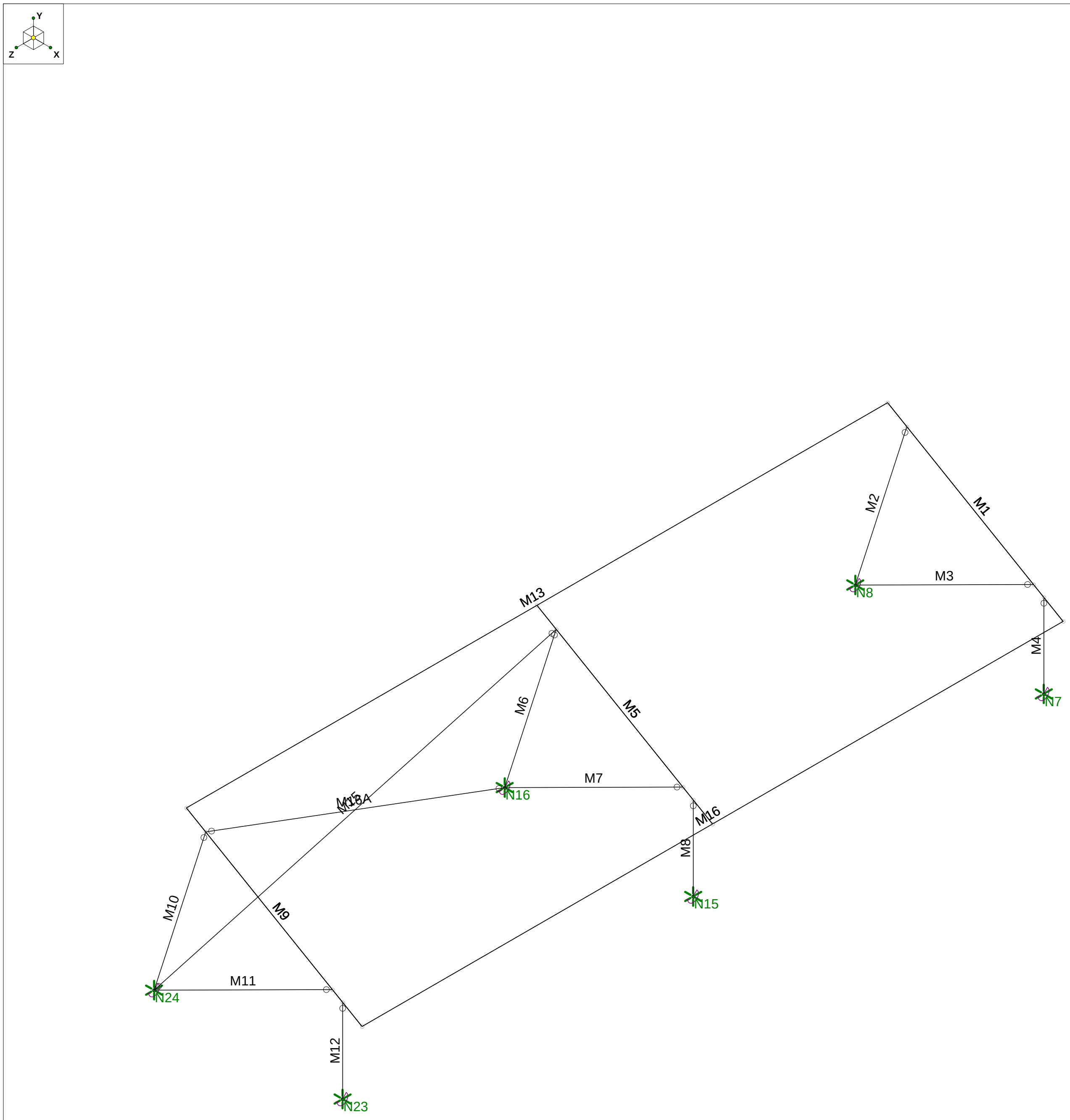


Schletter, Inc.		30ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

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.

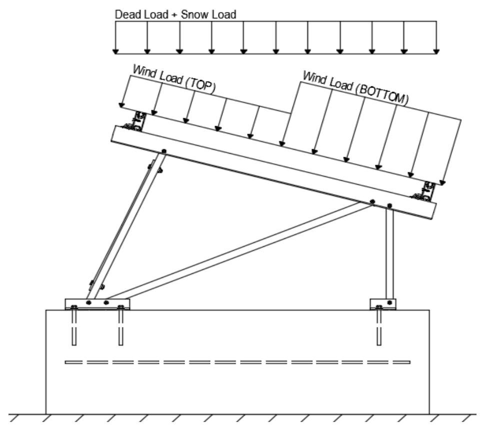
1.2 Construction

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 = 30°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - 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 = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

S_S =	0.00	R =	1.25
S_{DS} =	0.00	C_S =	0
S_1 =	0.00	ρ =	1.3
S_{D1} =	0.00	Ω =	1.25
T_a =	0.00	C_d =	1.25

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

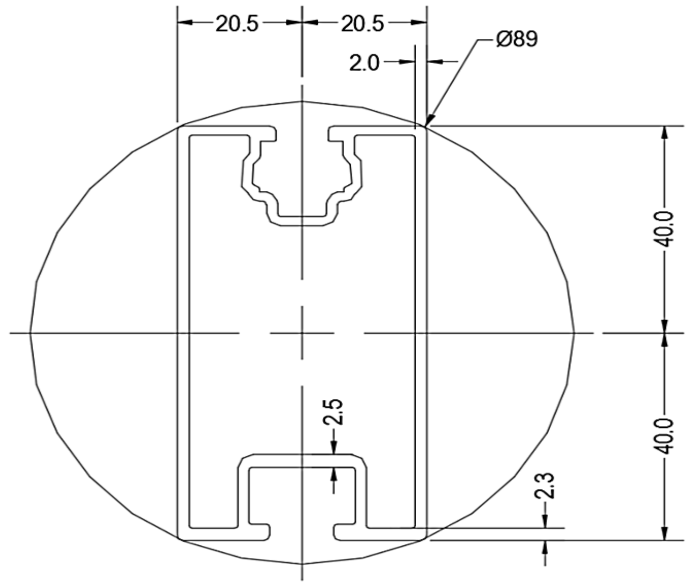
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

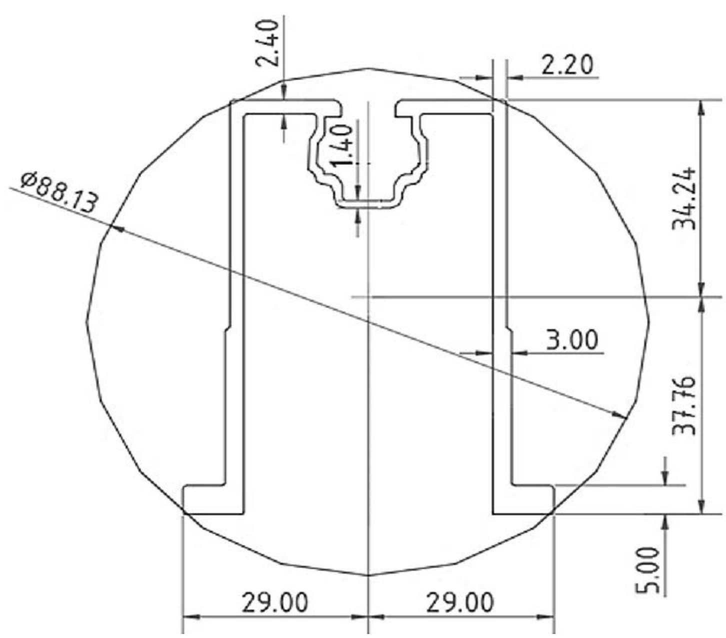
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	93	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.83	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	0.898	k-ft
M_z =	0.236	k-ft
$M_{y\ allowable}$ =	1.791	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	78%	



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).

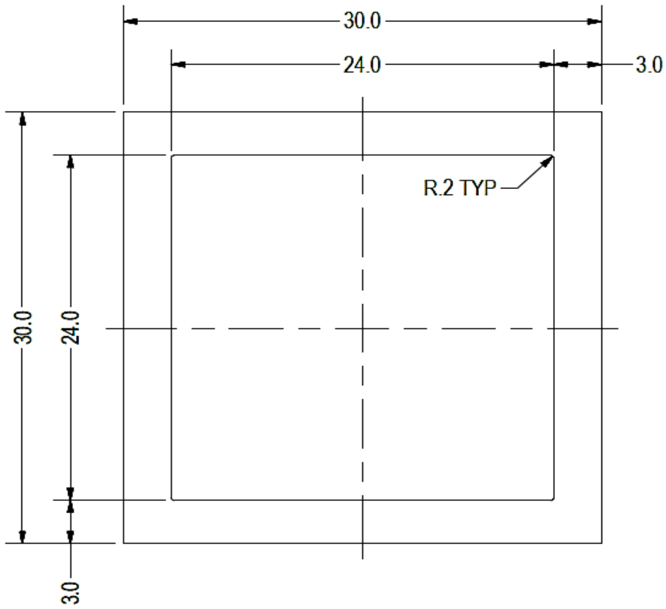
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.82	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.598	k-ft
M_z =	0.000	k-ft
P_n =	0.318	k
$M_{y\ allowable}$ =	1.463	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



4.3 Front Strut Design

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

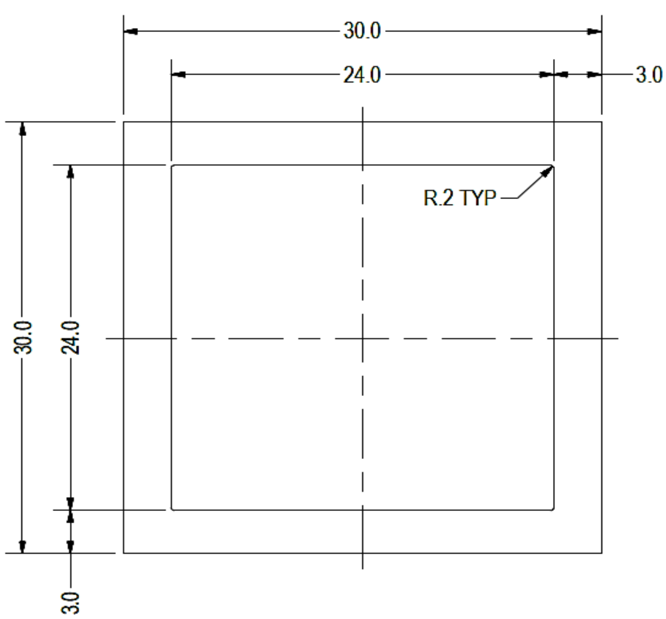
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.203	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	10%	



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).

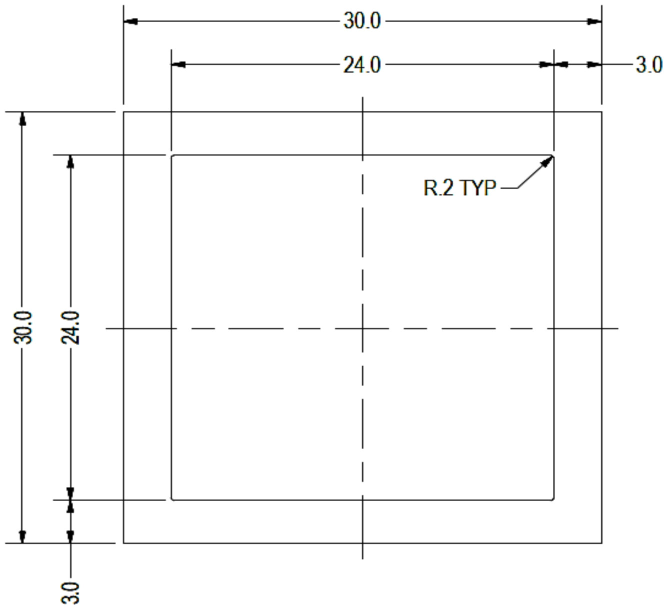
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.634	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	17%	



4.5 Rear Strut Design

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

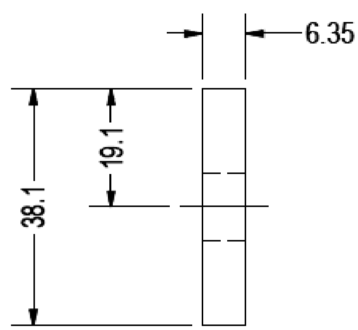
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.008	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	20%	



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 =	0.006	k-ft
P_n =	0.050	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	14%	



A cross brace kit is required every 14 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

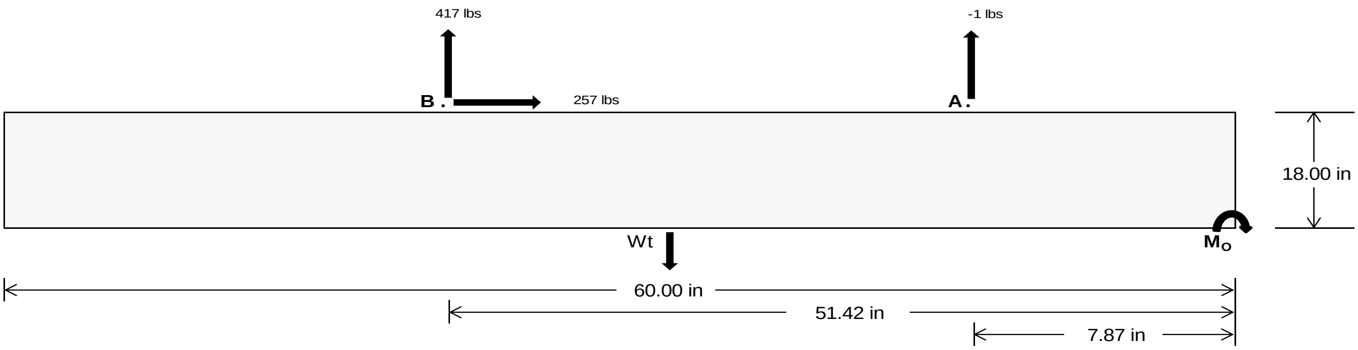
5.1 Helical Pile Foundations

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 =	5.80	1813.67	k
Compressive Load =	1563.90	1380.88	k
Lateral Load =	5.35	1115.69	k
Moment (Weak Axis) =	0.01	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 =	26073.0 in-lbs
Resisting Force Required =	869.10 lbs
S.F. =	1.67
Weight Required =	1448.50 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 =	257.25 lbs
Friction =	0.4
Weight Required =	643.13 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 =	257.25 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	612 lbs	612 lbs	612 lbs	612 lbs	432 lbs	432 lbs	432 lbs	432 lbs	728 lbs	728 lbs	728 lbs	728 lbs	2 lbs	2 lbs	2 lbs	2 lbs
F_B	429 lbs	429 lbs	429 lbs	429 lbs	554 lbs	554 lbs	554 lbs	554 lbs	698 lbs	698 lbs	698 lbs	698 lbs	-834 lbs	-834 lbs	-834 lbs	-834 lbs
F_V	73 lbs	73 lbs	73 lbs	73 lbs	471 lbs	471 lbs	471 lbs	471 lbs	402 lbs	402 lbs	402 lbs	402 lbs	-515 lbs	-515 lbs	-515 lbs	-515 lbs
P_{total}	2944 lbs	3035 lbs	3125 lbs	3216 lbs	2889 lbs	2980 lbs	3071 lbs	3161 lbs	3329 lbs	3419 lbs	3510 lbs	3601 lbs	309 lbs	364 lbs	418 lbs	472 lbs
M	473 lbs-ft	473 lbs-ft	473 lbs-ft	473 lbs-ft	512 lbs-ft	512 lbs-ft	512 lbs-ft	512 lbs-ft	699 lbs-ft	699 lbs-ft	699 lbs-ft	699 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft
e	0.16 ft	0.16 ft	0.15 ft	0.15 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.33 ft	1.98 ft	1.72 ft	1.52 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}	271.6 psf	269.1 psf	266.9 psf	264.8 psf	259.9 psf	258.0 psf	256.3 psf	254.6 psf	284.5 psf	281.5 psf	278.7 psf	276.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	401.4 psf	393.0 psf	385.4 psf	378.4 psf	400.5 psf	392.2 psf	384.6 psf	377.6 psf	476.4 psf	464.6 psf	453.9 psf	444.0 psf	690.8 psf	254.7 psf	187.1 psf	161.4 psf

Maximum Bearing Pressure =	691 psf
Allowable Bearing Pressure =	1500 psf

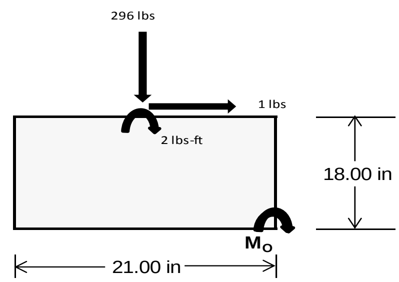
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 255.6 ft-lbs
Resisting Force Required = 292.12 lbs
S.F. = 1.67
Weight Required = 486.87 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	90 lbs	235 lbs	85 lbs	301 lbs	862 lbs	296 lbs	26 lbs	69 lbs	25 lbs
F_V	6 lbs	5 lbs	0 lbs	23 lbs	21 lbs	1 lbs	2 lbs	2 lbs	0 lbs
P_{total}	2446 lbs	2591 lbs	2441 lbs	2544 lbs	3105 lbs	2539 lbs	715 lbs	758 lbs	714 lbs
M	8 lbs-ft	8 lbs-ft	0 lbs-ft	39 lbs-ft	32 lbs-ft	4 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.02 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.74 ft	1.75 ft	1.72 ft	1.73 ft	1.75 ft	1.74 ft	1.74 ft	1.75 ft
f_{min}	276.3 sqft	293.0 sqft	278.8 sqft	275.6 sqft	342.3 sqft	288.7 sqft	80.8 sqft	85.7 sqft	81.5 sqft
f_{max}	282.8 psf	299.2 psf	279.2 psf	306.0 psf	367.4 psf	291.7 psf	82.7 psf	87.5 psf	81.6 psf

Maximum Bearing Pressure = 367 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

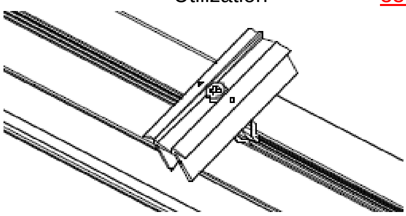
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

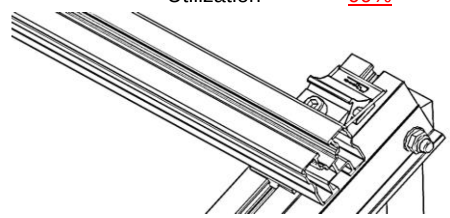
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

Fastening of Modules to Purlins			Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.405 k		Maximum Uplifting Force =	1.107 k
Allowable Uplift =	1.214 k		Allowable Uplift =	1.116 k
Utilization =	33%		Utilization =	99%



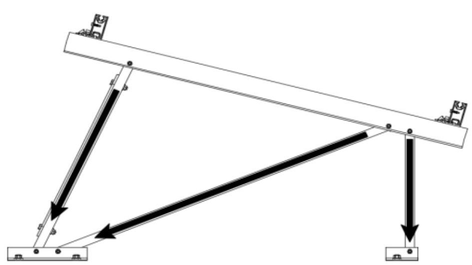


6.2 Bolted Connections

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

Front Strut			Rear Strut	
Maximum Axial Load =	1.203 k		Maximum Axial Load =	1.190 k
M8 Bolt Capacity =	5.692 k		M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k		Strut Bearing Capacity =	7.952 k
Utilization =	21%		Utilization =	21%

Diagonal Strut			Bracing	
Maximum Axial Load =	0.634 k		Maximum Axial Load =	0.050 k
M8 Bolt Shear Capacity =	5.692 k		M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k		Strut Bearing Capacity =	7.952 k
Utilization =	11%		Utilization =	1%



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.

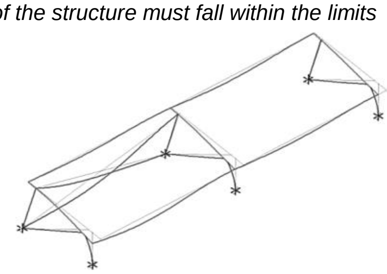
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	32.32 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.646 in
Max Drift, Δ_{MAX} =	0.064 in
N/A	

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 93.00 in

J = 0.427

193.965

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.8 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 93.00 in

J = 0.427

210.771

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.8 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.791 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

<u>Compression</u>

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.36
21.0529

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.8 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.36
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.8 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

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

S2 = 14.7
F_{UT}= (φbk2*√(BpE))/(5.1b/t)
F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7
F_{ST}= φb[Bp-1.6Dp*b/t]
F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.463 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

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 = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in³

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in³

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.68476
r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671
φcc = 0.81587
$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$
$\varphi F_L =$ 10.0603 ksi

3.4.9

b/t = 7.75
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.3 ksi

b/t = 7.75
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 10.06 ksi
A = 323.87 mm^2
0.50 in^2
$P_{max} =$ 5.05 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-60.928	-60.928	0	0
2	M16	y	-98.014	-98.014	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	121.855	121.855	0	0
2	M16	y	58.278	58.278	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																
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	211.957	2	309.139	2	-.004	15	0	15	0	1	0	1
2		min	-268.852	3	-426.451	3	-.203	1	0	3	0	1	0	1
3	N7	max	.005	3	461.498	1	-.087	15	0	15	0	1	0	1
4		min	-.195	2	7.789	12	-1.863	1	-.003	1	0	1	0	1
5	N15	max	.001	12	1202.999	1	.718	1	.001	1	0	1	0	1
6		min	-1.791	2	-4.459	3	-.375	3	0	3	0	1	0	1
7	N16	max	809.496	2	1062.219	2	-.263	10	0	1	0	1	0	1
8		min	-858.225	3	-1395.131	3	-45.169	3	0	3	0	1	0	1
9	N23	max	.005	3	461.125	1	4.115	1	.007	1	0	1	0	1
10		min	-.195	2	8.154	12	.18	15	0	15	0	1	0	1
11	N24	max	212.527	2	313.783	2	45.448	3	.002	1	0	1	0	1
12		min	-268.957	3	-423.752	3	.033	10	0	3	0	1	0	1
13	Totals:	max	1231.8	2	3745.608	1	0	2						
14		min	-1396.031	3	-2229.287	3	0	3						

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	308.661	1	.653	4	.609	1	0	15	0	12	0	1
2			min	-366.727	3	.154	15	-.024	3	-.001	1	0	1	0	1
3		2	max	308.787	1	.602	4	.609	1	0	15	0	15	0	15
4			min	-366.632	3	.142	15	-.024	3	-.001	1	0	1	0	4
5		3	max	308.913	1	.551	4	.609	1	0	15	0	15	0	15
6			min	-366.538	3	.13	15	-.024	3	-.001	1	0	1	0	4
7		4	max	309.039	1	.5	4	.609	1	0	15	0	1	0	15
8			min	-366.444	3	.118	15	-.024	3	-.001	1	0	3	0	4
9		5	max	309.165	1	.449	4	.609	1	0	15	0	1	0	15
10			min	-366.349	3	.106	15	-.024	3	-.001	1	0	3	0	4
11		6	max	309.291	1	.398	4	.609	1	0	15	0	1	0	15
12			min	-366.255	3	.094	15	-.024	3	-.001	1	0	3	0	4
13		7	max	309.416	1	.347	4	.609	1	0	15	0	1	0	15
14			min	-366.16	3	.082	15	-.024	3	-.001	1	0	3	0	4
15		8	max	309.542	1	.295	4	.609	1	0	15	0	1	0	15
16			min	-366.066	3	.07	15	-.024	3	-.001	1	0	3	0	4
17		9	max	309.668	1	.244	4	.609	1	0	15	0	1	0	15
18			min	-365.972	3	.058	15	-.024	3	-.001	1	0	3	0	4
19		10	max	309.794	1	.193	4	.609	1	0	15	0	1	0	15
20			min	-365.877	3	.046	15	-.024	3	-.001	1	0	3	0	4
21		11	max	309.92	1	.142	4	.609	1	0	15	0	1	0	15
22			min	-365.783	3	.033	12	-.024	3	-.001	1	0	3	0	4
23		12	max	310.046	1	.1	2	.609	1	0	15	0	1	0	15
24			min	-365.688	3	.013	12	-.024	3	-.001	1	0	3	0	4
25		13	max	310.172	1	.06	2	.609	1	0	15	.001	1	0	15
26			min	-365.594	3	-.014	3	-.024	3	-.001	1	0	3	0	4
27		14	max	310.297	1	.02	2	.609	1	0	15	.001	1	0	15
28			min	-365.5	3	-.044	3	-.024	3	-.001	1	0	3	0	4
29		15	max	310.423	1	-.014	15	.609	1	0	15	.001	1	0	15
30			min	-365.405	3	-.074	3	-.024	3	-.001	1	0	3	0	4
31		16	max	310.549	1	-.026	15	.609	1	0	15	.001	1	0	15
32			min	-365.311	3	-.114	4	-.024	3	-.001	1	0	3	0	4
33		17	max	310.675	1	-.038	15	.609	1	0	15	.001	1	0	15
34			min	-365.216	3	-.165	4	-.024	3	-.001	1	0	3	0	4
35		18	max	310.801	1	-.05	15	.609	1	0	15	.002	1	0	15
36			min	-365.122	3	-.216	4	-.024	3	-.001	1	0	3	0	4
37		19	max	310.927	1	-.062	15	.609	1	0	15	.002	1	0	15

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
38			min	-365.028	3	-.267	4	-.024	3	-.001	1	0	3	0	4
39	M3	1	max	153.631	2	1.757	4	-.028	15	0	15	.002	1	0	4
40			min	-176.797	3	.413	15	-.676	1	0	1	0	15	0	15
41		2	max	153.561	2	1.58	4	-.028	15	0	15	.002	1	0	2
42			min	-176.849	3	.372	15	-.676	1	0	1	0	15	0	12
43		3	max	153.492	2	1.403	4	-.028	15	0	15	.002	1	0	2
44			min	-176.901	3	.33	15	-.676	1	0	1	0	15	0	3
45		4	max	153.423	2	1.226	4	-.028	15	0	15	.002	1	0	15
46			min	-176.953	3	.289	15	-.676	1	0	1	0	15	0	4
47		5	max	153.353	2	1.05	4	-.028	15	0	15	.002	1	0	15
48			min	-177.005	3	.247	15	-.676	1	0	1	0	15	0	4
49		6	max	153.284	2	.873	4	-.028	15	0	15	.001	1	0	15
50			min	-177.057	3	.205	15	-.676	1	0	1	0	15	0	4
51		7	max	153.215	2	.696	4	-.028	15	0	15	.001	1	0	15
52			min	-177.109	3	.164	15	-.676	1	0	1	0	15	0	4
53		8	max	153.145	2	.519	4	-.028	15	0	15	.001	1	0	15
54			min	-177.161	3	.122	15	-.676	1	0	1	0	15	-.001	4
55		9	max	153.076	2	.342	4	-.028	15	0	15	.001	1	0	15
56			min	-177.213	3	.081	15	-.676	1	0	1	0	15	-.001	4
57		10	max	153.007	2	.165	4	-.028	15	0	15	0	1	0	15
58			min	-177.265	3	.039	15	-.676	1	0	1	0	15	-.001	4
59		11	max	152.937	2	.016	2	-.028	15	0	15	0	1	0	15
60			min	-177.317	3	-.038	3	-.676	1	0	1	0	15	-.001	4
61		12	max	152.868	2	-.044	15	-.028	15	0	15	0	1	0	15
62			min	-177.369	3	-.188	4	-.676	1	0	1	0	15	-.001	4
63		13	max	152.799	2	-.086	15	-.028	15	0	15	0	1	0	15
64			min	-177.421	3	-.365	4	-.676	1	0	1	0	15	-.001	4
65		14	max	152.729	2	-.127	15	-.028	15	0	15	0	1	0	15
66			min	-177.473	3	-.542	4	-.676	1	0	1	0	15	-.001	4
67		15	max	152.66	2	-.169	15	-.028	15	0	15	0	1	0	15
68			min	-177.525	3	-.719	4	-.676	1	0	1	0	12	0	4
69		16	max	152.591	2	-.21	15	-.028	15	0	15	0	1	0	15
70			min	-177.577	3	-.896	4	-.676	1	0	1	0	3	0	4
71		17	max	152.521	2	-.252	15	-.028	15	0	15	0	15	0	15
72			min	-177.629	3	-1.072	4	-.676	1	0	1	0	1	0	4
73		18	max	152.452	2	-.293	15	-.028	15	0	15	0	15	0	15
74			min	-177.681	3	-1.249	4	-.676	1	0	1	0	1	0	4
75		19	max	152.383	2	-.335	15	-.028	15	0	15	0	15	0	1
76			min	-177.733	3	-1.426	4	-.676	1	0	1	0	1	0	1
77	M4	1	max	460.333	1	0	1	-.087	15	0	1	0	3	0	1
78			min	7.207	12	0	1	-2.017	1	0	1	0	1	0	1
79		2	max	460.397	1	0	1	-.087	15	0	1	0	15	0	1
80			min	7.239	12	0	1	-2.017	1	0	1	0	1	0	1
81		3	max	460.462	1	0	1	-.087	15	0	1	0	15	0	1
82			min	7.271	12	0	1	-2.017	1	0	1	0	1	0	1
83		4	max	460.527	1	0	1	-.087	15	0	1	0	15	0	1
84			min	7.304	12	0	1	-2.017	1	0	1	0	1	0	1
85		5	max	460.592	1	0	1	-.087	15	0	1	0	15	0	1
86			min	7.336	12	0	1	-2.017	1	0	1	0	1	0	1
87		6	max	460.656	1	0	1	-.087	15	0	1	0	15	0	1
88			min	7.368	12	0	1	-2.017	1	0	1	0	1	0	1
89		7	max	460.721	1	0	1	-.087	15	0	1	0	15	0	1
90			min	7.401	12	0	1	-2.017	1	0	1	-.001	1	0	1
91		8	max	460.786	1	0	1	-.087	15	0	1	0	15	0	1
92			min	7.433	12	0	1	-2.017	1	0	1	-.001	1	0	1
93		9	max	460.85	1	0	1	-.087	15	0	1	0	15	0	1
94			min	7.465	12	0	1	-2.017	1	0	1	-.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	460.915	1	0	1	-.087	15	0	1	0	15	0	1
96			min	7.498	12	0	1	-2.017	1	0	1	-.002	1	0	1
97		11	max	460.98	1	0	1	-.087	15	0	1	0	15	0	1
98			min	7.53	12	0	1	-2.017	1	0	1	-.002	1	0	1
99		12	max	461.045	1	0	1	-.087	15	0	1	0	15	0	1
100			min	7.562	12	0	1	-2.017	1	0	1	-.002	1	0	1
101		13	max	461.109	1	0	1	-.087	15	0	1	0	15	0	1
102			min	7.595	12	0	1	-2.017	1	0	1	-.002	1	0	1
103		14	max	461.174	1	0	1	-.087	15	0	1	0	15	0	1
104			min	7.627	12	0	1	-2.017	1	0	1	-.002	1	0	1
105		15	max	461.239	1	0	1	-.087	15	0	1	0	15	0	1
106			min	7.66	12	0	1	-2.017	1	0	1	-.003	1	0	1
107		16	max	461.303	1	0	1	-.087	15	0	1	0	15	0	1
108			min	7.692	12	0	1	-2.017	1	0	1	-.003	1	0	1
109		17	max	461.368	1	0	1	-.087	15	0	1	0	15	0	1
110			min	7.724	12	0	1	-2.017	1	0	1	-.003	1	0	1
111		18	max	461.433	1	0	1	-.087	15	0	1	0	15	0	1
112			min	7.757	12	0	1	-2.017	1	0	1	-.003	1	0	1
113		19	max	461.498	1	0	1	-.087	15	0	1	0	15	0	1
114			min	7.789	12	0	1	-2.017	1	0	1	-.003	1	0	1
115	M6	1	max	1006.217	1	.657	4	.17	1	0	1	0	3	0	1
116			min	-1189.549	3	.154	15	-.129	3	0	15	0	11	0	1
117		2	max	1006.343	1	.606	4	.17	1	0	1	0	3	0	15
118			min	-1189.455	3	.142	15	-.129	3	0	15	0	11	0	4
119		3	max	1006.468	1	.554	4	.17	1	0	1	0	3	0	15
120			min	-1189.36	3	.13	15	-.129	3	0	15	0	15	0	4
121		4	max	1006.594	1	.503	4	.17	1	0	1	0	1	0	15
122			min	-1189.266	3	.118	15	-.129	3	0	15	0	15	0	4
123		5	max	1006.72	1	.452	4	.17	1	0	1	0	1	0	15
124			min	-1189.172	3	.105	12	-.129	3	0	15	0	15	0	4
125		6	max	1006.846	1	.41	2	.17	1	0	1	0	1	0	15
126			min	-1189.077	3	.085	12	-.129	3	0	15	0	12	0	4
127		7	max	1006.972	1	.37	2	.17	1	0	1	0	1	0	15
128			min	-1188.983	3	.065	12	-.129	3	0	15	0	3	0	4
129		8	max	1007.098	1	.331	2	.17	1	0	1	0	1	0	15
130			min	-1188.888	3	.045	12	-.129	3	0	15	0	3	0	4
131		9	max	1007.224	1	.291	2	.17	1	0	1	0	1	0	12
132			min	-1188.794	3	.025	12	-.129	3	0	15	0	3	0	4
133		10	max	1007.349	1	.251	2	.17	1	0	1	0	1	0	12
134			min	-1188.7	3	-.004	3	-.129	3	0	15	0	3	0	2
135		11	max	1007.475	1	.211	2	.17	1	0	1	0	1	0	12
136			min	-1188.605	3	-.033	3	-.129	3	0	15	0	3	0	2
137		12	max	1007.601	1	.171	2	.17	1	0	1	0	1	0	12
138			min	-1188.511	3	-.063	3	-.129	3	0	15	0	3	0	2
139		13	max	1007.727	1	.131	2	.17	1	0	1	0	1	0	12
140			min	-1188.416	3	-.093	3	-.129	3	0	15	0	3	0	2
141		14	max	1007.853	1	.092	2	.17	1	0	1	0	1	0	12
142			min	-1188.322	3	-.123	3	-.129	3	0	15	0	3	0	2
143		15	max	1007.979	1	.052	2	.17	1	0	1	0	1	0	12
144			min	-1188.228	3	-.153	3	-.129	3	0	15	0	3	0	2
145		16	max	1008.105	1	.012	2	.17	1	0	1	0	1	0	12
146			min	-1188.133	3	-.183	3	-.129	3	0	15	0	3	0	2
147		17	max	1008.231	1	-.028	2	.17	1	0	1	0	1	0	12
148			min	-1188.039	3	-.213	3	-.129	3	0	15	0	3	0	2
149		18	max	1008.356	1	-.05	15	.17	1	0	1	0	1	0	3
150			min	-1187.944	3	-.243	3	-.129	3	0	15	0	3	0	2
151		19	max	1008.482	1	-.062	15	.17	1	0	1	0	1	0	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
152			min	-1187.85	3	-.273	3	-.129	3	0	15	0	3	0	2
153	M7	1	max	633.976	2	1.762	4	.016	3	0	2	0	2	0	2
154			min	-551.089	3	.414	15	-.004	10	0	3	0	3	0	3
155		2	max	633.906	2	1.585	4	.016	3	0	2	0	2	0	2
156			min	-551.141	3	.372	15	-.004	10	0	3	0	3	0	3
157		3	max	633.837	2	1.408	4	.016	3	0	2	0	2	0	2
158			min	-551.193	3	.331	15	-.004	10	0	3	0	3	0	3
159		4	max	633.768	2	1.231	4	.016	3	0	2	0	2	0	2
160			min	-551.245	3	.289	15	-.004	10	0	3	0	3	0	3
161		5	max	633.698	2	1.054	4	.016	3	0	2	0	2	0	15
162			min	-551.297	3	.248	15	-.004	10	0	3	0	3	0	3
163		6	max	633.629	2	.877	4	.016	3	0	2	0	2	0	15
164			min	-551.349	3	.206	15	-.004	10	0	3	0	3	0	4
165		7	max	633.56	2	.701	4	.016	3	0	2	0	2	0	15
166			min	-551.401	3	.165	15	-.004	10	0	3	0	3	0	4
167		8	max	633.49	2	.524	4	.016	3	0	2	0	2	0	15
168			min	-551.453	3	.123	15	-.004	10	0	3	0	3	-.001	4
169		9	max	633.421	2	.361	2	.016	3	0	2	0	2	0	15
170			min	-551.505	3	.068	12	-.004	10	0	3	0	3	-.001	4
171		10	max	633.352	2	.224	2	.016	3	0	2	0	2	0	15
172			min	-551.557	3	-.012	3	-.004	10	0	3	0	3	-.001	4
173		11	max	633.282	2	.086	2	.016	3	0	2	0	2	0	15
174			min	-551.608	3	-.115	3	-.004	10	0	3	0	3	-.001	4
175		12	max	633.213	2	-.043	15	.016	3	0	2	0	2	0	15
176			min	-551.66	3	-.219	3	-.004	10	0	3	0	3	-.001	4
177		13	max	633.144	2	-.085	15	.016	3	0	2	0	2	0	15
178			min	-551.712	3	-.36	4	-.004	10	0	3	0	3	-.001	4
179		14	max	633.074	2	-.126	15	.016	3	0	2	0	2	0	15
180			min	-551.764	3	-.537	4	-.004	10	0	3	0	3	-.001	4
181		15	max	633.005	2	-.168	15	.016	3	0	2	0	2	0	15
182			min	-551.816	3	-.714	4	-.004	10	0	3	0	3	0	4
183		16	max	632.936	2	-.209	15	.016	3	0	2	0	2	0	15
184			min	-551.868	3	-.891	4	-.004	10	0	3	0	3	0	4
185		17	max	632.866	2	-.251	15	.016	3	0	2	0	2	0	15
186			min	-551.92	3	-1.068	4	-.004	10	0	3	0	3	0	4
187		18	max	632.797	2	-.293	15	.016	3	0	2	0	2	0	15
188			min	-551.972	3	-1.245	4	-.004	10	0	3	0	3	0	4
189		19	max	632.728	2	-.334	15	.016	3	0	2	0	2	0	1
190			min	-552.024	3	-1.421	4	-.004	10	0	3	0	3	0	1
191	M8	1	max	1201.835	1	0	1	.893	1	0	1	0	15	0	1
192			min	-5.333	3	0	1	-.375	3	0	1	0	1	0	1
193		2	max	1201.899	1	0	1	.893	1	0	1	0	1	0	1
194			min	-5.284	3	0	1	-.375	3	0	1	0	3	0	1
195		3	max	1201.964	1	0	1	.893	1	0	1	0	1	0	1
196			min	-5.236	3	0	1	-.375	3	0	1	0	3	0	1
197		4	max	1202.029	1	0	1	.893	1	0	1	0	1	0	1
198			min	-5.187	3	0	1	-.375	3	0	1	0	3	0	1
199		5	max	1202.094	1	0	1	.893	1	0	1	0	1	0	1
200			min	-5.139	3	0	1	-.375	3	0	1	0	3	0	1
201		6	max	1202.158	1	0	1	.893	1	0	1	0	1	0	1
202			min	-5.09	3	0	1	-.375	3	0	1	0	3	0	1
203		7	max	1202.223	1	0	1	.893	1	0	1	0	1	0	1
204			min	-5.042	3	0	1	-.375	3	0	1	0	3	0	1
205		8	max	1202.288	1	0	1	.893	1	0	1	0	1	0	1
206			min	-4.993	3	0	1	-.375	3	0	1	0	3	0	1
207		9	max	1202.352	1	0	1	.893	1	0	1	0	1	0	1
208			min	-4.945	3	0	1	-.375	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	1202.417	1	0	1	.893	1	0	1	0	1	0	1
210			min	-4.896	3	0	1	-.375	3	0	1	0	3	0	1
211		11	max	1202.482	1	0	1	.893	1	0	1	0	1	0	1
212			min	-4.848	3	0	1	-.375	3	0	1	0	3	0	1
213		12	max	1202.547	1	0	1	.893	1	0	1	0	1	0	1
214			min	-4.799	3	0	1	-.375	3	0	1	0	3	0	1
215		13	max	1202.611	1	0	1	.893	1	0	1	0	1	0	1
216			min	-4.751	3	0	1	-.375	3	0	1	0	3	0	1
217		14	max	1202.676	1	0	1	.893	1	0	1	.001	1	0	1
218			min	-4.702	3	0	1	-.375	3	0	1	0	3	0	1
219		15	max	1202.741	1	0	1	.893	1	0	1	.001	1	0	1
220			min	-4.654	3	0	1	-.375	3	0	1	0	3	0	1
221		16	max	1202.805	1	0	1	.893	1	0	1	.001	1	0	1
222			min	-4.605	3	0	1	-.375	3	0	1	0	3	0	1
223		17	max	1202.87	1	0	1	.893	1	0	1	.001	1	0	1
224			min	-4.557	3	0	1	-.375	3	0	1	0	3	0	1
225		18	max	1202.935	1	0	1	.893	1	0	1	.001	1	0	1
226			min	-4.508	3	0	1	-.375	3	0	1	0	3	0	1
227		19	max	1202.999	1	0	1	.893	1	0	1	.001	1	0	1
228			min	-4.459	3	0	1	-.375	3	0	1	0	3	0	1
229	M10	1	max	324.054	1	.648	4	-.008	12	.001	1	0	1	0	1
230			min	-346.087	3	.153	15	-.219	1	0	3	0	3	0	1
231		2	max	324.18	1	.597	4	-.008	12	.001	1	0	1	0	15
232			min	-345.992	3	.141	15	-.219	1	0	3	0	3	0	4
233		3	max	324.306	1	.545	4	-.008	12	.001	1	0	1	0	15
234			min	-345.898	3	.129	15	-.219	1	0	3	0	3	0	4
235		4	max	324.432	1	.494	4	-.008	12	.001	1	0	1	0	15
236			min	-345.804	3	.117	15	-.219	1	0	3	0	3	0	4
237		5	max	324.557	1	.443	4	-.008	12	.001	1	0	1	0	15
238			min	-345.709	3	.105	15	-.219	1	0	3	0	3	0	4
239		6	max	324.683	1	.392	4	-.008	12	.001	1	0	1	0	15
240			min	-345.615	3	.093	15	-.219	1	0	3	0	3	0	4
241		7	max	324.809	1	.341	4	-.008	12	.001	1	0	1	0	15
242			min	-345.52	3	.081	15	-.219	1	0	3	0	3	0	4
243		8	max	324.935	1	.29	4	-.008	12	.001	1	0	1	0	15
244			min	-345.426	3	.069	15	-.219	1	0	3	0	3	0	4
245		9	max	325.061	1	.239	4	-.008	12	.001	1	0	1	0	15
246			min	-345.332	3	.057	15	-.219	1	0	3	0	3	0	4
247		10	max	325.187	1	.187	4	-.008	12	.001	1	0	2	0	15
248			min	-345.237	3	.045	15	-.219	1	0	3	0	3	0	4
249		11	max	325.313	1	.14	2	-.008	12	.001	1	0	15	0	15
250			min	-345.143	3	.033	15	-.219	1	0	3	0	3	0	4
251		12	max	325.439	1	.1	2	-.008	12	.001	1	0	15	0	15
252			min	-345.048	3	.021	15	-.219	1	0	3	0	3	0	4
253		13	max	325.564	1	.06	2	-.008	12	.001	1	0	15	0	15
254			min	-344.954	3	.007	9	-.219	1	0	3	0	1	0	4
255		14	max	325.69	1	.02	2	-.008	12	.001	1	0	15	0	15
256			min	-344.86	3	-.032	1	-.219	1	0	3	0	1	0	4
257		15	max	325.816	1	-.015	15	-.008	12	.001	1	0	15	0	15
258			min	-344.765	3	-.072	1	-.219	1	0	3	0	1	0	4
259		16	max	325.942	1	-.027	15	-.008	12	.001	1	0	15	0	15
260			min	-344.671	3	-.119	4	-.219	1	0	3	0	1	0	4
261		17	max	326.068	1	-.039	15	-.008	12	.001	1	0	15	0	15
262			min	-344.576	3	-.171	4	-.219	1	0	3	0	1	0	4
263		18	max	326.194	1	-.051	15	-.008	12	.001	1	0	15	0	15
264			min	-344.482	3	-.222	4	-.219	1	0	3	0	1	0	4
265		19	max	326.32	1	-.063	15	-.008	12	.001	1	0	15	0	15

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
266			min	-344.388	3	-.273	4	-.219	1	0	3	0	1	0	4
267	M11	1	max	153.391	2	1.761	4	.757	1	.001	1	0	3	0	4
268			min	-177.44	3	.414	15	.009	12	0	15	-.002	1	0	12
269		2	max	153.321	2	1.585	4	.757	1	.001	1	0	3	0	1
270			min	-177.492	3	.372	15	.009	12	0	15	-.002	1	0	3
271		3	max	153.252	2	1.408	4	.757	1	.001	1	0	3	0	1
272			min	-177.544	3	.331	15	.009	12	0	15	-.002	1	0	3
273		4	max	153.183	2	1.231	4	.757	1	.001	1	0	3	0	15
274			min	-177.596	3	.289	15	.009	12	0	15	-.002	1	0	3
275		5	max	153.113	2	1.054	4	.757	1	.001	1	0	3	0	15
276			min	-177.648	3	.248	15	.009	12	0	15	-.002	1	0	4
277		6	max	153.044	2	.877	4	.757	1	.001	1	0	3	0	15
278			min	-177.7	3	.206	15	.009	12	0	15	-.001	1	0	4
279		7	max	152.975	2	.7	4	.757	1	.001	1	0	3	0	15
280			min	-177.752	3	.165	15	.009	12	0	15	-.001	1	0	4
281		8	max	152.905	2	.524	4	.757	1	.001	1	0	3	0	15
282			min	-177.804	3	.123	15	.009	12	0	15	-.001	1	-.001	4
283		9	max	152.836	2	.347	4	.757	1	.001	1	0	3	0	15
284			min	-177.856	3	.081	15	.009	12	0	15	0	1	-.001	4
285		10	max	152.767	2	.17	4	.757	1	.001	1	0	3	0	15
286			min	-177.908	3	.035	12	.009	12	0	15	0	1	-.001	4
287		11	max	152.697	2	.017	1	.757	1	.001	1	0	3	0	15
288			min	-177.96	3	-.056	3	.009	12	0	15	0	1	-.001	4
289		12	max	152.628	2	-.043	15	.757	1	.001	1	0	3	0	15
290			min	-178.012	3	-.184	4	.009	12	0	15	0	1	-.001	4
291		13	max	152.559	2	-.085	15	.757	1	.001	1	0	3	0	15
292			min	-178.064	3	-.361	4	.009	12	0	15	0	1	-.001	4
293		14	max	152.49	2	-.126	15	.757	1	.001	1	0	3	0	15
294			min	-178.116	3	-.537	4	.009	12	0	15	0	1	-.001	4
295		15	max	152.42	2	-.168	15	.757	1	.001	1	0	3	0	15
296			min	-178.168	3	-.714	4	.009	12	0	15	0	10	0	4
297		16	max	152.351	2	-.21	15	.757	1	.001	1	0	1	0	15
298			min	-178.22	3	-.891	4	.009	12	0	15	0	15	0	4
299		17	max	152.282	2	-.251	15	.757	1	.001	1	0	1	0	15
300			min	-178.272	3	-1.068	4	.009	12	0	15	0	15	0	4
301		18	max	152.212	2	-.293	15	.757	1	.001	1	0	1	0	15
302			min	-178.324	3	-1.245	4	.009	12	0	15	0	15	0	4
303		19	max	152.143	2	-.334	15	.757	1	.001	1	0	1	0	1
304			min	-178.376	3	-1.422	4	.009	12	0	15	0	15	0	1
305	M12	1	max	459.96	1	0	1	4.452	1	0	1	0	2	0	1
306			min	7.571	12	0	1	.181	15	0	1	0	3	0	1
307		2	max	460.025	1	0	1	4.452	1	0	1	0	1	0	1
308			min	7.604	12	0	1	.181	15	0	1	0	15	0	1
309		3	max	460.089	1	0	1	4.452	1	0	1	0	1	0	1
310			min	7.636	12	0	1	.181	15	0	1	0	15	0	1
311		4	max	460.154	1	0	1	4.452	1	0	1	.001	1	0	1
312			min	7.668	12	0	1	.181	15	0	1	0	15	0	1
313		5	max	460.219	1	0	1	4.452	1	0	1	.002	1	0	1
314			min	7.701	12	0	1	.181	15	0	1	0	15	0	1
315		6	max	460.284	1	0	1	4.452	1	0	1	.002	1	0	1
316			min	7.733	12	0	1	.181	15	0	1	0	15	0	1
317		7	max	460.348	1	0	1	4.452	1	0	1	.002	1	0	1
318			min	7.765	12	0	1	.181	15	0	1	0	15	0	1
319		8	max	460.413	1	0	1	4.452	1	0	1	.003	1	0	1
320			min	7.798	12	0	1	.181	15	0	1	0	15	0	1
321		9	max	460.478	1	0	1	4.452	1	0	1	.003	1	0	1
322			min	7.83	12	0	1	.181	15	0	1	0	15	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
323		10	max	460.542	1	0	1	4.452	1	0	1	.004	1	0	1
324			min	7.862	12	0	1	.181	15	0	1	0	15	0	1
325		11	max	460.607	1	0	1	4.452	1	0	1	.004	1	0	1
326			min	7.895	12	0	1	.181	15	0	1	0	15	0	1
327		12	max	460.672	1	0	1	4.452	1	0	1	.004	1	0	1
328			min	7.927	12	0	1	.181	15	0	1	0	15	0	1
329		13	max	460.737	1	0	1	4.452	1	0	1	.005	1	0	1
330			min	7.96	12	0	1	.181	15	0	1	0	15	0	1
331		14	max	460.801	1	0	1	4.452	1	0	1	.005	1	0	1
332			min	7.992	12	0	1	.181	15	0	1	0	15	0	1
333		15	max	460.866	1	0	1	4.452	1	0	1	.006	1	0	1
334			min	8.024	12	0	1	.181	15	0	1	0	15	0	1
335		16	max	460.931	1	0	1	4.452	1	0	1	.006	1	0	1
336			min	8.057	12	0	1	.181	15	0	1	0	15	0	1
337		17	max	460.995	1	0	1	4.452	1	0	1	.006	1	0	1
338			min	8.089	12	0	1	.181	15	0	1	0	15	0	1
339		18	max	461.06	1	0	1	4.452	1	0	1	.007	1	0	1
340			min	8.121	12	0	1	.181	15	0	1	0	15	0	1
341		19	max	461.125	1	0	1	4.452	1	0	1	.007	1	0	1
342			min	8.154	12	0	1	.181	15	0	1	0	15	0	1
343	M1	1	max	156.864	1	343.955	3	-3.57	15	0	1	.172	1	.012	1
344			min	6.379	15	-305.593	1	-86.839	1	0	3	.007	15	-.011	3
345		2	max	157.004	1	343.774	3	-3.57	15	0	1	.153	1	.078	1
346			min	6.422	15	-305.835	1	-86.839	1	0	3	.006	15	-.086	3
347		3	max	91.152	1	7.364	9	-3.547	15	0	12	.133	1	.143	1
348			min	-7.979	10	-24.107	2	-86.757	1	0	1	.005	15	-.159	3
349		4	max	91.292	1	7.162	9	-3.547	15	0	12	.114	1	.144	1
350			min	-7.863	10	-24.348	2	-86.757	1	0	1	.005	15	-.156	3
351		5	max	91.431	1	6.961	9	-3.547	15	0	12	.095	1	.145	1
352			min	-7.746	10	-24.59	2	-86.757	1	0	1	.004	15	-.153	3
353		6	max	91.571	1	6.759	9	-3.547	15	0	12	.076	1	.146	1
354			min	-7.63	10	-24.832	2	-86.757	1	0	1	.003	15	-.149	3
355		7	max	91.71	1	6.558	9	-3.547	15	0	12	.057	1	.147	2
356			min	-7.514	10	-25.074	2	-86.757	1	0	1	.002	15	-.146	3
357		8	max	91.85	1	6.356	9	-3.547	15	0	12	.038	1	.153	2
358			min	-7.397	10	-25.316	2	-86.757	1	0	1	.002	15	-.143	3
359		9	max	91.99	1	6.155	9	-3.547	15	0	12	.02	1	.158	2
360			min	-7.281	10	-25.558	2	-86.757	1	0	1	0	15	-.139	3
361		10	max	92.129	1	5.953	9	-3.547	15	0	12	0	3	.164	2
362			min	-7.165	10	-25.799	2	-86.757	1	0	1	0	10	-.136	3
363		11	max	92.269	1	5.752	9	-3.547	15	0	12	0	12	.169	2
364			min	-7.048	10	-26.041	2	-86.757	1	0	1	-.018	1	-.132	3
365		12	max	92.409	1	5.55	9	-3.547	15	0	12	-.001	12	.175	2
366			min	-6.932	10	-26.283	2	-86.757	1	0	1	-.037	1	-.129	3
367		13	max	92.548	1	5.349	9	-3.547	15	0	12	-.002	12	.181	2
368			min	-6.816	10	-26.525	2	-86.757	1	0	1	-.056	1	-.125	3
369		14	max	92.688	1	5.147	9	-3.547	15	0	12	-.003	15	.187	2
370			min	-6.699	10	-26.767	2	-86.757	1	0	1	-.074	1	-.122	3
371		15	max	92.827	1	4.946	9	-3.547	15	0	12	-.004	15	.192	2
372			min	-6.583	10	-27.008	2	-86.757	1	0	1	-.093	1	-.118	3
373		16	max	96.357	2	99.942	2	-3.574	15	0	1	-.005	15	.197	2
374			min	-5.451	3	-165.884	3	-87.314	1	0	12	-.113	1	-.113	3
375		17	max	96.497	2	99.7	2	-3.574	15	0	1	-.005	15	.176	2
376			min	-5.346	3	-166.065	3	-87.314	1	0	12	-.132	1	-.077	3
377		18	max	-6.391	15	374.563	2	-3.662	15	0	3	-.006	15	.095	2
378			min	-156.388	1	-158.347	3	-89.551	1	0	2	-.151	1	-.043	3
379		19	max	-6.349	15	374.321	2	-3.662	15	0	3	-.007	15	.014	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-156.249	1	-158.528	3	-89.551	1	0	2	-.171	1	-.009	3
381	M5	1	max	345.939	1	1133.458	3	-.098	10	0	1	.005	1	.022	3
382			min	12.192	12	-1007.799	1	-40.618	3	0	3	0	10	-.023	1
383		2	max	346.079	1	1133.276	3	-.098	10	0	1	0	2	.195	1
384			min	12.262	12	-1008.04	1	-40.618	3	0	3	-.004	3	-.223	3
385		3	max	278.767	3	6.948	9	4.609	3	0	3	0	2	.41	1
386			min	-42.803	10	-86.516	2	-.491	2	0	1	-.012	3	-.464	3
387		4	max	278.871	3	6.747	9	4.609	3	0	3	0	2	.417	1
388			min	-42.687	10	-86.757	2	-.491	2	0	1	-.011	3	-.454	3
389		5	max	278.976	3	6.545	9	4.609	3	0	3	0	2	.425	1
390			min	-42.57	10	-86.999	2	-.491	2	0	1	-.01	3	-.443	3
391		6	max	279.081	3	6.344	9	4.609	3	0	3	0	2	.433	1
392			min	-42.454	10	-87.241	2	-.491	2	0	1	-.009	3	-.432	3
393		7	max	279.186	3	6.142	9	4.609	3	0	3	0	2	.441	1
394			min	-42.338	10	-87.483	2	-.491	2	0	1	-.008	3	-.421	3
395		8	max	279.29	3	5.941	9	4.609	3	0	3	0	2	.449	2
396			min	-42.221	10	-87.725	2	-.491	2	0	1	-.007	3	-.411	3
397		9	max	279.395	3	5.739	9	4.609	3	0	3	0	2	.468	2
398			min	-42.105	10	-87.967	2	-.491	2	0	1	-.006	3	-.4	3
399		10	max	279.5	3	5.538	9	4.609	3	0	3	0	10	.487	2
400			min	-41.989	10	-88.208	2	-.491	2	0	1	-.005	3	-.389	3
401		11	max	279.604	3	5.336	9	4.609	3	0	3	0	10	.506	2
402			min	-41.872	10	-88.45	2	-.491	2	0	1	-.004	3	-.378	3
403		12	max	279.709	3	5.135	9	4.609	3	0	3	0	10	.525	2
404			min	-41.756	10	-88.692	2	-.491	2	0	1	-.003	3	-.367	3
405		13	max	279.814	3	4.933	9	4.609	3	0	3	0	10	.545	2
406			min	-41.639	10	-88.934	2	-.491	2	0	1	-.003	1	-.356	3
407		14	max	279.919	3	4.732	9	4.609	3	0	3	0	10	.564	2
408			min	-41.523	10	-89.176	2	-.491	2	0	1	-.002	1	-.345	3
409		15	max	280.023	3	4.53	9	4.609	3	0	3	0	15	.583	2
410			min	-41.407	10	-89.417	2	-.491	2	0	1	-.002	1	-.334	3
411		16	max	318.381	2	442.797	2	4.586	3	0	1	0	3	.598	2
412			min	-22.367	3	-513.128	3	-.523	2	0	15	-.001	1	-.319	3
413		17	max	318.521	2	442.556	2	4.586	3	0	1	.001	3	.502	2
414			min	-22.262	3	-513.309	3	-.523	2	0	15	-.001	1	-.207	3
415		18	max	-13.074	12	1230.201	2	4.212	3	0	12	.002	3	.238	2
416			min	-346.914	1	-518.118	3	-.123	2	0	1	0	2	-.095	3
417		19	max	-13.004	12	1229.959	2	4.212	3	0	12	.003	3	.017	3
418			min	-346.775	1	-518.3	3	-.123	2	0	1	0	2	-.028	2
419	M9	1	max	156.124	1	343.931	3	113.589	1	0	3	-.007	15	.012	1
420			min	6.347	15	-305.575	1	4.915	15	0	1	-.171	1	-.011	3
421		2	max	156.264	1	343.75	3	113.589	1	0	3	-.004	12	.078	1
422			min	6.389	15	-305.817	1	4.915	15	0	1	-.146	1	-.086	3
423		3	max	91.082	1	7.335	9	82.037	1	0	1	.003	3	.143	1
424			min	-7.444	10	-24.121	2	1.661	12	0	15	-.12	1	-.159	3
425		4	max	91.221	1	7.134	9	82.037	1	0	1	.004	3	.144	1
426			min	-7.328	10	-24.362	2	1.661	12	0	15	-.103	1	-.156	3
427		5	max	91.361	1	6.932	9	82.037	1	0	1	.004	3	.145	1
428			min	-7.212	10	-24.604	2	1.661	12	0	15	-.085	1	-.152	3
429		6	max	91.5	1	6.731	9	82.037	1	0	1	.005	3	.146	1
430			min	-7.095	10	-24.846	2	1.661	12	0	15	-.067	1	-.149	3
431		7	max	91.64	1	6.529	9	82.037	1	0	1	.005	3	.147	2
432			min	-6.979	10	-25.088	2	1.661	12	0	15	-.049	1	-.146	3
433		8	max	91.78	1	6.328	9	82.037	1	0	1	.006	3	.153	2
434			min	-6.863	10	-25.33	2	1.661	12	0	15	-.031	1	-.143	3
435		9	max	91.919	1	6.126	9	82.037	1	0	1	.006	3	.158	2
436			min	-6.746	10	-25.571	2	1.661	12	0	15	-.014	1	-.139	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
437		10	max	92.059	1	5.924	9	82.037	1	0	1	.007	3	.164	2
438			min	-6.63	10	-25.813	2	1.661	12	0	15	0	2	-.136	3
439		11	max	92.199	1	5.723	9	82.037	1	0	1	.022	1	.169	2
440			min	-6.514	10	-26.055	2	1.661	12	0	15	0	15	-.133	3
441		12	max	92.338	1	5.521	9	82.037	1	0	1	.04	1	.175	2
442			min	-6.397	10	-26.297	2	1.661	12	0	15	.002	15	-.129	3
443		13	max	92.478	1	5.32	9	82.037	1	0	1	.058	1	.181	2
444			min	-6.281	10	-26.539	2	1.661	12	0	15	.002	15	-.126	3
445		14	max	92.617	1	5.118	9	82.037	1	0	1	.075	1	.187	2
446			min	-6.165	10	-26.781	2	1.661	12	0	15	.003	15	-.122	3
447		15	max	92.757	1	4.917	9	82.037	1	0	1	.093	1	.192	2
448			min	-6.048	10	-27.022	2	1.661	12	0	15	.004	15	-.118	3
449		16	max	96.696	2	99.728	2	82.676	1	0	15	.112	1	.197	2
450			min	-5.506	3	-166.366	3	1.671	12	0	1	.005	15	-.113	3
451		17	max	96.835	2	99.487	2	82.676	1	0	15	.13	1	.176	2
452			min	-5.401	3	-166.548	3	1.671	12	0	1	.005	15	-.077	3
453		18	max	-6.378	15	374.564	2	87.228	1	0	2	.149	1	.095	2
454			min	-156.044	1	-158.344	3	1.988	12	0	3	.006	15	-.043	3
455		19	max	-6.336	15	374.322	2	87.228	1	0	2	.168	1	.014	2
456			min	-155.904	1	-158.525	3	1.988	12	0	3	.007	15	-.009	3
457	M13	1	max	113.887	1	305.004	1	-6.347	15	.012	1	.171	1	0	1
458			min	4.916	15	-343.915	3	-156.104	1	-.011	3	.007	15	0	3
459		2	max	113.887	1	215.365	1	-4.863	15	.012	1	.052	1	.253	3
460			min	4.916	15	-242.746	3	-119.497	1	-.011	3	.002	15	-.224	1
461		3	max	113.887	1	125.727	1	-3.379	15	.012	1	.003	3	.418	3
462			min	4.916	15	-141.577	3	-82.89	1	-.011	3	-.035	1	-.371	1
463		4	max	113.887	1	36.089	1	-1.895	15	.012	1	-.001	12	.496	3
464			min	4.916	15	-40.407	3	-46.283	1	-.011	3	-.09	1	-.441	1
465		5	max	113.887	1	60.762	3	-.411	15	.012	1	-.003	12	.488	3
466			min	4.916	15	-53.55	1	-9.676	1	-.011	3	-.115	1	-.433	1
467		6	max	113.887	1	161.931	3	26.931	1	.012	1	-.003	12	.392	3
468			min	4.916	15	-143.188	1	.382	12	-.011	3	-.107	1	-.348	1
469		7	max	113.887	1	263.1	3	63.539	1	.012	1	-.002	12	.209	3
470			min	4.916	15	-232.826	1	1.83	12	-.011	3	-.068	1	-.186	1
471		8	max	113.887	1	364.269	3	100.146	1	.012	1	.002	1	.053	1
472			min	4.916	15	-322.464	1	3.278	12	-.011	3	0	3	-.061	3
473		9	max	113.887	1	465.438	3	136.753	1	.012	1	.104	1	.369	1
474			min	4.916	15	-412.103	1	4.725	12	-.011	3	.003	12	-.419	3
475		10	max	113.887	1	566.607	3	173.36	1	.011	2	.238	1	.762	1
476			min	4.916	15	-501.741	1	6.173	12	-.012	1	.008	12	-.863	3
477		11	max	87.169	1	412.103	1	-4.567	12	.011	3	.1	1	.369	1
478			min	3.571	15	-465.438	3	-136.008	1	-.012	1	0	3	-.419	3
479		12	max	87.169	1	322.464	1	-3.119	12	.011	3	.002	2	.053	1
480			min	3.571	15	-364.269	3	-99.401	1	-.012	1	-.004	3	-.061	3
481		13	max	87.169	1	232.826	1	-1.671	12	.011	3	-.003	15	.209	3
482			min	3.571	15	-263.1	3	-62.793	1	-.012	1	-.071	1	-.186	1
483		14	max	87.169	1	143.188	1	-.204	3	.011	3	-.004	15	.392	3
484			min	3.571	15	-161.931	3	-26.186	1	-.012	1	-.11	1	-.348	1
485		15	max	87.169	1	53.549	1	10.421	1	.011	3	-.005	15	.488	3
486			min	3.571	15	-60.762	3	.444	15	-.012	1	-.117	1	-.433	1
487		16	max	87.169	1	40.408	3	47.028	1	.011	3	-.003	12	.496	3
488			min	3.571	15	-36.089	1	1.928	15	-.012	1	-.092	1	-.441	1
489		17	max	87.169	1	141.577	3	83.635	1	.011	3	0	12	.418	3
490			min	3.571	15	-125.727	1	3.412	15	-.012	1	-.036	1	-.371	1
491		18	max	87.169	1	242.746	3	120.242	1	.011	3	.052	1	.253	3
492			min	3.571	15	-215.366	1	4.896	15	-.012	1	.002	15	-.224	1
493		19	max	87.169	1	343.915	3	156.849	1	.011	3	.172	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
494			min	3.571	15	-305.004	1	6.379	15	-.012	1	.007	15	0	3
495	M16	1	max	-1.987	12	374.607	2	-6.336	15	.009	3	.168	1	0	2
496			min	-86.87	1	-158.558	3	-155.92	1	-.014	2	.007	15	0	3
497		2	max	-1.987	12	264.535	2	-4.852	15	.009	3	.049	1	.117	3
498			min	-86.87	1	-112.135	3	-119.313	1	-.014	2	.002	15	-.275	2
499		3	max	-1.987	12	154.462	2	-3.368	15	.009	3	-.001	12	.193	3
500			min	-86.87	1	-65.713	3	-82.706	1	-.014	2	-.038	1	-.456	2
501		4	max	-1.987	12	44.39	2	-1.885	15	.009	3	-.004	15	.23	3
502			min	-86.87	1	-19.291	3	-46.098	1	-.014	2	-.093	1	-.541	2
503		5	max	-1.987	12	27.131	3	-.401	15	.009	3	-.005	15	.226	3
504			min	-86.87	1	-65.683	2	-9.491	1	-.014	2	-.117	1	-.532	2
505		6	max	-1.987	12	73.554	3	27.116	1	.009	3	-.004	15	.183	3
506			min	-86.87	1	-175.756	2	.611	12	-.014	2	-.109	1	-.428	2
507		7	max	-1.987	12	119.976	3	63.723	1	.009	3	-.003	15	.1	3
508			min	-86.87	1	-285.828	2	2.059	12	-.014	2	-.07	1	-.229	2
509		8	max	-1.987	12	166.398	3	100.33	1	.009	3	.002	2	.064	2
510			min	-86.87	1	-395.901	2	3.507	12	-.014	2	-.003	3	-.024	3
511		9	max	-1.987	12	212.82	3	136.937	1	.009	3	.103	1	.453	2
512			min	-86.87	1	-505.973	2	4.955	12	-.014	2	.002	12	-.187	3
513		10	max	-3.661	15	-14.39	15	173.544	1	0	15	.236	1	.936	2
514			min	-89.234	1	-616.046	2	-9.865	3	-.014	2	.009	12	-.39	3
515		11	max	-3.661	15	505.973	2	-5.154	12	.014	2	.103	1	.453	2
516			min	-89.234	1	-212.82	3	-136.592	1	-.009	3	.004	12	-.187	3
517		12	max	-3.661	15	395.901	2	-3.706	12	.014	2	.002	2	.064	2
518			min	-89.234	1	-166.398	3	-99.985	1	-.009	3	0	3	-.024	3
519		13	max	-3.661	15	285.828	2	-2.258	12	.014	2	-.003	12	.1	3
520			min	-89.234	1	-119.976	3	-63.378	1	-.009	3	-.069	1	-.229	2
521		14	max	-3.661	15	175.755	2	-.811	12	.014	2	-.004	12	.183	3
522			min	-89.234	1	-73.554	3	-26.771	1	-.009	3	-.108	1	-.428	2
523		15	max	-3.661	15	65.683	2	9.836	1	.014	2	-.004	12	.226	3
524			min	-89.234	1	-27.131	3	.413	15	-.009	3	-.116	1	-.532	2
525		16	max	-3.661	15	19.291	3	46.443	1	.014	2	-.003	12	.23	3
526			min	-89.234	1	-44.39	2	1.897	15	-.009	3	-.091	1	-.541	2
527		17	max	-3.661	15	65.713	3	83.05	1	.014	2	0	12	.193	3
528			min	-89.234	1	-154.462	2	3.381	15	-.009	3	-.036	1	-.456	2
529		18	max	-3.661	15	112.135	3	119.658	1	.014	2	.052	1	.117	3
530			min	-89.234	1	-264.535	2	4.865	15	-.009	3	.002	15	-.275	2
531		19	max	-3.661	15	158.558	3	156.265	1	.014	2	.171	1	0	2
532			min	-89.234	1	-374.607	2	6.349	15	-.009	3	.007	15	0	3
533	M15	1	max	0	2	2.707	4	.033	3	0	1	0	1	0	1
534			min	-48.721	3	0	2	-.031	1	0	3	0	3	0	1
535		2	max	0	2	2.406	4	.033	3	0	1	0	1	0	2
536			min	-48.791	3	0	2	-.031	1	0	3	0	3	-.001	4
537		3	max	0	2	2.106	4	.033	3	0	1	0	1	0	2
538			min	-48.862	3	0	2	-.031	1	0	3	0	3	-.002	4
539		4	max	0	2	1.805	4	.033	3	0	1	0	1	0	2
540			min	-48.932	3	0	2	-.031	1	0	3	0	3	-.003	4
541		5	max	0	2	1.504	4	.033	3	0	1	0	1	0	2
542			min	-49.003	3	0	2	-.031	1	0	3	0	3	-.004	4
543		6	max	0	2	1.203	4	.033	3	0	1	0	1	0	2
544			min	-49.073	3	0	2	-.031	1	0	3	0	3	-.005	4
545		7	max	0	2	.902	4	.033	3	0	1	0	3	0	2
546			min	-49.144	3	0	2	-.031	1	0	3	0	1	-.005	4
547		8	max	0	2	.602	4	.033	3	0	1	0	3	0	2
548			min	-49.214	3	0	2	-.031	1	0	3	0	1	-.005	4
549		9	max	0	2	.301	4	.033	3	0	1	0	3	0	2
550			min	-49.285	3	0	2	-.031	1	0	3	0	1	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.033	3	0	1	0	3	0	2
552			min	-49.355	3	0	1	-.031	1	0	3	0	1	-.006	4
553		11	max	0	2	0	2	.033	3	0	1	0	3	0	2
554			min	-49.426	3	-.301	4	-.031	1	0	3	0	1	-.006	4
555		12	max	0	2	0	2	.033	3	0	1	0	3	0	2
556			min	-49.496	3	-.602	4	-.031	1	0	3	0	1	-.005	4
557		13	max	0	2	0	2	.033	3	0	1	0	3	0	2
558			min	-49.567	3	-.902	4	-.031	1	0	3	0	1	-.005	4
559		14	max	0	2	0	2	.033	3	0	1	0	3	0	2
560			min	-49.637	3	-1.203	4	-.031	1	0	3	0	1	-.005	4
561		15	max	0	2	0	2	.033	3	0	1	0	3	0	2
562			min	-49.708	3	-1.504	4	-.031	1	0	3	0	1	-.004	4
563		16	max	0	2	0	2	.033	3	0	1	0	3	0	2
564			min	-49.778	3	-1.805	4	-.031	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.033	3	0	1	0	3	0	2
566			min	-49.849	3	-2.106	4	-.031	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.033	3	0	1	0	3	0	2
568			min	-49.919	3	-2.406	4	-.031	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.033	3	0	1	0	3	0	1
570			min	-49.99	3	-2.707	4	-.031	1	0	3	0	1	0	1
571	M16A	1	max	-.991	10	2.707	4	.022	1	0	3	0	3	0	1
572			min	-49.437	3	.636	15	-.014	3	0	2	0	1	0	1
573		2	max	-.913	10	2.406	4	.022	1	0	3	0	3	0	15
574			min	-49.366	3	.566	15	-.014	3	0	2	0	1	-.001	4
575		3	max	-.835	10	2.106	4	.022	1	0	3	0	3	0	15
576			min	-49.296	3	.495	15	-.014	3	0	2	0	1	-.002	4
577		4	max	-.756	10	1.805	4	.022	1	0	3	0	3	0	15
578			min	-49.225	3	.424	15	-.014	3	0	2	0	1	-.003	4
579		5	max	-.678	10	1.504	4	.022	1	0	3	0	3	0	15
580			min	-49.155	3	.354	15	-.014	3	0	2	0	1	-.004	4
581		6	max	-.6	10	1.203	4	.022	1	0	3	0	3	-.001	15
582			min	-49.084	3	.283	15	-.014	3	0	2	0	1	-.005	4
583		7	max	-.522	10	.902	4	.022	1	0	3	0	3	-.001	15
584			min	-49.014	3	.212	15	-.014	3	0	2	0	1	-.005	4
585		8	max	-.443	10	.602	4	.022	1	0	3	0	3	-.001	15
586			min	-48.943	3	.141	15	-.014	3	0	2	0	1	-.005	4
587		9	max	-.365	10	.301	4	.022	1	0	3	0	3	-.001	15
588			min	-48.873	3	.071	15	-.014	3	0	2	0	1	-.006	4
589		10	max	-.287	10	0	1	.022	1	0	3	0	3	-.001	15
590			min	-48.802	3	0	1	-.014	3	0	2	0	1	-.006	4
591		11	max	-.208	10	-.071	15	.022	1	0	3	0	3	-.001	15
592			min	-48.732	3	-.301	4	-.014	3	0	2	0	1	-.006	4
593		12	max	-.13	10	-.141	15	.022	1	0	3	0	3	-.001	15
594			min	-48.661	3	-.602	4	-.014	3	0	2	0	1	-.005	4
595		13	max	-.052	10	-.212	15	.022	1	0	3	0	2	-.001	15
596			min	-48.591	3	-.902	4	-.014	3	0	2	0	3	-.005	4
597		14	max	.027	10	-.283	15	.022	1	0	3	0	1	-.001	15
598			min	-48.52	3	-1.203	4	-.014	3	0	2	0	3	-.005	4
599		15	max	.105	10	-.354	15	.022	1	0	3	0	1	0	15
600			min	-48.45	3	-1.504	4	-.014	3	0	2	0	3	-.004	4
601		16	max	.183	10	-.424	15	.022	1	0	3	0	1	0	15
602			min	-48.379	3	-1.805	4	-.014	3	0	2	0	3	-.003	4
603		17	max	.262	10	-.495	15	.022	1	0	3	0	1	0	15
604			min	-48.309	3	-2.106	4	-.014	3	0	2	0	3	-.002	4
605		18	max	.34	10	-.566	15	.022	1	0	3	0	1	0	15
606			min	-48.238	3	-2.406	4	-.014	3	0	2	0	3	-.001	4
607		19	max	.418	10	-.636	15	.022	1	0	3	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
608			min	-48.168	3	-2.707	4	-.014	3	0	2	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	.003	1	.01	2	.016	1	-5.789e-5	15	NC	3	NC	3
2			min	-.004	3	-.01	3	0	3	-1.412e-3	1	3891.325	2	2400.902	1
3		2	max	.003	1	.009	2	.015	1	-5.537e-5	15	NC	3	NC	3
4			min	-.003	3	-.01	3	0	3	-1.351e-3	1	4236.221	2	2585.101	1
5		3	max	.003	1	.008	2	.014	1	-5.285e-5	15	NC	3	NC	3
6			min	-.003	3	-.009	3	0	3	-1.29e-3	1	4644.369	2	2802.656	1
7		4	max	.003	1	.008	2	.013	1	-5.033e-5	15	NC	3	NC	3
8			min	-.003	3	-.009	3	0	3	-1.229e-3	1	5130.526	2	3061.502	1
9		5	max	.002	1	.007	2	.012	1	-4.78e-5	15	NC	1	NC	3
10			min	-.003	3	-.008	3	0	3	-1.168e-3	1	5714.207	2	3372.229	1
11		6	max	.002	1	.006	2	.011	1	-4.528e-5	15	NC	1	NC	3
12			min	-.003	3	-.008	3	0	3	-1.107e-3	1	6421.628	2	3749.219	1
13		7	max	.002	1	.005	2	.009	1	-4.276e-5	15	NC	1	NC	2
14			min	-.002	3	-.007	3	0	3	-1.046e-3	1	7288.658	2	4212.402	1
15		8	max	.002	1	.005	2	.008	1	-4.024e-5	15	NC	1	NC	2
16			min	-.002	3	-.007	3	0	3	-9.846e-4	1	8365.442	2	4790.061	1
17		9	max	.002	1	.004	2	.007	1	-3.771e-5	15	NC	1	NC	2
18			min	-.002	3	-.006	3	0	3	-9.235e-4	1	9723.865	2	5523.455	1
19		10	max	.002	1	.003	2	.006	1	-3.519e-5	15	NC	1	NC	2
20			min	-.002	3	-.006	3	0	3	-8.624e-4	1	NC	1	6474.779	1
21		11	max	.001	1	.003	2	.005	1	-3.267e-5	15	NC	1	NC	2
22			min	-.002	3	-.005	3	0	3	-8.013e-4	1	NC	1	7741.532	1
23		12	max	.001	1	.002	2	.004	1	-3.015e-5	15	NC	1	NC	2
24			min	-.001	3	-.005	3	0	3	-7.402e-4	1	NC	1	9484.087	1
25		13	max	.001	1	.002	2	.003	1	-2.762e-5	15	NC	1	NC	1
26			min	-.001	3	-.004	3	0	3	-6.791e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.003	1	-2.51e-5	15	NC	1	NC	1
28			min	0	3	-.004	3	0	3	-6.18e-4	1	NC	1	NC	1
29		15	max	0	1	.001	2	.002	1	-2.258e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-5.569e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-2.006e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.958e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.753e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	12	-4.347e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.501e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.736e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-1.102e-5	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.125e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.475e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	5.311e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.811e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	7.287e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	2.147e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	8.677e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.483e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	1.007e-5	15	NC	1	NC	1
47		5	max	0	3	0	2	0	12	2.819e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	1.146e-5	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	3.155e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.285e-5	15	NC	1	NC	1
51		7	max	0	3	.001	2	0	3	3.492e-4	1	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
52			min	0	2	-.005	3	0	1	1.424e-5	15	NC	1	NC	1
53		8	max	0	3	.001	2	0	3	3.828e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.563e-5	15	NC	1	NC	1
55		9	max	0	3	.002	2	0	3	4.164e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	1.702e-5	15	NC	1	NC	1
57		10	max	.001	3	.002	2	0	1	4.5e-4	1	NC	1	NC	1
58			min	0	2	-.007	3	0	15	1.841e-5	15	NC	1	NC	1
59		11	max	.001	3	.003	2	.001	1	4.836e-4	1	NC	1	NC	1
60			min	0	2	-.008	3	0	15	1.98e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	5.172e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	2.119e-5	15	NC	1	NC	1
63		13	max	.001	3	.004	2	.003	1	5.508e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	2.258e-5	15	NC	1	NC	1
65		14	max	.001	3	.005	2	.004	1	5.844e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	15	2.397e-5	15	9225.073	2	NC	1
67		15	max	.002	3	.006	2	.005	1	6.18e-4	1	NC	1	NC	2
68			min	-.001	2	-.009	3	0	15	2.536e-5	15	7796.698	2	9611.643	1
69		16	max	.002	3	.007	2	.006	1	6.517e-4	1	NC	1	NC	2
70			min	-.001	2	-.009	3	0	15	2.675e-5	15	6682.732	2	8006.772	1
71		17	max	.002	3	.008	2	.007	1	6.853e-4	1	NC	3	NC	2
72			min	-.002	2	-.009	3	0	15	2.814e-5	15	5805.318	2	6856.697	1
73		18	max	.002	3	.009	2	.008	1	7.189e-4	1	NC	3	NC	2
74			min	-.002	2	-.009	3	0	15	2.954e-5	15	5108.306	2	6003.543	1
75		19	max	.002	3	.01	2	.009	1	7.525e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	15	3.093e-5	15	4550.9	2	5354.668	1
77	M4	1	max	.002	1	.012	2	0	15	-4.311e-5	12	NC	1	NC	3
78			min	0	12	-.01	3	-.006	1	-1.097e-3	1	NC	1	2994.475	1
79		2	max	.002	1	.011	2	0	15	-4.311e-5	12	NC	1	NC	3
80			min	0	12	-.009	3	-.006	1	-1.097e-3	1	NC	1	3266.029	1
81		3	max	.002	1	.01	2	0	15	-4.311e-5	12	NC	1	NC	3
82			min	0	12	-.009	3	-.005	1	-1.097e-3	1	NC	1	3589.253	1
83		4	max	.002	1	.01	2	0	15	-4.311e-5	12	NC	1	NC	2
84			min	0	12	-.008	3	-.005	1	-1.097e-3	1	NC	1	3977.771	1
85		5	max	.002	1	.009	2	0	15	-4.311e-5	12	NC	1	NC	2
86			min	0	12	-.008	3	-.004	1	-1.097e-3	1	NC	1	4450.14	1
87		6	max	.002	1	.009	2	0	15	-4.311e-5	12	NC	1	NC	2
88			min	0	12	-.007	3	-.004	1	-1.097e-3	1	NC	1	5032.174	1
89		7	max	.001	1	.008	2	0	15	-4.311e-5	12	NC	1	NC	2
90			min	0	12	-.007	3	-.003	1	-1.097e-3	1	NC	1	5760.641	1
91		8	max	.001	1	.007	2	0	15	-4.311e-5	12	NC	1	NC	2
92			min	0	12	-.006	3	-.003	1	-1.097e-3	1	NC	1	6689.383	1
93		9	max	.001	1	.007	2	0	15	-4.311e-5	12	NC	1	NC	2
94			min	0	12	-.005	3	-.002	1	-1.097e-3	1	NC	1	7899.85	1
95		10	max	.001	1	.006	2	0	15	-4.311e-5	12	NC	1	NC	2
96			min	0	12	-.005	3	-.002	1	-1.097e-3	1	NC	1	9520.093	1
97		11	max	0	1	.005	2	0	15	-4.311e-5	12	NC	1	NC	1
98			min	0	12	-.004	3	-.002	1	-1.097e-3	1	NC	1	NC	1
99		12	max	0	1	.005	2	0	15	-4.311e-5	12	NC	1	NC	1
100			min	0	12	-.004	3	-.001	1	-1.097e-3	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-4.311e-5	12	NC	1	NC	1
102			min	0	12	-.003	3	0	1	-1.097e-3	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-4.311e-5	12	NC	1	NC	1
104			min	0	12	-.003	3	0	1	-1.097e-3	1	NC	1	NC	1
105		15	max	0	1	.003	2	0	15	-4.311e-5	12	NC	1	NC	1
106			min	0	12	-.002	3	0	1	-1.097e-3	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-4.311e-5	12	NC	1	NC	1
108			min	0	12	-.002	3	0	1	-1.097e-3	1	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
109		17	max	0	1	.001	2	0	15	-4.311e-5	12	NC	1	NC	1
110			min	0	12	-.001	3	0	1	-1.097e-3	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-4.311e-5	12	NC	1	NC	1
112			min	0	12	0	3	0	1	-1.097e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-4.311e-5	12	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.097e-3	1	NC	1	NC	1
115	M6	1	max	.01	1	.033	2	.005	1	2.904e-4	3	NC	3	NC	2
116			min	-.012	3	-.029	3	-.003	3	1.603e-6	10	1197.004	2	7820.743	1
117		2	max	.009	1	.031	2	.005	1	2.811e-4	3	NC	3	NC	2
118			min	-.011	3	-.027	3	-.003	3	7.59e-7	10	1280.355	2	8492.506	1
119		3	max	.009	1	.029	2	.004	1	2.718e-4	3	NC	3	NC	2
120			min	-.01	3	-.026	3	-.003	3	-8.478e-8	10	1375.8	2	9286.993	1
121		4	max	.008	1	.027	2	.004	1	2.624e-4	3	NC	3	NC	1
122			min	-.01	3	-.024	3	-.003	3	-2.059e-6	2	1485.757	2	NC	1
123		5	max	.008	1	.024	2	.003	1	2.531e-4	3	NC	3	NC	1
124			min	-.009	3	-.023	3	-.003	3	-5.509e-6	2	1613.338	2	NC	1
125		6	max	.007	1	.022	2	.003	1	2.437e-4	3	NC	3	NC	1
126			min	-.008	3	-.021	3	-.002	3	-8.958e-6	2	1762.62	2	NC	1
127		7	max	.007	1	.02	2	.003	1	2.344e-4	3	NC	3	NC	1
128			min	-.008	3	-.02	3	-.002	3	-1.241e-5	2	1939.038	2	NC	1
129		8	max	.006	1	.018	2	.002	1	2.25e-4	3	NC	3	NC	1
130			min	-.007	3	-.018	3	-.002	3	-1.586e-5	2	2150.01	2	NC	1
131		9	max	.005	1	.016	2	.002	1	2.157e-4	3	NC	3	NC	1
132			min	-.006	3	-.017	3	-.002	3	-1.931e-5	2	2405.918	2	NC	1
133		10	max	.005	1	.014	2	.002	1	2.063e-4	3	NC	3	NC	1
134			min	-.006	3	-.015	3	-.001	3	-2.276e-5	2	2721.758	2	NC	1
135		11	max	.004	1	.013	2	.001	1	1.97e-4	3	NC	3	NC	1
136			min	-.005	3	-.013	3	-.001	3	-2.621e-5	2	3120.019	2	NC	1
137		12	max	.004	1	.011	2	.001	1	1.876e-4	3	NC	3	NC	1
138			min	-.004	3	-.012	3	-.001	3	-2.965e-5	2	3636.027	2	NC	1
139		13	max	.003	1	.009	2	0	1	1.783e-4	3	NC	3	NC	1
140			min	-.004	3	-.01	3	0	3	-3.31e-5	2	4328.648	2	NC	1
141		14	max	.003	1	.007	2	0	1	1.69e-4	3	NC	3	NC	1
142			min	-.003	3	-.008	3	0	3	-3.655e-5	2	5303.807	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.596e-4	3	NC	3	NC	1
144			min	-.003	3	-.007	3	0	3	-4.e-5	2	6773.313	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.503e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-4.345e-5	2	9231.31	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.409e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-4.69e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.316e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-5.035e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.222e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.38e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.516e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.738e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.254e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-4.224e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.203e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-2.71e-5	3	NC	1	NC	1
159		4	max	.001	3	.004	2	0	3	2.152e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.196e-5	3	NC	1	NC	1
161		5	max	.001	3	.006	2	0	3	2.102e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	7.003e-7	15	7912.799	2	NC	1
163		6	max	.002	3	.007	2	.001	3	2.051e-5	1	NC	3	NC	1
164			min	-.002	2	-.01	3	0	1	7.845e-7	15	6346.058	2	NC	1
165		7	max	.002	3	.009	2	.001	3	3.347e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.011	3	0	1	8.687e-7	15	5276.701	2	NC	1
167		8	max	.002	3	.01	2	.001	3	4.861e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-2.759e-6	2	4494.135	2	NC	1
169		9	max	.003	3	.012	2	.002	3	6.375e-5	3	NC	3	NC	1
170			min	-.003	2	-.014	3	-.001	1	-6.746e-6	2	3893.398	2	NC	1
171		10	max	.003	3	.013	2	.002	3	7.89e-5	3	NC	3	NC	1
172			min	-.004	2	-.016	3	-.001	1	-1.073e-5	2	3416.312	2	NC	1
173		11	max	.003	3	.015	2	.002	3	9.404e-5	3	NC	3	NC	1
174			min	-.004	2	-.017	3	-.001	1	-1.472e-5	2	3027.967	2	NC	1
175		12	max	.004	3	.017	2	.002	3	1.092e-4	3	NC	3	NC	1
176			min	-.004	2	-.019	3	-.002	1	-1.871e-5	2	2706.054	2	NC	1
177		13	max	.004	3	.019	2	.002	3	1.243e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	-.002	1	-2.27e-5	2	2435.563	2	NC	1
179		14	max	.005	3	.021	2	.002	3	1.395e-4	3	NC	3	NC	1
180			min	-.005	2	-.021	3	-.002	1	-2.669e-5	2	2205.944	2	NC	1
181		15	max	.005	3	.023	2	.002	3	1.546e-4	3	NC	3	NC	1
182			min	-.006	2	-.022	3	-.002	1	-3.067e-5	2	2009.509	2	NC	1
183		16	max	.005	3	.025	2	.002	3	1.697e-4	3	NC	3	NC	1
184			min	-.006	2	-.023	3	-.002	1	-3.466e-5	2	1840.482	2	NC	1
185		17	max	.006	3	.027	2	.002	3	1.849e-4	3	NC	3	NC	1
186			min	-.006	2	-.024	3	-.002	1	-3.865e-5	2	1694.411	2	NC	1
187		18	max	.006	3	.029	2	.002	3	2.e-4	3	NC	3	NC	1
188			min	-.007	2	-.025	3	-.003	1	-4.264e-5	2	1567.8	2	NC	1
189		19	max	.006	3	.032	2	.002	3	2.152e-4	3	NC	3	NC	1
190			min	-.007	2	-.026	3	-.003	1	-4.662e-5	2	1457.858	2	NC	1
191	M8	1	max	.006	1	.038	2	.003	1	-6.052e-6	10	NC	1	NC	2
192			min	0	3	-.029	3	-.001	3	-1.876e-4	1	NC	1	6858.304	1
193		2	max	.005	1	.036	2	.003	1	-6.052e-6	10	NC	1	NC	2
194			min	0	3	-.027	3	-.001	3	-1.876e-4	1	NC	1	7477.377	1
195		3	max	.005	1	.034	2	.002	1	-6.052e-6	10	NC	1	NC	2
196			min	0	3	-.025	3	0	3	-1.876e-4	1	NC	1	8214.386	1
197		4	max	.005	1	.031	2	.002	1	-6.052e-6	10	NC	1	NC	2
198			min	0	3	-.024	3	0	3	-1.876e-4	1	NC	1	9100.397	1
199		5	max	.004	1	.029	2	.002	1	-6.052e-6	10	NC	1	NC	1
200			min	0	3	-.022	3	0	3	-1.876e-4	1	NC	1	NC	1
201		6	max	.004	1	.027	2	.002	1	-6.052e-6	10	NC	1	NC	1
202			min	0	3	-.021	3	0	3	-1.876e-4	1	NC	1	NC	1
203		7	max	.004	1	.025	2	.001	1	-6.052e-6	10	NC	1	NC	1
204			min	0	3	-.019	3	0	3	-1.876e-4	1	NC	1	NC	1
205		8	max	.003	1	.023	2	.001	1	-6.052e-6	10	NC	1	NC	1
206			min	0	3	-.017	3	0	3	-1.876e-4	1	NC	1	NC	1
207		9	max	.003	1	.021	2	.001	1	-6.052e-6	10	NC	1	NC	1
208			min	0	3	-.016	3	0	3	-1.876e-4	1	NC	1	NC	1
209		10	max	.003	1	.019	2	0	1	-6.052e-6	10	NC	1	NC	1
210			min	0	3	-.014	3	0	3	-1.876e-4	1	NC	1	NC	1
211		11	max	.003	1	.017	2	0	1	-6.052e-6	10	NC	1	NC	1
212			min	0	3	-.013	3	0	3	-1.876e-4	1	NC	1	NC	1
213		12	max	.002	1	.015	2	0	1	-6.052e-6	10	NC	1	NC	1
214			min	0	3	-.011	3	0	3	-1.876e-4	1	NC	1	NC	1
215		13	max	.002	1	.013	2	0	1	-6.052e-6	10	NC	1	NC	1
216			min	0	3	-.01	3	0	3	-1.876e-4	1	NC	1	NC	1
217		14	max	.002	1	.01	2	0	1	-6.052e-6	10	NC	1	NC	1
218			min	0	3	-.008	3	0	3	-1.876e-4	1	NC	1	NC	1
219		15	max	.001	1	.008	2	0	1	-6.052e-6	10	NC	1	NC	1
220			min	0	3	-.006	3	0	3	-1.876e-4	1	NC	1	NC	1
221		16	max	0	1	.006	2	0	1	-6.052e-6	10	NC	1	NC	1
222			min	0	3	-.005	3	0	3	-1.876e-4	1	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
223		17	max	0	1	.004	2	0	1	-6.052e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-1.876e-4	1	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-6.052e-6	10	NC	1	NC	1
226			min	0	3	-.002	3	0	3	-1.876e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-6.052e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.876e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.01	2	0	3	1.165e-3	1	NC	3	NC	1
230			min	-.003	3	-.01	3	-.002	1	-2.742e-4	3	3893.204	2	NC	1
231		2	max	.003	1	.009	2	0	3	1.104e-3	1	NC	3	NC	1
232			min	-.003	3	-.01	3	-.002	1	-2.656e-4	3	4238.337	2	NC	1
233		3	max	.003	1	.008	2	0	3	1.043e-3	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.002	1	-2.569e-4	3	4646.78	2	NC	1
235		4	max	.003	1	.008	2	0	3	9.822e-4	1	NC	3	NC	1
236			min	-.003	3	-.009	3	-.002	1	-2.482e-4	3	5133.304	2	NC	1
237		5	max	.002	1	.007	2	0	3	9.213e-4	1	NC	1	NC	1
238			min	-.003	3	-.008	3	-.002	1	-2.396e-4	3	5717.449	2	NC	1
239		6	max	.002	1	.006	2	0	3	8.604e-4	1	NC	1	NC	1
240			min	-.002	3	-.008	3	-.002	1	-2.309e-4	3	6425.462	2	NC	1
241		7	max	.002	1	.005	2	0	3	7.995e-4	1	NC	1	NC	1
242			min	-.002	3	-.007	3	-.002	1	-2.222e-4	3	7293.259	2	NC	1
243		8	max	.002	1	.005	2	0	3	7.386e-4	1	NC	1	NC	1
244			min	-.002	3	-.007	3	-.001	1	-2.136e-4	3	8371.051	2	NC	1
245		9	max	.002	1	.004	2	0	3	6.776e-4	1	NC	1	NC	1
246			min	-.002	3	-.007	3	-.001	1	-2.049e-4	3	9730.826	2	NC	1
247		10	max	.002	1	.003	2	0	3	6.167e-4	1	NC	1	NC	1
248			min	-.002	3	-.006	3	-.001	1	-1.962e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	5.558e-4	1	NC	1	NC	1
250			min	-.001	3	-.005	3	0	1	-1.876e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.949e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-1.789e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	4.34e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-1.703e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.731e-4	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-1.616e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	3.121e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-1.529e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.512e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.443e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.903e-4	1	NC	1	NC	1
262			min	0	3	-.002	3	0	1	-1.356e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.294e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.269e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.846e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.183e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.575e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.363e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	11	3.843e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.663e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	10	2.11e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.596e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	3.771e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-2.226e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-9.312e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-2.856e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	15	-1.421e-5	15	NC	1	NC	1
278			min	0	2	-.005	3	-.002	1	-3.486e-4	1	NC	1	NC	1
279		7	max	0	3	.001	2	0	15	-1.688e-5	15	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
280			min	0	2	-.005	3	-.002	1	-4.116e-4	1	NC	1	NC	1
281		8	max	0	3	.001	2	0	15	-1.954e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.003	1	-4.746e-4	1	NC	1	NC	1
283		9	max	0	3	.002	2	0	15	-2.22e-5	15	NC	1	NC	1
284			min	0	2	-.007	3	-.004	1	-5.376e-4	1	NC	1	NC	1
285		10	max	.001	3	.002	2	0	15	-2.487e-5	15	NC	1	NC	2
286			min	0	2	-.007	3	-.006	1	-6.006e-4	1	NC	1	8298.18	1
287		11	max	.001	3	.003	2	0	15	-2.753e-5	15	NC	1	NC	2
288			min	0	2	-.008	3	-.007	1	-6.636e-4	1	NC	1	6818.107	1
289		12	max	.001	3	.003	2	0	15	-3.02e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.008	1	-7.266e-4	1	NC	1	5744.612	1
291		13	max	.001	3	.004	2	0	15	-3.286e-5	15	NC	1	NC	2
292			min	-.001	2	-.008	3	-.009	1	-7.896e-4	1	NC	1	4941.302	1
293		14	max	.001	3	.005	2	0	15	-3.552e-5	15	NC	1	NC	2
294			min	-.001	2	-.009	3	-.011	1	-8.526e-4	1	9235.86	2	4325.053	1
295		15	max	.002	3	.006	2	0	15	-3.819e-5	15	NC	1	NC	2
296			min	-.001	2	-.009	3	-.012	1	-9.156e-4	1	7805.055	2	3842.82	1
297		16	max	.002	3	.007	2	0	15	-4.085e-5	15	NC	1	NC	3
298			min	-.001	2	-.009	3	-.013	1	-9.786e-4	1	6689.354	2	3459.45	1
299		17	max	.002	3	.008	2	0	15	-4.351e-5	15	NC	3	NC	3
300			min	-.002	2	-.009	3	-.015	1	-1.042e-3	1	5810.681	2	3150.916	1
301		18	max	.002	3	.009	2	0	15	-4.618e-5	15	NC	3	NC	3
302			min	-.002	2	-.009	3	-.016	1	-1.105e-3	1	5112.742	2	2900.371	1
303		19	max	.002	3	.01	2	0	15	-4.884e-5	15	NC	3	NC	3
304			min	-.002	2	-.009	3	-.017	1	-1.168e-3	1	4554.646	2	2695.756	1
305	M12	1	max	.002	1	.012	2	.014	1	1.085e-3	1	NC	1	NC	3
306			min	0	12	-.01	3	0	15	4.617e-5	15	NC	1	1366.727	1
307		2	max	.002	1	.011	2	.013	1	1.085e-3	1	NC	1	NC	3
308			min	0	12	-.009	3	0	15	4.617e-5	15	NC	1	1490.373	1
309		3	max	.002	1	.01	2	.012	1	1.085e-3	1	NC	1	NC	3
310			min	0	12	-.009	3	0	15	4.617e-5	15	NC	1	1637.56	1
311		4	max	.002	1	.01	2	.011	1	1.085e-3	1	NC	1	NC	3
312			min	0	12	-.008	3	0	15	4.617e-5	15	NC	1	1814.492	1
313		5	max	.002	1	.009	2	.01	1	1.085e-3	1	NC	1	NC	3
314			min	0	12	-.008	3	0	15	4.617e-5	15	NC	1	2029.62	1
315		6	max	.002	1	.009	2	.008	1	1.085e-3	1	NC	1	NC	3
316			min	0	12	-.007	3	0	15	4.617e-5	15	NC	1	2294.701	1
317		7	max	.001	1	.008	2	.007	1	1.085e-3	1	NC	1	NC	3
318			min	0	12	-.007	3	0	15	4.617e-5	15	NC	1	2626.477	1
319		8	max	.001	1	.007	2	.006	1	1.085e-3	1	NC	1	NC	3
320			min	0	12	-.006	3	0	15	4.617e-5	15	NC	1	3049.469	1
321		9	max	.001	1	.007	2	.005	1	1.085e-3	1	NC	1	NC	3
322			min	0	12	-.006	3	0	15	4.617e-5	15	NC	1	3600.766	1
323		10	max	.001	1	.006	2	.004	1	1.085e-3	1	NC	1	NC	2
324			min	0	12	-.005	3	0	15	4.617e-5	15	NC	1	4338.68	1
325		11	max	0	1	.005	2	.004	1	1.085e-3	1	NC	1	NC	2
326			min	0	12	-.004	3	0	15	4.617e-5	15	NC	1	5359.255	1
327		12	max	0	1	.005	2	.003	1	1.085e-3	1	NC	1	NC	2
328			min	0	12	-.004	3	0	15	4.617e-5	15	NC	1	6830.043	1
329		13	max	0	1	.004	2	.002	1	1.085e-3	1	NC	1	NC	2
330			min	0	12	-.003	3	0	15	4.617e-5	15	NC	1	9065.364	1
331		14	max	0	1	.003	2	.002	1	1.085e-3	1	NC	1	NC	1
332			min	0	12	-.003	3	0	15	4.617e-5	15	NC	1	NC	1
333		15	max	0	1	.003	2	.001	1	1.085e-3	1	NC	1	NC	1
334			min	0	12	-.002	3	0	15	4.617e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	1.085e-3	1	NC	1	NC	1
336			min	0	12	-.002	3	0	15	4.617e-5	15	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
337		17	max	0	1	.001	2	0	1	1.085e-3	1	NC	1	NC	1
338			min	0	12	-.001	3	0	15	4.617e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	1.085e-3	1	NC	1	NC	1
340			min	0	12	0	3	0	15	4.617e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	1.085e-3	1	NC	1	NC	1
342			min	0	1	0	1	0	1	4.617e-5	15	NC	1	NC	1
343	M1	1	max	.009	3	.027	3	.002	3	1.288e-2	1	NC	1	NC	1
344			min	-.009	2	-.025	2	-.006	1	-1.441e-2	3	NC	1	NC	1
345		2	max	.009	3	.016	3	.001	3	5.964e-3	1	NC	4	NC	2
346			min	-.009	2	-.015	2	-.012	1	-7.144e-3	3	4161.394	2	6979.562	1
347		3	max	.009	3	.005	3	0	3	-7.779e-6	3	NC	4	NC	2
348			min	-.009	2	-.004	2	-.016	1	-8.186e-4	1	2141.465	2	4232.785	1
349		4	max	.009	3	.005	1	0	3	-1.776e-6	3	NC	5	NC	3
350			min	-.009	2	-.003	3	-.019	1	-7.006e-4	1	1499.86	2	3503.061	1
351		5	max	.009	3	.012	2	0	3	4.227e-6	3	NC	5	NC	3
352			min	-.009	2	-.01	3	-.019	1	-5.826e-4	1	1189.389	2	3364.378	1
353		6	max	.009	3	.019	2	0	3	1.023e-5	3	NC	5	NC	3
354			min	-.009	2	-.016	3	-.018	1	-4.646e-4	1	1012.134	2	3600.833	1
355		7	max	.009	3	.024	2	0	3	1.623e-5	3	NC	5	NC	2
356			min	-.009	2	-.02	3	-.016	1	-3.466e-4	1	902.981	2	4289.072	1
357		8	max	.009	3	.028	2	0	3	2.224e-5	3	NC	5	NC	2
358			min	-.009	2	-.023	3	-.013	1	-2.287e-4	1	834.724	2	5891.544	1
359		9	max	.009	3	.03	2	0	3	2.824e-5	3	NC	5	NC	1
360			min	-.009	2	-.025	3	-.009	1	-1.107e-4	1	794.526	2	NC	1
361		10	max	.009	3	.031	2	0	3	3.424e-5	3	NC	5	NC	1
362			min	-.009	2	-.025	3	-.005	1	-2.179e-6	2	776.279	2	NC	1
363		11	max	.009	3	.031	2	0	3	1.253e-4	1	NC	5	NC	1
364			min	-.009	2	-.025	3	-.001	1	5.506e-6	15	777.809	2	NC	1
365		12	max	.009	3	.029	2	.002	1	2.433e-4	1	NC	5	NC	2
366			min	-.009	2	-.023	3	0	15	1.031e-5	15	800.06	2	6728.291	1
367		13	max	.009	3	.025	2	.005	1	3.613e-4	1	NC	5	NC	2
368			min	-.009	2	-.019	3	0	15	1.511e-5	15	847.59	2	4685.322	1
369		14	max	.009	3	.02	2	.008	1	4.793e-4	1	NC	5	NC	3
370			min	-.009	2	-.015	3	0	15	1.992e-5	15	930.866	2	3847.011	1
371		15	max	.009	3	.013	2	.009	1	5.973e-4	1	NC	5	NC	3
372			min	-.009	2	-.01	3	0	15	2.472e-5	15	1072.81	2	3546.563	1
373		16	max	.009	3	.004	1	.009	1	6.79e-4	1	NC	4	NC	3
374			min	-.009	2	-.003	3	0	15	2.807e-5	15	1329.33	2	3657.897	1
375		17	max	.009	3	.005	3	.007	1	3.018e-5	3	NC	4	NC	2
376			min	-.009	2	-.007	2	0	15	-1.023e-4	1	1878.135	2	4391.266	1
377		18	max	.009	3	.013	3	.002	1	7.817e-3	2	NC	4	NC	2
378			min	-.009	2	-.019	2	0	15	-3.394e-3	3	3628.251	2	7208.276	1
379		19	max	.009	3	.022	3	0	3	1.584e-2	2	NC	1	NC	1
380			min	-.009	2	-.033	2	-.004	1	-6.882e-3	3	NC	1	NC	1
381	M5	1	max	.026	3	.078	3	.002	3	1.247e-6	3	NC	1	NC	1
382			min	-.03	2	-.077	1	-.006	1	5.462e-8	10	NC	1	NC	1
383		2	max	.026	3	.047	3	.003	3	7.815e-5	3	NC	5	NC	1
384			min	-.03	2	-.045	1	-.006	1	-6.617e-5	1	1414.47	1	NC	1
385		3	max	.026	3	.017	3	.003	3	1.535e-4	3	NC	5	NC	1
386			min	-.03	2	-.014	2	-.005	1	-1.319e-4	1	727.113	1	NC	1
387		4	max	.026	3	.012	1	.004	3	1.487e-4	3	NC	5	NC	1
388			min	-.03	2	-.008	3	-.004	1	-1.252e-4	1	511.702	1	NC	1
389		5	max	.026	3	.035	1	.004	3	1.439e-4	3	NC	5	NC	1
390			min	-.03	2	-.028	3	-.004	1	-1.185e-4	1	405.377	2	NC	1
391		6	max	.026	3	.054	2	.005	3	1.391e-4	3	NC	15	NC	1
392			min	-.03	2	-.045	3	-.004	1	-1.117e-4	1	344.241	2	NC	1
393		7	max	.025	3	.07	2	.005	3	1.343e-4	3	NC	15	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
394			min	-.03	2	-.057	3	-.003	1	-1.05e-4	1	306.519	2	NC	1
395		8	max	.025	3	.081	2	.005	3	1.295e-4	3	NC	15	NC	1
396			min	-.03	2	-.066	3	-.003	1	-9.829e-5	1	282.836	2	NC	1
397		9	max	.025	3	.089	2	.005	3	1.247e-4	3	NC	15	NC	1
398			min	-.03	2	-.071	3	-.003	1	-9.157e-5	1	268.763	2	NC	1
399		10	max	.025	3	.092	2	.004	3	1.199e-4	3	NC	15	NC	1
400			min	-.03	2	-.072	3	-.003	1	-8.484e-5	1	262.185	2	NC	1
401		11	max	.025	3	.09	2	.004	3	1.151e-4	3	NC	15	NC	1
402			min	-.03	2	-.07	3	-.002	1	-7.812e-5	1	262.335	2	NC	1
403		12	max	.025	3	.084	2	.004	3	1.103e-4	3	NC	15	NC	1
404			min	-.03	2	-.064	3	-.002	1	-7.14e-5	1	269.509	2	NC	1
405		13	max	.025	3	.073	2	.003	3	1.054e-4	3	NC	15	NC	1
406			min	-.03	2	-.055	3	-.002	1	-6.468e-5	1	285.231	2	NC	1
407		14	max	.025	3	.058	2	.003	3	1.006e-4	3	NC	15	NC	1
408			min	-.03	2	-.042	3	-.002	1	-5.796e-5	1	313.03	2	NC	1
409		15	max	.025	3	.037	2	.002	3	9.583e-5	3	NC	5	NC	1
410			min	-.03	2	-.027	3	-.003	1	-5.124e-5	1	360.67	2	NC	1
411		16	max	.025	3	.01	1	.002	3	8.75e-5	3	NC	5	NC	1
412			min	-.03	2	-.008	3	-.003	1	-5.38e-5	1	447.201	2	NC	1
413		17	max	.025	3	.014	3	.001	3	-3.227e-6	12	NC	5	NC	1
414			min	-.03	2	-.022	2	-.003	1	-2.772e-4	1	634.104	2	NC	1
415		18	max	.025	3	.038	3	0	3	-2.225e-6	12	NC	5	NC	1
416			min	-.03	2	-.059	2	-.003	1	-1.421e-4	1	1231.498	2	NC	1
417		19	max	.025	3	.062	3	0	3	-3.211e-8	15	NC	1	NC	1
418			min	-.03	2	-.098	2	-.003	1	-2.49e-7	3	NC	1	NC	1
419	M9	1	max	.009	3	.026	3	.001	3	1.442e-2	3	NC	1	NC	1
420			min	-.009	2	-.025	2	-.008	1	-1.287e-2	1	NC	1	NC	1
421		2	max	.009	3	.015	3	0	3	7.128e-3	3	NC	4	NC	2
422			min	-.009	2	-.015	2	-.001	1	-6.238e-3	1	4163.032	2	8088.856	1
423		3	max	.009	3	.005	3	.002	1	2.732e-4	1	NC	4	NC	2
424			min	-.009	2	-.004	2	0	3	-2.69e-5	3	2142.333	2	5023.365	1
425		4	max	.009	3	.005	1	.004	1	1.732e-4	1	NC	5	NC	3
426			min	-.009	2	-.003	3	0	3	-3.453e-5	3	1500.48	2	4257.477	1
427		5	max	.009	3	.012	2	.005	1	7.319e-5	1	NC	5	NC	3
428			min	-.009	2	-.01	3	-.001	3	-4.215e-5	3	1189.877	2	4221.089	1
429		6	max	.009	3	.019	2	.004	1	7.96e-6	2	NC	5	NC	3
430			min	-.009	2	-.016	3	-.002	3	-4.977e-5	3	1012.543	2	4739.962	1
431		7	max	.009	3	.024	2	.002	1	-2.553e-6	10	NC	5	NC	2
432			min	-.009	2	-.02	3	-.002	3	-1.268e-4	1	903.34	2	6135.752	1
433		8	max	.009	3	.028	2	0	2	-9.311e-6	15	NC	5	NC	1
434			min	-.009	2	-.023	3	-.003	3	-2.268e-4	1	835.049	2	NC	1
435		9	max	.009	3	.03	2	0	10	-1.34e-5	15	NC	5	NC	1
436			min	-.009	2	-.025	3	-.004	1	-3.268e-4	1	794.827	2	NC	1
437		10	max	.009	3	.031	2	0	15	-1.748e-5	15	NC	5	NC	1
438			min	-.009	2	-.026	3	-.007	1	-4.268e-4	1	776.566	2	NC	1
439		11	max	.009	3	.031	2	0	15	-2.157e-5	15	NC	5	NC	2
440			min	-.009	2	-.025	3	-.011	1	-5.268e-4	1	778.089	2	7547.709	1
441		12	max	.009	3	.029	2	0	15	-2.565e-5	15	NC	5	NC	2
442			min	-.009	2	-.023	3	-.014	1	-6.268e-4	1	800.34	2	4927.113	1
443		13	max	.009	3	.025	2	0	15	-2.974e-5	15	NC	5	NC	2
444			min	-.009	2	-.019	3	-.016	1	-7.269e-4	1	847.877	2	3840.874	1
445		14	max	.009	3	.02	2	0	15	-3.382e-5	15	NC	5	NC	3
446			min	-.009	2	-.015	3	-.018	1	-8.269e-4	1	931.171	2	3346.36	1
447		15	max	.009	3	.013	2	0	15	-3.791e-5	15	NC	5	NC	3
448			min	-.009	2	-.01	3	-.018	1	-9.269e-4	1	1073.149	2	3199.713	1
449		16	max	.009	3	.004	1	0	15	-4.081e-5	15	NC	4	NC	3
450			min	-.009	2	-.003	3	-.017	1	-9.992e-4	1	1329.732	2	3382.19	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
451		17	max	.009	3	.005	3	0	15	2.733e-5	3	NC	4	NC	2
452			min	-.009	2	-.007	2	-.014	1	-4.119e-4	1	1878.663	2	4132.142	1
453		18	max	.009	3	.013	3	0	15	3.424e-3	3	NC	4	NC	2
454			min	-.009	2	-.019	2	-.009	1	-7.931e-3	2	3629.232	2	6871.497	1
455		19	max	.009	3	.022	3	0	3	6.882e-3	3	NC	1	NC	1
456			min	-.009	2	-.033	2	-.002	1	-1.584e-2	2	NC	1	NC	1
457	M13	1	max	.008	1	.026	3	.009	3	4.173e-3	3	NC	1	NC	1
458			min	-.001	3	-.025	2	-.009	2	-4.17e-3	1	NC	1	NC	1
459		2	max	.007	1	.17	3	.047	1	5.033e-3	3	NC	5	NC	3
460			min	-.001	3	-.154	1	0	10	-5.07e-3	1	1293.346	3	3554.305	1
461		3	max	.007	1	.288	3	.119	1	5.893e-3	3	NC	5	NC	3
462			min	-.001	3	-.259	1	.005	15	-5.97e-3	1	710.759	3	1497.881	1
463		4	max	.007	1	.363	3	.18	1	6.753e-3	3	NC	5	NC	3
464			min	-.002	3	-.326	1	.008	15	-6.87e-3	1	553.336	3	1007.761	1
465		5	max	.007	1	.385	3	.209	1	7.613e-3	3	NC	5	NC	3
466			min	-.002	3	-.347	1	.009	15	-7.77e-3	1	518.276	3	870.202	1
467		6	max	.007	1	.357	3	.198	1	8.473e-3	3	NC	5	NC	3
468			min	-.002	3	-.323	1	.008	15	-8.671e-3	1	562.212	3	915.62	1
469		7	max	.007	1	.289	3	.15	1	9.333e-3	3	NC	5	NC	3
470			min	-.002	3	-.263	1	.005	10	-9.571e-3	1	709.54	3	1196.905	1
471		8	max	.007	1	.199	3	.079	1	1.019e-2	3	NC	5	NC	3
472			min	-.002	3	-.184	1	-.004	10	-1.047e-2	1	1080.482	3	2204.712	1
473		9	max	.007	1	.116	3	.024	3	1.105e-2	3	NC	4	NC	1
474			min	-.002	3	-.111	1	-.017	2	-1.137e-2	1	2080.436	3	NC	1
475		10	max	.006	1	.078	3	.026	3	1.191e-2	3	NC	4	NC	1
476			min	-.002	3	-.077	1	-.03	2	-1.227e-2	1	3567.105	1	8831.395	2
477		11	max	.006	1	.116	3	.03	3	1.105e-2	3	NC	4	NC	2
478			min	-.002	3	-.111	1	-.016	2	-1.137e-2	1	2080.435	3	8883.436	3
479		12	max	.006	1	.199	3	.086	1	1.019e-2	3	NC	5	NC	5
480			min	-.002	3	-.184	1	-.004	10	-1.047e-2	1	1080.481	3	2034.494	1
481		13	max	.006	1	.289	3	.159	1	9.335e-3	3	NC	5	NC	5
482			min	-.002	3	-.263	1	.005	10	-9.57e-3	1	709.54	3	1135.587	1
483		14	max	.006	1	.357	3	.207	1	8.475e-3	3	NC	5	NC	5
484			min	-.002	3	-.323	1	.009	15	-8.669e-3	1	562.212	3	878.583	1
485		15	max	.006	1	.385	3	.217	1	7.616e-3	3	NC	5	NC	5
486			min	-.002	3	-.347	1	.009	15	-7.769e-3	1	518.276	3	839.551	1
487		16	max	.006	1	.363	3	.186	1	6.757e-3	3	NC	5	NC	5
488			min	-.002	3	-.326	1	.008	15	-6.868e-3	1	553.336	3	974.298	1
489		17	max	.006	1	.288	3	.124	1	5.897e-3	3	NC	5	NC	3
490			min	-.002	3	-.259	1	.005	15	-5.968e-3	1	710.759	3	1446.64	1
491		18	max	.006	1	.17	3	.05	1	5.038e-3	3	NC	5	NC	3
492			min	-.002	3	-.154	1	0	10	-5.067e-3	1	1293.345	3	3410.324	1
493		19	max	.006	1	.027	3	.009	3	4.179e-3	3	NC	1	NC	1
494			min	-.002	3	-.025	2	-.009	2	-4.167e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.022	3	.009	3	5.077e-3	2	NC	1	NC	1
496			min	0	3	-.033	2	-.009	2	-3.377e-3	3	NC	1	NC	1
497		2	max	.002	1	.091	3	.05	1	6.163e-3	2	NC	5	NC	3
498			min	0	3	-.191	2	0	10	-4.041e-3	3	1176.957	2	3334.934	1
499		3	max	.002	1	.148	3	.125	1	7.248e-3	2	NC	5	NC	3
500			min	0	3	-.321	2	.005	15	-4.704e-3	3	646.251	2	1430.089	1
501		4	max	.003	1	.184	3	.187	1	8.334e-3	2	NC	5	NC	5
502			min	0	3	-.403	2	.008	15	-5.367e-3	3	502.342	2	968.97	1
503		5	max	.003	1	.197	3	.216	1	9.419e-3	2	NC	5	NC	5
504			min	0	3	-.429	2	.009	15	-6.031e-3	3	469.295	2	838.785	1
505		6	max	.003	1	.186	3	.206	1	1.05e-2	2	NC	5	NC	5
506			min	0	3	-.4	2	.009	15	-6.694e-3	3	506.809	2	881.787	1
507		7	max	.003	1	.156	3	.157	1	1.159e-2	2	NC	5	NC	5

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
508			min	0	3	-.326	2	.005	10	-7.357e-3	3	634.28	2	1146.656	1
509		8	max	.003	1	.116	3	.084	1	1.268e-2	2	NC	5	NC	5
510			min	0	3	-.229	2	-.004	10	-8.021e-3	3	948.591	2	2078.801	1
511		9	max	.003	1	.079	3	.028	3	1.376e-2	2	NC	4	NC	1
512			min	0	3	-.139	2	-.016	2	-8.684e-3	3	1745.871	2	9690.854	3
513		10	max	.003	1	.062	3	.025	3	1.485e-2	2	NC	4	NC	1
514			min	0	3	-.098	2	-.03	2	-9.347e-3	3	2832.427	2	8868.3	2
515		11	max	.003	1	.079	3	.025	3	1.376e-2	2	NC	4	NC	1
516			min	0	3	-.139	2	-.016	2	-8.683e-3	3	1745.871	2	NC	1
517		12	max	.003	1	.116	3	.082	1	1.268e-2	2	NC	5	NC	3
518			min	0	3	-.229	2	-.004	10	-8.019e-3	3	948.591	2	2137.659	1
519		13	max	.003	1	.156	3	.153	1	1.159e-2	2	NC	5	NC	5
520			min	0	3	-.326	2	.005	10	-7.355e-3	3	634.28	2	1171.824	1
521		14	max	.004	1	.186	3	.201	1	1.051e-2	2	NC	5	NC	5
522			min	0	3	-.4	2	.009	15	-6.691e-3	3	506.809	2	899.8	1
523		15	max	.004	1	.197	3	.212	1	9.42e-3	2	NC	5	NC	5
524			min	0	3	-.429	2	.009	15	-6.027e-3	3	469.295	2	856.453	1
525		16	max	.004	1	.184	3	.182	1	8.335e-3	2	NC	5	NC	3
526			min	0	3	-.403	2	.008	15	-5.363e-3	3	502.342	2	991.879	1
527		17	max	.004	1	.147	3	.121	1	7.25e-3	2	NC	5	NC	3
528			min	0	3	-.321	2	.005	15	-4.699e-3	3	646.251	2	1471.899	1
529		18	max	.004	1	.091	3	.048	1	6.164e-3	2	NC	5	NC	3
530			min	0	3	-.191	2	0	10	-4.035e-3	3	1176.957	2	3475.247	1
531		19	max	.004	1	.022	3	.009	3	5.079e-3	2	NC	1	NC	1
532			min	0	3	-.033	2	-.009	2	-3.37e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.817e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-8.566e-5	2	NC	1	NC	1
535		2	max	0	3	-.005	15	.001	1	8.844e-4	3	NC	5	NC	1
536			min	0	10	-.023	4	0	3	-6.302e-4	2	4468.999	4	NC	1
537		3	max	0	3	-.01	15	.004	1	1.387e-3	3	9674.438	15	NC	1
538			min	0	10	-.045	4	-.003	3	-1.175e-3	2	2274.121	4	NC	1
539		4	max	0	3	-.015	15	.008	1	1.89e-3	3	6637.23	15	NC	4
540			min	0	10	-.065	4	-.007	3	-1.719e-3	2	1560.18	4	8028.54	2
541		5	max	0	3	-.02	15	.013	1	2.392e-3	3	5179.098	15	NC	4
542			min	0	10	-.083	4	-.012	3	-2.277e-3	1	1217.424	4	5354.188	2
543		6	max	0	3	-.023	15	.018	1	2.895e-3	3	4358.758	15	NC	4
544			min	0	10	-.099	4	-.017	3	-2.838e-3	1	1024.591	4	3939.168	3
545		7	max	0	3	-.026	15	.023	1	3.398e-3	3	3865.432	15	NC	4
546			min	0	10	-.112	4	-.022	3	-3.4e-3	1	908.628	4	3081.417	3
547		8	max	0	3	-.028	15	.029	1	3.901e-3	3	3569.362	15	NC	4
548			min	0	10	-.121	4	-.028	3	-3.961e-3	1	839.032	4	2541.956	3
549		9	max	0	3	-.03	15	.033	1	4.403e-3	3	3410	15	NC	4
550			min	0	10	-.127	4	-.032	3	-4.522e-3	1	801.571	4	2188.828	3
551		10	max	0	3	-.03	15	.037	1	4.906e-3	3	3359.585	15	NC	4
552			min	0	10	-.129	4	-.036	3	-5.084e-3	1	789.721	4	1955.728	3
553		11	max	0	3	-.03	15	.039	1	5.409e-3	3	3410	15	NC	4
554			min	0	10	-.127	4	-.038	3	-5.645e-3	1	801.571	4	1807.839	3
555		12	max	0	3	-.028	15	.04	1	5.911e-3	3	3569.362	15	NC	5
556			min	0	10	-.121	4	-.039	3	-6.207e-3	1	839.032	4	1727.895	3
557		13	max	0	3	-.026	15	.039	1	6.414e-3	3	3865.432	15	NC	5
558			min	0	10	-.112	4	-.038	3	-6.768e-3	1	908.628	4	1710.908	3
559		14	max	0	3	-.023	15	.036	1	6.917e-3	3	4358.758	15	NC	4
560			min	0	10	-.1	4	-.035	3	-7.329e-3	1	1024.591	4	1764.371	3
561		15	max	.001	3	-.02	15	.03	1	7.419e-3	3	5179.098	15	NC	4
562			min	0	10	-.084	4	-.028	3	-7.891e-3	1	1217.424	4	1915.723	3
563		16	max	.001	3	-.015	15	.021	1	7.922e-3	3	6637.23	15	NC	4
564			min	0	10	-.066	4	-.019	3	-8.452e-3	1	1560.18	4	2239.44	3

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
565		17	max	.001	3	-.011	15	.009	1	8.425e-3	3	9674.438	15	NC	4
566			min	0	10	-.046	4	-.006	3	-9.013e-3	1	2274.121	4	2969.157	3
567		18	max	.001	3	-.006	15	.01	3	8.928e-3	3	NC	5	NC	4
568			min	0	10	-.024	4	-.014	2	-9.575e-3	1	4468.999	4	5286.734	3
569		19	max	.001	3	.003	2	.031	3	9.43e-3	3	NC	1	NC	1
570			min	-.001	10	-.003	9	-.034	2	-1.014e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	2	.01	3	3.186e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	9	-.01	2	-3.16e-3	2	NC	1	NC	1
573		2	max	0	10	-.005	15	.005	1	3.052e-3	3	NC	5	NC	2
574			min	-.001	3	-.023	4	-.002	10	-3.017e-3	2	4468.999	4	8805.326	1
575		3	max	0	10	-.011	15	.014	1	2.917e-3	3	9674.438	15	NC	4
576			min	-.001	3	-.045	4	-.004	3	-2.874e-3	2	2274.121	4	4975.49	1
577		4	max	0	10	-.015	15	.021	1	2.783e-3	3	6637.23	15	NC	4
578			min	-.001	3	-.065	4	-.008	3	-2.73e-3	2	1560.18	4	3778.564	1
579		5	max	0	10	-.02	15	.026	1	2.648e-3	3	5179.098	15	NC	4
580			min	-.001	3	-.084	4	-.011	3	-2.587e-3	2	1217.424	4	3257.729	1
581		6	max	0	10	-.023	15	.028	1	2.513e-3	3	4358.758	15	NC	4
582			min	0	3	-.099	4	-.013	3	-2.443e-3	2	1024.591	4	3027.389	1
583		7	max	0	10	-.026	15	.029	1	2.379e-3	3	3865.432	15	NC	4
584			min	0	3	-.112	4	-.014	3	-2.3e-3	2	908.628	4	2966.348	1
585		8	max	0	10	-.028	15	.029	1	2.244e-3	3	3569.362	15	NC	4
586			min	0	3	-.121	4	-.014	3	-2.157e-3	2	839.032	4	3032.584	1
587		9	max	0	10	-.03	15	.028	1	2.11e-3	3	3410	15	NC	4
588			min	0	3	-.126	4	-.014	3	-2.013e-3	2	801.571	4	3219.3	1
589		10	max	0	10	-.03	15	.025	1	1.975e-3	3	3359.585	15	NC	4
590			min	0	3	-.128	4	-.012	3	-1.87e-3	2	789.721	4	3544.378	1
591		11	max	0	10	-.03	15	.022	1	1.84e-3	3	3410	15	NC	4
592			min	0	3	-.126	4	-.011	3	-1.727e-3	2	801.571	4	4053.819	1
593		12	max	0	10	-.028	15	.018	1	1.706e-3	3	3569.362	15	NC	4
594			min	0	3	-.121	4	-.009	3	-1.583e-3	2	839.032	4	4838.944	1
595		13	max	0	10	-.026	15	.014	1	1.571e-3	3	3865.432	15	NC	3
596			min	0	3	-.111	4	-.006	3	-1.44e-3	2	908.628	4	6080.435	1
597		14	max	0	10	-.023	15	.01	1	1.437e-3	3	4358.758	15	NC	2
598			min	0	3	-.099	4	-.004	3	-1.297e-3	2	1024.591	4	8163.619	1
599		15	max	0	10	-.02	15	.007	1	1.302e-3	3	5179.098	15	NC	1
600			min	0	3	-.083	4	-.002	3	-1.153e-3	2	1217.424	4	NC	1
601		16	max	0	10	-.015	15	.004	1	1.167e-3	3	6637.23	15	NC	1
602			min	0	3	-.065	4	0	3	-1.01e-3	2	1560.18	4	NC	1
603		17	max	0	10	-.01	15	.001	1	1.033e-3	3	9674.438	15	NC	1
604			min	0	3	-.045	4	0	10	-8.664e-4	2	2274.121	4	NC	1
605		18	max	0	10	-.005	15	0	3	8.983e-4	3	NC	5	NC	1
606			min	0	3	-.023	4	0	2	-7.231e-4	2	4468.999	4	NC	1
607		19	max	0	1	0	1	0	1	7.637e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.797e-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

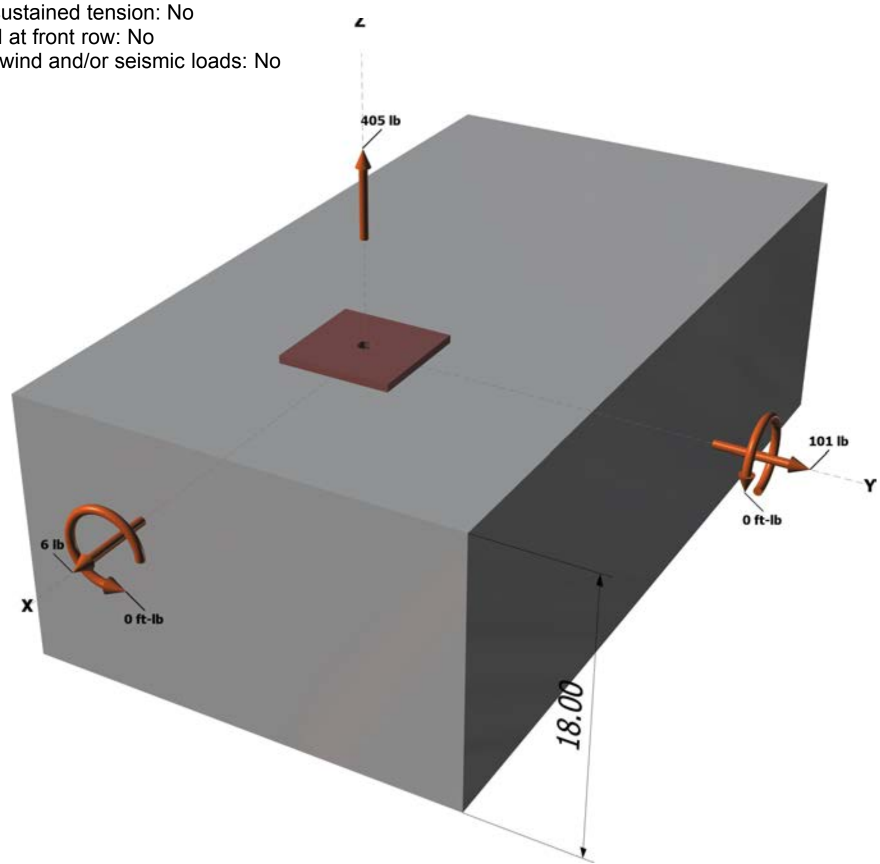
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

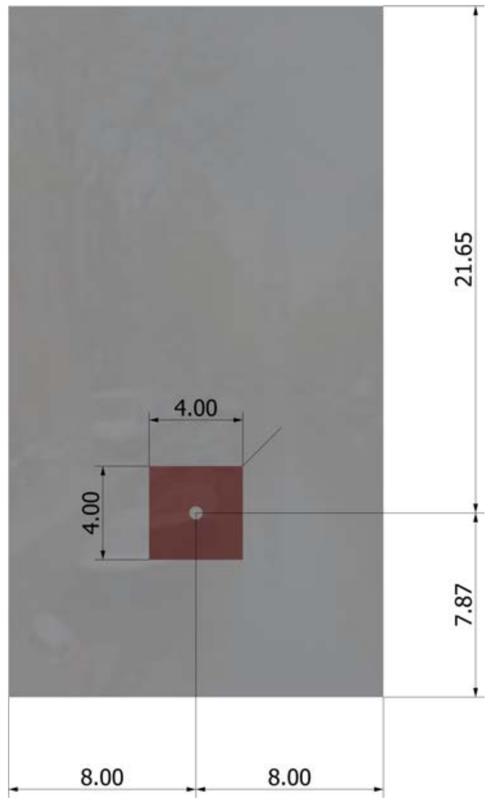
<Figure 1>



Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	2/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

<Figure 2>



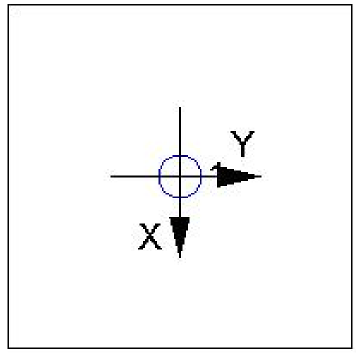
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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.

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

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 2.4.5673.0

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

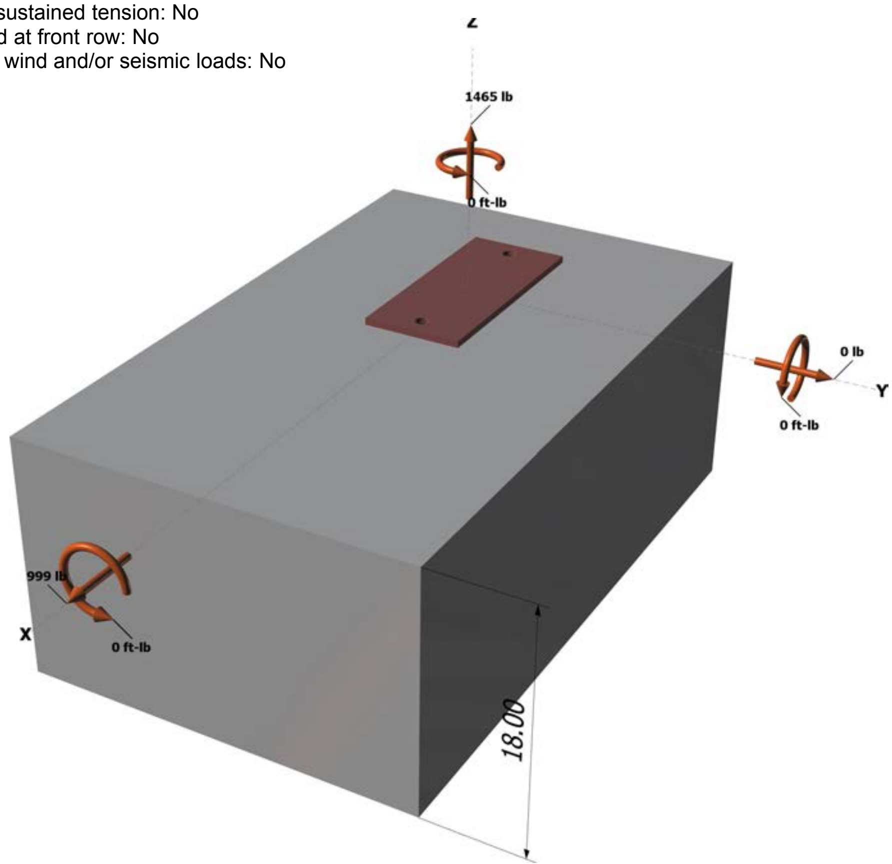
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

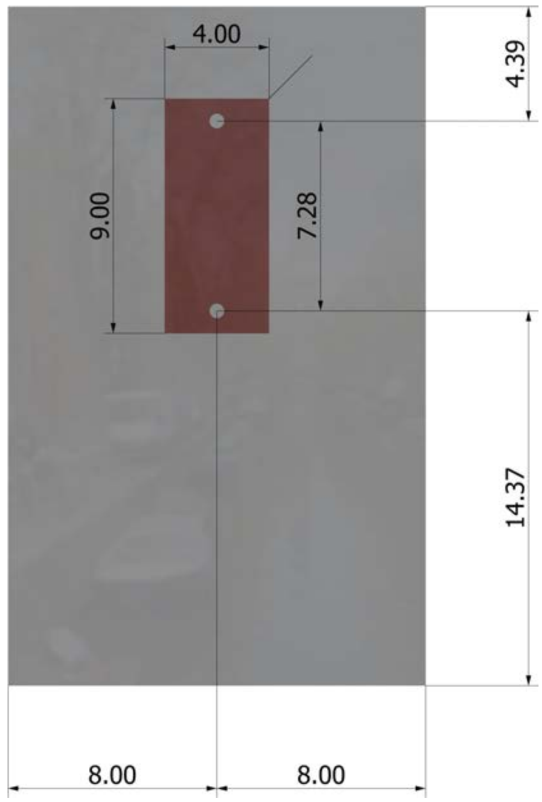
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



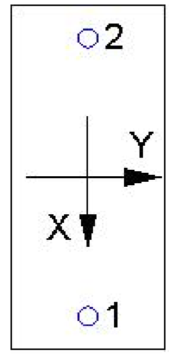
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.