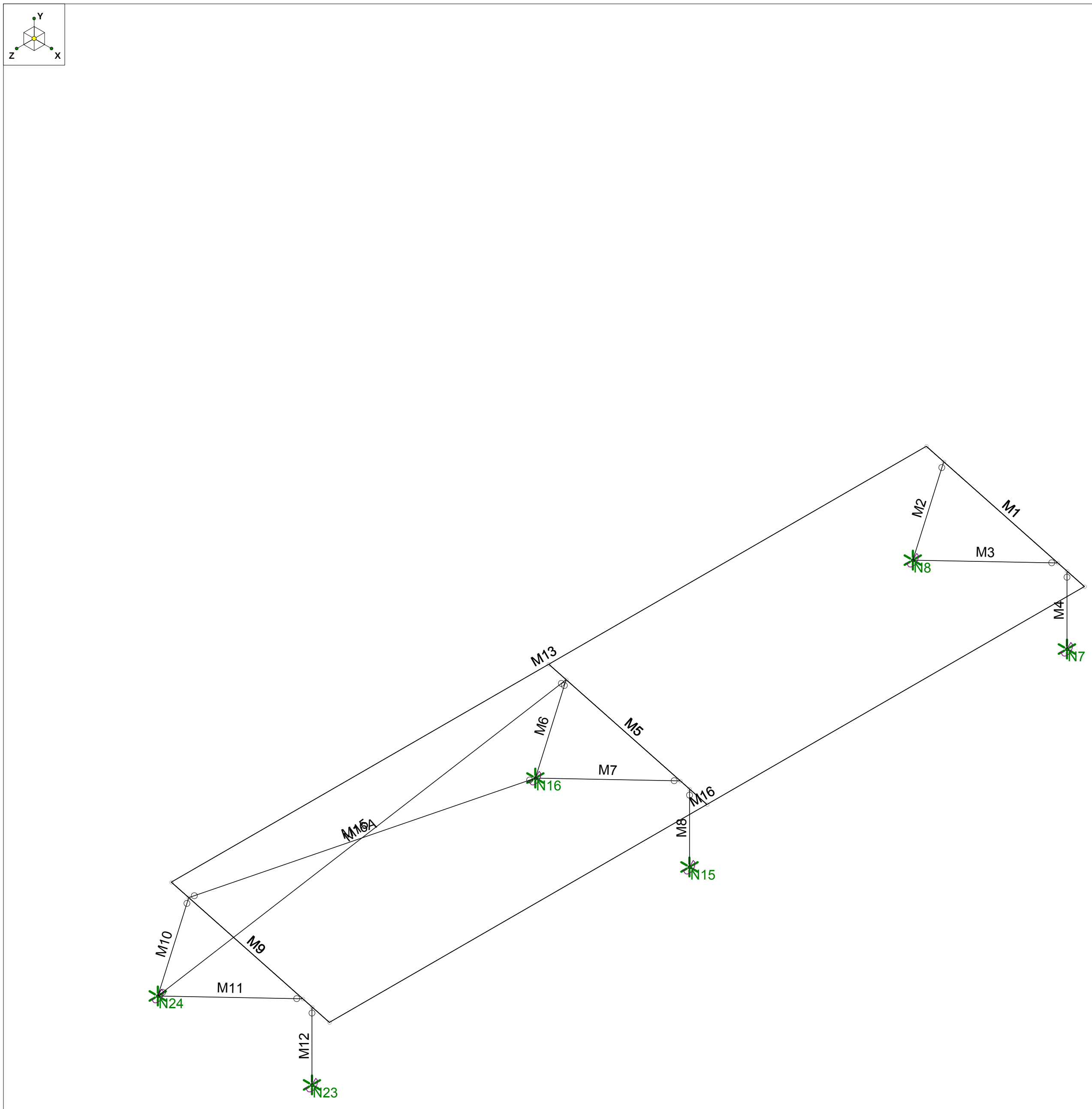


Schletter, Inc.		15° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

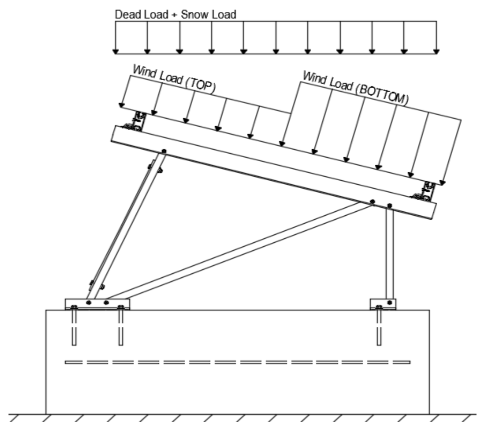
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 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 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 22.68 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 1.00
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 150 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

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 + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

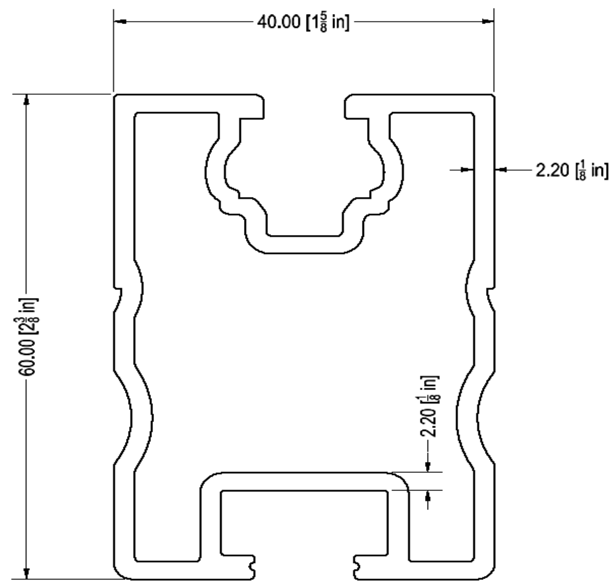
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

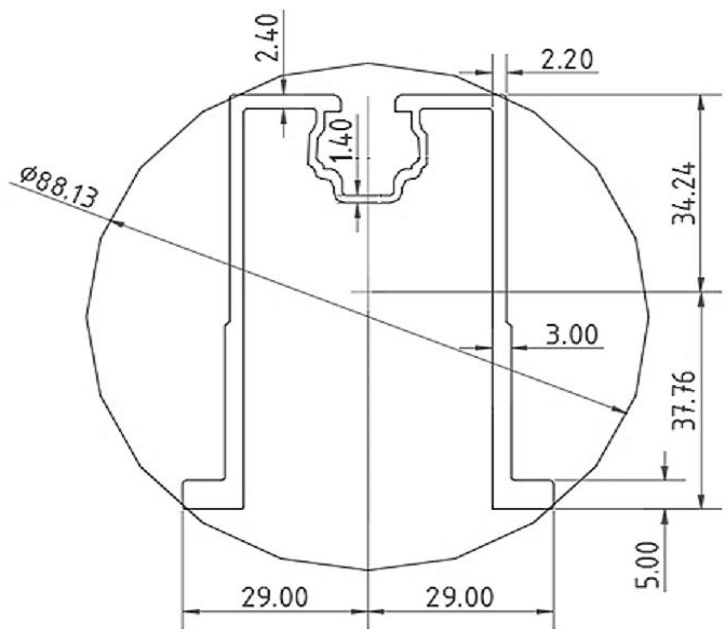
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	54	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.52	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.448	k-ft
M_z =	0.060	k-ft
$M_{y\ allowable}$ =	1.256	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	43%	



4.2 Girder Design

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

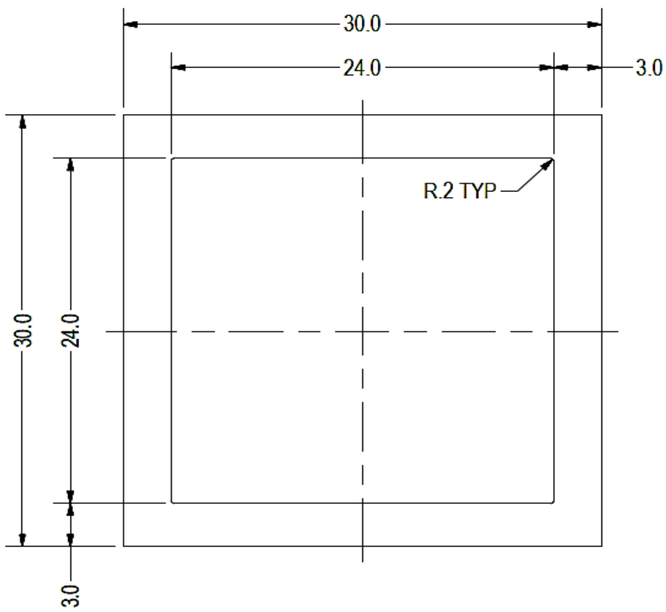
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.82	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.489	k-ft
M_z =	0.000	k-ft
P_n =	0.224	k
$M_{y\ allowable}$ =	1.463	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	35%	



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).

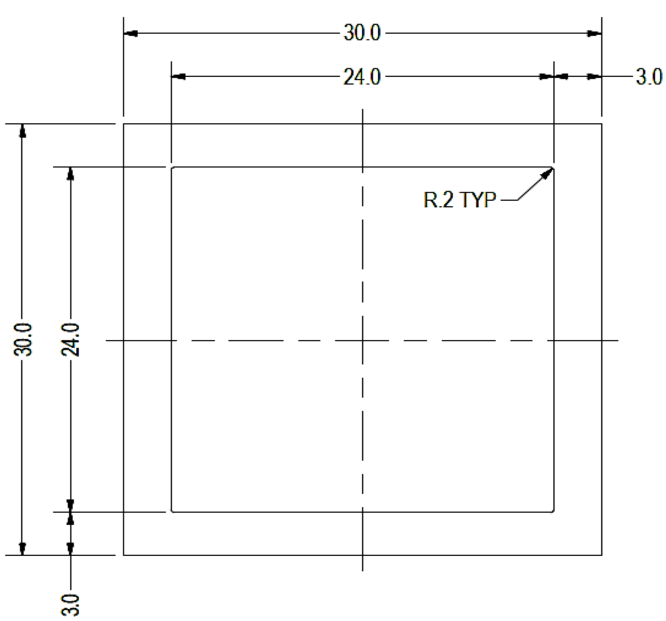
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.129	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	9%	



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).

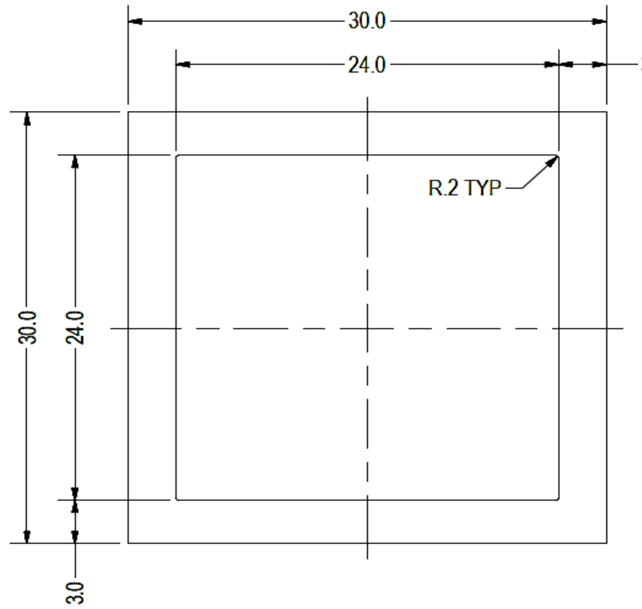
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.184	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	5%	



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).

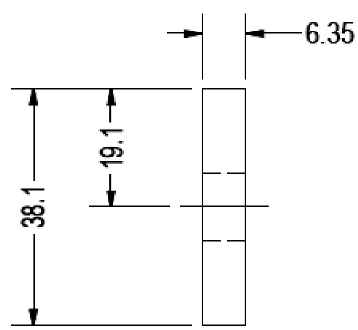
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.863	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	11%	



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 =	0.003	k-ft
P_n =	0.169	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	8%	



A cross brace kit is required every 24 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

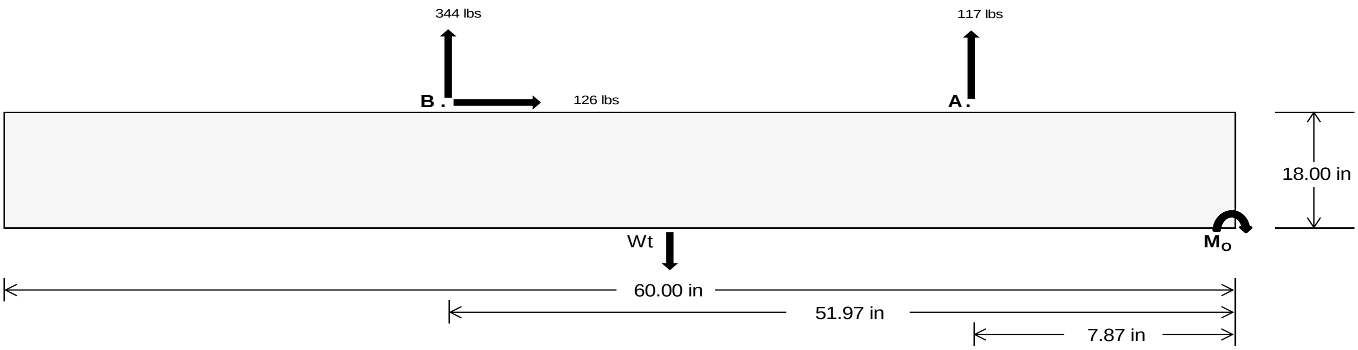
5.1 Helical Pile Foundations

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 =	513.16	1495.36	k
Compressive Load =	1467.69	1057.89	k
Lateral Load =	24.22	547.40	k
Moment (Weak Axis) =	0.04	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 21083.0 in-lbs
Resisting Force Required = 702.77 lbs
S.F. = 1.67
Weight Required = 1171.28 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 = 126.30 lbs
Friction = 0.4
Weight Required = 315.75 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 = 126.30 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 + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
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	471 lbs	471 lbs	471 lbs	471 lbs	548 lbs	548 lbs	548 lbs	548 lbs	731 lbs	731 lbs	731 lbs	731 lbs	-234 lbs	-234 lbs	-234 lbs	-234 lbs
F_B	341 lbs	341 lbs	341 lbs	341 lbs	394 lbs	394 lbs	394 lbs	394 lbs	527 lbs	527 lbs	527 lbs	527 lbs	-688 lbs	-688 lbs	-688 lbs	-688 lbs
F_V	26 lbs	26 lbs	26 lbs	26 lbs	220 lbs	220 lbs	220 lbs	220 lbs	183 lbs	183 lbs	183 lbs	183 lbs	-253 lbs	-253 lbs	-253 lbs	-253 lbs
P_{total}	2716 lbs	2806 lbs	2897 lbs	2988 lbs	2845 lbs	2936 lbs	3026 lbs	3117 lbs	3161 lbs	3252 lbs	3343 lbs	3433 lbs	219 lbs	274 lbs	328 lbs	382 lbs
M	283 lbs-ft	283 lbs-ft	283 lbs-ft	283 lbs-ft	620 lbs-ft	620 lbs-ft	620 lbs-ft	620 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft	449 lbs-ft	449 lbs-ft	449 lbs-ft	449 lbs-ft
e	0.10 ft	0.10 ft	0.10 ft	0.09 ft	0.22 ft	0.21 ft	0.20 ft	0.20 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.05 ft	1.64 ft	1.37 ft	1.18 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}	271.5 psf	269.1 psf	266.8 psf	264.8 psf	240.1 psf	239.1 psf	238.2 psf	237.3 psf	270.9 psf	268.4 psf	266.2 psf	264.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	349.2 psf	343.2 psf	337.7 psf	332.7 psf	410.1 psf	401.4 psf	393.4 psf	386.0 psf	451.7 psf	441.1 psf	431.4 psf	422.4 psf	185.5 psf	116.0 psf	101.0 psf	96.2 psf

Maximum Bearing Pressure = 452 psf
Allowable Bearing Pressure = 1500 psf

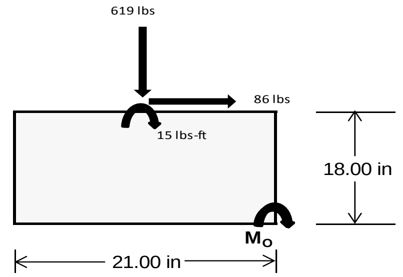
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 397.9 ft-lbs
Resisting Force Required = 454.74 lbs
S.F. = 1.67
Weight Required = 757.90 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	105 lbs	90 lbs	55 lbs	256 lbs	619 lbs	217 lbs	66 lbs	-12 lbs	18 lbs
F_V	14 lbs	114 lbs	14 lbs	10 lbs	86 lbs	10 lbs	14 lbs	114 lbs	14 lbs
P_{total}	2461 lbs	2446 lbs	2411 lbs	2498 lbs	2862 lbs	2460 lbs	755 lbs	677 lbs	707 lbs
M	38 lbs-ft	191 lbs-ft	39 lbs-ft	28 lbs-ft	144 lbs-ft	31 lbs-ft	38 lbs-ft	191 lbs-ft	39 lbs-ft
e	0.02 ft	0.08 ft	0.02 ft	0.01 ft	0.05 ft	0.01 ft	0.05 ft	0.28 ft	0.06 ft
L/6	0.29 ft	1.59 ft	1.72 ft	1.73 ft	1.65 ft	1.73 ft	1.65 ft	1.19 ft	1.64 ft
f_{min}	266.2 sqft	204.7 sqft	260.1 sqft	274.7 sqft	270.8 sqft	269.2 sqft	71.2 sqft	2.7 sqft	65.4 sqft
f_{max}	296.3 psf	354.3 psf	291.0 psf	296.3 psf	383.3 psf	293.1 psf	101.4 psf	152.1 psf	96.3 psf

Maximum Bearing Pressure = 383 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.

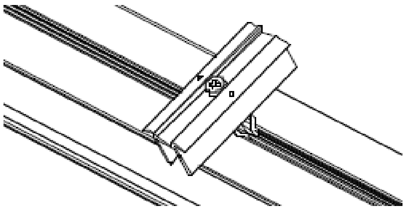
6. DESIGN OF JOINTS AND CONNECTIONS

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.

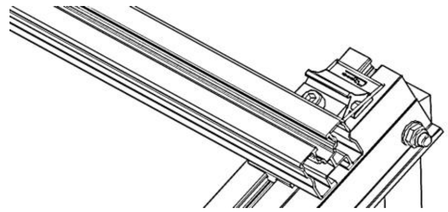
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.677	k
Allowable Uplift =	1.214	k
Utilization =	56%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.083	k
Allowable Uplift =	1.116	k
Utilization =	97%	



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 =	1.129	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Rear Strut

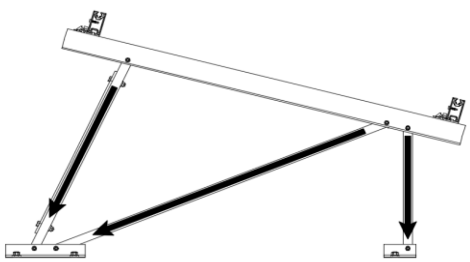
Maximum Axial Load =	1.138	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut

Maximum Axial Load =	0.184	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	

Bracing

Maximum Axial Load =	0.169	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	2%	



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

7. SEISMIC DESIGN

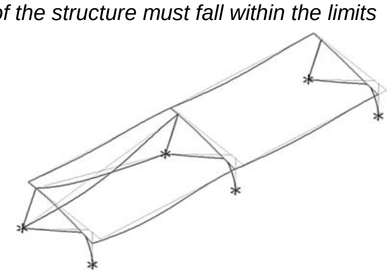
7.1 Seismic Drift

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

Mean Height, h_{sx} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.061	in

$0.061 \leq 0.568$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 54.00 in

J = 0.255

140.613

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

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= 29.5 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 54.00 in

J = 0.255

146.018

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

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= 29.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.5 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.256 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 = 1.36
21.0529

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.8 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

$$S2 = \frac{k_1Bp}{1.6Dp}$$

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.36
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.8 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

$$S2 = \frac{k_1Bp}{5.1Dp}$$

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

$$S2 = \frac{k_1Bp}{1.6Dp}$$

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.463 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

b/t = 24.46
S1 = 3.83
S2 = 10.30
φF_L= (φck2*√(BpE))/(5.1b/t)
φF_L= 10.4 ksi

3.4.9

b/t = 4.29
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φyFcy
φF_L= 33.3 ksi

b/t = 24.46
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT}= 10.43
F_{ST}= 28.24
φF_L= Fut + (Fst - Fut)ρst < Fst
φF_L= 14.3 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

A.3 Design of Aluminum Struts (Front) - Aluminum Design Manual, 2005 Edition

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 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

φcc = 0.83792

φF_L= φcc(Bc-Dc*λ)

φF_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)

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= 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

$\lambda =$ 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

$\varphi cc =$ 0.75985

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

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L =$ 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	-98.517	-98.517	0	0
2	M16	y	-157.628	-157.628	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	200.975	200.975	0	0
2	M16	y	98.517	98.517	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	110.188	2	241.406	2	.016	9	0	9	0	1	0	1
2		min	-137.974	3	-355.843	3	-2.092	5	0	3	0	1	0	1
3	N7	max	0	5	374.267	1	0	10	0	10	0	1	0	1
4		min	-.109	2	-115.292	3	-18.216	4	-.029	4	0	1	0	1
5	N15	max	0	15	1128.996	1	.134	9	0	1	0	1	0	1
6		min	-1.145	2	-394.736	3	-18.632	5	-.029	4	0	1	0	1
7	N16	max	377.643	2	813.765	1	0	10	0	9	0	1	0	1
8		min	-421.078	3	-1150.274	3	-150.959	4	0	3	0	1	0	1
9	N23	max	0	15	374.393	1	.733	1	.001	1	0	1	0	1
10		min	-.109	2	-114.936	3	-17.329	5	-.027	5	0	1	0	1
11	N24	max	110.189	2	244.132	1	50.794	3	0	4	0	1	0	1
12		min	-138.215	3	-354.529	3	-2.967	5	0	3	0	1	0	1
13	Totals:	max	596.657	2	3176.787	1	0	12						
14		min	-697.628	3	-2485.611	3	-209.636	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	269.54	1	.661	6	.871	4	0	10	0	3	0	1
2			min	-357.634	3	.153	15	-.121	3	0	4	0	2	0	1
3		2	max	269.636	1	.623	6	.784	4	0	10	0	4	0	15
4			min	-357.562	3	.144	15	-.121	3	0	4	0	10	0	6
5		3	max	269.733	1	.586	6	.697	4	0	10	0	4	0	15
6			min	-357.49	3	.136	15	-.121	3	0	4	0	3	0	6
7		4	max	269.829	1	.548	6	.609	4	0	10	0	4	0	15
8			min	-357.418	3	.127	15	-.121	3	0	4	0	3	0	6
9		5	max	269.925	1	.51	6	.522	4	0	10	0	4	0	15
10			min	-357.345	3	.118	15	-.121	3	0	4	0	3	0	6
11		6	max	270.022	1	.472	6	.435	4	0	10	0	4	0	15
12			min	-357.273	3	.109	15	-.121	3	0	4	0	3	0	6
13		7	max	270.118	1	.434	6	.347	4	0	10	0	4	0	15
14			min	-357.201	3	.1	15	-.121	3	0	4	0	3	0	6
15		8	max	270.214	1	.396	6	.26	4	0	10	0	4	0	15
16			min	-357.129	3	.091	15	-.121	3	0	4	0	3	0	6
17		9	max	270.311	1	.359	6	.2	1	0	10	0	4	0	15
18			min	-357.056	3	.082	15	-.121	3	0	4	0	3	0	6
19		10	max	270.407	1	.321	6	.2	1	0	10	0	4	0	15
20			min	-356.984	3	.073	15	-.121	3	0	4	0	3	0	6
21		11	max	270.504	1	.283	6	.2	1	0	10	0	4	0	15
22			min	-356.912	3	.064	15	-.121	3	0	4	0	3	0	6
23		12	max	270.6	1	.245	6	.2	1	0	10	0	4	0	15
24			min	-356.839	3	.056	15	-.139	5	0	4	0	3	0	6
25		13	max	270.696	1	.207	6	.2	1	0	10	0	4	0	15
26			min	-356.767	3	.047	15	-.226	5	0	4	0	3	0	6
27		14	max	270.793	1	.169	6	.2	1	0	10	0	4	0	15
28			min	-356.695	3	.038	15	-.313	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	270.889	1	.132	6	.2	1	0	10	0	4	0	15
30			min	-356.623	3	.029	15	-.401	5	0	4	0	3	0	6
31		16	max	270.985	1	.094	6	.2	1	0	10	0	4	0	15
32			min	-356.55	3	.02	15	-.488	5	0	4	0	3	0	6
33		17	max	271.082	1	.064	2	.2	1	0	10	0	1	0	15
34			min	-356.478	3	.011	15	-.575	5	0	4	0	3	0	6
35		18	max	271.178	1	.034	2	.2	1	0	10	0	1	0	15
36			min	-356.406	3	0	9	-.663	5	0	4	0	3	0	6
37		19	max	271.274	1	.007	10	.2	1	0	10	0	1	0	15
38			min	-356.333	3	-.027	1	-.75	5	0	4	0	3	0	6
39	M3	1	max	48.764	2	1.812	6	-.003	10	0	5	0	4	0	6
40			min	-55.49	9	.425	15	-1.357	4	0	1	0	10	0	15
41		2	max	48.697	2	1.634	6	-.003	10	0	5	0	1	0	6
42			min	-55.546	9	.383	15	-1.224	4	0	1	0	10	0	15
43		3	max	48.63	2	1.456	6	-.003	10	0	5	0	1	0	2
44			min	-55.602	9	.341	15	-1.09	4	0	1	0	10	0	15
45		4	max	48.563	2	1.278	6	-.003	10	0	5	0	1	0	15
46			min	-55.658	9	.299	15	-.957	4	0	1	0	5	0	4
47		5	max	48.496	2	1.1	6	-.003	10	0	5	0	1	0	15
48			min	-55.714	9	.257	15	-.823	4	0	1	0	5	0	4
49		6	max	48.429	2	.922	6	-.003	10	0	5	0	1	0	15
50			min	-55.77	9	.215	15	-.69	4	0	1	0	5	0	4
51		7	max	48.362	2	.744	6	-.003	10	0	5	0	1	0	15
52			min	-55.826	9	.174	15	-.556	4	0	1	0	5	0	4
53		8	max	48.294	2	.566	6	-.003	10	0	5	0	1	0	15
54			min	-55.882	9	.132	15	-.422	4	0	1	0	5	0	4
55		9	max	48.227	2	.388	6	-.003	10	0	5	0	1	0	15
56			min	-55.938	9	.09	15	-.289	4	0	1	0	5	-.001	4
57		10	max	48.16	2	.21	6	-.003	10	0	5	0	1	0	15
58			min	-55.994	9	.048	15	-.186	1	0	1	0	5	-.001	4
59		11	max	48.093	2	.038	2	.017	5	0	5	0	1	0	15
60			min	-56.049	9	.006	15	-.186	1	0	1	0	5	-.001	4
61		12	max	48.026	2	-.036	15	.15	5	0	5	0	1	0	15
62			min	-56.105	9	-.146	4	-.186	1	0	1	0	5	-.001	4
63		13	max	47.959	2	-.078	15	.284	5	0	5	0	1	0	15
64			min	-56.161	9	-.324	4	-.186	1	0	1	0	5	-.001	4
65		14	max	47.892	2	-.119	15	.417	5	0	5	0	9	0	15
66			min	-56.217	9	-.502	4	-.186	1	0	1	0	5	-.001	4
67		15	max	47.825	2	-.161	15	.551	5	0	5	0	10	0	15
68			min	-56.273	9	-.68	4	-.186	1	0	1	0	4	0	4
69		16	max	47.758	2	-.203	15	.684	5	0	5	0	10	0	15
70			min	-56.329	9	-.858	4	-.186	1	0	1	0	4	0	4
71		17	max	47.691	2	-.245	15	.818	5	0	5	0	10	0	15
72			min	-56.385	9	-1.037	4	-.186	1	0	1	0	4	0	4
73		18	max	47.623	2	-.287	15	.951	5	0	5	0	10	0	15
74			min	-56.441	9	-1.215	4	-.186	1	0	1	0	1	0	4
75		19	max	47.556	2	-.329	15	1.085	5	0	5	0	5	0	1
76			min	-56.497	9	-1.393	4	-.186	1	0	1	0	1	0	1
77	M4	1	max	373.102	1	0	1	-.001	10	0	1	0	5	0	1
78			min	-116.166	3	0	1	-17.434	4	0	1	0	2	0	1
79		2	max	373.167	1	0	1	-.001	10	0	1	0	12	0	1
80			min	-116.117	3	0	1	-17.491	4	0	1	-.002	4	0	1
81		3	max	373.231	1	0	1	-.001	10	0	1	0	10	0	1
82			min	-116.068	3	0	1	-17.547	4	0	1	-.003	4	0	1
83		4	max	373.296	1	0	1	-.001	10	0	1	0	10	0	1
84			min	-116.02	3	0	1	-17.603	4	0	1	-.005	4	0	1
85		5	max	373.361	1	0	1	-.001	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-115.971	3	0	1	-17.659	4	0	1	-.006	4	0	1
87		6	max	373.426	1	0	1	-.001	10	0	1	0	10	0	1
88			min	-115.923	3	0	1	-17.715	4	0	1	-.008	4	0	1
89		7	max	373.49	1	0	1	-.001	10	0	1	0	10	0	1
90			min	-115.874	3	0	1	-17.771	4	0	1	-.009	4	0	1
91		8	max	373.555	1	0	1	-.001	10	0	1	0	10	0	1
92			min	-115.826	3	0	1	-17.827	4	0	1	-.011	4	0	1
93		9	max	373.62	1	0	1	-.001	10	0	1	0	10	0	1
94			min	-115.777	3	0	1	-17.883	4	0	1	-.013	4	0	1
95		10	max	373.684	1	0	1	-.001	10	0	1	0	10	0	1
96			min	-115.729	3	0	1	-17.939	4	0	1	-.014	4	0	1
97		11	max	373.749	1	0	1	-.001	10	0	1	0	10	0	1
98			min	-115.68	3	0	1	-17.995	4	0	1	-.016	4	0	1
99		12	max	373.814	1	0	1	-.001	10	0	1	0	10	0	1
100			min	-115.632	3	0	1	-18.051	4	0	1	-.017	4	0	1
101		13	max	373.879	1	0	1	-.001	10	0	1	0	10	0	1
102			min	-115.583	3	0	1	-18.107	4	0	1	-.019	4	0	1
103		14	max	373.943	1	0	1	-.001	10	0	1	0	10	0	1
104			min	-115.535	3	0	1	-18.163	4	0	1	-.021	4	0	1
105		15	max	374.008	1	0	1	-.001	10	0	1	0	10	0	1
106			min	-115.486	3	0	1	-18.22	4	0	1	-.022	4	0	1
107		16	max	374.073	1	0	1	-.001	10	0	1	0	10	0	1
108			min	-115.438	3	0	1	-18.276	4	0	1	-.024	4	0	1
109		17	max	374.137	1	0	1	-.001	10	0	1	0	10	0	1
110			min	-115.389	3	0	1	-18.332	4	0	1	-.026	4	0	1
111		18	max	374.202	1	0	1	-.001	10	0	1	0	10	0	1
112			min	-115.341	3	0	1	-18.388	4	0	1	-.027	4	0	1
113		19	max	374.267	1	0	1	-.001	10	0	1	0	10	0	1
114			min	-115.292	3	0	1	-18.444	4	0	1	-.029	4	0	1
115	M6	1	max	861.423	1	.648	6	.866	4	0	3	0	3	0	1
116			min	-1138.46	3	.15	15	-.25	3	0	5	0	1	0	1
117		2	max	861.519	1	.61	6	.779	4	0	3	0	4	0	15
118			min	-1138.388	3	.141	15	-.25	3	0	5	0	2	0	6
119		3	max	861.616	1	.572	6	.692	4	0	3	0	4	0	15
120			min	-1138.316	3	.132	15	-.25	3	0	5	0	2	0	6
121		4	max	861.712	1	.534	6	.604	4	0	3	0	4	0	15
122			min	-1138.243	3	.123	15	-.25	3	0	5	0	2	0	6
123		5	max	861.809	1	.496	6	.517	4	0	3	0	4	0	15
124			min	-1138.171	3	.115	15	-.25	3	0	5	0	3	0	6
125		6	max	861.905	1	.459	6	.43	4	0	3	0	4	0	15
126			min	-1138.099	3	.106	15	-.25	3	0	5	0	3	0	6
127		7	max	862.001	1	.421	6	.342	4	0	3	0	4	0	15
128			min	-1138.027	3	.097	15	-.25	3	0	5	0	3	0	6
129		8	max	862.098	1	.383	6	.255	4	0	3	0	4	0	15
130			min	-1137.954	3	.088	15	-.25	3	0	5	0	3	0	6
131		9	max	862.194	1	.345	6	.168	4	0	3	0	4	0	15
132			min	-1137.882	3	.079	15	-.25	3	0	5	0	3	0	6
133		10	max	862.29	1	.307	6	.08	4	0	3	0	4	0	15
134			min	-1137.81	3	.07	15	-.25	3	0	5	0	3	0	6
135		11	max	862.387	1	.269	6	.055	9	0	3	0	4	0	15
136			min	-1137.737	3	.061	15	-.25	3	0	5	0	3	0	6
137		12	max	862.483	1	.239	2	.055	9	0	3	0	4	0	15
138			min	-1137.665	3	.052	15	-.25	3	0	5	0	3	0	6
139		13	max	862.579	1	.21	2	.055	9	0	3	0	4	0	15
140			min	-1137.593	3	.043	15	-.25	3	0	5	0	3	0	6
141		14	max	862.676	1	.18	2	.055	9	0	3	0	4	0	15
142			min	-1137.521	3	.035	15	-.29	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	862.772	1	.151	2	.055	9	0	3	0	4	0	15
144			min	-1137.448	3	.026	15	-.377	5	0	5	0	3	0	6
145		16	max	862.869	1	.121	2	.055	9	0	3	0	4	0	15
146			min	-1137.376	3	.017	15	-.464	5	0	5	0	3	0	6
147		17	max	862.965	1	.092	2	.055	9	0	3	0	4	0	15
148			min	-1137.304	3	-.003	9	-.552	5	0	5	0	3	0	6
149		18	max	863.061	1	.062	2	.055	9	0	3	0	4	0	15
150			min	-1137.232	3	-.028	9	-.639	5	0	5	0	3	0	6
151		19	max	863.158	1	.033	2	.055	9	0	3	0	4	0	15
152			min	-1137.159	3	-.052	9	-.726	5	0	5	0	3	0	6
153	M7	1	max	184.006	2	1.817	4	0	2	0	1	0	4	0	4
154			min	-100.03	9	.431	15	-1.42	4	0	3	0	3	0	15
155		2	max	183.939	2	1.639	4	0	2	0	1	0	4	0	4
156			min	-100.085	9	.389	15	-1.287	4	0	3	0	3	0	15
157		3	max	183.872	2	1.461	4	0	2	0	1	0	4	0	2
158			min	-100.141	9	.347	15	-1.153	4	0	3	0	3	0	9
159		4	max	183.805	2	1.283	4	0	2	0	1	0	1	0	15
160			min	-100.197	9	.305	15	-1.02	4	0	3	0	3	0	9
161		5	max	183.738	2	1.105	4	0	2	0	1	0	1	0	15
162			min	-100.253	9	.264	15	-.886	4	0	3	0	5	0	6
163		6	max	183.67	2	.927	4	0	2	0	1	0	1	0	15
164			min	-100.309	9	.222	15	-.753	4	0	3	0	5	0	6
165		7	max	183.603	2	.749	4	0	2	0	1	0	1	0	15
166			min	-100.365	9	.18	15	-.619	4	0	3	0	5	0	6
167		8	max	183.536	2	.571	4	0	2	0	1	0	1	0	15
168			min	-100.421	9	.138	15	-.486	4	0	3	0	5	0	6
169		9	max	183.469	2	.393	4	0	2	0	1	0	1	0	15
170			min	-100.477	9	.096	15	-.352	4	0	3	0	5	-.001	6
171		10	max	183.402	2	.215	4	0	2	0	1	0	1	0	15
172			min	-100.533	9	.054	15	-.219	4	0	3	0	5	-.001	6
173		11	max	183.335	2	.056	2	0	2	0	1	0	1	0	15
174			min	-100.589	9	-.001	9	-.085	4	0	3	0	5	-.001	6
175		12	max	183.268	2	-.029	15	.051	5	0	1	0	1	0	15
176			min	-100.645	9	-.141	6	-.012	1	0	3	0	5	-.001	6
177		13	max	183.201	2	-.071	15	.184	5	0	1	0	1	0	15
178			min	-100.7	9	-.319	6	-.012	1	0	3	0	5	-.001	6
179		14	max	183.134	2	-.113	15	.318	5	0	1	0	1	0	15
180			min	-100.756	9	-.497	6	-.012	1	0	3	0	5	-.001	6
181		15	max	183.067	2	-.155	15	.451	5	0	1	0	1	0	15
182			min	-100.812	9	-.675	6	-.012	1	0	3	0	5	0	6
183		16	max	182.999	2	-.197	15	.585	5	0	1	0	1	0	15
184			min	-100.868	9	-.853	6	-.012	1	0	3	0	5	0	6
185		17	max	182.932	2	-.239	15	.718	5	0	1	0	1	0	15
186			min	-100.924	9	-1.031	6	-.012	1	0	3	0	5	0	6
187		18	max	182.865	2	-.28	15	.852	5	0	1	0	1	0	15
188			min	-100.98	9	-1.209	6	-.012	1	0	3	0	5	0	6
189		19	max	182.798	2	-.322	15	.985	5	0	1	0	1	0	1
190			min	-101.036	9	-1.387	6	-.012	1	0	3	0	3	0	1
191	M8	1	max	1127.831	1	0	1	.163	1	0	1	0	4	0	1
192			min	-395.61	3	0	1	-17.81	4	0	1	0	1	0	1
193		2	max	1127.896	1	0	1	.163	1	0	1	0	1	0	1
194			min	-395.562	3	0	1	-17.866	4	0	1	-.002	4	0	1
195		3	max	1127.961	1	0	1	.163	1	0	1	0	1	0	1
196			min	-395.513	3	0	1	-17.922	4	0	1	-.003	4	0	1
197		4	max	1128.025	1	0	1	.163	1	0	1	0	1	0	1
198			min	-395.464	3	0	1	-17.978	4	0	1	-.005	4	0	1
199		5	max	1128.09	1	0	1	.163	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	-395.416	3	0	1	-18.035	4	0	1	-.006	4	0	1
201		6	max	1128.155	1	0	1	.163	1	0	1	0	1	0	1
202			min	-395.367	3	0	1	-18.091	4	0	1	-.008	4	0	1
203		7	max	1128.219	1	0	1	.163	1	0	1	0	1	0	1
204			min	-395.319	3	0	1	-18.147	4	0	1	-.01	4	0	1
205		8	max	1128.284	1	0	1	.163	1	0	1	0	1	0	1
206			min	-395.27	3	0	1	-18.203	4	0	1	-.011	4	0	1
207		9	max	1128.349	1	0	1	.163	1	0	1	0	1	0	1
208			min	-395.222	3	0	1	-18.259	4	0	1	-.013	4	0	1
209		10	max	1128.414	1	0	1	.163	1	0	1	0	1	0	1
210			min	-395.173	3	0	1	-18.315	4	0	1	-.015	4	0	1
211		11	max	1128.478	1	0	1	.163	1	0	1	0	1	0	1
212			min	-395.125	3	0	1	-18.371	4	0	1	-.016	4	0	1
213		12	max	1128.543	1	0	1	.163	1	0	1	0	1	0	1
214			min	-395.076	3	0	1	-18.427	4	0	1	-.018	4	0	1
215		13	max	1128.608	1	0	1	.163	1	0	1	0	1	0	1
216			min	-395.028	3	0	1	-18.483	4	0	1	-.019	4	0	1
217		14	max	1128.672	1	0	1	.163	1	0	1	0	1	0	1
218			min	-394.979	3	0	1	-18.539	4	0	1	-.021	4	0	1
219		15	max	1128.737	1	0	1	.163	1	0	1	0	1	0	1
220			min	-394.931	3	0	1	-18.595	4	0	1	-.023	4	0	1
221		16	max	1128.802	1	0	1	.163	1	0	1	0	1	0	1
222			min	-394.882	3	0	1	-18.651	4	0	1	-.024	4	0	1
223		17	max	1128.867	1	0	1	.163	1	0	1	0	1	0	1
224			min	-394.834	3	0	1	-18.707	4	0	1	-.026	4	0	1
225		18	max	1128.931	1	0	1	.163	1	0	1	0	1	0	1
226			min	-394.785	3	0	1	-18.764	4	0	1	-.028	4	0	1
227		19	max	1128.996	1	0	1	.163	1	0	1	0	1	0	1
228			min	-394.736	3	0	1	-18.82	4	0	1	-.029	4	0	1
229	M10	1	max	271.176	1	.69	4	1.011	5	0	1	0	4	0	1
230			min	-328.677	3	.173	15	-.097	1	-.001	5	0	3	0	1
231		2	max	271.272	1	.652	4	.924	5	0	1	0	4	0	15
232			min	-328.605	3	.164	15	-.097	1	-.001	5	0	3	0	4
233		3	max	271.368	1	.615	4	.836	5	0	1	0	4	0	15
234			min	-328.533	3	.155	15	-.097	1	-.001	5	0	3	0	4
235		4	max	271.465	1	.577	4	.749	5	0	1	0	4	0	15
236			min	-328.461	3	.146	15	-.097	1	-.001	5	0	3	0	4
237		5	max	271.561	1	.539	4	.662	5	0	1	0	5	0	15
238			min	-328.388	3	.137	15	-.097	1	-.001	5	0	3	0	4
239		6	max	271.658	1	.501	4	.574	5	0	1	0	5	0	15
240			min	-328.316	3	.129	15	-.097	1	-.001	5	0	3	0	4
241		7	max	271.754	1	.463	4	.487	5	0	1	0	5	0	15
242			min	-328.244	3	.12	15	-.097	1	-.001	5	0	3	0	4
243		8	max	271.85	1	.425	4	.4	5	0	1	0	5	0	15
244			min	-328.171	3	.111	15	-.097	1	-.001	5	0	3	0	4
245		9	max	271.947	1	.388	4	.312	5	0	1	0	5	0	15
246			min	-328.099	3	.102	15	-.097	1	-.001	5	0	3	0	4
247		10	max	272.043	1	.35	4	.225	5	0	1	0	5	0	15
248			min	-328.027	3	.093	15	-.097	1	-.001	5	0	3	0	4
249		11	max	272.139	1	.312	4	.138	5	0	1	0	5	0	15
250			min	-327.955	3	.084	15	-.097	1	-.001	5	0	3	0	4
251		12	max	272.236	1	.274	4	.05	5	0	1	0	5	0	15
252			min	-327.882	3	.075	15	-.097	1	-.001	5	0	3	0	4
253		13	max	272.332	1	.236	4	-.005	10	0	1	0	5	0	15
254			min	-327.81	3	.066	15	-.097	1	-.001	5	0	3	0	4
255		14	max	272.428	1	.198	4	-.005	10	0	1	0	5	0	15
256			min	-327.738	3	.057	15	-.133	4	-.001	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	272.525	1	.161	4	-.005	10	0	1	0	5	0	15
258			min	-327.666	3	.049	15	-.22	4	-.001	5	0	3	0	4
259		16	max	272.621	1	.123	4	-.005	10	0	1	0	5	0	15
260			min	-327.593	3	.04	15	-.308	4	-.001	5	0	3	0	4
261		17	max	272.718	1	.085	4	-.005	10	0	1	0	5	0	15
262			min	-327.521	3	.024	9	-.395	4	-.001	5	0	3	0	4
263		18	max	272.814	1	.055	3	-.005	10	0	1	0	5	0	15
264			min	-327.449	3	-.001	9	-.482	4	-.001	5	0	3	0	4
265		19	max	272.91	1	.033	3	-.005	10	0	1	0	5	0	15
266			min	-327.376	3	-.028	1	-.57	4	-.001	5	0	3	0	4
267	M11	1	max	48.321	2	1.811	6	.203	1	0	4	.001	5	0	6
268			min	-55.573	9	.424	15	-1.222	5	0	10	0	1	0	15
269		2	max	48.254	2	1.633	6	.203	1	0	4	0	5	0	6
270			min	-55.629	9	.382	15	-1.089	5	0	10	0	1	0	15
271		3	max	48.187	2	1.455	6	.203	1	0	4	0	5	0	2
272			min	-55.685	9	.34	15	-.955	5	0	10	0	1	0	3
273		4	max	48.12	2	1.277	6	.203	1	0	4	0	5	0	15
274			min	-55.741	9	.298	15	-.822	5	0	10	0	1	0	4
275		5	max	48.052	2	1.099	6	.203	1	0	4	0	3	0	15
276			min	-55.797	9	.257	15	-.688	5	0	10	0	1	0	4
277		6	max	47.985	2	.921	6	.203	1	0	4	0	3	0	15
278			min	-55.853	9	.215	15	-.554	5	0	10	0	1	0	4
279		7	max	47.918	2	.743	6	.203	1	0	4	0	3	0	15
280			min	-55.909	9	.173	15	-.421	5	0	10	0	1	0	4
281		8	max	47.851	2	.565	6	.203	1	0	4	0	3	0	15
282			min	-55.965	9	.131	15	-.287	5	0	10	0	1	0	4
283		9	max	47.784	2	.387	6	.203	1	0	4	0	3	0	15
284			min	-56.021	9	.089	15	-.154	5	0	10	0	1	-.001	4
285		10	max	47.717	2	.209	6	.203	1	0	4	0	3	0	15
286			min	-56.077	9	.047	15	-.02	5	0	10	0	4	-.001	4
287		11	max	47.65	2	.038	2	.203	1	0	4	0	3	0	15
288			min	-56.133	9	.002	3	-.017	3	0	10	0	4	-.001	4
289		12	max	47.583	2	-.036	15	.289	4	0	4	0	3	0	15
290			min	-56.188	9	-.147	4	-.017	3	0	10	0	4	-.001	4
291		13	max	47.516	2	-.078	15	.422	4	0	4	0	3	0	15
292			min	-56.244	9	-.325	4	-.017	3	0	10	0	5	-.001	4
293		14	max	47.449	2	-.12	15	.556	4	0	4	0	3	0	15
294			min	-56.3	9	-.503	4	-.017	3	0	10	0	10	-.001	4
295		15	max	47.381	2	-.162	15	.69	4	0	4	0	3	0	15
296			min	-56.356	9	-.681	4	-.017	3	0	10	0	10	0	4
297		16	max	47.314	2	-.204	15	.823	4	0	4	0	4	0	15
298			min	-56.412	9	-.859	4	-.017	3	0	10	0	10	0	4
299		17	max	47.247	2	-.246	15	.957	4	0	4	0	4	0	15
300			min	-56.468	9	-1.037	4	-.017	3	0	10	0	10	0	4
301		18	max	47.18	2	-.287	15	1.09	4	0	4	0	4	0	15
302			min	-56.524	9	-1.215	4	-.017	3	0	10	0	10	0	4
303		19	max	47.113	2	-.329	15	1.224	4	0	4	.001	4	0	1
304			min	-56.58	9	-1.393	4	-.017	3	0	10	0	10	0	1
305	M12	1	max	373.229	1	0	1	.781	1	0	1	0	4	0	1
306			min	-115.809	3	0	1	-16.331	5	0	1	0	3	0	1
307		2	max	373.293	1	0	1	.781	1	0	1	0	1	0	1
308			min	-115.761	3	0	1	-16.388	5	0	1	-.001	5	0	1
309		3	max	373.358	1	0	1	.781	1	0	1	0	1	0	1
310			min	-115.712	3	0	1	-16.444	5	0	1	-.003	5	0	1
311		4	max	373.423	1	0	1	.781	1	0	1	0	1	0	1
312			min	-115.664	3	0	1	-16.5	5	0	1	-.004	5	0	1
313		5	max	373.488	1	0	1	.781	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	-115.615	3	0	1	-16.556	5	0	1	-.006	5	0	1
315		6	max	373.552	1	0	1	.781	1	0	1	0	1	0	1
316			min	-115.567	3	0	1	-16.612	5	0	1	-.007	5	0	1
317		7	max	373.617	1	0	1	.781	1	0	1	0	1	0	1
318			min	-115.518	3	0	1	-16.668	5	0	1	-.009	5	0	1
319		8	max	373.682	1	0	1	.781	1	0	1	0	1	0	1
320			min	-115.47	3	0	1	-16.724	5	0	1	-.01	5	0	1
321		9	max	373.746	1	0	1	.781	1	0	1	0	1	0	1
322			min	-115.421	3	0	1	-16.78	5	0	1	-.012	5	0	1
323		10	max	373.811	1	0	1	.781	1	0	1	0	1	0	1
324			min	-115.373	3	0	1	-16.836	5	0	1	-.013	5	0	1
325		11	max	373.876	1	0	1	.781	1	0	1	0	1	0	1
326			min	-115.324	3	0	1	-16.892	5	0	1	-.015	5	0	1
327		12	max	373.941	1	0	1	.781	1	0	1	0	1	0	1
328			min	-115.275	3	0	1	-16.948	5	0	1	-.016	5	0	1
329		13	max	374.005	1	0	1	.781	1	0	1	0	1	0	1
330			min	-115.227	3	0	1	-17.004	5	0	1	-.018	5	0	1
331		14	max	374.07	1	0	1	.781	1	0	1	0	1	0	1
332			min	-115.178	3	0	1	-17.061	5	0	1	-.019	5	0	1
333		15	max	374.135	1	0	1	.781	1	0	1	0	1	0	1
334			min	-115.13	3	0	1	-17.117	5	0	1	-.021	5	0	1
335		16	max	374.199	1	0	1	.781	1	0	1	.001	1	0	1
336			min	-115.081	3	0	1	-17.173	5	0	1	-.022	5	0	1
337		17	max	374.264	1	0	1	.781	1	0	1	.001	1	0	1
338			min	-115.033	3	0	1	-17.229	5	0	1	-.024	5	0	1
339		18	max	374.329	1	0	1	.781	1	0	1	.001	1	0	1
340			min	-114.984	3	0	1	-17.285	5	0	1	-.026	5	0	1
341		19	max	374.393	1	0	1	.781	1	0	1	.001	1	0	1
342			min	-114.936	3	0	1	-17.341	5	0	1	-.027	5	0	1
343	M1	1	max	59.741	1	336.525	3	-.261	10	0	1	.033	1	0	1
344			min	3.576	12	-271.899	1	-17.02	1	0	3	0	10	0	3
345		2	max	59.813	1	336.323	3	-.261	10	0	1	.03	1	.059	1
346			min	3.613	12	-272.169	1	-17.02	1	0	3	0	10	-.073	3
347		3	max	69.799	1	4.675	14	-.257	10	0	5	.026	1	.117	1
348			min	-6.422	3	-21.327	3	-16.881	1	0	1	0	10	-.145	3
349		4	max	69.872	1	4.41	14	-.257	10	0	5	.022	1	.118	1
350			min	-6.368	3	-21.529	3	-16.881	1	0	1	0	10	-.14	3
351		5	max	69.944	1	4.145	14	-.257	10	0	5	.018	1	.119	1
352			min	-6.314	3	-21.732	3	-16.881	1	0	1	0	10	-.135	3
353		6	max	70.016	1	3.88	14	-.257	10	0	5	.015	1	.119	1
354			min	-6.26	3	-21.934	3	-16.881	1	0	1	0	10	-.131	3
355		7	max	70.088	1	3.615	14	-.257	10	0	5	.011	1	.12	1
356			min	-6.206	3	-22.136	3	-16.881	1	0	1	0	10	-.126	3
357		8	max	70.161	1	3.35	14	-.257	10	0	5	.007	1	.121	1
358			min	-6.151	3	-22.339	3	-16.881	1	0	1	0	10	-.121	3
359		9	max	70.233	1	3.085	14	-.257	10	0	5	.004	1	.124	2
360			min	-6.097	3	-22.541	3	-16.881	1	0	1	0	10	-.116	3
361		10	max	70.305	1	2.844	9	-.257	10	0	5	.001	3	.128	2
362			min	-6.043	3	-22.743	3	-16.881	1	0	1	0	10	-.111	3
363		11	max	70.378	1	2.62	9	-.257	10	0	5	0	3	.131	2
364			min	-5.989	3	-22.945	3	-16.881	1	0	1	-.004	1	-.106	3
365		12	max	70.45	1	2.395	9	-.257	10	0	5	0	12	.135	2
366			min	-5.935	3	-23.148	3	-16.881	1	0	1	-.007	1	-.101	3
367		13	max	70.522	1	2.17	9	-.257	10	0	5	0	10	.139	2
368			min	-5.88	3	-23.35	3	-16.881	1	0	1	-.011	1	-.096	3
369		14	max	70.594	1	1.945	9	-.257	10	0	5	0	10	.143	2
370			min	-5.826	3	-23.552	3	-16.881	1	0	1	-.015	1	-.091	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	70.667	1	1.721	9	-.257	10	0	5	0	10	.147	2
372			min	-5.772	3	-23.755	3	-16.881	1	0	1	-.018	1	-.086	3
373		16	max	67.419	2	13.888	10	-.26	10	0	1	0	10	.15	2
374			min	-33.81	3	-49.203	3	-17.053	1	0	4	-.022	1	-.081	3
375		17	max	67.491	2	13.663	10	-.26	10	0	1	0	10	.148	2
376			min	-33.756	3	-49.405	3	-17.053	1	0	4	-.026	1	-.07	3
377		18	max	-2.382	12	342.464	2	-.26	10	0	3	0	10	.075	2
378			min	-59.771	1	-161.891	3	-27.44	4	0	2	-.03	1	-.035	3
379		19	max	-2.346	12	342.194	2	-.26	10	0	3	0	10	0	2
380			min	-59.699	1	-162.093	3	-27.198	4	0	2	-.033	1	0	3
381	M5	1	max	142.752	1	1092.563	3	0	10	0	1	.032	4	0	3
382			min	.212	15	-879.73	1	-45.512	3	0	5	0	10	0	1
383		2	max	142.825	1	1092.361	3	0	10	0	1	.028	4	.19	1
384			min	.234	15	-880	1	-45.512	3	0	5	-.004	3	-.236	3
385		3	max	173.526	1	6.727	9	4.988	3	0	3	.023	4	.378	1
386			min	-39.759	3	-74.962	3	-17.655	4	0	4	-.013	3	-.468	3
387		4	max	173.598	1	6.502	9	4.988	3	0	3	.019	4	.382	1
388			min	-39.704	3	-75.164	3	-17.413	4	0	4	-.012	3	-.452	3
389		5	max	173.671	1	6.278	9	4.988	3	0	3	.015	4	.386	1
390			min	-39.65	3	-75.367	3	-17.171	4	0	4	-.011	3	-.436	3
391		6	max	173.743	1	6.053	9	4.988	3	0	3	.012	4	.391	1
392			min	-39.596	3	-75.569	3	-16.929	4	0	4	-.01	3	-.419	3
393		7	max	173.815	1	5.828	9	4.988	3	0	3	.008	4	.395	1
394			min	-39.542	3	-75.771	3	-16.687	4	0	4	-.009	3	-.403	3
395		8	max	173.887	1	5.603	9	4.988	3	0	3	.004	4	.399	1
396			min	-39.488	3	-75.974	3	-16.445	4	0	4	-.008	3	-.386	3
397		9	max	173.96	1	5.378	9	4.988	3	0	3	0	4	.405	2
398			min	-39.433	3	-76.176	3	-16.203	4	0	4	-.006	3	-.37	3
399		10	max	174.032	1	5.154	9	4.988	3	0	3	0	2	.417	2
400			min	-39.379	3	-76.378	3	-15.961	4	0	4	-.005	3	-.353	3
401		11	max	174.104	1	4.929	9	4.988	3	0	3	0	2	.429	2
402			min	-39.325	3	-76.58	3	-15.719	4	0	4	-.006	4	-.337	3
403		12	max	174.177	1	4.704	9	4.988	3	0	3	0	2	.441	2
404			min	-39.271	3	-76.783	3	-15.477	4	0	4	-.009	4	-.32	3
405		13	max	174.249	1	4.479	9	4.988	3	0	3	0	2	.453	2
406			min	-39.217	3	-76.985	3	-15.235	4	0	4	-.013	4	-.303	3
407		14	max	174.321	1	4.255	9	4.988	3	0	3	0	2	.466	2
408			min	-39.162	3	-77.187	3	-14.993	4	0	4	-.016	4	-.287	3
409		15	max	174.393	1	4.03	9	4.988	3	0	3	0	3	.478	2
410			min	-39.108	3	-77.39	3	-14.751	4	0	4	-.019	4	-.27	3
411		16	max	223.679	2	64.026	2	4.963	3	0	3	0	3	.489	2
412			min	-105.977	3	-135.616	3	-13.53	4	0	4	-.023	4	-.253	3
413		17	max	223.751	2	63.756	2	4.963	3	0	3	.002	3	.475	2
414			min	-105.923	3	-135.818	3	-13.288	4	0	4	-.026	4	-.223	3
415		18	max	-2.678	12	1107.074	2	4.574	3	0	4	.003	3	.239	2
416			min	-142.916	1	-518.969	3	-30.448	5	0	1	-.032	4	-.112	3
417		19	max	-2.642	12	1106.804	2	4.574	3	0	4	.004	3	0	3
418			min	-142.844	1	-519.171	3	-30.206	5	0	1	-.039	4	0	2
419	M9	1	max	59.627	1	336.485	3	124.86	4	0	3	0	5	0	1
420			min	-.24	5	-271.899	1	.262	10	0	1	-.033	1	0	3
421		2	max	59.699	1	336.283	3	125.102	4	0	3	.027	5	.059	1
422			min	-.212	15	-272.168	1	.262	10	0	1	-.029	1	-.073	3
423		3	max	70.054	1	4.404	9	16.592	1	0	4	.052	5	.117	1
424			min	-6.529	3	-21.25	3	-23.384	5	0	10	-.025	1	-.145	3
425		4	max	70.126	1	4.179	9	16.592	1	0	4	.047	5	.118	1
426			min	-6.474	3	-21.452	3	-23.142	5	0	10	-.022	1	-.14	3
427		5	max	70.199	1	3.954	9	16.592	1	0	4	.042	5	.119	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	-6.42	3	-21.655	3	-22.9	5	0	10	-.018	1	-.135	3
429		6	max	70.271	1	3.729	9	16.592	1	0	4	.037	5	.119	1
430			min	-6.366	3	-21.857	3	-22.658	5	0	10	-.014	1	-.131	3
431		7	max	70.343	1	3.505	9	16.592	1	0	4	.032	5	.12	1
432			min	-6.312	3	-22.059	3	-22.416	5	0	10	-.011	1	-.126	3
433		8	max	70.415	1	3.28	9	16.592	1	0	4	.027	5	.121	1
434			min	-6.258	3	-22.262	3	-22.174	5	0	10	-.007	1	-.121	3
435		9	max	70.488	1	3.055	9	16.592	1	0	4	.022	5	.124	2
436			min	-6.203	3	-22.464	3	-21.932	5	0	10	-.004	1	-.116	3
437		10	max	70.56	1	2.83	9	16.592	1	0	4	.018	4	.128	2
438			min	-6.149	3	-22.666	3	-21.69	5	0	10	0	1	-.111	3
439		11	max	70.632	1	2.606	9	16.592	1	0	4	.014	4	.131	2
440			min	-6.095	3	-22.868	3	-21.448	5	0	10	0	10	-.106	3
441		12	max	70.705	1	2.381	9	16.592	1	0	4	.01	4	.135	2
442			min	-6.041	3	-23.071	3	-21.206	5	0	10	0	10	-.101	3
443		13	max	70.777	1	2.156	9	16.592	1	0	4	.011	1	.139	2
444			min	-5.986	3	-23.273	3	-20.964	5	0	10	0	10	-.096	3
445		14	max	70.849	1	1.931	9	16.592	1	0	4	.014	1	.143	2
446			min	-5.932	3	-23.475	3	-20.722	5	0	10	0	5	-.091	3
447		15	max	70.921	1	1.706	9	16.592	1	0	4	.018	1	.146	2
448			min	-5.878	3	-23.678	3	-20.48	5	0	10	-.005	5	-.086	3
449		16	max	67.49	2	13.665	10	16.783	1	0	10	.022	1	.15	2
450			min	-34.372	3	-49.543	3	-19.059	5	0	4	-.008	5	-.081	3
451		17	max	67.563	2	13.44	10	16.783	1	0	10	.025	1	.148	2
452			min	-34.318	3	-49.745	3	-18.817	5	0	4	-.012	5	-.07	3
453		18	max	8.331	5	342.464	2	17.547	1	0	2	.029	1	.075	2
454			min	-59.649	1	-161.886	3	-34.892	5	0	3	-.02	5	-.035	3
455		19	max	8.364	5	342.194	2	17.547	1	0	2	.033	1	0	2
456			min	-59.577	1	-162.088	3	-34.65	5	0	3	-.028	5	0	3
457	M13	1	max	124.859	4	271.714	1	.24	5	0	1	.033	1	0	1
458			min	.262	10	-336.507	3	-59.624	1	0	3	0	5	0	3
459		2	max	119.948	4	192.738	1	.924	5	0	1	.008	3	.144	3
460			min	.262	10	-238.423	3	-45.061	1	0	3	-.001	10	-.116	1
461		3	max	115.038	4	113.761	1	1.608	5	0	1	.006	3	.238	3
462			min	.262	10	-140.338	3	-30.499	1	0	3	-.012	1	-.193	1
463		4	max	110.127	4	34.785	1	2.293	5	0	1	.004	3	.284	3
464			min	.262	10	-42.253	3	-15.937	1	0	3	-.024	1	-.23	1
465		5	max	105.216	4	55.832	3	2.977	5	0	1	.002	3	.281	3
466			min	.262	10	-44.191	1	-2.598	3	0	3	-.028	1	-.228	1
467		6	max	100.305	4	153.917	3	13.188	1	0	1	.004	5	.228	3
468			min	.262	10	-123.168	1	-1.954	3	0	3	-.025	1	-.186	1
469		7	max	95.394	4	252.001	3	27.75	1	0	1	.006	5	.127	3
470			min	.262	10	-202.144	1	-1.311	3	0	3	-.015	1	-.104	1
471		8	max	90.483	4	350.086	3	42.312	1	0	1	.009	4	.016	1
472			min	.262	10	-281.12	1	-.667	3	0	3	0	12	-.024	3
473		9	max	85.573	4	448.171	3	56.874	1	0	1	.028	1	.177	1
474			min	.262	10	-360.096	1	-.023	3	0	3	0	3	-.223	3
475		10	max	80.662	4	546.256	3	71.436	1	0	1	.06	1	.377	1
476			min	.262	10	-439.073	1	.58	12	0	3	-.018	5	-.472	3
477		11	max	55.54	4	360.096	1	6.508	5	0	3	.027	1	.177	1
478			min	.261	10	-448.171	3	-56.76	1	0	1	-.014	5	-.223	3
479		12	max	50.63	4	281.12	1	7.192	5	0	3	.003	2	.016	1
480			min	.261	10	-350.086	3	-42.198	1	0	1	-.011	5	-.024	3
481		13	max	45.719	4	202.144	1	7.876	5	0	3	0	10	.127	3
482			min	.261	10	-252.001	3	-27.636	1	0	1	-.015	1	-.104	1
483		14	max	40.808	4	123.168	1	8.561	5	0	3	-.002	10	.228	3
484			min	.261	10	-153.917	3	-13.074	1	0	1	-.025	1	-.186	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	35.897	4	44.191	1	9.805	4	0	3	.001	5	.281	3
486			min	.261	10	-55.832	3	-1.043	2	0	1	-.028	1	-.228	1
487		16	max	30.986	4	42.253	3	16.051	1	0	3	.006	5	.284	3
488			min	.261	10	-34.785	1	.251	10	0	1	-.023	1	-.23	1
489		17	max	26.075	4	140.338	3	30.613	1	0	3	.011	5	.238	3
490			min	.261	10	-113.761	1	1.473	10	0	1	-.012	1	-.193	1
491		18	max	21.165	4	238.423	3	45.175	1	0	3	.019	4	.144	3
492			min	.261	10	-192.738	1	2.695	10	0	1	-.001	10	-.116	1
493		19	max	17.045	1	336.507	3	59.737	1	0	3	.033	1	0	1
494			min	.261	10	-271.714	1	3.577	12	0	1	0	10	0	3
495	M16	1	max	34.637	5	342.272	2	8.364	5	0	3	.033	1	0	2
496			min	-17.522	1	-162.101	3	-59.581	1	0	2	-.028	5	0	3
497		2	max	29.726	5	242.711	2	9.049	5	0	3	.007	1	.069	3
498			min	-17.522	1	-115.245	3	-45.018	1	0	2	-.023	5	-.146	2
499		3	max	24.816	5	143.151	2	9.733	5	0	3	0	12	.115	3
500			min	-17.522	1	-68.389	3	-30.456	1	0	2	-.021	4	-.243	2
501		4	max	19.905	5	43.591	2	10.417	5	0	3	-.001	12	.138	3
502			min	-17.522	1	-21.533	3	-15.894	1	0	2	-.024	1	-.289	2
503		5	max	14.994	5	25.322	3	11.102	5	0	3	-.002	12	.137	3
504			min	-17.522	1	-55.969	2	-1.689	3	0	2	-.028	1	-.286	2
505		6	max	10.083	5	72.178	3	14.236	4	0	3	-.002	15	.112	3
506			min	-17.522	1	-155.529	2	-1.045	3	0	2	-.025	1	-.233	2
507		7	max	5.172	5	119.034	3	27.793	1	0	3	.004	5	.065	3
508			min	-17.522	1	-255.09	2	-.401	3	0	2	-.015	1	-.131	2
509		8	max	1.773	3	165.89	3	42.355	1	0	3	.011	4	.022	2
510			min	-17.522	1	-354.65	2	.243	3	0	2	-.004	3	-.007	3
511		9	max	1.773	3	212.746	3	56.917	1	0	3	.028	1	.224	2
512			min	-17.522	1	-454.21	2	.696	12	0	2	-.003	3	-.101	3
513		10	max	20.652	5	-9.171	15	71.48	1	0	14	.06	1	.476	2
514			min	-17.522	1	-553.77	2	-2.185	3	0	2	-.003	3	-.219	3
515		11	max	15.741	5	454.21	2	5.821	5	0	2	.028	1	.224	2
516			min	-17.48	1	-212.746	3	-56.796	1	0	3	-.012	5	-.101	3
517		12	max	10.83	5	354.65	2	6.505	5	0	2	.003	2	.022	2
518			min	-17.48	1	-165.89	3	-42.233	1	0	3	-.009	5	-.007	3
519		13	max	5.919	5	255.09	2	7.189	5	0	2	0	10	.065	3
520			min	-17.48	1	-119.034	3	-27.671	1	0	3	-.015	1	-.131	2
521		14	max	1.009	5	155.529	2	7.874	5	0	2	0	12	.112	3
522			min	-17.48	1	-72.178	3	-13.109	1	0	3	-.025	1	-.233	2
523		15	max	-.26	10	55.969	2	9.094	4	0	2	.003	5	.137	3
524			min	-17.48	1	-25.322	3	-1.067	2	0	3	-.028	1	-.286	2
525		16	max	-.26	10	21.533	3	16.016	1	0	2	.007	5	.138	3
526			min	-17.48	1	-43.591	2	.237	10	0	3	-.023	1	-.289	2
527		17	max	-.26	10	68.389	3	30.578	1	0	2	.012	5	.115	3
528			min	-17.48	1	-143.151	2	1.46	10	0	3	-.012	1	-.243	2
529		18	max	-.26	10	115.245	3	45.14	1	0	2	.019	4	.069	3
530			min	-22.309	4	-242.711	2	1.917	12	0	3	-.001	10	-.146	2
531		19	max	-.26	10	162.101	3	59.702	1	0	2	.033	1	0	2
532			min	-27.219	4	-342.272	2	2.346	12	0	3	0	10	0	3
533	M15	1	max	0	1	.923	3	.104	3	0	1	0	1	0	1
534			min	-57.759	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.821	3	.104	3	0	1	0	1	0	1
536			min	-57.813	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.718	3	.104	3	0	1	0	1	0	1
538			min	-57.867	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.616	3	.104	3	0	1	0	1	0	1
540			min	-57.92	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.513	3	.104	3	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-57.974	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.41	3	.104	3	0	1	0	1	0	1
544			min	-58.028	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.308	3	.104	3	0	1	0	3	0	1
546			min	-58.082	3	0	1	0	1	0	3	0	1	-.001	3
547		8	max	0	1	.205	3	.104	3	0	1	0	3	0	1
548			min	-58.136	3	0	1	0	1	0	3	0	1	-.001	3
549		9	max	0	1	.103	3	.104	3	0	1	0	3	0	1
550			min	-58.19	3	0	1	0	1	0	3	0	1	-.001	3
551		10	max	0	1	0	1	.104	3	0	1	0	3	0	1
552			min	-58.244	3	0	1	0	1	0	3	0	1	-.001	3
553		11	max	0	1	0	1	.104	3	0	1	0	3	0	1
554			min	-58.298	3	-.103	3	0	1	0	3	0	1	-.001	3
555		12	max	0	1	0	1	.104	3	0	1	0	3	0	1
556			min	-58.352	3	-.205	3	0	1	0	3	0	1	-.001	3
557		13	max	0	1	0	1	.104	3	0	1	0	3	0	1
558			min	-58.406	3	-.308	3	0	1	0	3	0	1	-.001	3
559		14	max	0	1	0	1	.104	3	0	1	0	3	0	1
560			min	-58.46	3	-.41	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.104	3	0	1	0	3	0	1
562			min	-58.514	3	-.513	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.104	3	0	1	0	3	0	1
564			min	-58.568	3	-.616	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.104	3	0	1	0	3	0	1
566			min	-58.622	3	-.718	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.104	3	0	1	0	3	0	1
568			min	-58.676	3	-.821	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.104	3	0	1	0	3	0	1
570			min	-58.73	3	-.923	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	2.134	4	.233	4	0	3	0	3	0	1
572			min	-168.798	4	0	2	-.04	3	0	1	0	4	0	1
573		2	max	0	2	1.897	4	.211	4	0	3	0	3	0	2
574			min	-168.823	4	0	2	-.04	3	0	1	0	4	0	4
575		3	max	0	2	1.66	4	.19	4	0	3	0	3	0	2
576			min	-168.848	4	0	2	-.04	3	0	1	0	4	-.001	4
577		4	max	0	2	1.423	4	.168	4	0	3	0	3	0	2
578			min	-168.872	4	0	2	-.04	3	0	1	0	1	-.002	4
579		5	max	0	2	1.185	4	.147	4	0	3	0	3	0	2
580			min	-168.897	4	0	2	-.04	3	0	1	0	1	-.002	4
581		6	max	0	2	.948	4	.125	4	0	3	0	3	0	2
582			min	-168.922	4	0	2	-.04	3	0	1	0	1	-.002	4
583		7	max	0	2	.711	4	.104	4	0	3	0	3	0	2
584			min	-168.946	4	0	2	-.04	3	0	1	0	1	-.002	4
585		8	max	0	2	.474	4	.082	4	0	3	0	5	0	2
586			min	-168.971	4	0	2	-.04	3	0	1	0	1	-.003	4
587		9	max	0	2	.237	4	.06	4	0	3	0	5	0	2
588			min	-168.996	4	0	2	-.04	3	0	1	0	1	-.003	4
589		10	max	0	2	0	1	.039	1	0	3	0	5	0	2
590			min	-169.02	4	0	1	-.04	3	0	1	0	1	-.003	4
591		11	max	0	2	0	2	.039	1	0	3	0	5	0	2
592			min	-169.045	4	-.237	4	-.04	3	0	1	0	1	-.003	4
593		12	max	0	2	0	2	.039	1	0	3	0	5	0	2
594			min	-169.07	4	-.474	4	-.04	3	0	1	0	1	-.003	4
595		13	max	0	2	0	2	.039	1	0	3	0	5	0	2
596			min	-169.094	4	-.711	4	-.04	3	0	1	0	3	-.002	4
597		14	max	.039	11	0	2	.039	1	0	3	0	5	0	2
598			min	-169.119	4	-.948	4	-.052	5	0	1	0	3	-.002	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.099	11	0	2	.039	1	0	3	0	4	0	2
600			min	-169.143	4	-1.185	4	-.073	5	0	1	0	3	-.002	4
601		16	max	.159	11	0	2	.039	1	0	3	0	4	0	2
602			min	-169.168	4	-1.423	4	-.095	5	0	1	0	3	-.002	4
603		17	max	.219	11	0	2	.039	1	0	3	0	1	0	2
604			min	-169.193	4	-1.66	4	-.116	5	0	1	0	3	-.001	4
605		18	max	.279	11	0	2	.039	1	0	3	0	1	0	2
606			min	-169.217	4	-1.897	4	-.138	5	0	1	0	3	0	4
607		19	max	.339	11	0	2	.039	1	0	3	0	1	0	1
608			min	-169.242	4	-2.134	4	-.159	5	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.002	1	.005	2	.003	1	9.995e-4	5	NC	3	NC	1
2			min	-.003	3	-.004	3	-.01	5	-2.418e-4	1	5663.178	2	NC	1
3		2	max	.002	1	.005	2	.003	1	1.019e-3	5	NC	3	NC	1
4			min	-.003	3	-.004	3	-.009	5	-2.319e-4	1	6156.926	2	NC	1
5		3	max	.002	1	.004	2	.002	1	1.038e-3	5	NC	1	NC	1
6			min	-.002	3	-.004	3	-.009	5	-2.22e-4	1	6740.262	2	NC	1
7		4	max	.002	1	.004	2	.002	1	1.058e-3	5	NC	1	NC	1
8			min	-.002	3	-.004	3	-.008	5	-2.122e-4	1	7434.48	2	NC	1
9		5	max	.002	1	.004	2	.002	1	1.077e-3	5	NC	1	NC	1
10			min	-.002	3	-.004	3	-.008	5	-2.023e-4	1	8267.875	2	NC	1
11		6	max	.001	1	.003	2	.002	1	1.096e-3	5	NC	1	NC	1
12			min	-.002	3	-.004	3	-.008	5	-1.925e-4	1	9278.675	2	NC	1
13		7	max	.001	1	.003	2	.002	1	1.116e-3	5	NC	1	NC	1
14			min	-.002	3	-.003	3	-.007	5	-1.826e-4	1	NC	1	NC	1
15		8	max	.001	1	.002	2	.001	1	1.135e-3	5	NC	1	NC	1
16			min	-.002	3	-.003	3	-.007	5	-1.728e-4	1	NC	1	NC	1
17		9	max	.001	1	.002	2	.001	1	1.155e-3	5	NC	1	NC	1
18			min	-.001	3	-.003	3	-.006	5	-1.629e-4	1	NC	1	NC	1
19		10	max	.001	1	.002	2	.001	1	1.174e-3	5	NC	1	NC	1
20			min	-.001	3	-.003	3	-.006	5	-1.531e-4	1	NC	1	NC	1
21		11	max	0	1	.002	2	0	1	1.193e-3	5	NC	1	NC	1
22			min	-.001	3	-.003	3	-.005	5	-1.432e-4	1	NC	1	NC	1
23		12	max	0	1	.001	2	0	1	1.213e-3	5	NC	1	NC	1
24			min	-.001	3	-.002	3	-.005	5	-1.333e-4	1	NC	1	NC	1
25		13	max	0	1	0	2	0	1	1.232e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.004	5	-1.235e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	0	1	1.251e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.003	5	-1.136e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.271e-3	5	NC	1	NC	1
30			min	0	3	-.001	3	-.003	5	-1.038e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.29e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.002	5	-9.392e-5	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.31e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.001	5	-8.407e-5	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.329e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-7.421e-5	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.348e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-6.435e-5	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	2.929e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-6.138e-4	5	NC	1	NC	1
41		2	max	0	9	0	2	.003	5	3.874e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-6.18e-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	9	0	2	.007	5	4.82e-5	1	NC	1	NC	1
44			min	0	2	-.001	3	0	1	-6.221e-4	5	NC	1	NC	1
45		4	max	0	9	0	2	.01	4	5.766e-5	1	NC	1	NC	1
46			min	0	2	-.002	3	0	1	-6.262e-4	5	NC	1	NC	1
47		5	max	0	9	0	2	.013	4	6.712e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	-6.303e-4	5	NC	1	NC	1
49		6	max	0	9	0	2	.016	4	7.658e-5	1	NC	1	NC	1
50			min	0	2	-.003	3	0	1	-6.345e-4	5	NC	1	NC	1
51		7	max	0	9	0	2	.02	4	8.603e-5	1	NC	1	NC	1
52			min	0	2	-.004	3	0	9	-6.386e-4	5	NC	1	NC	1
53		8	max	0	9	0	2	.023	4	9.549e-5	1	NC	1	NC	1
54			min	0	2	-.004	3	0	9	-6.427e-4	5	NC	1	NC	1
55		9	max	0	9	0	2	.026	4	1.05e-4	1	NC	1	NC	1
56			min	0	2	-.005	3	0	10	-6.469e-4	5	NC	1	NC	1
57		10	max	0	9	.001	2	.029	4	1.144e-4	1	NC	1	NC	1
58			min	0	2	-.005	3	0	10	-6.51e-4	5	NC	1	NC	1
59		11	max	0	9	.002	2	.032	4	1.239e-4	1	NC	1	NC	1
60			min	0	2	-.006	3	0	10	-6.551e-4	5	NC	1	NC	1
61		12	max	0	9	.002	2	.035	4	1.333e-4	1	NC	1	NC	1
62			min	0	2	-.006	3	0	10	-6.593e-4	5	NC	1	NC	1
63		13	max	0	9	.003	2	.038	4	1.428e-4	1	NC	1	NC	1
64			min	0	2	-.006	3	0	10	-6.634e-4	5	NC	1	NC	1
65		14	max	0	9	.003	2	.04	4	1.522e-4	1	NC	1	NC	1
66			min	0	2	-.006	3	0	10	-6.675e-4	5	NC	1	NC	1
67		15	max	0	9	.004	2	.043	4	1.617e-4	1	NC	1	NC	1
68			min	0	2	-.006	3	0	10	-6.717e-4	5	NC	1	NC	1
69		16	max	0	9	.005	2	.046	4	1.712e-4	1	NC	1	NC	1
70			min	0	2	-.006	3	0	10	-6.758e-4	5	9217.88	2	NC	1
71		17	max	0	9	.006	2	.048	4	1.806e-4	1	NC	1	NC	1
72			min	0	2	-.006	3	0	10	-6.799e-4	5	7826.044	2	NC	1
73		18	max	0	9	.007	2	.051	4	1.901e-4	1	NC	3	NC	1
74			min	0	2	-.006	3	0	10	-6.841e-4	5	6759.369	2	NC	1
75		19	max	0	9	.008	2	.053	4	1.995e-4	1	NC	3	NC	1
76			min	0	2	-.006	3	0	10	-6.882e-4	5	5932.172	2	NC	1
77	M4	1	max	.002	1	.006	2	0	10	2.28e-3	5	NC	1	NC	1
78			min	0	3	-.005	3	-.056	4	-2.149e-4	1	NC	1	343.765	4
79		2	max	.002	1	.006	2	0	10	2.28e-3	5	NC	1	NC	1
80			min	0	3	-.005	3	-.052	4	-2.149e-4	1	NC	1	374.719	4
81		3	max	.002	1	.005	2	0	10	2.28e-3	5	NC	1	NC	1
82			min	0	3	-.004	3	-.047	4	-2.149e-4	1	NC	1	411.557	4
83		4	max	.001	1	.005	2	0	10	2.28e-3	5	NC	1	NC	1
84			min	0	3	-.004	3	-.042	4	-2.149e-4	1	NC	1	455.828	4
85		5	max	.001	1	.005	2	0	10	2.28e-3	5	NC	1	NC	1
86			min	0	3	-.004	3	-.038	4	-2.149e-4	1	NC	1	509.643	4
87		6	max	.001	1	.004	2	0	10	2.28e-3	5	NC	1	NC	1
88			min	0	3	-.003	3	-.034	4	-2.149e-4	1	NC	1	575.938	4
89		7	max	.001	1	.004	2	0	10	2.28e-3	5	NC	1	NC	1
90			min	0	3	-.003	3	-.029	4	-2.149e-4	1	NC	1	658.893	4
91		8	max	.001	1	.004	2	0	10	2.28e-3	5	NC	1	NC	1
92			min	0	3	-.003	3	-.025	4	-2.149e-4	1	NC	1	764.629	4
93		9	max	0	1	.003	2	0	10	2.28e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.021	4	-2.149e-4	1	NC	1	902.404	4
95		10	max	0	1	.003	2	0	10	2.28e-3	5	NC	1	NC	1
96			min	0	3	-.002	3	-.018	4	-2.149e-4	1	NC	1	1086.769	4
97		11	max	0	1	.003	2	0	10	2.28e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.014	4	-2.149e-4	1	NC	1	1341.691	4
99		12	max	0	1	.002	2	0	10	2.28e-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	-.011	4	-2.149e-4	1	NC	1	1708.972	4
101		13	max	0	1	.002	2	0	10	2.28e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.009	4	-2.149e-4	1	NC	1	2267.018	4
103		14	max	0	1	.002	2	0	10	2.28e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.006	4	-2.149e-4	1	NC	1	3177.55	4
105		15	max	0	1	.001	2	0	10	2.28e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.004	4	-2.149e-4	1	NC	1	4820.49	4
107		16	max	0	1	.001	2	0	10	2.28e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.002	4	-2.149e-4	1	NC	1	8275.825	4
109		17	max	0	1	0	2	0	10	2.28e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.001	4	-2.149e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	2.28e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-2.149e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	2.28e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-2.149e-4	1	NC	1	NC	1
115	M6	1	max	.006	1	.018	2	0	1	1.064e-3	4	NC	3	NC	1
116			min	-.008	3	-.013	3	-.009	5	-8.515e-8	2	1686.906	2	8324.059	3
117		2	max	.006	1	.017	2	0	1	1.083e-3	4	NC	3	NC	1
118			min	-.008	3	-.013	3	-.009	5	-8.064e-8	2	1801.101	2	8918.42	3
119		3	max	.006	1	.016	2	0	1	1.102e-3	4	NC	3	NC	1
120			min	-.008	3	-.012	3	-.009	5	-7.613e-8	2	1931.47	2	9614.413	3
121		4	max	.005	1	.014	2	0	1	1.121e-3	4	NC	3	NC	1
122			min	-.007	3	-.011	3	-.008	5	-6.992e-7	11	2081.257	2	NC	1
123		5	max	.005	1	.013	2	0	1	1.14e-3	4	NC	3	NC	1
124			min	-.007	3	-.011	3	-.008	5	-1.743e-6	11	2254.642	2	NC	1
125		6	max	.005	1	.012	2	0	1	1.159e-3	4	NC	3	NC	1
126			min	-.006	3	-.01	3	-.008	5	-3.032e-6	1	2457.096	2	NC	1
127		7	max	.004	1	.011	2	0	1	1.178e-3	4	NC	3	NC	1
128			min	-.006	3	-.009	3	-.007	5	-5.382e-6	1	2695.92	2	NC	1
129		8	max	.004	1	.01	2	0	1	1.197e-3	4	NC	3	NC	1
130			min	-.005	3	-.009	3	-.007	5	-7.733e-6	1	2981.079	2	NC	1
131		9	max	.004	1	.009	2	0	1	1.215e-3	4	NC	3	NC	1
132			min	-.005	3	-.008	3	-.006	5	-1.008e-5	1	3326.531	2	NC	1
133		10	max	.003	1	.008	2	0	1	1.234e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.006	5	-1.243e-5	1	3752.444	2	NC	1
135		11	max	.003	1	.007	2	0	1	1.253e-3	4	NC	3	NC	1
136			min	-.004	3	-.007	3	-.005	5	-1.478e-5	1	4289.076	2	NC	1
137		12	max	.002	1	.006	2	0	1	1.272e-3	4	NC	3	NC	1
138			min	-.003	3	-.006	3	-.005	5	-1.713e-5	1	4983.983	2	NC	1
139		13	max	.002	1	.005	2	0	1	1.291e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.004	5	-1.948e-5	1	5916.431	2	NC	1
141		14	max	.002	1	.004	2	0	1	1.31e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.003	5	-2.183e-5	1	7229.102	2	NC	1
143		15	max	.001	1	.003	2	0	1	1.329e-3	4	NC	1	NC	1
144			min	-.002	3	-.003	3	-.003	5	-2.418e-5	1	9207.366	2	NC	1
145		16	max	.001	1	.002	2	0	1	1.348e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.002	5	-2.654e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.367e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.001	5	-2.889e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.386e-3	4	NC	1	NC	1
150			min	0	3	0	3	0	5	-3.124e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.404e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-3.359e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.521e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-6.393e-4	4	NC	1	NC	1
155		2	max	0	9	.001	2	.003	4	1.39e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	1	-6.303e-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	.007	4	1.259e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-6.212e-4	4	NC	1	NC	1
159		4	max	0	9	.003	2	.01	4	1.128e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-6.122e-4	4	NC	1	NC	1
161		5	max	0	9	.004	2	.014	4	9.975e-6	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-6.032e-4	4	NC	1	NC	1
163		6	max	0	9	.005	2	.017	4	8.666e-6	1	NC	1	NC	1
164			min	0	2	-.007	3	0	1	-5.942e-4	4	8553.554	2	NC	1
165		7	max	0	9	.007	2	.021	4	2.283e-5	3	NC	3	NC	1
166			min	0	2	-.008	3	0	1	-5.852e-4	4	7075.993	2	NC	1
167		8	max	0	9	.008	2	.024	4	3.846e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-5.762e-4	4	5988.877	2	NC	1
169		9	max	0	9	.009	2	.027	4	5.409e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-5.672e-4	4	5151.328	2	NC	1
171		10	max	0	9	.01	2	.03	4	6.972e-5	3	NC	3	NC	1
172			min	-.001	2	-.012	3	0	1	-5.582e-4	4	4485.159	2	NC	1
173		11	max	0	9	.012	2	.033	4	8.535e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	0	1	-5.492e-4	4	3943.235	2	NC	1
175		12	max	0	9	.013	2	.036	4	1.01e-4	3	NC	3	NC	1
176			min	-.001	2	-.014	3	0	1	-5.402e-4	4	3495.187	2	NC	1
177		13	max	0	9	.015	2	.039	4	1.166e-4	3	NC	3	NC	1
178			min	-.001	2	-.015	3	0	1	-5.312e-4	4	3120.341	2	NC	1
179		14	max	0	9	.016	2	.042	4	1.322e-4	3	NC	3	NC	1
180			min	-.002	2	-.016	3	0	1	-5.222e-4	4	2803.965	2	NC	1
181		15	max	0	9	.018	2	.045	4	1.479e-4	3	NC	3	NC	1
182			min	-.002	2	-.017	3	0	1	-5.132e-4	4	2535.166	2	NC	1
183		16	max	0	9	.02	2	.047	4	1.635e-4	3	NC	3	NC	1
184			min	-.002	2	-.018	3	0	1	-5.042e-4	4	2305.65	2	NC	1
185		17	max	.001	9	.022	2	.05	4	1.791e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	0	1	-4.952e-4	4	2108.956	2	NC	1
187		18	max	.001	9	.024	2	.052	4	1.948e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	0	1	-4.862e-4	4	1939.966	2	NC	1
189		19	max	.001	9	.026	2	.055	4	2.104e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	0	1	-4.771e-4	4	1794.578	2	NC	1
191	M8	1	max	.005	1	.02	2	0	1	2.095e-3	4	NC	1	NC	1
192			min	-.002	3	-.015	3	-.057	4	-1.674e-4	3	NC	1	336.691	4
193		2	max	.005	1	.019	2	0	1	2.095e-3	4	NC	1	NC	1
194			min	-.002	3	-.014	3	-.053	4	-1.674e-4	3	NC	1	367.008	4
195		3	max	.005	1	.018	2	0	1	2.095e-3	4	NC	1	NC	1
196			min	-.002	3	-.013	3	-.048	4	-1.674e-4	3	NC	1	403.089	4
197		4	max	.004	1	.017	2	0	1	2.095e-3	4	NC	1	NC	1
198			min	-.002	3	-.012	3	-.043	4	-1.674e-4	3	NC	1	446.451	4
199		5	max	.004	1	.016	2	0	1	2.095e-3	4	NC	1	NC	1
200			min	-.001	3	-.012	3	-.039	4	-1.674e-4	3	NC	1	499.162	4
201		6	max	.004	1	.015	2	0	1	2.095e-3	4	NC	1	NC	1
202			min	-.001	3	-.011	3	-.034	4	-1.674e-4	3	NC	1	564.096	4
203		7	max	.004	1	.014	2	0	1	2.095e-3	4	NC	1	NC	1
204			min	-.001	3	-.01	3	-.03	4	-1.674e-4	3	NC	1	645.349	4
205		8	max	.003	1	.012	2	0	1	2.095e-3	4	NC	1	NC	1
206			min	-.001	3	-.009	3	-.026	4	-1.674e-4	3	NC	1	748.916	4
207		9	max	.003	1	.011	2	0	1	2.095e-3	4	NC	1	NC	1
208			min	-.001	3	-.008	3	-.022	4	-1.674e-4	3	NC	1	883.864	4
209		10	max	.003	1	.01	2	0	1	2.095e-3	4	NC	1	NC	1
210			min	0	3	-.007	3	-.018	4	-1.674e-4	3	NC	1	1064.449	4
211		11	max	.002	1	.009	2	0	1	2.095e-3	4	NC	1	NC	1
212			min	0	3	-.007	3	-.015	4	-1.674e-4	3	NC	1	1314.145	4
213		12	max	.002	1	.008	2	0	1	2.095e-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	-.012	4	-1.674e-4	3	NC	1	1673.898	4
215		13	max	.002	1	.007	2	0	1	2.095e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.009	4	-1.674e-4	3	NC	1	2220.508	4
217		14	max	.001	1	.006	2	0	1	2.095e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.006	4	-1.674e-4	3	NC	1	3112.384	4
219		15	max	.001	1	.005	2	0	1	2.095e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.004	4	-1.674e-4	3	NC	1	4721.671	4
221		16	max	0	1	.003	2	0	1	2.095e-3	4	NC	1	NC	1
222			min	0	3	-.002	3	-.002	4	-1.674e-4	3	NC	1	8106.24	4
223		17	max	0	1	.002	2	0	1	2.095e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.001	4	-1.674e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	2.095e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.674e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	2.095e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.674e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.005	2	0	3	2.575e-4	1	NC	3	NC	1
230			min	-.002	3	-.004	3	-.004	4	-3.492e-4	3	5674.732	2	NC	1
231		2	max	.002	1	.005	2	0	3	2.45e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.004	4	-3.393e-4	3	6169.746	2	NC	1
233		3	max	.002	1	.004	2	0	3	2.837e-4	4	NC	1	NC	1
234			min	-.002	3	-.004	3	-.004	4	-3.295e-4	3	6754.625	2	NC	1
235		4	max	.002	1	.004	2	0	3	3.3e-4	4	NC	1	NC	1
236			min	-.002	3	-.004	3	-.004	4	-3.197e-4	3	7450.741	2	NC	1
237		5	max	.002	1	.004	2	0	3	3.764e-4	4	NC	1	NC	1
238			min	-.002	3	-.004	3	-.004	4	-3.098e-4	3	8286.493	2	NC	1
239		6	max	.001	1	.003	2	0	3	4.227e-4	4	NC	1	NC	1
240			min	-.002	3	-.004	3	-.004	4	-3.e-4	3	9300.257	2	NC	1
241		7	max	.001	1	.003	2	0	3	4.69e-4	4	NC	1	NC	1
242			min	-.002	3	-.004	3	-.004	4	-2.901e-4	3	NC	1	NC	1
243		8	max	.001	1	.002	2	0	3	5.154e-4	4	NC	1	NC	1
244			min	-.001	3	-.003	3	-.004	4	-2.803e-4	3	NC	1	NC	1
245		9	max	.001	1	.002	2	0	3	5.617e-4	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.003	4	-2.705e-4	3	NC	1	NC	1
247		10	max	.001	1	.002	2	0	3	6.08e-4	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.003	4	-2.606e-4	3	NC	1	NC	1
249		11	max	0	1	.002	2	0	3	6.544e-4	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.003	4	-2.508e-4	3	NC	1	NC	1
251		12	max	0	1	.001	2	0	3	7.007e-4	4	NC	1	NC	1
252			min	0	3	-.002	3	-.003	4	-2.41e-4	3	NC	1	NC	1
253		13	max	0	1	0	2	0	3	7.47e-4	4	NC	1	NC	1
254			min	0	3	-.002	3	-.003	4	-2.311e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	7.933e-4	4	NC	1	NC	1
256			min	0	3	-.002	3	-.002	4	-2.213e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	8.397e-4	4	NC	1	NC	1
258			min	0	3	-.002	3	-.002	4	-2.115e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	8.86e-4	4	NC	1	NC	1
260			min	0	3	-.001	3	-.001	4	-2.016e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	9.323e-4	4	NC	1	NC	1
262			min	0	3	0	3	0	4	-1.918e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	9.787e-4	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-1.82e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.025e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.721e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	7.856e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-4.672e-4	4	NC	1	NC	1
269		2	max	0	9	0	2	.003	4	6.3e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-5.17e-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	9	0	2	.005	4	4.744e-5	3	NC	1	NC	1
272			min	0	2	-.001	3	0	3	-5.668e-4	4	NC	1	9037.956	4
273		4	max	0	9	0	2	.008	4	3.188e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	-.001	3	-6.166e-4	4	NC	1	5957.257	4
275		5	max	0	9	0	2	.01	4	1.632e-5	3	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-6.664e-4	4	NC	1	4428.822	4
277		6	max	0	9	0	2	.013	4	7.595e-7	3	NC	1	NC	1
278			min	0	2	-.003	3	-.002	3	-7.163e-4	4	NC	1	3519.844	4
279		7	max	0	9	0	2	.016	4	-1.286e-6	10	NC	1	NC	1
280			min	0	2	-.004	3	-.002	3	-7.661e-4	4	NC	1	2919.538	4
281		8	max	0	9	0	2	.018	5	-1.418e-6	10	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-8.159e-4	4	NC	1	2494.783	5
283		9	max	0	9	0	2	.021	5	-1.551e-6	10	NC	1	NC	1
284			min	0	2	-.005	3	-.002	3	-8.657e-4	4	NC	1	2176.64	5
285		10	max	0	9	.001	2	.024	5	-1.683e-6	10	NC	1	NC	1
286			min	0	2	-.005	3	-.002	3	-9.156e-4	4	NC	1	1931.436	5
287		11	max	0	9	.002	2	.026	5	-1.815e-6	10	NC	1	NC	1
288			min	0	2	-.006	3	-.002	3	-9.654e-4	4	NC	1	1736.797	5
289		12	max	0	9	.002	2	.029	5	-1.947e-6	10	NC	1	NC	1
290			min	0	2	-.006	3	-.002	3	-1.015e-3	4	NC	1	1578.494	5
291		13	max	0	9	.003	2	.032	5	-2.079e-6	10	NC	1	NC	1
292			min	0	2	-.006	3	-.002	3	-1.065e-3	4	NC	1	1447.049	5
293		14	max	0	9	.003	2	.034	5	-2.212e-6	10	NC	1	NC	1
294			min	0	2	-.006	3	-.002	3	-1.115e-3	4	NC	1	1335.899	5
295		15	max	0	9	.004	2	.037	5	-2.344e-6	10	NC	1	NC	1
296			min	0	2	-.007	3	-.002	3	-1.165e-3	4	NC	1	1240.359	5
297		16	max	0	9	.005	2	.04	5	-2.476e-6	10	NC	1	NC	1
298			min	0	2	-.007	3	-.002	1	-1.215e-3	4	9230.757	2	1156.991	5
299		17	max	0	9	.006	2	.042	5	-2.608e-6	10	NC	1	NC	1
300			min	0	2	-.007	3	-.003	1	-1.264e-3	4	7835.722	2	1083.222	5
301		18	max	0	9	.007	2	.045	5	-2.741e-6	10	NC	3	NC	1
302			min	0	2	-.006	3	-.003	1	-1.314e-3	4	6766.879	2	1017.086	5
303		19	max	0	9	.008	2	.048	5	-2.873e-6	10	NC	3	NC	1
304			min	0	2	-.006	3	-.003	1	-1.364e-3	4	5938.178	2	957.069	5
305	M12	1	max	.002	1	.006	2	.003	1	2.846e-3	4	NC	1	NC	2
306			min	0	3	-.005	3	-.053	5	2.593e-6	10	NC	1	366.538	5
307		2	max	.002	1	.006	2	.002	1	2.846e-3	4	NC	1	NC	2
308			min	0	3	-.005	3	-.048	5	2.593e-6	10	NC	1	399.534	5
309		3	max	.002	1	.005	2	.002	1	2.846e-3	4	NC	1	NC	2
310			min	0	3	-.004	3	-.044	5	2.593e-6	10	NC	1	438.802	5
311		4	max	.001	1	.005	2	.002	1	2.846e-3	4	NC	1	NC	1
312			min	0	3	-.004	3	-.04	5	2.593e-6	10	NC	1	485.992	5
313		5	max	.001	1	.005	2	.002	1	2.846e-3	4	NC	1	NC	1
314			min	0	3	-.004	3	-.036	5	2.593e-6	10	NC	1	543.355	5
315		6	max	.001	1	.004	2	.001	1	2.846e-3	4	NC	1	NC	1
316			min	0	3	-.003	3	-.031	5	2.593e-6	10	NC	1	614.019	5
317		7	max	.001	1	.004	2	.001	1	2.846e-3	4	NC	1	NC	1
318			min	0	3	-.003	3	-.028	5	2.593e-6	10	NC	1	702.44	5
319		8	max	.001	1	.004	2	.001	1	2.846e-3	4	NC	1	NC	1
320			min	0	3	-.003	3	-.024	5	2.593e-6	10	NC	1	815.141	5
321		9	max	0	1	.003	2	0	1	2.846e-3	4	NC	1	NC	1
322			min	0	3	-.003	3	-.02	5	2.593e-6	10	NC	1	961.989	5
323		10	max	0	1	.003	2	0	1	2.846e-3	4	NC	1	NC	1
324			min	0	3	-.002	3	-.017	5	2.593e-6	10	NC	1	1158.492	5
325		11	max	0	1	.003	2	0	1	2.846e-3	4	NC	1	NC	1
326			min	0	3	-.002	3	-.014	5	2.593e-6	10	NC	1	1430.193	5
327		12	max	0	1	.002	2	0	1	2.846e-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	-.011	5	2.593e-6	10	NC	1	1821.641	5
329		13	max	0	1	.002	2	0	1	2.846e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.008	5	2.593e-6	10	NC	1	2416.397	5
331		14	max	0	1	.002	2	0	1	2.846e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.006	5	2.593e-6	10	NC	1	3386.81	5
333		15	max	0	1	.001	2	0	1	2.846e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.004	5	2.593e-6	10	NC	1	5137.769	5
335		16	max	0	1	.001	2	0	1	2.846e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.002	5	2.593e-6	10	NC	1	8820.212	5
337		17	max	0	1	0	2	0	1	2.846e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.001	5	2.593e-6	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	2.846e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	2.593e-6	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	2.846e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	2.593e-6	10	NC	1	NC	1
343	M1	1	max	.004	3	.021	3	.005	5	8.312e-3	1	NC	1	NC	1
344			min	-.005	2	-.019	1	0	1	-1.009e-2	3	NC	1	NC	1
345		2	max	.004	3	.011	3	.007	5	4.053e-3	1	NC	4	NC	1
346			min	-.005	2	-.01	1	-.002	1	-4.968e-3	3	5122.109	3	NC	1
347		3	max	.004	3	.002	3	.01	5	1.943e-4	5	NC	4	NC	1
348			min	-.005	2	-.002	1	-.003	1	-1.265e-4	1	2659.86	3	9993.366	5
349		4	max	.004	3	.006	2	.012	5	1.873e-4	5	NC	4	NC	1
350			min	-.005	2	-.005	3	-.003	1	-1.022e-4	1	1884.142	1	6294.748	5
351		5	max	.004	3	.012	2	.015	5	1.803e-4	5	NC	4	NC	1
352			min	-.005	2	-.011	3	-.003	1	-7.791e-5	1	1503.421	2	4497.945	5
353		6	max	.004	3	.017	2	.018	5	1.732e-4	5	NC	4	NC	1
354			min	-.005	2	-.016	3	-.003	1	-5.361e-5	1	1281.902	2	3452.202	5
355		7	max	.004	3	.021	2	.022	5	1.662e-4	5	NC	5	NC	1
356			min	-.005	2	-.019	3	-.003	1	-2.93e-5	1	1145.881	2	2776.777	5
357		8	max	.004	3	.024	2	.025	5	1.592e-4	5	NC	5	NC	1
358			min	-.005	2	-.022	3	-.002	1	-1.195e-5	9	1061.25	2	2309.717	5
359		9	max	.004	3	.026	2	.029	5	1.551e-4	4	NC	5	NC	1
360			min	-.005	2	-.023	3	-.002	1	1.02e-6	10	1011.944	2	1965.934	4
361		10	max	.004	3	.027	2	.032	4	1.534e-4	4	NC	5	NC	1
362			min	-.005	2	-.023	3	0	1	1.302e-6	10	990.355	2	1700.479	4
363		11	max	.004	3	.026	2	.036	4	1.517e-4	4	NC	5	NC	1
364			min	-.005	2	-.022	3	0	9	1.583e-6	10	993.826	2	1497.669	4
365		12	max	.004	3	.025	2	.04	4	1.5e-4	4	NC	5	NC	1
366			min	-.005	2	-.02	3	0	10	1.864e-6	10	1023.64	2	1339.344	4
367		13	max	.004	3	.022	2	.043	4	1.484e-4	4	NC	5	NC	1
368			min	-.005	2	-.018	3	0	10	2.146e-6	10	1085.661	2	1213.681	4
369		14	max	.004	3	.018	2	.047	4	1.467e-4	4	NC	4	NC	1
370			min	-.005	2	-.014	3	0	10	2.427e-6	10	1193.239	2	1112.691	4
371		15	max	.004	3	.012	2	.05	4	1.651e-4	1	NC	4	NC	1
372			min	-.005	2	-.01	3	0	10	2.709e-6	10	1375.456	2	1030.825	4
373		16	max	.005	3	.005	2	.053	4	3.188e-4	4	NC	4	NC	1
374			min	-.005	2	-.004	3	0	10	2.939e-6	10	1702.666	2	964.128	4
375		17	max	.005	3	.002	3	.056	4	4.666e-3	4	NC	4	NC	1
376			min	-.006	2	-.003	2	0	10	1.945e-6	10	2393.406	2	909.779	4
377		18	max	.005	3	.008	3	.059	4	5.173e-3	2	NC	4	NC	1
378			min	-.005	2	-.013	2	0	10	-2.531e-3	3	4623.872	2	865.535	4
379		19	max	.005	3	.015	3	.061	4	1.042e-2	2	NC	1	NC	1
380			min	-.005	2	-.023	2	0	1	-5.146e-3	3	NC	1	830.737	4
381	M5	1	max	.014	3	.066	3	.005	5	8.041e-6	4	NC	1	NC	1
382			min	-.018	2	-.062	1	0	1	0	1	NC	1	NC	1
383		2	max	.014	3	.036	3	.007	5	9.064e-5	5	NC	4	NC	1
384			min	-.018	2	-.033	1	0	1	-1.977e-5	1	1577.388	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	.008	3	.009	5	1.719e-4	5	NC	5	NC	1
386			min	-.018	2	-.005	1	0	1	-3.916e-5	1	812.841	1	NC	1
387		4	max	.014	3	.019	2	.012	5	1.789e-4	5	NC	5	NC	1
388			min	-.018	2	-.016	3	0	1	-3.646e-5	1	573.227	1	NC	1
389		5	max	.014	3	.039	2	.016	5	1.859e-4	5	NC	5	NC	1
390			min	-.018	2	-.035	3	0	1	-3.425e-5	9	457.905	1	NC	1
391		6	max	.014	3	.055	2	.019	5	1.929e-4	5	NC	5	NC	1
392			min	-.018	2	-.05	3	0	1	-3.207e-5	9	392.563	1	NC	1
393		7	max	.014	3	.069	2	.023	5	1.999e-4	5	NC	5	NC	1
394			min	-.018	2	-.061	3	0	1	-2.988e-5	9	352.324	2	NC	1
395		8	max	.014	3	.078	2	.027	5	2.069e-4	5	NC	5	NC	1
396			min	-.018	2	-.069	3	0	1	-2.77e-5	9	326.181	2	NC	1
397		9	max	.014	3	.085	2	.03	4	2.138e-4	5	NC	5	NC	1
398			min	-.018	2	-.073	3	0	1	-2.551e-5	9	310.93	2	NC	1
399		10	max	.014	3	.087	2	.034	4	2.208e-4	5	NC	5	NC	1
400			min	-.018	2	-.073	3	0	1	-2.333e-5	9	304.221	2	NC	1
401		11	max	.014	3	.086	2	.038	4	2.278e-4	5	NC	5	NC	1
402			min	-.018	2	-.07	3	0	1	-2.114e-5	9	305.232	2	NC	1
403		12	max	.014	3	.08	2	.042	4	2.348e-4	5	NC	5	NC	1
404			min	-.018	2	-.065	3	0	1	-1.896e-5	9	314.352	2	NC	1
405		13	max	.014	3	.071	2	.045	4	2.418e-4	5	NC	5	NC	1
406			min	-.018	2	-.056	3	0	1	-1.677e-5	9	333.382	2	NC	1
407		14	max	.014	3	.057	2	.049	4	2.488e-4	5	NC	5	NC	1
408			min	-.018	2	-.044	3	0	1	-1.459e-5	9	366.429	2	NC	1
409		15	max	.014	3	.039	2	.052	4	2.562e-4	4	NC	5	NC	1
410			min	-.018	2	-.03	3	0	1	-1.24e-5	9	422.442	2	NC	1
411		16	max	.014	3	.017	2	.055	4	4.364e-4	4	NC	5	NC	1
412			min	-.018	2	-.014	3	0	1	-1.124e-5	9	523.089	2	NC	1
413		17	max	.014	3	.005	3	.057	4	4.714e-3	4	NC	5	NC	1
414			min	-.018	2	-.01	2	0	1	-3.846e-5	1	735.861	2	NC	1
415		18	max	.014	3	.026	3	.059	4	2.421e-3	4	NC	4	NC	1
416			min	-.018	2	-.041	2	0	1	-1.976e-5	1	1422.24	2	NC	1
417		19	max	.014	3	.049	3	.061	4	3.48e-6	5	NC	1	NC	1
418			min	-.018	2	-.075	2	0	1	-3.32e-7	3	NC	1	NC	1
419	M9	1	max	.005	3	.02	3	.004	5	1.01e-2	3	NC	1	NC	1
420			min	-.005	2	-.019	1	-.001	1	-8.312e-3	1	NC	1	NC	1
421		2	max	.005	3	.011	3	.004	5	5.017e-3	3	NC	4	NC	1
422			min	-.005	2	-.01	1	0	9	-4.098e-3	1	5124.207	3	NC	1
423		3	max	.004	3	.002	3	.004	4	3.737e-5	1	NC	4	NC	1
424			min	-.005	2	-.002	1	0	3	-3.524e-5	5	2660.98	3	NC	1
425		4	max	.005	3	.006	2	.005	4	1.974e-5	3	NC	4	NC	1
426			min	-.005	2	-.005	3	-.001	3	-5.203e-5	5	1885.39	1	NC	1
427		5	max	.005	3	.012	2	.006	4	1.079e-5	2	NC	4	NC	1
428			min	-.005	2	-.011	3	-.002	3	-7.205e-5	4	1503.718	2	NC	1
429		6	max	.005	3	.017	2	.008	4	4.546e-6	2	NC	4	NC	1
430			min	-.005	2	-.016	3	-.002	3	-9.274e-5	4	1282.168	2	NC	1
431		7	max	.005	3	.021	2	.011	4	-3.2e-7	10	NC	5	NC	1
432			min	-.005	2	-.019	3	-.003	3	-1.134e-4	4	1146.129	2	6640.443	4
433		8	max	.005	3	.024	2	.014	4	-6.093e-7	10	NC	5	NC	1
434			min	-.005	2	-.022	3	-.003	3	-1.341e-4	4	1061.49	2	4610.767	4
435		9	max	.005	3	.026	2	.017	4	-8.987e-7	10	NC	5	NC	1
436			min	-.005	2	-.023	3	-.003	3	-1.548e-4	4	1012.182	2	3428.712	4
437		10	max	.005	3	.027	2	.021	5	-1.188e-6	10	NC	5	NC	1
438			min	-.005	2	-.023	3	-.003	3	-1.755e-4	4	990.596	2	2676.895	4
439		11	max	.005	3	.026	2	.026	5	-1.477e-6	10	NC	5	NC	1
440			min	-.005	2	-.022	3	-.003	3	-1.962e-4	4	994.075	2	2167.787	4
441		12	max	.005	3	.025	2	.03	5	-1.767e-6	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	-.003	3	-2.169e-4	4	1023.904	2	1806.524	4
443		13	max	.005	3	.022	2	.035	5	-2.056e-6	10	NC	5	NC	1
444			min	-.005	2	-.018	3	-.003	3	-2.376e-4	4	1085.947	2	1540.324	5
445		14	max	.005	3	.018	2	.039	5	-2.345e-6	10	NC	5	NC	1
446			min	-.005	2	-.014	3	-.003	1	-2.582e-4	4	1193.56	2	1337.555	5
447		15	max	.005	3	.012	2	.044	5	-2.635e-6	10	NC	4	NC	1
448			min	-.005	2	-.01	3	-.003	1	-2.789e-4	4	1375.828	2	1182.3	5
449		16	max	.005	3	.005	2	.048	5	-2.879e-6	10	NC	4	NC	1
450			min	-.005	2	-.004	3	-.003	1	-2.211e-4	1	1703.122	2	1061.26	5
451		17	max	.005	3	.002	3	.053	5	4.542e-3	4	NC	4	NC	1
452			min	-.005	2	-.003	2	-.003	1	-1.348e-4	1	2393.997	2	963.084	4
453		18	max	.005	3	.008	3	.057	4	2.54e-3	3	NC	4	NC	1
454			min	-.005	2	-.013	2	-.002	1	-5.174e-3	2	4624.976	2	883.327	4
455		19	max	.005	3	.015	3	.061	4	5.145e-3	3	NC	1	NC	1
456			min	-.005	2	-.023	2	0	1	-1.042e-2	2	NC	1	818.86	4
457	M13	1	max	.001	1	.02	3	.005	3	3.561e-3	3	NC	1	NC	1
458			min	-.004	5	-.019	1	-.005	2	-3.382e-3	1	NC	1	NC	1
459		2	max	.001	1	.079	3	.003	9	4.435e-3	3	NC	4	NC	1
460			min	-.004	5	-.067	1	-.004	2	-4.238e-3	1	1844.397	3	NC	1
461		3	max	.001	1	.128	3	.008	1	5.31e-3	3	NC	5	NC	2
462			min	-.004	5	-.108	1	-.003	10	-5.093e-3	1	1007.242	3	9085.601	1
463		4	max	0	1	.16	3	.013	1	6.184e-3	3	NC	5	NC	2
464			min	-.004	5	-.134	1	-.004	5	-5.949e-3	1	775.318	3	6459.384	1
465		5	max	0	1	.172	3	.015	1	7.058e-3	3	NC	5	NC	2
466			min	-.004	5	-.145	1	-.005	5	-6.804e-3	1	712.655	3	5946.37	1
467		6	max	0	1	.165	3	.012	1	7.933e-3	3	NC	5	NC	2
468			min	-.004	5	-.14	1	-.006	5	-7.66e-3	1	748.914	3	6934.703	1
469		7	max	0	1	.141	3	.008	9	8.807e-3	3	NC	5	NC	1
470			min	-.005	5	-.122	1	-.008	2	-8.516e-3	1	892.567	3	NC	1
471		8	max	0	1	.109	3	.01	3	9.682e-3	3	NC	5	NC	1
472			min	-.005	5	-.097	1	-.013	2	-9.371e-3	1	1212.069	3	NC	1
473		9	max	0	1	.08	3	.012	3	1.056e-2	3	NC	4	NC	1
474			min	-.005	5	-.073	1	-.016	2	-1.023e-2	1	1824.893	3	9819.622	2
475		10	max	0	1	.066	3	.014	3	1.143e-2	3	NC	4	NC	1
476			min	-.005	5	-.062	1	-.018	2	-1.108e-2	1	2380.706	3	8548.057	2
477		11	max	0	1	.08	3	.015	3	1.056e-2	3	NC	4	NC	1
478			min	-.005	5	-.073	1	-.016	2	-1.023e-2	1	1824.892	3	9819.681	2
479		12	max	0	1	.11	3	.015	3	9.683e-3	3	NC	5	NC	1
480			min	-.005	5	-.097	1	-.013	2	-9.372e-3	1	1212.069	3	9844.212	3
481		13	max	0	1	.141	3	.015	3	8.81e-3	3	NC	5	NC	1
482			min	-.005	5	-.122	1	-.008	2	-8.516e-3	1	892.567	3	NC	1
483		14	max	0	1	.165	3	.014	3	7.936e-3	3	NC	5	NC	2
484			min	-.005	5	-.14	1	-.005	10	-7.661e-3	1	748.914	3	6927.21	1
485		15	max	0	1	.172	3	.015	1	7.063e-3	3	NC	5	NC	2
486			min	-.005	5	-.145	1	-.004	10	-6.806e-3	1	712.654	3	5950.048	1
487		16	max	0	1	.16	3	.013	1	6.189e-3	3	NC	5	NC	2
488			min	-.005	5	-.134	1	-.004	10	-5.95e-3	1	775.317	3	6473.076	1
489		17	max	0	1	.128	3	.008	1	5.315e-3	3	NC	5	NC	2
490			min	-.005	5	-.108	1	-.003	5	-5.095e-3	1	1007.242	3	9121.788	1
491		18	max	0	1	.079	3	.006	3	4.442e-3	3	NC	4	NC	1
492			min	-.005	5	-.067	1	-.004	2	-4.239e-3	1	1844.397	3	NC	1
493		19	max	0	1	.021	3	.004	3	3.568e-3	3	NC	1	NC	1
494			min	-.005	5	-.019	1	-.005	2	-3.384e-3	1	NC	1	NC	1
495	M16	1	max	0	1	.015	3	.005	3	3.94e-3	2	NC	1	NC	1
496			min	-.061	4	-.023	2	-.005	2	-2.676e-3	3	NC	1	NC	1
497		2	max	0	1	.045	3	.007	4	4.926e-3	2	NC	4	NC	1
498			min	-.061	4	-.084	2	-.004	2	-3.318e-3	3	1786.87	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	1	.07	3	.012	4	5.913e-3	2	NC	5	NC	2
500			min	-.061	4	-.134	2	-.003	10	-3.959e-3	3	974.552	2	8974.156	4
501		4	max	0	1	.088	3	.013	14	6.899e-3	2	NC	5	NC	2
502			min	-.061	4	-.167	2	-.004	10	-4.601e-3	3	748.406	2	6523.256	1
503		5	max	0	1	.095	3	.014	1	7.886e-3	2	NC	5	NC	2
504			min	-.061	4	-.181	2	-.004	10	-5.243e-3	3	685.303	2	6020.568	1
505		6	max	0	1	.093	3	.013	3	8.872e-3	2	NC	5	NC	2
506			min	-.061	4	-.174	2	-.006	10	-5.884e-3	3	715.694	2	7062.316	1
507		7	max	0	1	.083	3	.014	3	9.858e-3	2	NC	5	NC	1
508			min	-.061	4	-.151	2	-.009	2	-6.526e-3	3	843.913	2	NC	1
509		8	max	0	1	.069	3	.015	3	1.084e-2	2	NC	5	NC	1
510			min	-.061	4	-.119	2	-.013	2	-7.167e-3	3	1124.039	2	NC	1
511		9	max	0	1	.055	3	.014	3	1.183e-2	2	NC	4	NC	1
512			min	-.061	4	-.089	2	-.017	2	-7.809e-3	3	1635.925	2	9606.903	2
513		10	max	0	1	.049	3	.014	3	1.282e-2	2	NC	4	NC	1
514			min	-.061	4	-.075	2	-.018	2	-8.451e-3	3	2072.857	2	8382.804	2
515		11	max	0	1	.055	3	.013	3	1.183e-2	2	NC	4	NC	1
516			min	-.061	4	-.089	2	-.017	2	-7.808e-3	3	1635.925	2	9606.944	2
517		12	max	0	1	.069	3	.012	3	1.085e-2	2	NC	5	NC	1
518			min	-.061	4	-.119	2	-.013	2	-7.166e-3	3	1124.039	2	NC	1
519		13	max	0	1	.083	3	.011	3	9.859e-3	2	NC	5	NC	1
520			min	-.061	4	-.151	2	-.009	2	-6.524e-3	3	843.913	2	NC	1
521		14	max	0	1	.093	3	.012	1	8.873e-3	2	NC	5	NC	2
522			min	-.061	4	-.174	2	-.006	10	-5.881e-3	3	715.694	2	7071.903	1
523		15	max	0	1	.095	3	.014	1	7.886e-3	2	NC	5	NC	2
524			min	-.061	4	-.181	2	-.004	10	-5.239e-3	3	685.303	2	6037.655	1
525		16	max	0	1	.088	3	.013	1	6.9e-3	2	NC	5	NC	2
526			min	-.061	4	-.167	2	-.004	5	-4.597e-3	3	748.406	2	6552.035	1
527		17	max	0	1	.07	3	.008	1	5.914e-3	2	NC	5	NC	2
528			min	-.061	4	-.134	2	-.005	5	-3.954e-3	3	974.552	2	9226.731	1
529		18	max	0	1	.045	3	.005	3	4.928e-3	2	NC	4	NC	1
530			min	-.061	4	-.084	2	-.004	2	-3.312e-3	3	1786.87	2	NC	1
531		19	max	0	1	.015	3	.005	3	3.941e-3	2	NC	1	NC	1
532			min	-.061	4	-.023	2	-.005	2	-2.67e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.082e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-4.408e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.004	4	7.592e-4	3	NC	1	NC	1
536			min	0	4	-.002	1	0	3	-5.035e-4	2	NC	1	NC	1
537		3	max	0	3	0	5	.008	4	1.21e-3	3	NC	1	NC	1
538			min	0	4	-.005	1	-.003	3	-9.612e-4	2	NC	1	7995.282	4
539		4	max	0	3	0	5	.012	4	1.661e-3	3	NC	3	NC	9
540			min	-.001	4	-.007	1	-.006	3	-1.431e-3	1	9160.505	2	5326.013	4
541		5	max	0	3	0	5	.015	4	2.112e-3	3	NC	5	NC	9
542			min	-.002	4	-.009	1	-.01	3	-1.905e-3	1	7148.035	2	4094.136	4
543		6	max	0	3	.001	5	.018	4	2.563e-3	3	NC	5	8574.048	9
544			min	-.002	4	-.011	1	-.014	3	-2.378e-3	1	6015.827	2	3403.558	3
545		7	max	0	3	.001	5	.02	4	3.014e-3	3	NC	5	6688.496	9
546			min	-.003	4	-.012	1	-.018	3	-2.852e-3	1	5334.953	2	2649.076	3
547		8	max	0	3	.001	5	.021	4	3.465e-3	3	NC	5	5505.9	9
548			min	-.003	4	-.013	1	-.022	3	-3.325e-3	1	4926.327	2	2176.954	3
549		9	max	0	3	.002	5	.025	1	3.916e-3	3	NC	5	5280.609	15
550			min	-.004	4	-.014	1	-.026	3	-3.798e-3	1	4706.379	2	1868.896	3
551		10	max	0	3	.002	5	.028	1	4.367e-3	3	NC	5	5632.117	15
552			min	-.004	4	-.014	1	-.029	3	-4.272e-3	1	4636.799	2	1665.813	3
553		11	max	0	3	.002	5	.03	1	4.818e-3	3	NC	5	6355.921	15
554			min	-.005	4	-.014	1	-.032	3	-4.745e-3	1	4706.379	2	1536.766	3
555		12	max	0	3	.002	5	.031	1	5.269e-3	3	NC	5	7679.535	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	-.005	4	-.013	1	-.033	3	-5.219e-3	1	4926.327	2	1466.344	3
557		13	max	0	3	.003	5	.03	1	5.72e-3	3	NC	5	NC	15
558			min	-.006	4	-.012	1	-.032	3	-5.692e-3	1	5334.953	2	1449.857	3
559		14	max	0	3	.003	5	.028	1	6.171e-3	3	NC	5	NC	5
560			min	-.006	4	-.011	1	-.03	3	-6.165e-3	1	6015.827	2	1493.326	3
561		15	max	0	3	.003	5	.025	1	6.622e-3	3	NC	5	NC	5
562			min	-.007	4	-.01	1	-.026	3	-6.639e-3	1	7148.035	2	1619.694	3
563		16	max	0	3	.003	5	.019	1	7.073e-3	3	NC	3	NC	4
564			min	-.007	4	-.008	1	-.02	3	-7.112e-3	1	9160.505	2	1891.611	3
565		17	max	0	3	.004	5	.01	1	7.524e-3	3	NC	1	NC	4
566			min	-.008	4	-.006	1	-.011	3	-7.586e-3	1	NC	1	2505.907	3
567		18	max	0	3	.004	5	.001	9	7.975e-3	3	NC	1	NC	4
568			min	-.008	4	-.004	9	-.005	2	-8.059e-3	1	NC	1	4458.592	3
569		19	max	0	3	.004	5	.016	3	8.426e-3	3	NC	1	NC	1
570			min	-.009	4	-.002	9	-.018	2	-8.532e-3	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	2.497e-3	3	NC	1	NC	1
572			min	-.003	4	-.002	4	-.006	2	-2.516e-3	2	NC	1	NC	1
573		2	max	0	10	0	12	.001	9	2.388e-3	3	NC	1	NC	1
574			min	-.003	4	-.006	4	-.001	5	-2.398e-3	2	NC	1	NC	1
575		3	max	0	10	-.002	12	.005	1	2.28e-3	3	NC	1	NC	4
576			min	-.002	4	-.01	4	-.004	3	-2.28e-3	2	7703.344	4	7107.235	3
577		4	max	0	10	-.003	12	.008	1	2.172e-3	3	NC	3	NC	4
578			min	-.002	4	-.014	4	-.007	3	-2.162e-3	2	5284.944	4	5396.648	3
579		5	max	0	10	-.004	12	.009	1	2.063e-3	3	NC	12	NC	9
580			min	-.002	4	-.017	4	-.01	5	-2.044e-3	2	4123.895	4	4651.95	3
581		6	max	0	10	-.005	12	.011	1	1.955e-3	3	NC	12	NC	10
582			min	-.002	4	-.02	4	-.014	5	-1.926e-3	2	3470.694	4	4322.14	3
583		7	max	0	10	-.006	12	.011	1	1.847e-3	3	NC	12	NC	10
584			min	-.002	4	-.022	4	-.017	5	-1.808e-3	2	3077.879	4	3743.361	5
585		8	max	0	10	-.006	12	.011	1	1.738e-3	3	9852.653	12	NC	10
586			min	-.002	4	-.023	4	-.02	5	-1.69e-3	2	2842.131	4	3140.171	5
587		9	max	0	10	-.006	12	.01	1	1.63e-3	3	9412.759	12	NC	9
588			min	-.002	4	-.024	4	-.023	5	-1.573e-3	2	2715.238	4	2786.033	5
589		10	max	0	10	-.006	12	.009	1	1.522e-3	3	9273.598	12	NC	9
590			min	-.001	4	-.024	4	-.024	5	-1.455e-3	2	2675.095	4	2592.011	5
591		11	max	0	10	-.006	12	.008	1	1.413e-3	3	9412.759	12	NC	9
592			min	-.001	4	-.024	4	-.025	5	-1.337e-3	2	2715.238	4	2517.781	5
593		12	max	0	10	-.006	12	.007	1	1.305e-3	3	9852.653	12	NC	9
594			min	-.001	4	-.023	4	-.025	5	-1.219e-3	2	2842.131	4	2550.569	5
595		13	max	0	10	-.006	12	.005	1	1.196e-3	3	NC	12	NC	2
596			min	0	4	-.021	4	-.023	5	-1.101e-3	2	3077.879	4	2699.839	5
597		14	max	0	10	-.005	12	.004	1	1.088e-3	3	NC	12	NC	1
598			min	0	4	-.018	4	-.021	5	-9.829e-4	2	3470.694	4	3003.473	5
599		15	max	0	10	-.004	12	.002	1	9.797e-4	3	NC	12	NC	1
600			min	0	4	-.016	4	-.018	5	-8.649e-4	2	4123.895	4	3553.224	5
601		16	max	0	10	-.003	12	.001	1	8.713e-4	3	NC	3	NC	1
602			min	0	4	-.012	4	-.014	5	-7.47e-4	2	5284.944	4	4577.779	5
603		17	max	0	10	-.002	12	0	9	7.63e-4	3	NC	1	NC	1
604			min	0	4	-.008	4	-.009	5	-6.291e-4	2	7703.344	4	6780.912	5
605		18	max	0	10	-.001	12	0	9	7.187e-4	4	NC	1	NC	1
606			min	0	4	-.004	4	-.005	5	-5.111e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	7.789e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.932e-4	2	NC	1	NC	1

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

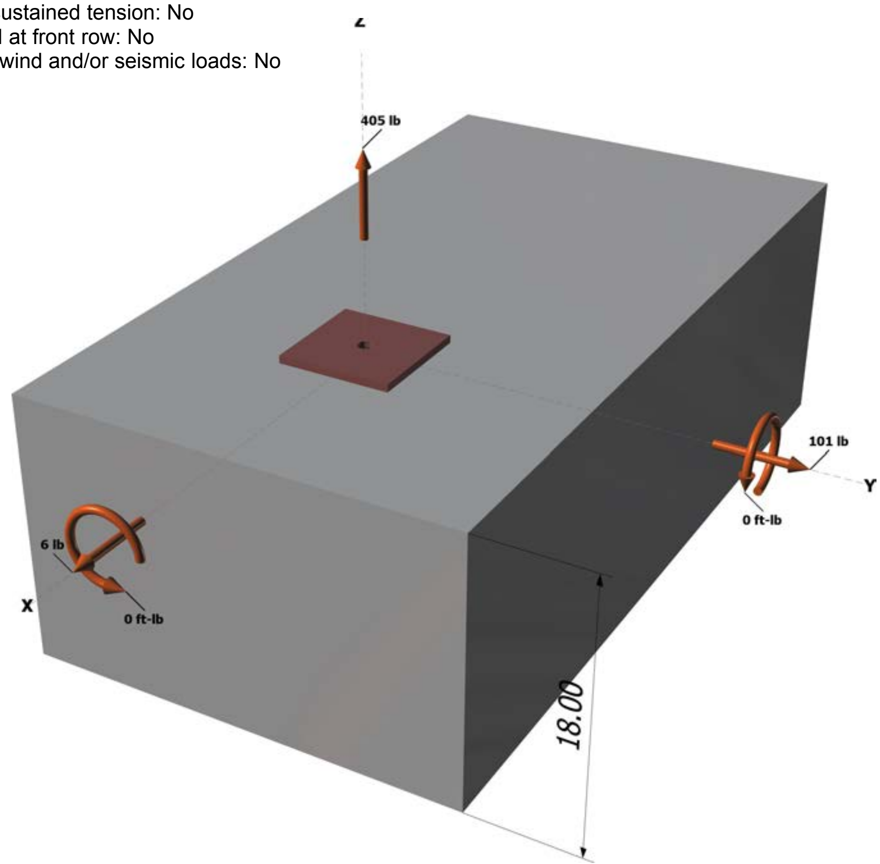
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch): 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): 4.00 x 4.00 x 0.28

<Figure 1>



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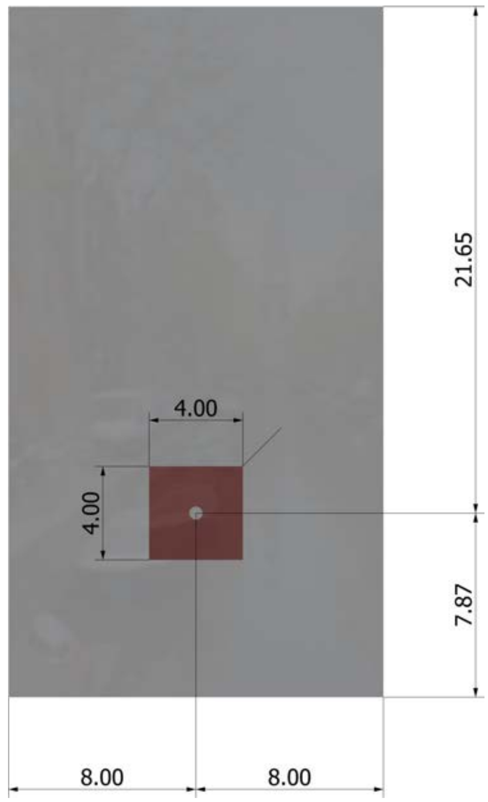


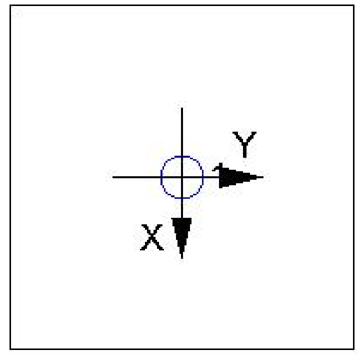
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

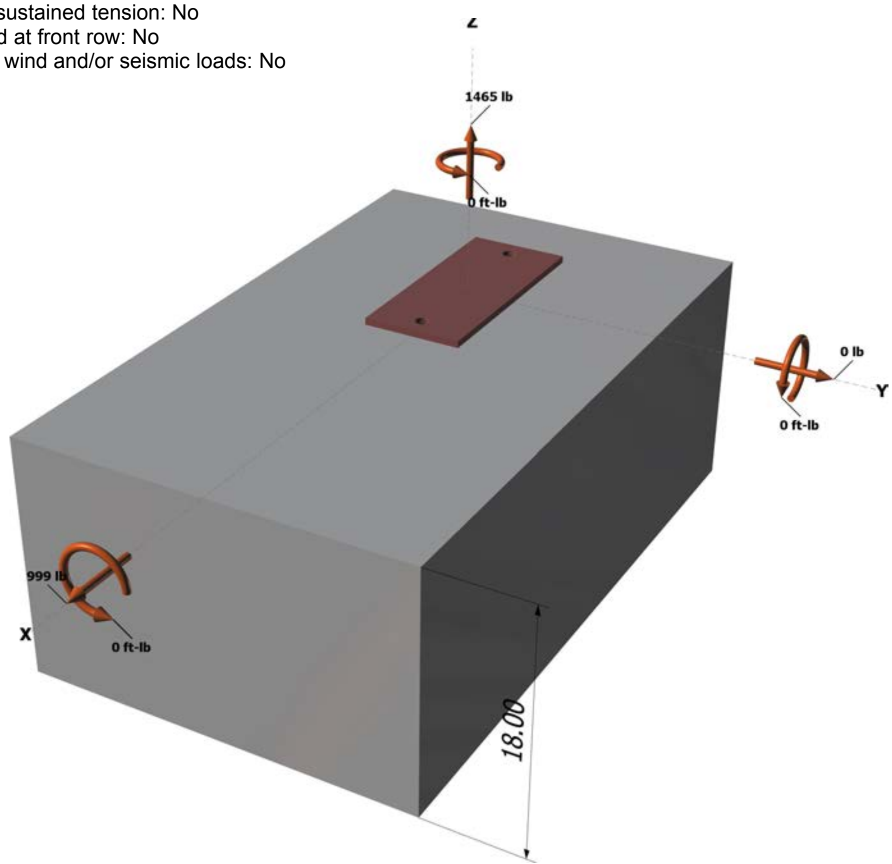
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

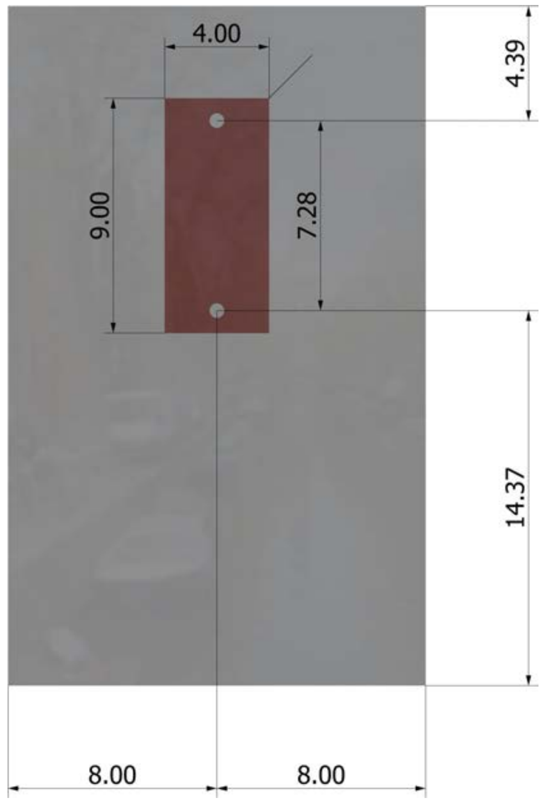
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'$_c$ (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



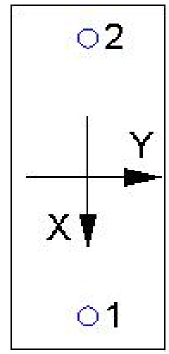
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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