	1	1.863e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.005	5	-3.784e-5	1	6723.111	2	NC	1
143		15	max	.002	1	.004	2	0	1	1.883e-3	4	NC	3	NC	1
144			min	-.002	3	-.003	3	-.004	5	-4.415e-5	1	8543.549	2	NC	1
145		16	max	.001	1	.003	2	0	1	1.902e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.003	5	-5.047e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.922e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.002	5	-5.678e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.941e-3	4	NC	1	NC	1
150			min	0	3	0	3	0	5	-6.31e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.961e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-6.942e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	3.115e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-8.928e-4	4	NC	1	NC	1
155		2	max	0	9	.001	2	.005	4	2.622e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	1	-8.827e-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	9	.002	2	.01	4	2.13e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-8.726e-4	4	NC	1	NC	1
159		4	max	0	9	.004	2	.014	4	1.637e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-8.625e-4	4	NC	1	NC	1
161		5	max	0	9	.005	2	.019	4	1.145e-5	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-8.525e-4	4	9767.234	2	NC	1
163		6	max	0	9	.006	2	.024	4	7.71e-6	3	NC	3	NC	1
164			min	0	2	-.007	3	0	1	-8.424e-4	4	7804.93	2	NC	1
165		7	max	0	9	.007	2	.029	4	1.923e-5	3	NC	3	NC	1
166			min	0	2	-.008	3	0	1	-8.323e-4	4	6460.381	2	NC	1
167		8	max	0	9	.008	2	.033	4	3.075e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	-.001	1	-8.222e-4	4	5473.488	2	NC	1
169		9	max	0	9	.01	2	.038	4	4.227e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	-.001	1	-8.122e-4	4	4714.626	2	NC	1
171		10	max	0	9	.011	2	.043	4	5.379e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	-.001	1	-8.021e-4	4	4111.846	2	NC	1
173		11	max	0	9	.013	2	.047	4	6.531e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-7.92e-4	4	3621.82	2	NC	1
175		12	max	0	9	.014	2	.051	4	7.683e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-7.819e-4	4	3216.695	2	NC	1
177		13	max	.001	9	.016	2	.056	4	8.835e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-7.719e-4	4	2877.574	2	NC	1
179		14	max	.001	9	.018	2	.06	4	9.988e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.002	1	-7.618e-4	4	2591.055	2	NC	1
181		15	max	.001	9	.02	2	.064	4	1.114e-4	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-7.517e-4	4	2347.273	2	NC	1
183		16	max	.001	9	.022	2	.068	4	1.229e-4	3	NC	3	NC	1
184			min	-.002	2	-.018	3	-.002	1	-7.416e-4	4	2138.753	2	NC	1
185		17	max	.001	9	.023	2	.072	4	1.344e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-7.315e-4	4	1959.692	2	NC	1
187		18	max	.001	9	.025	2	.076	4	1.46e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-7.215e-4	4	1805.509	2	NC	1
189		19	max	.002	9	.028	2	.08	4	1.575e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-7.114e-4	4	1672.539	2	NC	1
191	M8	1	max	.007	1	.022	2	.002	1	3.194e-3	4	NC	1	NC	1
192			min	-.002	3	-.015	3	-.084	4	-1.261e-4	3	NC	1	230.582	4
193		2	max	.006	1	.02	2	.002	1	3.194e-3	4	NC	1	NC	1
194			min	-.002	3	-.014	3	-.077	4	-1.261e-4	3	NC	1	251.362	4
195		3	max	.006	1	.019	2	.001	1	3.194e-3	4	NC	1	NC	1
196			min	-.002	3	-.013	3	-.07	4	-1.261e-4	3	NC	1	276.094	4
197		4	max	.006	1	.018	2	.001	1	3.194e-3	4	NC	1	NC	1
198			min	-.002	3	-.012	3	-.063	4	-1.261e-4	3	NC	1	305.82	4
199		5	max	.005	1	.017	2	.001	1	3.194e-3	4	NC	1	NC	1
200			min	-.001	3	-.011	3	-.057	4	-1.261e-4	3	NC	1	341.958	4
201		6	max	.005	1	.016	2	0	1	3.194e-3	4	NC	1	NC	1
202			min	-.001	3	-.011	3	-.05	4	-1.261e-4	3	NC	1	386.48	4
203		7	max	.004	1	.014	2	0	1	3.194e-3	4	NC	1	NC	1
204			min	-.001	3	-.01	3	-.044	4	-1.261e-4	3	NC	1	442.196	4
205		8	max	.004	1	.013	2	0	1	3.194e-3	4	NC	1	NC	1
206			min	-.001	3	-.009	3	-.038	4	-1.261e-4	3	NC	1	513.217	4
207		9	max	.004	1	.012	2	0	1	3.194e-3	4	NC	1	NC	1
208			min	-.001	3	-.008	3	-.032	4	-1.261e-4	3	NC	1	605.766	4
209		10	max	.003	1	.011	2	0	1	3.194e-3	4	NC	1	NC	1
210			min	0	3	-.007	3	-.026	4	-1.261e-4	3	NC	1	729.622	4
211		11	max	.003	1	.01	2	0	1	3.194e-3	4	NC	1	NC	1
212			min	0	3	-.007	3	-.021	4	-1.261e-4	3	NC	1	900.89	4
213		12	max	.003	1	.008	2	0	1	3.194e-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	-.006	3	-.017	4	-1.261e-4	3	NC	1	1147.665	4
215		13	max	.002	1	.007	2	0	1	3.194e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.013	4	-1.261e-4	3	NC	1	1522.642	4
217		14	max	.002	1	.006	2	0	1	3.194e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.009	4	-1.261e-4	3	NC	1	2134.519	4
219		15	max	.001	1	.005	2	0	1	3.194e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.006	4	-1.261e-4	3	NC	1	3238.661	4
221		16	max	.001	1	.004	2	0	1	3.194e-3	4	NC	1	NC	1
222			min	0	3	-.002	3	-.003	4	-1.261e-4	3	NC	1	5561.01	4
223		17	max	0	1	.002	2	0	1	3.194e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.261e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	3.194e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.261e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	3.194e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.261e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.005	2	0	3	5.917e-4	1	NC	3	NC	1
230			min	-.002	3	-.004	3	-.005	4	-2.33e-4	3	5764.667	2	NC	1
231		2	max	.002	1	.005	2	0	3	5.638e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.005	4	-2.266e-4	3	6267.154	2	NC	1
233		3	max	.002	1	.004	2	0	3	5.359e-4	1	NC	1	NC	1
234			min	-.002	3	-.004	3	-.005	4	-2.201e-4	3	6860.775	2	NC	1
235		4	max	.002	1	.004	2	0	3	5.557e-4	4	NC	1	NC	1
236			min	-.002	3	-.004	3	-.005	4	-2.137e-4	3	7567.159	2	NC	1
237		5	max	.002	1	.004	2	0	3	6.124e-4	4	NC	1	NC	1
238			min	-.002	3	-.004	3	-.005	4	-2.072e-4	3	8415.037	2	NC	1
239		6	max	.002	1	.003	2	0	3	6.691e-4	4	NC	1	NC	1
240			min	-.002	3	-.004	3	-.005	4	-2.007e-4	3	9443.212	2	NC	1
241		7	max	.002	1	.003	2	0	3	7.258e-4	4	NC	1	NC	1
242			min	-.002	3	-.003	3	-.005	4	-1.943e-4	3	NC	1	NC	1
243		8	max	.002	1	.002	2	0	3	7.825e-4	4	NC	1	NC	1
244			min	-.002	3	-.003	3	-.005	4	-1.878e-4	3	NC	1	NC	1
245		9	max	.001	1	.002	2	0	3	8.393e-4	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.005	4	-1.814e-4	3	NC	1	NC	1
247		10	max	.001	1	.002	2	0	3	8.96e-4	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.004	4	-1.749e-4	3	NC	1	NC	1
249		11	max	.001	1	.001	2	0	3	9.527e-4	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.004	4	-1.685e-4	3	NC	1	NC	1
251		12	max	0	1	.001	2	0	3	1.009e-3	4	NC	1	NC	1
252			min	0	3	-.002	3	-.004	4	-1.62e-4	3	NC	1	NC	1
253		13	max	0	1	0	2	0	3	1.066e-3	4	NC	1	NC	1
254			min	0	3	-.002	3	-.003	4	-1.555e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	1.123e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.003	4	-1.491e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.18e-3	4	NC	1	NC	1
258			min	0	3	-.001	3	-.002	4	-1.426e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.236e-3	4	NC	1	NC	1
260			min	0	3	-.001	3	-.002	4	-1.362e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.293e-3	4	NC	1	NC	1
262			min	0	3	0	3	-.001	4	-1.297e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.35e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-1.233e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.407e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.168e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.328e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-6.414e-4	4	NC	1	NC	1
269		2	max	0	1	0	2	.003	4	4.129e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-7.195e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	1	0	2	.007	4	2.929e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-7.977e-4	4	NC	1	6615.24	4
273		4	max	0	1	0	2	.011	4	1.73e-5	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-8.759e-4	4	NC	1	4362.348	4
275		5	max	0	1	0	2	.014	4	5.308e-6	3	NC	1	NC	1
276			min	0	10	-.003	3	0	3	-9.541e-4	4	NC	1	3241.682	4
277		6	max	0	1	0	2	.018	4	-4.558e-6	12	NC	1	NC	1
278			min	0	10	-.003	3	-.001	3	-1.032e-3	4	NC	1	2573.15	4
279		7	max	0	1	0	2	.022	4	-1.212e-5	12	NC	1	NC	1
280			min	0	10	-.004	3	-.001	3	-1.11e-3	4	NC	1	2130.117	4
281		8	max	0	1	0	2	.025	5	-1.459e-5	10	NC	1	NC	1
282			min	0	10	-.004	3	-.001	3	-1.189e-3	4	NC	1	1812.998	5
283		9	max	0	1	0	2	.029	5	-1.618e-5	10	NC	1	NC	1
284			min	0	10	-.005	3	-.002	1	-1.267e-3	4	NC	1	1575.868	5
285		10	max	0	1	.001	2	.033	5	-1.778e-5	10	NC	1	NC	1
286			min	0	10	-.005	3	-.002	1	-1.345e-3	4	NC	1	1392.524	5
287		11	max	0	1	.002	2	.037	5	-1.938e-5	10	NC	1	NC	1
288			min	0	10	-.006	3	-.003	1	-1.423e-3	4	NC	1	1246.553	5
289		12	max	0	1	.002	2	.041	5	-2.097e-5	10	NC	1	NC	1
290			min	0	10	-.006	3	-.003	1	-1.501e-3	4	NC	1	1127.525	5
291		13	max	0	1	.003	2	.045	5	-2.257e-5	10	NC	1	NC	1
292			min	0	10	-.006	3	-.004	1	-1.579e-3	4	NC	1	1028.494	5
293		14	max	0	1	.004	2	.049	5	-2.417e-5	10	NC	1	NC	1
294			min	0	10	-.006	3	-.005	1	-1.658e-3	4	NC	1	944.66	5
295		15	max	0	1	.004	2	.053	5	-2.577e-5	10	NC	1	NC	2
296			min	0	10	-.006	3	-.005	1	-1.736e-3	4	NC	1	872.601	5
297		16	max	0	1	.005	2	.057	5	-2.736e-5	10	NC	1	NC	2
298			min	0	10	-.006	3	-.006	1	-1.814e-3	4	8961.357	2	809.815	5
299		17	max	0	1	.006	2	.061	5	-2.896e-5	10	NC	3	NC	2
300			min	0	10	-.006	3	-.006	1	-1.892e-3	4	7620.255	2	754.431	5
301		18	max	0	1	.007	2	.065	5	-3.056e-5	10	NC	3	NC	2
302			min	0	10	-.006	3	-.007	1	-1.97e-3	4	6590.075	2	705.027	5
303		19	max	0	1	.008	2	.07	5	-3.215e-5	10	NC	3	NC	2
304			min	0	10	-.006	3	-.007	1	-2.048e-3	4	5789.553	2	660.506	5
305	M12	1	max	.002	1	.006	2	.006	1	4.332e-3	4	NC	1	NC	3
306			min	0	3	-.005	3	-.077	5	3.1e-5	10	NC	1	251.824	5
307		2	max	.002	1	.006	2	.006	1	4.332e-3	4	NC	1	NC	2
308			min	0	3	-.004	3	-.07	5	3.1e-5	10	NC	1	274.513	5
309		3	max	.002	1	.005	2	.005	1	4.332e-3	4	NC	1	NC	2
310			min	0	3	-.004	3	-.064	5	3.1e-5	10	NC	1	301.517	5
311		4	max	.002	1	.005	2	.005	1	4.332e-3	4	NC	1	NC	2
312			min	0	3	-.004	3	-.058	5	3.1e-5	10	NC	1	333.974	5
313		5	max	.002	1	.005	2	.004	1	4.332e-3	4	NC	1	NC	2
314			min	0	3	-.004	3	-.052	5	3.1e-5	10	NC	1	373.43	5
315		6	max	.002	1	.004	2	.004	1	4.332e-3	4	NC	1	NC	2
316			min	0	3	-.003	3	-.046	5	3.1e-5	10	NC	1	422.04	5
317		7	max	.001	1	.004	2	.003	1	4.332e-3	4	NC	1	NC	2
318			min	0	3	-.003	3	-.04	5	3.1e-5	10	NC	1	482.87	5
319		8	max	.001	1	.004	2	.003	1	4.332e-3	4	NC	1	NC	2
320			min	0	3	-.003	3	-.034	5	3.1e-5	10	NC	1	560.41	5
321		9	max	.001	1	.003	2	.002	1	4.332e-3	4	NC	1	NC	2
322			min	0	3	-.003	3	-.029	5	3.1e-5	10	NC	1	661.452	5
323		10	max	.001	1	.003	2	.002	1	4.332e-3	4	NC	1	NC	1
324			min	0	3	-.002	3	-.024	5	3.1e-5	10	NC	1	796.671	5
325		11	max	0	1	.003	2	.002	1	4.332e-3	4	NC	1	NC	1
326			min	0	3	-.002	3	-.02	5	3.1e-5	10	NC	1	983.649	5
327		12	max	0	1	.002	2	.001	1	4.332e-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	3	-.002	3	-.015	5	3.1e-5	10	NC	1	1253.057	5
329		13	max	0	1	.002	2	0	1	4.332e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.012	5	3.1e-5	10	NC	1	1662.419	5
331		14	max	0	1	.002	2	0	1	4.332e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.008	5	3.1e-5	10	NC	1	2330.393	5
333		15	max	0	1	.001	2	0	1	4.332e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.005	5	3.1e-5	10	NC	1	3535.743	5
335		16	max	0	1	.001	2	0	1	4.332e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.003	5	3.1e-5	10	NC	1	6070.922	5
337		17	max	0	1	0	2	0	1	4.332e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.001	5	3.1e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	4.332e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	3.1e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	4.332e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	3.1e-5	10	NC	1	NC	1
343	M1	1	max	.004	3	.02	3	.007	5	1.84e-2	1	NC	1	NC	1
344			min	-.005	2	-.023	1	-.003	1	-1.753e-2	3	NC	1	NC	1
345		2	max	.004	3	.011	3	.01	5	8.941e-3	1	NC	4	NC	1
346			min	-.005	2	-.012	1	-.006	1	-8.663e-3	3	4232.683	1	NC	1
347		3	max	.004	3	.002	3	.014	5	3.14e-4	5	NC	4	NC	2
348			min	-.005	2	-.002	1	-.008	1	-3.415e-4	1	2183.999	1	6581.792	5
349		4	max	.004	3	.007	1	.018	5	3.087e-4	5	NC	5	NC	2
350			min	-.005	2	-.005	3	-.009	1	-2.844e-4	1	1543.984	1	4186.4	5
351		5	max	.004	3	.014	1	.022	5	3.035e-4	5	NC	5	NC	2
352			min	-.005	2	-.01	3	-.009	1	-2.274e-4	1	1236.496	1	3014.526	5
353		6	max	.004	3	.02	1	.027	5	2.983e-4	5	NC	5	NC	2
354			min	-.005	2	-.015	3	-.008	1	-1.704e-4	1	1062.725	1	2327.84	5
355		7	max	.004	3	.025	1	.032	5	2.93e-4	5	NC	5	NC	1
356			min	-.005	2	-.018	3	-.007	1	-1.133e-4	1	957.511	1	1881.42	5
357		8	max	.004	3	.028	1	.037	5	2.878e-4	5	NC	5	NC	1
358			min	-.005	2	-.021	3	-.006	1	-5.627e-5	1	893.768	1	1570.79	5
359		9	max	.004	3	.03	1	.042	5	2.832e-4	4	NC	5	NC	1
360			min	-.005	2	-.022	3	-.004	1	7.744e-7	1	858.851	1	1336.606	4
361		10	max	.004	3	.031	1	.047	5	2.897e-4	4	NC	5	NC	1
362			min	-.005	2	-.022	3	-.003	1	1.129e-5	10	846.923	1	1155.062	4
363		11	max	.004	3	.03	1	.052	4	2.963e-4	4	NC	5	NC	1
364			min	-.005	2	-.021	3	0	1	1.449e-5	10	856.202	1	1016.313	4
365		12	max	.004	3	.028	1	.058	4	3.028e-4	4	NC	5	NC	1
366			min	-.005	2	-.02	3	0	10	1.769e-5	10	888.224	1	907.957	4
367		13	max	.004	3	.025	1	.063	4	3.094e-4	4	NC	5	NC	1
368			min	-.005	2	-.017	3	0	10	2.089e-5	10	948.5	1	821.912	4
369		14	max	.004	3	.02	1	.068	4	3.159e-4	4	NC	5	NC	2
370			min	-.005	2	-.013	3	0	10	2.41e-5	10	1049.128	1	752.719	4
371		15	max	.004	3	.013	1	.073	4	3.43e-4	1	NC	5	NC	2
372			min	-.005	2	-.009	3	0	10	2.579e-5	12	1216.072	1	696.584	4
373		16	max	.004	3	.006	1	.078	4	5.826e-4	4	NC	4	NC	2
374			min	-.005	2	-.004	3	0	10	2.566e-5	12	1511.312	1	650.802	4
375		17	max	.004	3	.002	3	.083	4	6.878e-3	4	NC	4	NC	2
376			min	-.005	2	-.003	1	0	10	1.456e-5	10	2121.473	1	613.439	4
377		18	max	.004	3	.008	3	.087	4	1.047e-2	1	NC	4	NC	1
378			min	-.005	2	-.014	1	0	10	-4.205e-3	3	4097.576	1	582.979	4
379		19	max	.004	3	.015	3	.09	4	2.106e-2	1	NC	1	NC	1
380			min	-.005	2	-.026	1	-.002	1	-8.517e-3	3	NC	1	558.966	4
381	M5	1	max	.014	3	.065	3	.007	5	5.443e-6	4	NC	1	NC	1
382			min	-.019	2	-.078	1	-.003	1	4.712e-8	2	NC	1	NC	1
383		2	max	.014	3	.035	3	.01	5	1.469e-4	5	NC	5	NC	1
384			min	-.019	2	-.042	1	-.003	1	-7.307e-5	1	1258.926	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.014	3	.007	3	.014	5	2.861e-4	5	NC	5	NC	1
386			min	-.019	2	-.007	1	-.003	1	-1.447e-4	1	649.081	1	NC	1
387		4	max	.014	3	.023	1	.018	5	2.984e-4	5	NC	5	NC	1
388			min	-.019	2	-.015	3	-.003	1	-1.373e-4	1	458.213	1	NC	1
389		5	max	.014	3	.048	1	.023	5	3.108e-4	5	NC	5	NC	1
390			min	-.019	2	-.034	3	-.003	1	-1.298e-4	1	366.419	1	NC	1
391		6	max	.014	3	.068	1	.028	5	3.231e-4	5	NC	15	NC	1
392			min	-.019	2	-.049	3	-.003	1	-1.223e-4	1	314.469	1	NC	1
393		7	max	.014	3	.084	1	.033	5	3.355e-4	5	NC	15	NC	1
394			min	-.019	2	-.06	3	-.003	1	-1.148e-4	1	282.939	1	NC	1
395		8	max	.014	3	.096	1	.039	5	3.478e-4	5	NC	15	NC	1
396			min	-.019	2	-.067	3	-.003	1	-1.074e-4	1	263.751	1	NC	1
397		9	max	.014	3	.103	1	.044	5	3.602e-4	5	NC	15	NC	1
398			min	-.019	2	-.071	3	-.003	1	-9.989e-5	1	253.126	1	NC	1
399		10	max	.014	3	.105	1	.049	5	3.725e-4	5	NC	15	NC	1
400			min	-.019	2	-.072	3	-.002	1	-9.241e-5	1	249.317	1	NC	1
401		11	max	.014	3	.103	1	.055	4	3.849e-4	5	NC	15	NC	1
402			min	-.019	2	-.069	3	-.002	1	-8.494e-5	1	251.776	1	NC	1
403		12	max	.014	3	.096	1	.06	4	3.972e-4	5	NC	15	NC	1
404			min	-.019	2	-.064	3	-.002	1	-7.746e-5	1	260.942	1	NC	1
405		13	max	.014	3	.084	1	.066	4	4.096e-4	5	NC	15	NC	1
406			min	-.019	2	-.055	3	-.002	1	-6.999e-5	1	278.427	1	NC	1
407		14	max	.014	3	.068	1	.071	4	4.219e-4	5	NC	15	NC	1
408			min	-.019	2	-.044	3	-.002	1	-6.251e-5	1	307.79	1	NC	1
409		15	max	.014	3	.046	1	.075	4	4.343e-4	5	NC	5	NC	1
410			min	-.019	2	-.03	3	-.002	1	-5.503e-5	1	356.691	1	NC	1
411		16	max	.014	3	.02	1	.08	4	6.954e-4	5	NC	5	NC	1
412			min	-.019	2	-.013	3	-.002	1	-5.083e-5	1	443.51	1	NC	1
413		17	max	.014	3	.005	3	.084	4	6.924e-3	4	NC	5	NC	1
414			min	-.019	2	-.011	1	-.002	1	-1.244e-4	1	624.365	1	NC	1
415		18	max	.014	3	.026	3	.087	4	3.553e-3	4	NC	5	NC	1
416			min	-.019	2	-.048	1	-.002	1	-6.351e-5	1	1207.493	1	NC	1
417		19	max	.014	3	.048	3	.09	4	2.154e-6	5	NC	1	NC	1
418			min	-.019	2	-.087	1	-.002	1	-1.404e-7	3	NC	1	NC	1
419	M9	1	max	.004	3	.02	3	.005	5	1.753e-2	3	NC	1	NC	1
420			min	-.005	2	-.023	1	-.004	1	-1.84e-2	1	NC	1	NC	1
421		2	max	.004	3	.011	3	.005	5	8.694e-3	3	NC	4	NC	1
422			min	-.005	2	-.013	1	0	1	-9.106e-3	1	4234.076	1	NC	1
423		3	max	.004	3	.002	3	.005	4	2.275e-5	2	NC	4	NC	1
424			min	-.005	2	-.002	1	0	3	-2.248e-5	5	2184.74	1	NC	1
425		4	max	.004	3	.007	1	.007	4	1.336e-5	3	NC	5	NC	1
426			min	-.005	2	-.005	3	0	3	-5.187e-5	4	1544.511	1	NC	1
427		5	max	.004	3	.014	1	.009	4	5.015e-6	3	NC	5	NC	1
428			min	-.005	2	-.011	3	-.001	3	-8.216e-5	4	1236.904	1	9500.616	14
429		6	max	.004	3	.02	1	.012	4	1.659e-6	10	NC	5	NC	1
430			min	-.005	2	-.015	3	-.002	3	-1.174e-4	1	1063.059	1	6242.775	4
431		7	max	.004	3	.025	1	.016	4	-1.551e-6	10	NC	5	NC	1
432			min	-.005	2	-.019	3	-.002	3	-1.617e-4	1	957.794	1	4164.439	4
433		8	max	.004	3	.028	1	.02	4	-4.761e-6	10	NC	5	NC	1
434			min	-.005	2	-.021	3	-.002	3	-2.059e-4	1	894.015	1	3000.725	4
435		9	max	.004	3	.03	1	.025	4	-7.971e-6	10	NC	5	NC	1
436			min	-.005	2	-.022	3	-.002	3	-2.501e-4	1	859.07	1	2282.614	4
437		10	max	.004	3	.031	1	.031	5	-1.118e-5	10	NC	5	NC	1
438			min	-.005	2	-.022	3	-.002	1	-2.943e-4	1	847.121	1	1807.648	4
439		11	max	.004	3	.03	1	.037	5	-1.439e-5	10	NC	5	NC	1
440			min	-.005	2	-.021	3	-.004	1	-3.385e-4	1	856.384	1	1476.765	4
441		12	max	.004	3	.028	1	.043	5	-1.76e-5	10	NC	5	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	-.005	2	-.02	3	-.005	1	-3.827e-4	1	888.394	1	1236.807	4
443		13	max	.004	3	.025	1	.05	5	-2.081e-5	10	NC	5	NC	2
444			min	-.005	2	-.017	3	-.007	1	-4.27e-4	1	948.662	1	1057.146	4
445		14	max	.004	3	.02	1	.056	5	-2.402e-5	10	NC	5	NC	2
446			min	-.005	2	-.014	3	-.007	1	-4.712e-4	1	1049.286	1	919.113	4
447		15	max	.004	3	.013	1	.063	5	-2.723e-5	10	NC	5	NC	2
448			min	-.005	2	-.009	3	-.008	1	-5.154e-4	1	1216.232	1	810.792	4
449		16	max	.004	3	.006	1	.07	5	-2.764e-5	15	NC	5	NC	2
450			min	-.005	2	-.004	3	-.007	1	-5.492e-4	1	1511.486	1	724.289	4
451		17	max	.004	3	.002	3	.077	5	6.653e-3	4	NC	4	NC	2
452			min	-.005	2	-.003	1	-.006	1	-3.349e-4	1	2121.705	1	654.048	4
453		18	max	.004	3	.008	3	.083	4	4.209e-3	3	NC	4	NC	1
454			min	-.005	2	-.014	1	-.004	1	-1.06e-2	1	4098.008	1	596.149	4
455		19	max	.004	3	.015	3	.09	4	8.517e-3	3	NC	1	NC	1
456			min	-.005	2	-.026	1	-.001	1	-2.106e-2	1	NC	1	548.485	4
457	M13	1	max	.004	1	.02	3	.004	3	3.44e-3	3	NC	1	NC	1
458			min	-.005	5	-.023	1	-.005	2	-4.151e-3	1	NC	1	NC	1
459		2	max	.004	1	.161	3	.016	1	4.308e-3	3	NC	5	NC	2
460			min	-.006	5	-.172	1	-.002	5	-5.236e-3	1	1012.905	1	7821.341	1
461		3	max	.004	1	.276	3	.041	1	5.176e-3	3	NC	5	NC	3
462			min	-.006	5	-.293	1	-.004	5	-6.322e-3	1	556.558	1	3350.701	1
463		4	max	.004	1	.349	3	.062	1	6.044e-3	3	NC	5	NC	3
464			min	-.006	5	-.37	1	-.006	5	-7.408e-3	1	433.168	1	2279.688	1
465		5	max	.004	1	.37	3	.072	1	6.912e-3	3	NC	5	NC	3
466			min	-.006	5	-.393	1	-.009	5	-8.494e-3	1	405.532	1	1991.597	1
467		6	max	.004	1	.342	3	.067	1	7.781e-3	3	NC	5	NC	3
468			min	-.006	5	-.365	1	-.011	5	-9.58e-3	1	439.551	1	2131.482	1
469		7	max	.004	1	.274	3	.048	1	8.649e-3	3	NC	5	NC	2
470			min	-.006	5	-.294	1	-.012	5	-1.067e-2	1	553.875	1	2882.805	1
471		8	max	.004	1	.184	3	.022	1	9.517e-3	3	NC	5	NC	2
472			min	-.006	5	-.202	1	-.011	5	-1.175e-2	1	840.553	1	5913.343	1
473		9	max	.004	1	.102	3	.012	3	1.038e-2	3	NC	5	NC	1
474			min	-.006	5	-.117	1	-.014	2	-1.284e-2	1	1604.061	1	NC	1
475		10	max	.003	1	.065	3	.014	3	1.125e-2	3	NC	4	NC	1
476			min	-.007	5	-.078	1	-.019	2	-1.392e-2	1	2736.486	1	NC	1
477		11	max	.003	1	.102	3	.015	3	1.039e-2	3	NC	5	NC	1
478			min	-.007	5	-.117	1	-.014	2	-1.284e-2	1	1604.061	1	NC	1
479		12	max	.003	1	.184	3	.022	1	9.517e-3	3	NC	5	NC	2
480			min	-.007	5	-.202	1	-.007	10	-1.175e-2	1	840.553	1	5808.07	1
481		13	max	.003	1	.274	3	.049	1	8.65e-3	3	NC	5	NC	2
482			min	-.007	5	-.294	1	-.004	10	-1.067e-2	1	553.875	1	2860.966	1
483		14	max	.003	1	.342	3	.067	1	7.782e-3	3	NC	5	NC	3
484			min	-.007	5	-.365	1	-.001	10	-9.581e-3	1	439.551	1	2124.664	1
485		15	max	.003	1	.371	3	.072	1	6.915e-3	3	NC	5	NC	3
486			min	-.007	5	-.393	1	0	10	-8.495e-3	1	405.532	1	1991.325	1
487		16	max	.003	1	.349	3	.062	1	6.047e-3	3	NC	5	NC	3
488			min	-.007	5	-.37	1	-.004	5	-7.409e-3	1	433.168	1	2286.105	1
489		17	max	.003	1	.276	3	.041	1	5.179e-3	3	NC	5	NC	3
490			min	-.007	5	-.293	1	-.007	5	-6.323e-3	1	556.558	1	3372.89	1
491		18	max	.003	1	.161	3	.015	1	4.312e-3	3	NC	5	NC	2
492			min	-.007	5	-.172	1	-.006	5	-5.237e-3	1	1012.906	1	7926.523	1
493		19	max	.003	1	.02	3	.004	3	3.444e-3	3	NC	1	NC	1
494			min	-.007	5	-.023	1	-.005	2	-4.152e-3	1	NC	1	NC	1
495	M16	1	max	.001	1	.015	3	.004	3	4.371e-3	1	NC	1	NC	1
496			min	-.09	4	-.026	1	-.005	2	-2.563e-3	3	NC	1	NC	1
497		2	max	.001	1	.083	3	.018	4	5.539e-3	1	NC	5	NC	2
498			min	-.09	4	-.195	1	-.002	10	-3.201e-3	3	884.912	1	7827.191	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	.001	1	.14	3	.041	1	6.706e-3	1	NC	5	NC	3
500			min	-.09	4	-.334	1	0	10	-3.838e-3	3	486.288	1	3353.921	1
501		4	max	.001	1	.176	3	.062	1	7.873e-3	1	NC	5	NC	3
502			min	-.09	4	-.422	1	0	10	-4.476e-3	3	378.559	1	2282.626	1
503		5	max	.001	1	.188	3	.071	1	9.04e-3	1	NC	5	NC	3
504			min	-.09	4	-.449	1	0	10	-5.113e-3	3	354.537	1	1995.259	1
505		6	max	.001	1	.176	3	.066	1	1.021e-2	1	NC	5	NC	3
506			min	-.09	4	-.416	1	-.001	10	-5.751e-3	3	384.521	1	2137.629	1
507		7	max	.001	1	.145	3	.048	1	1.137e-2	1	NC	5	NC	2
508			min	-.09	4	-.335	1	-.004	10	-6.388e-3	3	485.111	1	2898.169	1
509		8	max	.001	1	.103	3	.021	1	1.254e-2	1	NC	5	NC	2
510			min	-.09	4	-.229	1	-.007	10	-7.026e-3	3	738.11	1	5997.857	1
511		9	max	.002	1	.065	3	.015	3	1.371e-2	1	NC	5	NC	1
512			min	-.09	4	-.131	1	-.015	2	-7.663e-3	3	1417.955	1	NC	1
513		10	max	.002	1	.048	3	.014	3	1.488e-2	1	NC	4	NC	1
514			min	-.09	4	-.087	1	-.019	2	-8.301e-3	3	2442.851	1	NC	1
515		11	max	.002	1	.065	3	.013	3	1.371e-2	1	NC	5	NC	1
516			min	-.09	4	-.131	1	-.014	2	-7.663e-3	3	1417.955	1	NC	1
517		12	max	.002	1	.103	3	.021	1	1.254e-2	1	NC	5	NC	2
518			min	-.09	4	-.229	1	-.007	10	-7.025e-3	3	738.111	1	5955.036	1
519		13	max	.002	1	.145	3	.048	1	1.137e-2	1	NC	5	NC	2
520			min	-.09	4	-.335	1	-.004	10	-6.387e-3	3	485.111	1	2895.363	1
521		14	max	.002	1	.176	3	.066	1	1.021e-2	1	NC	5	NC	3
522			min	-.09	4	-.416	1	-.001	10	-5.749e-3	3	384.521	1	2142.069	1
523		15	max	.002	1	.188	3	.071	1	9.041e-3	1	NC	5	NC	3
524			min	-.09	4	-.449	1	-.004	5	-5.111e-3	3	354.537	1	2004.501	1
525		16	max	.002	1	.176	3	.061	1	7.874e-3	1	NC	5	NC	3
526			min	-.09	4	-.422	1	-.008	5	-4.473e-3	3	378.559	1	2299.881	1
527		17	max	.002	1	.14	3	.04	1	6.706e-3	1	NC	5	NC	3
528			min	-.09	4	-.334	1	-.01	5	-3.835e-3	3	486.288	1	3393.705	1
529		18	max	.002	1	.083	3	.015	1	5.539e-3	1	NC	5	NC	2
530			min	-.09	4	-.195	1	-.008	5	-3.198e-3	3	884.913	1	7985.562	1
531		19	max	.002	1	.015	3	.004	3	4.372e-3	1	NC	1	NC	1
532			min	-.09	4	-.026	1	-.005	2	-2.56e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.771e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-4.595e-4	5	NC	1	NC	1
535		2	max	0	3	0	15	.007	4	7.548e-4	3	NC	1	NC	1
536			min	0	5	-.007	1	0	3	-6.891e-4	1	NC	1	NC	1
537		3	max	0	3	0	15	.014	4	1.233e-3	3	NC	5	NC	1
538			min	-.001	5	-.015	1	-.003	3	-1.318e-3	1	5661.417	2	5573.541	4
539		4	max	0	3	-.001	15	.022	4	1.71e-3	3	NC	5	NC	9
540			min	-.002	5	-.021	1	-.006	3	-1.947e-3	1	3884.063	2	3697.712	4
541		5	max	0	3	-.001	15	.028	4	2.188e-3	3	NC	5	NC	9
542			min	-.003	5	-.027	1	-.01	3	-2.575e-3	1	3030.774	2	2838.128	4
543		6	max	0	3	-.002	15	.034	4	2.666e-3	3	NC	5	8701.003	10
544			min	-.004	5	-.033	1	-.014	3	-3.204e-3	1	2550.716	2	2383.992	4
545		7	max	0	3	-.002	15	.038	4	3.144e-3	3	NC	5	6831.152	10
546			min	-.004	5	-.037	1	-.018	3	-3.833e-3	1	2262.025	2	2138.725	4
547		8	max	0	3	-.002	15	.04	4	3.621e-3	3	NC	5	5650.96	10
548			min	-.005	5	-.04	1	-.022	3	-4.462e-3	1	2088.767	2	2024.796	4
549		9	max	0	3	-.002	15	.04	4	4.099e-3	3	NC	5	4876.674	10
550			min	-.006	5	-.042	1	-.026	3	-5.091e-3	1	1995.509	2	2011.832	4
551		10	max	0	3	-.002	15	.038	4	4.577e-3	3	NC	5	4365.131	10
552			min	-.006	5	-.043	1	-.029	3	-5.719e-3	1	1966.007	2	1812.85	1
553		11	max	0	3	-.002	15	.038	1	5.055e-3	3	NC	5	4241.767	15
554			min	-.007	5	-.042	1	-.031	3	-6.348e-3	1	1995.509	2	1674.677	1
555		12	max	0	3	-.001	15	.04	1	5.532e-3	3	NC	5	5167.563	15

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	-.008	5	-.041	1	-.032	3	-6.977e-3	1	2088.767	2	1599.749	1
557		13	max	0	3	0	15	.039	1	6.01e-3	3	NC	5	6950.638	15
558			min	-.009	5	-.038	1	-.032	3	-7.606e-3	1	2262.025	2	1583.287	1
559		14	max	0	3	0	15	.037	1	6.488e-3	3	NC	5	NC	15
560			min	-.009	5	-.034	1	-.03	3	-8.234e-3	1	2550.716	2	1632.109	1
561		15	max	0	3	0	15	.032	1	6.966e-3	3	NC	5	NC	5
562			min	-.01	5	-.029	1	-.026	3	-8.863e-3	1	3030.774	2	1771.498	1
563		16	max	0	3	.001	5	.024	1	7.443e-3	3	NC	5	NC	4
564			min	-.011	5	-.024	1	-.02	3	-9.492e-3	1	3884.063	2	2070.21	1
565		17	max	0	3	.002	5	.013	1	7.921e-3	3	NC	5	NC	4
566			min	-.011	5	-.017	1	-.011	3	-1.012e-2	1	5661.417	2	2744.041	1
567		18	max	0	3	.003	5	.002	9	8.399e-3	3	NC	1	NC	4
568			min	-.012	5	-.01	1	-.005	2	-1.075e-2	1	NC	1	4884.724	1
569		19	max	0	3	.005	5	.015	3	8.877e-3	3	NC	1	NC	1
570			min	-.013	5	-.003	1	-.02	2	-1.138e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	2.65e-3	3	NC	1	NC	1
572			min	-.004	4	-.003	4	-.006	2	-3.156e-3	1	NC	1	NC	1
573		2	max	0	10	-.003	12	.003	1	2.533e-3	3	NC	1	NC	1
574			min	-.004	4	-.014	4	-.002	5	-3.004e-3	1	6904.214	4	NC	1
575		3	max	0	10	-.007	12	.009	1	2.416e-3	3	NC	12	NC	4
576			min	-.004	4	-.025	4	-.006	5	-2.853e-3	1	3513.319	4	6460.527	1
577		4	max	0	10	-.01	12	.013	1	2.298e-3	3	7768.126	12	NC	6
578			min	-.004	4	-.036	4	-.012	5	-2.701e-3	1	2410.342	4	4907.22	1
579		5	max	0	10	-.013	12	.016	1	2.181e-3	3	6061.547	12	NC	10
580			min	-.003	4	-.045	4	-.019	5	-2.55e-3	1	1880.814	4	4231.668	1
581		6	max	0	10	-.015	12	.017	1	2.064e-3	3	5101.433	12	NC	10
582			min	-.003	4	-.053	4	-.027	5	-2.398e-3	1	1582.904	4	3097.611	5
583		7	max	0	10	-.017	12	.018	1	1.946e-3	3	4524.05	12	NC	10
584			min	-.003	4	-.059	4	-.034	5	-2.247e-3	1	1403.75	4	2412.809	5
585		8	max	0	10	-.019	12	.018	1	1.829e-3	3	4177.534	12	NC	10
586			min	-.003	4	-.064	4	-.041	5	-2.095e-3	1	1296.231	4	2021.23	5
587		9	max	0	10	-.02	12	.017	1	1.712e-3	3	3991.019	12	NC	10
588			min	-.002	4	-.067	4	-.046	5	-1.944e-3	1	1238.358	4	1792.483	5
589		10	max	0	10	-.02	12	.015	1	1.594e-3	3	3932.014	12	NC	10
590			min	-.002	4	-.068	4	-.049	5	-1.792e-3	1	1220.05	4	1668.086	5
591		11	max	0	10	-.02	12	.013	1	1.477e-3	3	3991.019	12	NC	9
592			min	-.002	4	-.066	4	-.05	5	-1.64e-3	1	1238.358	4	1621.708	5
593		12	max	0	10	-.019	12	.011	1	1.36e-3	3	4177.534	12	NC	9
594			min	-.002	4	-.063	4	-.05	5	-1.489e-3	1	1296.231	4	1645.172	5
595		13	max	0	10	-.018	12	.009	1	1.242e-3	3	4524.05	12	NC	2
596			min	-.001	4	-.058	4	-.047	5	-1.337e-3	1	1403.75	4	1744.97	5
597		14	max	0	10	-.016	12	.006	1	1.125e-3	3	5101.433	12	NC	1
598			min	-.001	4	-.052	4	-.042	5	-1.186e-3	1	1582.904	4	1946.426	5
599		15	max	0	10	-.013	12	.004	1	1.008e-3	3	6061.547	12	NC	1
600			min	0	4	-.044	4	-.035	5	-1.034e-3	1	1880.814	4	2310.719	5
601		16	max	0	10	-.01	12	.002	1	8.903e-4	3	7768.126	12	NC	1
602			min	0	4	-.034	4	-.027	5	-8.827e-4	1	2410.342	4	2990.411	5
603		17	max	0	10	-.007	12	0	1	7.73e-4	3	NC	12	NC	1
604			min	0	4	-.023	4	-.018	5	-7.312e-4	1	3513.319	4	4455.605	5
605		18	max	0	10	-.004	12	0	9	7.421e-4	4	NC	1	NC	1
606			min	0	4	-.012	4	-.009	5	-5.957e-4	2	6904.214	4	9084.165	5
607		19	max	0	1	0	1	0	1	8.112e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.646e-4	2	NC	1	NC	1

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

SIMPSON Strong-Tie®

Anchor Designer™ Software
Version 2.4.5673.0

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

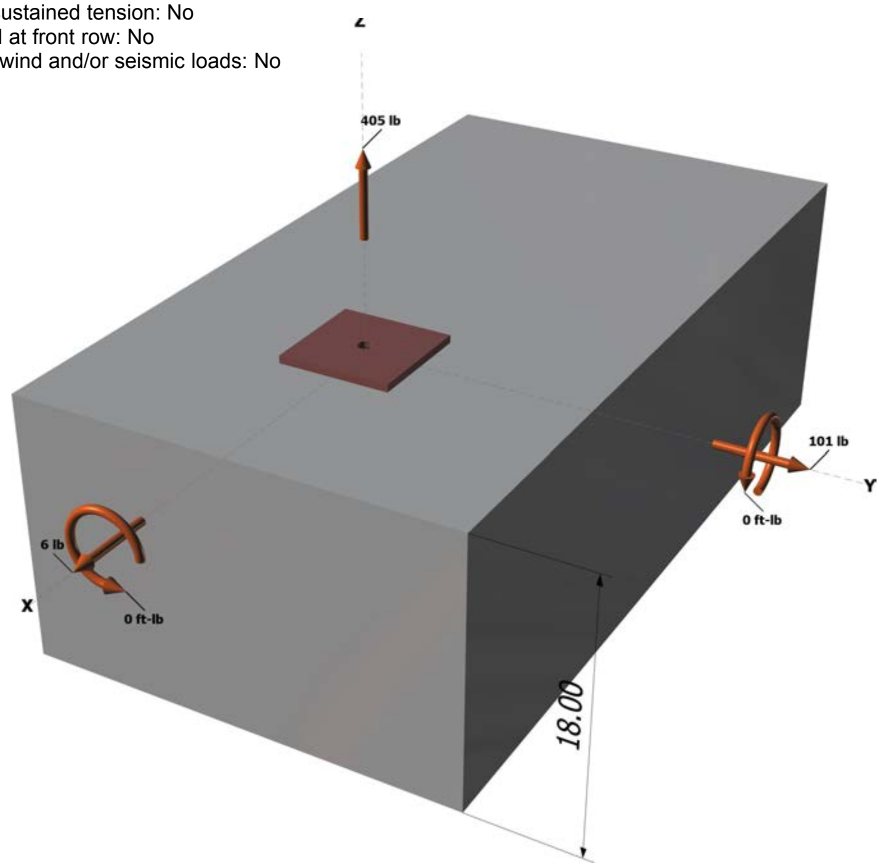
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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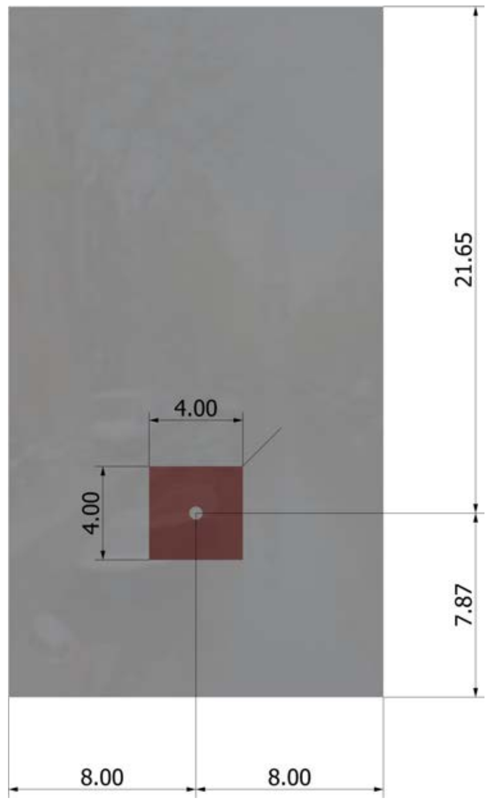


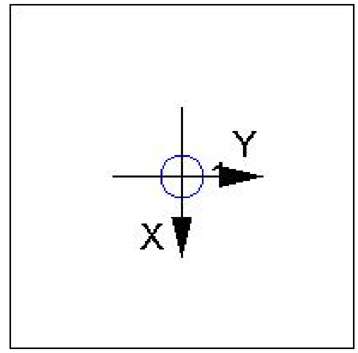
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	1.0	Pass

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

12. Warnings

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

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

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

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

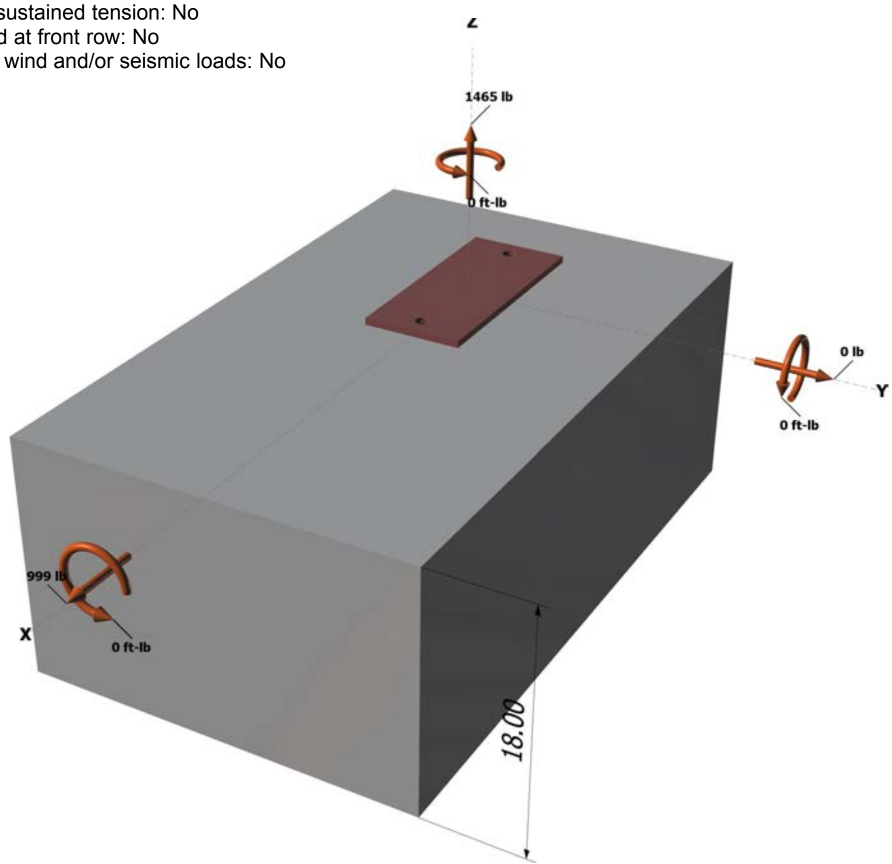
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

<Figure 1>



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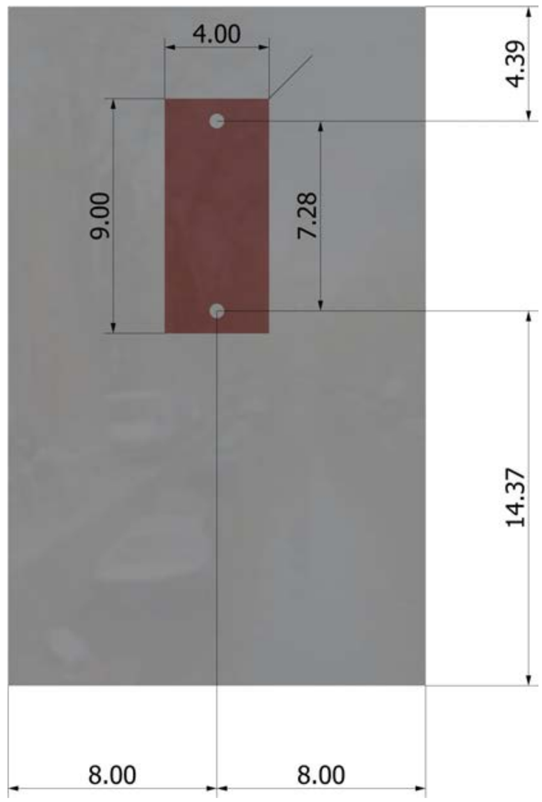


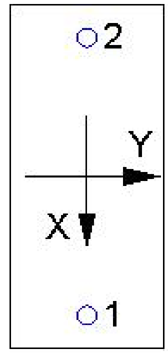
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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