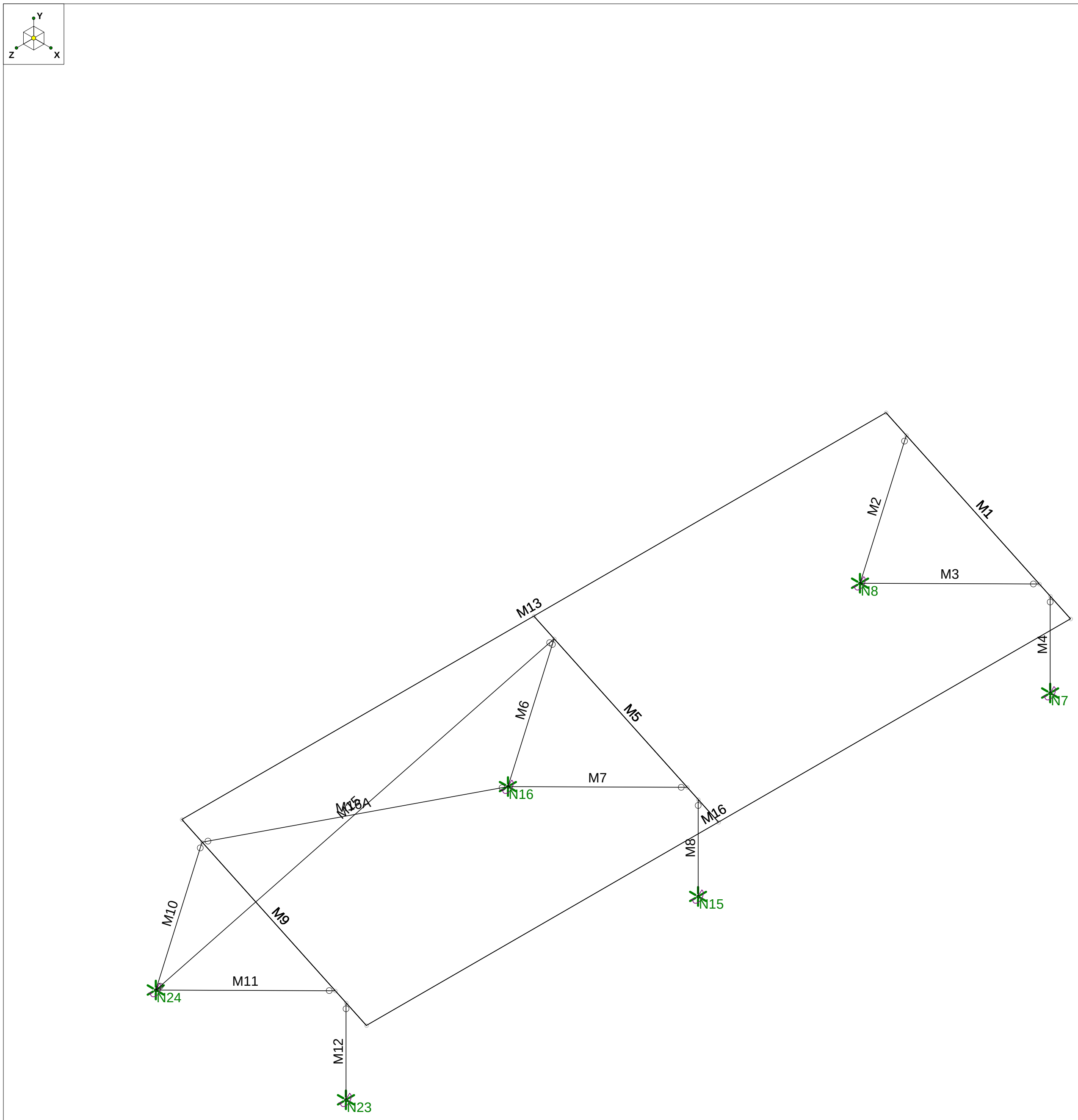


Schletter, Inc.		25ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

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.

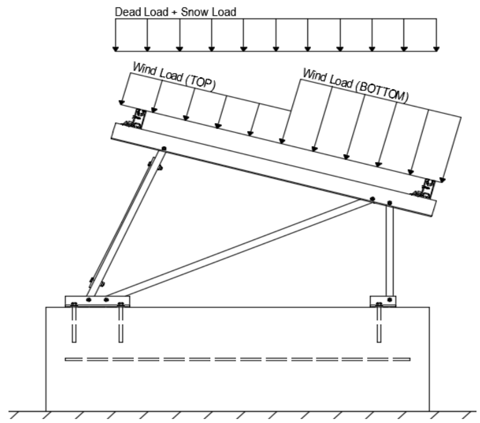
1.2 Construction

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 = 25°
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 =	18.56 psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00	
C_s =	0.82	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V = 115 mph — Exposure Category = C
Height ≤ 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 20.76 psf — *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.1	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.7	
$Cf-_{TOP}$	=	-2.2	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	

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

2.4 Seismic Loads - 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.

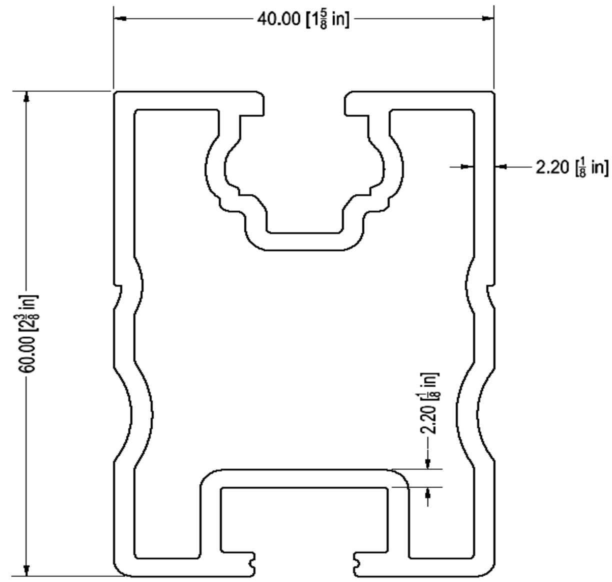
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24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

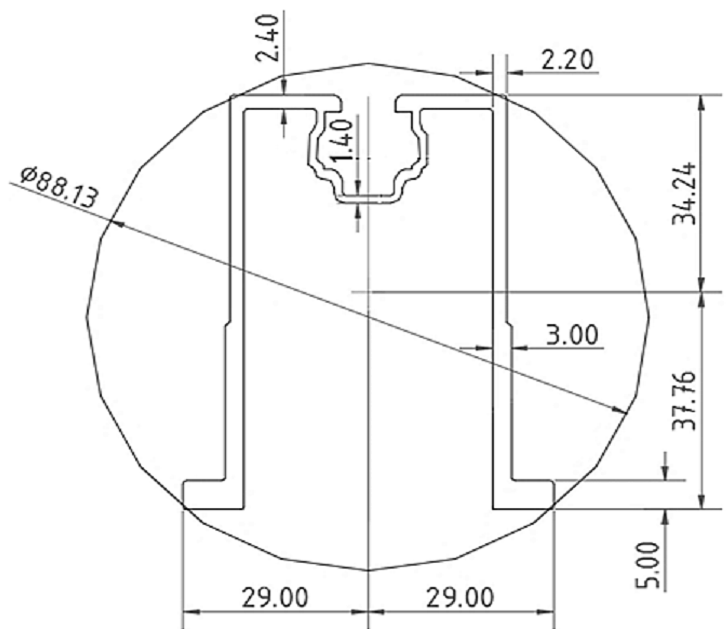
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.45	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.870	k-ft
M_z =	0.192	k-ft
$M_{y\ allowable}$ =	1.211	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	94%	



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).

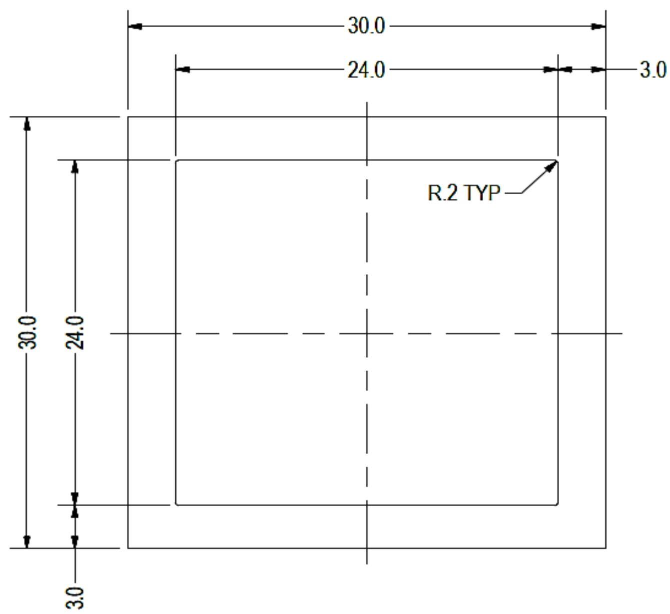
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.577	k-ft
M_z =	0.000	k-ft
P_n =	0.302	k
$M_{y\ allowable}$ =	1.453	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	42%	



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).

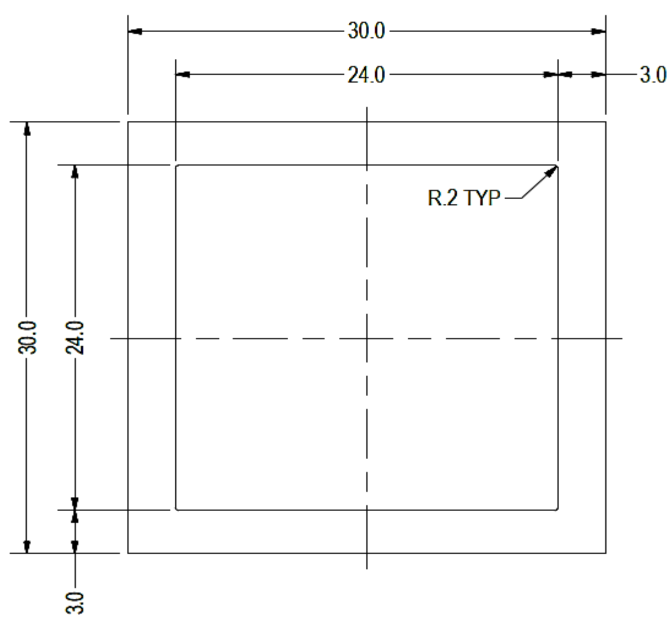
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.272	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	11%	



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).

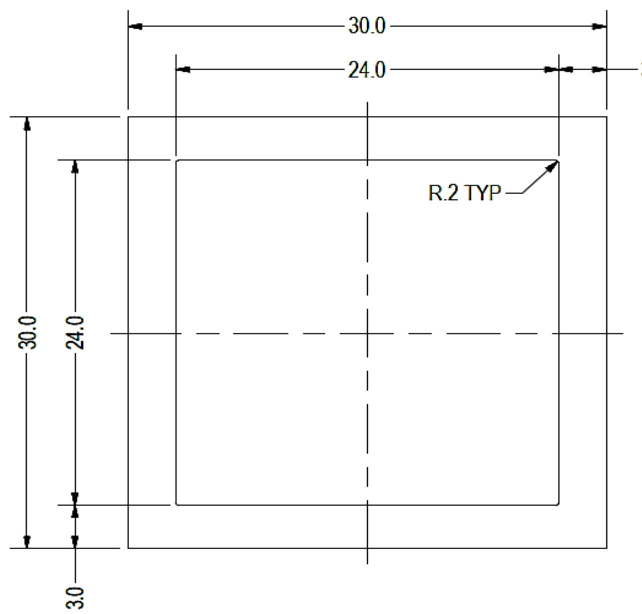
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.469	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	12%	



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).

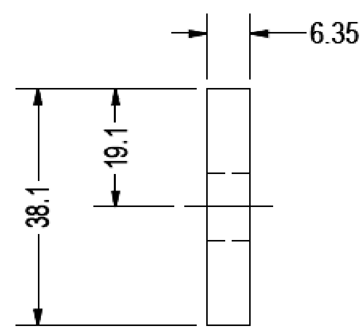
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.055	k
$M_{y\ allowable}$ =	0.410	k-ft
$M_{z\ allowable}$ =	0.410	k-ft
$P_{n\ allowable}$ =	5.820	k
Utilization =	18%	



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.005	k-ft
P_n =	0.044	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	11%	



A cross brace kit is required every 17 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

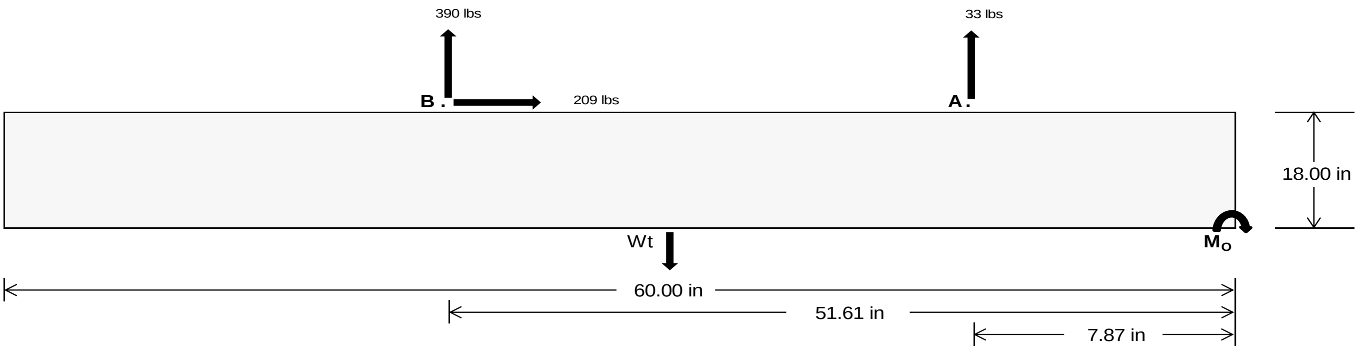
5.1 Helical Pile Foundations

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 =	151.29	1693.73	k
Compressive Load =	1653.15	1376.09	k
Lateral Load =	4.40	908.28	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 =	24133.9 in-lbs
Resisting Force Required =	804.46 lbs
S.F. =	1.67
Weight Required =	1340.77 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 =	209.44 lbs
Friction =	0.4
Weight Required =	523.59 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 =	209.44 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	630 lbs	630 lbs	630 lbs	630 lbs	469 lbs	469 lbs	469 lbs	469 lbs	773 lbs	773 lbs	773 lbs	773 lbs	-66 lbs	-66 lbs	-66 lbs	-66 lbs
F_B	456 lbs	456 lbs	456 lbs	456 lbs	507 lbs	507 lbs	507 lbs	507 lbs	684 lbs	684 lbs	684 lbs	684 lbs	-779 lbs	-779 lbs	-779 lbs	-779 lbs
F_V	69 lbs	69 lbs	69 lbs	69 lbs	381 lbs	381 lbs	381 lbs	381 lbs	332 lbs	332 lbs	332 lbs	332 lbs	-419 lbs	-419 lbs	-419 lbs	-419 lbs
P_{total}	2989 lbs	3080 lbs	3170 lbs	3261 lbs	2879 lbs	2969 lbs	3060 lbs	3151 lbs	3360 lbs	3451 lbs	3541 lbs	3632 lbs	297 lbs	351 lbs	406 lbs	460 lbs
M	443 lbs-ft	443 lbs-ft	443 lbs-ft	443 lbs-ft	523 lbs-ft	523 lbs-ft	523 lbs-ft	523 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	653 lbs-ft	653 lbs-ft	653 lbs-ft	653 lbs-ft
e	0.15 ft	0.14 ft	0.14 ft	0.14 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.20 ft	1.86 ft	1.61 ft	1.42 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}	280.9 psf	278.0 psf	275.4 psf	273.0 psf	257.2 psf	255.4 psf	253.8 psf	252.2 psf	289.2 psf	285.9 psf	282.9 psf	280.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	402.3 psf	393.9 psf	386.2 psf	379.2 psf	400.8 psf	392.4 psf	384.8 psf	377.9 psf	478.8 psf	466.9 psf	456.1 psf	446.1 psf	377.4 psf	199.5 psf	158.6 psf	142.0 psf

Maximum Bearing Pressure =	479 psf
Allowable Bearing Pressure =	1500 psf

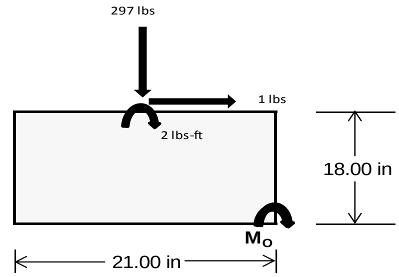
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 256.5 ft-lbs
Resisting Force Required = 293.15 lbs
S.F. = 1.67
Weight Required = 488.58 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	83 lbs	221 lbs	78 lbs	302 lbs	891 lbs	297 lbs	24 lbs	65 lbs	23 lbs
F_V	4 lbs	4 lbs	0 lbs	17 lbs	16 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2439 lbs	2577 lbs	2435 lbs	2545 lbs	3134 lbs	2540 lbs	713 lbs	754 lbs	712 lbs
M	6 lbs-ft	5 lbs-ft	0 lbs-ft	29 lbs-ft	24 lbs-ft	3 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.75 ft	1.75 ft	1.73 ft	1.73 ft	1.75 ft	1.75 ft	1.75 ft	1.75 ft
f_{min}	276.5 sqft	292.4 sqft	278.1 sqft	279.6 sqft	348.7 sqft	288.9 sqft	80.9 sqft	85.5 sqft	81.3 sqft
f_{max}	281.0 psf	296.6 psf	278.4 psf	302.0 psf	367.6 psf	291.6 psf	82.2 psf	86.7 psf	81.4 psf

Maximum Bearing Pressure = 368 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

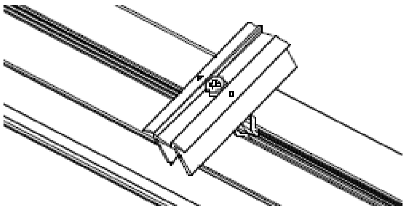
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

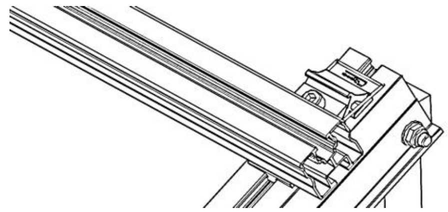
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.424	k
Allowable Uplift =	1.214	k
Utilization =	35%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.082	k
Allowable Uplift =	1.116	k
Utilization =	97%	



6.2 Bolted Connections

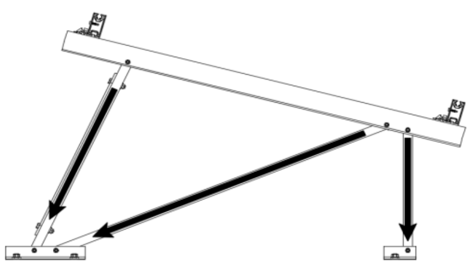
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.272	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	22%	

Rear Strut		
Maximum Axial Load =	1.168	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut		
Maximum Axial Load =	0.469	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	8%	

Bracing		
Maximum Axial Load =	0.044	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
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.

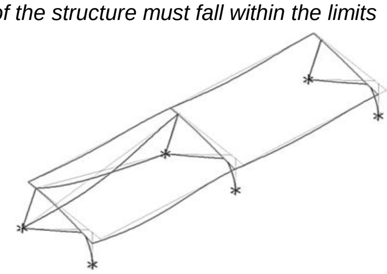
7. SEISMIC DESIGN

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} =	30.83	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.617	in
Max Drift, Δ_{MAX} =	0.052	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**

Strong Axis:

3.4.14

$L_b =$ 87.00 in

J = 0.255

226.543

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$

$\varphi F_L =$ 28.5 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

Weak Axis:

3.4.14

$L_b =$ 87.00 in

J = 0.255

235.251

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

S1 = 0.51461

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

S2 = 1701.56

$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$

$\varphi F_L =$ 28.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.5 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.211 k-ft

3.4.18

h/t = 7.4

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.22
22.2924

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.6 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 = 1.22
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= 29.6 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= 29.6 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.453 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^{*} =$ 0.33515

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

$S2^{*} =$ 1.23671

$\varphi cc =$ 0.83792

$\varphi F_L = \varphi cc(Bc\text{-}Dc^{*}\lambda)$

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

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= 30.2 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= 30.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.410 k-ft

Weak Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

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= 30.2

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= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.5514

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7972

φF_L= (φccFcy)/(λ²)

φF_L= 11.5927 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= 11.59 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.82 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	-51.748	-51.748	0	0
2	M16	Y	-51.748	-51.748	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	-63.697	-63.697	0	0
2	M16	y	-98.441	-98.441	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	127.394	127.394	0	0
2	M16	y	57.906	57.906	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	167.931	2	290.867	2	-.001	15	0	2	0	1	0	1
2		min	-218.283	3	-395.081	3	-.138	1	0	3	0	1	0	1
3	N7	max	0	15	465.415	1	-.065	15	0	15	0	1	0	1
4		min	-.157	2	-26.49	3	-1.555	1	-.003	1	0	1	0	1
5	N15	max	0	15	1271.653	1	.591	1	.001	1	0	1	0	1
6		min	-1.78	1	-116.38	3	-.357	3	0	3	0	1	0	1
7	N16	max	659.255	2	1058.532	1	-.157	10	0	1	0	1	0	1
8		min	-698.676	3	-1302.87	3	-40.02	3	0	3	0	1	0	1
9	N23	max	0	15	465.11	1	3.387	1	.006	1	0	1	0	1
10		min	-.157	2	-26.013	3	.133	15	0	15	0	1	0	1
11	N24	max	168.393	2	295.168	2	40.309	3	.002	1	0	1	0	1
12		min	-218.388	3	-392.541	3	.023	10	0	3	0	1	0	1
13	Totals:	max	993.576	2	3837.069	1	0	1						
14		min	-1135.512	3	-2259.373	3	0	2						

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	322.546	1	.641	4	.617	1	0	15	0	3	0	1
2			min	-356.585	3	.151	15	-.048	3	-.001	1	0	1	0	1
3		2	max	322.662	1	.596	4	.617	1	0	15	0	3	0	15
4			min	-356.497	3	.141	15	-.048	3	-.001	1	0	1	0	4
5		3	max	322.779	1	.55	4	.617	1	0	15	0	1	0	15
6			min	-356.41	3	.13	15	-.048	3	-.001	1	0	10	0	4
7		4	max	322.895	1	.504	4	.617	1	0	15	0	1	0	15
8			min	-356.323	3	.119	15	-.048	3	-.001	1	0	3	0	4
9		5	max	323.011	1	.459	4	.617	1	0	15	0	1	0	15
10			min	-356.235	3	.108	15	-.048	3	-.001	1	0	3	0	4
11		6	max	323.128	1	.413	4	.617	1	0	15	0	1	0	15
12			min	-356.148	3	.098	15	-.048	3	-.001	1	0	3	0	4
13		7	max	323.244	1	.367	4	.617	1	0	15	0	1	0	15
14			min	-356.061	3	.087	15	-.048	3	-.001	1	0	3	0	4
15		8	max	323.361	1	.322	4	.617	1	0	15	0	1	0	15
16			min	-355.973	3	.076	15	-.048	3	-.001	1	0	3	0	4
17		9	max	323.477	1	.276	4	.617	1	0	15	0	1	0	15
18			min	-355.886	3	.066	15	-.048	3	-.001	1	0	3	0	4
19		10	max	323.593	1	.23	4	.617	1	0	15	0	1	0	15
20			min	-355.799	3	.055	15	-.048	3	-.001	1	0	3	0	4
21		11	max	323.71	1	.185	4	.617	1	0	15	0	1	0	15
22			min	-355.711	3	.044	15	-.048	3	-.001	1	0	3	0	4
23		12	max	323.826	1	.139	4	.617	1	0	15	0	1	0	15
24			min	-355.624	3	.033	15	-.048	3	-.001	1	0	3	0	4
25		13	max	323.943	1	.099	2	.617	1	0	15	.001	1	0	15
26			min	-355.537	3	.019	12	-.048	3	-.001	1	0	3	0	4
27		14	max	324.059	1	.063	2	.617	1	0	15	.001	1	0	15
28			min	-355.45	3	-.002	3	-.048	3	-.001	1	0	3	0	4
29		15	max	324.175	1	.028	2	.617	1	0	15	.001	1	0	15
30			min	-355.362	3	-.029	3	-.048	3	-.001	1	0	3	0	4
31		16	max	324.292	1	-.008	2	.617	1	0	15	.001	1	0	15
32			min	-355.275	3	-.055	3	-.048	3	-.001	1	0	3	0	4
33		17	max	324.408	1	-.02	15	.617	1	0	15	.001	1	0	15
34			min	-355.188	3	-.089	4	-.048	3	-.001	1	0	3	0	4
35		18	max	324.525	1	-.031	15	.617	1	0	15	.002	1	0	15
36			min	-355.1	3	-.135	4	-.048	3	-.001	1	0	3	0	4
37		19	max	324.641	1	-.042	15	.617	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	-355.013	3	-.18	4	-.048	3	-.001	1	0	3	0	4
39	M3	1	max	105.616	2	1.777	4	-.023	15	0	15	.002	1	0	4
40			min	-127.12	3	.418	15	-.621	1	0	1	0	15	0	15
41		2	max	105.548	2	1.6	4	-.023	15	0	15	.002	1	0	4
42			min	-127.171	3	.376	15	-.621	1	0	1	0	15	0	12
43		3	max	105.479	2	1.422	4	-.023	15	0	15	.002	1	0	2
44			min	-127.223	3	.335	15	-.621	1	0	1	0	15	0	3
45		4	max	105.41	2	1.245	4	-.023	15	0	15	.002	1	0	15
46			min	-127.274	3	.293	15	-.621	1	0	1	0	15	0	4
47		5	max	105.342	2	1.068	4	-.023	15	0	15	.001	1	0	15
48			min	-127.326	3	.252	15	-.621	1	0	1	0	15	0	4
49		6	max	105.273	2	.891	4	-.023	15	0	15	.001	1	0	15
50			min	-127.377	3	.21	15	-.621	1	0	1	0	15	0	4
51		7	max	105.205	2	.714	4	-.023	15	0	15	.001	1	0	15
52			min	-127.429	3	.168	15	-.621	1	0	1	0	15	0	4
53		8	max	105.136	2	.536	4	-.023	15	0	15	.001	1	0	15
54			min	-127.48	3	.127	15	-.621	1	0	1	0	15	-.001	4
55		9	max	105.067	2	.359	4	-.023	15	0	15	0	1	0	15
56			min	-127.532	3	.085	15	-.621	1	0	1	0	15	-.001	4
57		10	max	104.999	2	.182	4	-.023	15	0	15	0	1	0	15
58			min	-127.583	3	.043	15	-.621	1	0	1	0	15	-.001	4
59		11	max	104.93	2	.024	2	-.023	15	0	15	0	1	0	15
60			min	-127.634	3	-.021	3	-.621	1	0	1	0	15	-.001	4
61		12	max	104.862	2	-.04	15	-.023	15	0	15	0	1	0	15
62			min	-127.686	3	-.172	4	-.621	1	0	1	0	15	-.001	4
63		13	max	104.793	2	-.082	15	-.023	15	0	15	0	1	0	15
64			min	-127.737	3	-.35	4	-.621	1	0	1	0	15	-.001	4
65		14	max	104.724	2	-.123	15	-.023	15	0	15	0	1	0	15
66			min	-127.789	3	-.527	4	-.621	1	0	1	0	12	-.001	4
67		15	max	104.656	2	-.165	15	-.023	15	0	15	0	1	0	15
68			min	-127.84	3	-.704	4	-.621	1	0	1	0	3	0	4
69		16	max	104.587	2	-.207	15	-.023	15	0	15	0	15	0	15
70			min	-127.892	3	-.881	4	-.621	1	0	1	0	1	0	4
71		17	max	104.519	2	-.248	15	-.023	15	0	15	0	15	0	15
72			min	-127.943	3	-1.058	4	-.621	1	0	1	0	1	0	4
73		18	max	104.45	2	-.29	15	-.023	15	0	15	0	15	0	15
74			min	-127.995	3	-1.236	4	-.621	1	0	1	0	1	0	4
75		19	max	104.381	2	-.332	15	-.023	15	0	15	0	15	0	1
76			min	-128.046	3	-1.413	4	-.621	1	0	1	0	1	0	1
77	M4	1	max	464.25	1	0	1	-.065	15	0	1	0	3	0	1
78			min	-27.363	3	0	1	-1.687	1	0	1	0	1	0	1
79		2	max	464.315	1	0	1	-.065	15	0	1	0	12	0	1
80			min	-27.315	3	0	1	-1.687	1	0	1	0	1	0	1
81		3	max	464.379	1	0	1	-.065	15	0	1	0	15	0	1
82			min	-27.266	3	0	1	-1.687	1	0	1	0	1	0	1
83		4	max	464.444	1	0	1	-.065	15	0	1	0	15	0	1
84			min	-27.218	3	0	1	-1.687	1	0	1	0	1	0	1
85		5	max	464.509	1	0	1	-.065	15	0	1	0	15	0	1
86			min	-27.169	3	0	1	-1.687	1	0	1	0	1	0	1
87		6	max	464.573	1	0	1	-.065	15	0	1	0	15	0	1
88			min	-27.121	3	0	1	-1.687	1	0	1	0	1	0	1
89		7	max	464.638	1	0	1	-.065	15	0	1	0	15	0	1
90			min	-27.072	3	0	1	-1.687	1	0	1	0	1	0	1
91		8	max	464.703	1	0	1	-.065	15	0	1	0	15	0	1
92			min	-27.024	3	0	1	-1.687	1	0	1	-.001	1	0	1
93		9	max	464.768	1	0	1	-.065	15	0	1	0	15	0	1
94			min	-26.975	3	0	1	-1.687	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	464.832	1	0	1	-.065	15	0	1	0	15	0	1
96			min	-26.927	3	0	1	-1.687	1	0	1	-.001	1	0	1
97		11	max	464.897	1	0	1	-.065	15	0	1	0	15	0	1
98			min	-26.878	3	0	1	-1.687	1	0	1	-.002	1	0	1
99		12	max	464.962	1	0	1	-.065	15	0	1	0	15	0	1
100			min	-26.83	3	0	1	-1.687	1	0	1	-.002	1	0	1
101		13	max	465.026	1	0	1	-.065	15	0	1	0	15	0	1
102			min	-26.781	3	0	1	-1.687	1	0	1	-.002	1	0	1
103		14	max	465.091	1	0	1	-.065	15	0	1	0	15	0	1
104			min	-26.732	3	0	1	-1.687	1	0	1	-.002	1	0	1
105		15	max	465.156	1	0	1	-.065	15	0	1	0	15	0	1
106			min	-26.684	3	0	1	-1.687	1	0	1	-.002	1	0	1
107		16	max	465.221	1	0	1	-.065	15	0	1	0	15	0	1
108			min	-26.635	3	0	1	-1.687	1	0	1	-.002	1	0	1
109		17	max	465.285	1	0	1	-.065	15	0	1	0	15	0	1
110			min	-26.587	3	0	1	-1.687	1	0	1	-.002	1	0	1
111		18	max	465.35	1	0	1	-.065	15	0	1	0	15	0	1
112			min	-26.538	3	0	1	-1.687	1	0	1	-.003	1	0	1
113		19	max	465.415	1	0	1	-.065	15	0	1	0	15	0	1
114			min	-26.49	3	0	1	-1.687	1	0	1	-.003	1	0	1
115	M6	1	max	1053.003	1	.642	4	.211	1	0	1	0	3	0	1
116			min	-1167.764	3	.151	15	-.139	3	0	15	0	1	0	1
117		2	max	1053.119	1	.596	4	.211	1	0	1	0	3	0	15
118			min	-1167.677	3	.141	15	-.139	3	0	15	0	11	0	4
119		3	max	1053.236	1	.551	4	.211	1	0	1	0	3	0	15
120			min	-1167.589	3	.13	15	-.139	3	0	15	0	15	0	4
121		4	max	1053.352	1	.505	4	.211	1	0	1	0	1	0	15
122			min	-1167.502	3	.119	15	-.139	3	0	15	0	15	0	4
123		5	max	1053.468	1	.459	4	.211	1	0	1	0	1	0	15
124			min	-1167.415	3	.108	15	-.139	3	0	15	0	15	0	4
125		6	max	1053.585	1	.414	2	.211	1	0	1	0	1	0	15
126			min	-1167.328	3	.098	15	-.139	3	0	15	0	3	0	4
127		7	max	1053.701	1	.378	2	.211	1	0	1	0	1	0	15
128			min	-1167.24	3	.086	12	-.139	3	0	15	0	3	0	4
129		8	max	1053.818	1	.342	2	.211	1	0	1	0	1	0	15
130			min	-1167.153	3	.068	12	-.139	3	0	15	0	3	0	4
131		9	max	1053.934	1	.307	2	.211	1	0	1	0	1	0	15
132			min	-1167.066	3	.05	12	-.139	3	0	15	0	3	0	4
133		10	max	1054.05	1	.271	2	.211	1	0	1	0	1	0	15
134			min	-1166.978	3	.032	12	-.139	3	0	15	0	3	0	4
135		11	max	1054.167	1	.236	2	.211	1	0	1	0	1	0	15
136			min	-1166.891	3	.012	3	-.139	3	0	15	0	3	0	2
137		12	max	1054.283	1	.2	2	.211	1	0	1	0	1	0	15
138			min	-1166.804	3	-.015	3	-.139	3	0	15	0	3	0	2
139		13	max	1054.4	1	.165	2	.211	1	0	1	0	1	0	12
140			min	-1166.716	3	-.041	3	-.139	3	0	15	0	3	0	2
141		14	max	1054.516	1	.129	2	.211	1	0	1	0	1	0	12
142			min	-1166.629	3	-.068	3	-.139	3	0	15	0	3	0	2
143		15	max	1054.632	1	.093	2	.211	1	0	1	0	1	0	12
144			min	-1166.542	3	-.095	3	-.139	3	0	15	0	3	0	2
145		16	max	1054.749	1	.058	2	.211	1	0	1	0	1	0	12
146			min	-1166.455	3	-.122	3	-.139	3	0	15	0	3	0	2
147		17	max	1054.865	1	.022	2	.211	1	0	1	0	1	0	12
148			min	-1166.367	3	-.148	3	-.139	3	0	15	0	3	0	2
149		18	max	1054.982	1	-.013	2	.211	1	0	1	0	1	0	12
150			min	-1166.28	3	-.175	3	-.139	3	0	15	0	3	0	2
151		19	max	1055.098	1	-.042	15	.211	1	0	1	0	1	0	12

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	-1166.193	3	-.202	3	-.139	3	0	15	0	3	0	2
153	M7	1	max	469.475	2	1.779	4	.012	1	0	2	0	2	0	2
154			min	-392.473	3	.419	15	-.004	10	0	3	0	3	0	12
155		2	max	469.406	2	1.602	4	.012	1	0	2	0	2	0	2
156			min	-392.525	3	.377	15	-.004	10	0	3	0	3	0	3
157		3	max	469.338	2	1.425	4	.012	1	0	2	0	2	0	2
158			min	-392.576	3	.335	15	-.004	10	0	3	0	3	0	3
159		4	max	469.269	2	1.248	4	.012	1	0	2	0	2	0	2
160			min	-392.628	3	.294	15	-.004	10	0	3	0	3	0	3
161		5	max	469.2	2	1.07	4	.012	1	0	2	0	2	0	15
162			min	-392.679	3	.252	15	-.004	10	0	3	0	3	0	3
163		6	max	469.132	2	.893	4	.012	1	0	2	0	2	0	15
164			min	-392.731	3	.21	15	-.004	10	0	3	0	3	0	4
165		7	max	469.063	2	.716	4	.012	1	0	2	0	2	0	15
166			min	-392.782	3	.169	15	-.004	10	0	3	0	3	0	4
167		8	max	468.995	2	.539	4	.012	1	0	2	0	2	0	15
168			min	-392.834	3	.127	15	-.004	10	0	3	0	3	-.001	4
169		9	max	468.926	2	.362	4	.012	1	0	2	0	2	0	15
170			min	-392.885	3	.085	15	-.004	10	0	3	0	3	-.001	4
171		10	max	468.857	2	.222	2	.012	1	0	2	0	2	0	15
172			min	-392.937	3	.021	12	-.004	10	0	3	0	3	-.001	4
173		11	max	468.789	2	.084	2	.012	1	0	2	0	2	0	15
174			min	-392.988	3	-.081	3	-.004	10	0	3	0	3	-.001	4
175		12	max	468.72	2	-.04	15	.012	1	0	2	0	2	0	15
176			min	-393.039	3	-.185	3	-.004	10	0	3	0	3	-.001	4
177		13	max	468.651	2	-.081	15	.012	1	0	2	0	2	0	15
178			min	-393.091	3	-.347	4	-.004	10	0	3	0	3	-.001	4
179		14	max	468.583	2	-.123	15	.012	1	0	2	0	2	0	15
180			min	-393.142	3	-.524	4	-.004	10	0	3	0	3	-.001	4
181		15	max	468.514	2	-.165	15	.012	1	0	2	0	2	0	15
182			min	-393.194	3	-.702	4	-.004	10	0	3	0	3	0	4
183		16	max	468.446	2	-.206	15	.012	1	0	2	0	2	0	15
184			min	-393.245	3	-.879	4	-.004	10	0	3	0	3	0	4
185		17	max	468.377	2	-.248	15	.012	1	0	2	0	2	0	15
186			min	-393.297	3	-1.056	4	-.004	10	0	3	0	3	0	4
187		18	max	468.308	2	-.29	15	.012	1	0	2	0	2	0	15
188			min	-393.348	3	-1.233	4	-.004	10	0	3	0	3	0	4
189		19	max	468.24	2	-.331	15	.012	1	0	2	0	2	0	1
190			min	-393.4	3	-1.41	4	-.004	10	0	3	0	3	0	1
191	M8	1	max	1270.488	1	0	1	.746	1	0	1	0	15	0	1
192			min	-117.253	3	0	1	-.35	3	0	1	0	1	0	1
193		2	max	1270.553	1	0	1	.746	1	0	1	0	1	0	1
194			min	-117.205	3	0	1	-.35	3	0	1	0	3	0	1
195		3	max	1270.618	1	0	1	.746	1	0	1	0	1	0	1
196			min	-117.156	3	0	1	-.35	3	0	1	0	3	0	1
197		4	max	1270.682	1	0	1	.746	1	0	1	0	1	0	1
198			min	-117.108	3	0	1	-.35	3	0	1	0	3	0	1
199		5	max	1270.747	1	0	1	.746	1	0	1	0	1	0	1
200			min	-117.059	3	0	1	-.35	3	0	1	0	3	0	1
201		6	max	1270.812	1	0	1	.746	1	0	1	0	1	0	1
202			min	-117.01	3	0	1	-.35	3	0	1	0	3	0	1
203		7	max	1270.876	1	0	1	.746	1	0	1	0	1	0	1
204			min	-116.962	3	0	1	-.35	3	0	1	0	3	0	1
205		8	max	1270.941	1	0	1	.746	1	0	1	0	1	0	1
206			min	-116.913	3	0	1	-.35	3	0	1	0	3	0	1
207		9	max	1271.006	1	0	1	.746	1	0	1	0	1	0	1
208			min	-116.865	3	0	1	-.35	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	1271.071	1	0	1	.746	1	0	1	0	1	0	1
210			min	-116.816	3	0	1	-.35	3	0	1	0	3	0	1
211		11	max	1271.135	1	0	1	.746	1	0	1	0	1	0	1
212			min	-116.768	3	0	1	-.35	3	0	1	0	3	0	1
213		12	max	1271.2	1	0	1	.746	1	0	1	0	1	0	1
214			min	-116.719	3	0	1	-.35	3	0	1	0	3	0	1
215		13	max	1271.265	1	0	1	.746	1	0	1	0	1	0	1
216			min	-116.671	3	0	1	-.35	3	0	1	0	3	0	1
217		14	max	1271.329	1	0	1	.746	1	0	1	0	1	0	1
218			min	-116.622	3	0	1	-.35	3	0	1	0	3	0	1
219		15	max	1271.394	1	0	1	.746	1	0	1	0	1	0	1
220			min	-116.574	3	0	1	-.35	3	0	1	0	3	0	1
221		16	max	1271.459	1	0	1	.746	1	0	1	.001	1	0	1
222			min	-116.525	3	0	1	-.35	3	0	1	0	3	0	1
223		17	max	1271.524	1	0	1	.746	1	0	1	.001	1	0	1
224			min	-116.477	3	0	1	-.35	3	0	1	0	3	0	1
225		18	max	1271.588	1	0	1	.746	1	0	1	.001	1	0	1
226			min	-116.428	3	0	1	-.35	3	0	1	0	3	0	1
227		19	max	1271.653	1	0	1	.746	1	0	1	.001	1	0	1
228			min	-116.38	3	0	1	-.35	3	0	1	0	3	0	1
229	M10	1	max	334.059	1	.634	4	-.006	15	.001	1	0	1	0	1
230			min	-338.432	3	.15	15	-.173	1	0	3	0	3	0	1
231		2	max	334.176	1	.588	4	-.006	15	.001	1	0	1	0	15
232			min	-338.345	3	.14	15	-.173	1	0	3	0	3	0	4
233		3	max	334.292	1	.543	4	-.006	15	.001	1	0	1	0	15
234			min	-338.258	3	.129	15	-.173	1	0	3	0	3	0	4
235		4	max	334.408	1	.497	4	-.006	15	.001	1	0	1	0	15
236			min	-338.171	3	.118	15	-.173	1	0	3	0	3	0	4
237		5	max	334.525	1	.451	4	-.006	15	.001	1	0	1	0	15
238			min	-338.083	3	.107	15	-.173	1	0	3	0	3	0	4
239		6	max	334.641	1	.406	4	-.006	15	.001	1	0	1	0	15
240			min	-337.996	3	.097	15	-.173	1	0	3	0	3	0	4
241		7	max	334.758	1	.36	4	-.006	15	.001	1	0	1	0	15
242			min	-337.909	3	.086	15	-.173	1	0	3	0	3	0	4
243		8	max	334.874	1	.314	4	-.006	15	.001	1	0	1	0	15
244			min	-337.821	3	.075	15	-.173	1	0	3	0	3	0	4
245		9	max	334.99	1	.269	4	-.006	15	.001	1	0	11	0	15
246			min	-337.734	3	.064	15	-.173	1	0	3	0	3	0	4
247		10	max	335.107	1	.223	4	-.006	15	.001	1	0	11	0	15
248			min	-337.647	3	.054	15	-.173	1	0	3	0	3	0	4
249		11	max	335.223	1	.177	4	-.006	15	.001	1	0	15	0	15
250			min	-337.559	3	.043	15	-.173	1	0	3	0	3	0	4
251		12	max	335.34	1	.134	2	-.006	15	.001	1	0	15	0	15
252			min	-337.472	3	.032	15	-.173	1	0	3	0	3	0	4
253		13	max	335.456	1	.099	2	-.006	15	.001	1	0	15	0	15
254			min	-337.385	3	.021	15	-.173	1	0	3	0	3	0	4
255		14	max	335.572	1	.063	2	-.006	15	.001	1	0	15	0	15
256			min	-337.298	3	-.003	1	-.173	1	0	3	0	1	0	4
257		15	max	335.689	1	.028	2	-.006	15	.001	1	0	15	0	15
258			min	-337.21	3	-.038	1	-.173	1	0	3	0	1	0	4
259		16	max	335.805	1	-.008	2	-.006	15	.001	1	0	15	0	15
260			min	-337.123	3	-.074	1	-.173	1	0	3	0	1	0	4
261		17	max	335.922	1	-.021	15	-.006	15	.001	1	0	15	0	15
262			min	-337.036	3	-.11	1	-.173	1	0	3	0	1	0	4
263		18	max	336.038	1	-.032	15	-.006	15	.001	1	0	15	0	15
264			min	-336.948	3	-.145	1	-.173	1	0	3	0	1	0	4
265		19	max	336.154	1	-.043	15	-.006	15	.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	-336.861	3	-.188	4	-.173	1	0	3	0	1	0	4
267	M11	1	max	105.348	2	1.781	4	.722	1	0	1	0	3	0	4
268			min	-127.738	3	.419	15	.008	12	0	15	-.002	1	0	15
269		2	max	105.279	2	1.604	4	.722	1	0	1	0	3	0	4
270			min	-127.789	3	.377	15	.008	12	0	15	-.002	1	0	12
271		3	max	105.211	2	1.427	4	.722	1	0	1	0	3	0	1
272			min	-127.841	3	.336	15	.008	12	0	15	-.002	1	0	3
273		4	max	105.142	2	1.25	4	.722	1	0	1	0	3	0	15
274			min	-127.892	3	.294	15	.008	12	0	15	-.002	1	0	3
275		5	max	105.074	2	1.073	4	.722	1	0	1	0	3	0	15
276			min	-127.944	3	.252	15	.008	12	0	15	-.001	1	0	4
277		6	max	105.005	2	.895	4	.722	1	0	1	0	3	0	15
278			min	-127.995	3	.211	15	.008	12	0	15	-.001	1	0	4
279		7	max	104.936	2	.718	4	.722	1	0	1	0	3	0	15
280			min	-128.047	3	.169	15	.008	12	0	15	-.001	1	0	4
281		8	max	104.868	2	.541	4	.722	1	0	1	0	3	0	15
282			min	-128.098	3	.127	15	.008	12	0	15	0	1	-.001	4
283		9	max	104.799	2	.364	4	.722	1	0	1	0	3	0	15
284			min	-128.149	3	.086	15	.008	12	0	15	0	1	-.001	4
285		10	max	104.731	2	.187	4	.722	1	0	1	0	3	0	15
286			min	-128.201	3	.044	15	.008	12	0	15	0	1	-.001	4
287		11	max	104.662	2	.025	1	.722	1	0	1	0	3	0	15
288			min	-128.252	3	-.039	3	.008	12	0	15	0	1	-.001	4
289		12	max	104.593	2	-.039	15	.722	1	0	1	0	3	0	15
290			min	-128.304	3	-.168	4	.008	12	0	15	0	1	-.001	4
291		13	max	104.525	2	-.081	15	.722	1	0	1	0	3	0	15
292			min	-128.355	3	-.345	4	.008	12	0	15	0	1	-.001	4
293		14	max	104.456	2	-.123	15	.722	1	0	1	0	3	0	15
294			min	-128.407	3	-.522	4	.008	12	0	15	0	2	-.001	4
295		15	max	104.388	2	-.164	15	.722	1	0	1	0	3	0	15
296			min	-128.458	3	-.699	4	.008	12	0	15	0	10	0	4
297		16	max	104.319	2	-.206	15	.722	1	0	1	0	1	0	15
298			min	-128.51	3	-.877	4	.008	12	0	15	0	15	0	4
299		17	max	104.25	2	-.248	15	.722	1	0	1	0	1	0	15
300			min	-128.561	3	-1.054	4	.008	12	0	15	0	15	0	4
301		18	max	104.182	2	-.289	15	.722	1	0	1	0	1	0	15
302			min	-128.613	3	-1.231	4	.008	12	0	15	0	15	0	4
303		19	max	104.113	2	-.331	15	.722	1	0	1	0	1	0	1
304			min	-128.664	3	-1.408	4	.008	12	0	15	0	15	0	1
305	M12	1	max	463.945	1	0	1	3.669	1	0	1	0	1	0	1
306			min	-26.886	3	0	1	.134	15	0	1	0	3	0	1
307		2	max	464.01	1	0	1	3.669	1	0	1	0	1	0	1
308			min	-26.838	3	0	1	.134	15	0	1	0	15	0	1
309		3	max	464.075	1	0	1	3.669	1	0	1	0	1	0	1
310			min	-26.789	3	0	1	.134	15	0	1	0	15	0	1
311		4	max	464.139	1	0	1	3.669	1	0	1	.001	1	0	1
312			min	-26.741	3	0	1	.134	15	0	1	0	15	0	1
313		5	max	464.204	1	0	1	3.669	1	0	1	.001	1	0	1
314			min	-26.692	3	0	1	.134	15	0	1	0	15	0	1
315		6	max	464.269	1	0	1	3.669	1	0	1	.002	1	0	1
316			min	-26.644	3	0	1	.134	15	0	1	0	15	0	1
317		7	max	464.333	1	0	1	3.669	1	0	1	.002	1	0	1
318			min	-26.595	3	0	1	.134	15	0	1	0	15	0	1
319		8	max	464.398	1	0	1	3.669	1	0	1	.002	1	0	1
320			min	-26.547	3	0	1	.134	15	0	1	0	15	0	1
321		9	max	464.463	1	0	1	3.669	1	0	1	.003	1	0	1
322			min	-26.498	3	0	1	.134	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	464.527	1	0	1	3.669	1	0	1	.003	1	0	1
324			min	-26.45	3	0	1	.134	15	0	1	0	15	0	1
325		11	max	464.592	1	0	1	3.669	1	0	1	.003	1	0	1
326			min	-26.401	3	0	1	.134	15	0	1	0	15	0	1
327		12	max	464.657	1	0	1	3.669	1	0	1	.004	1	0	1
328			min	-26.353	3	0	1	.134	15	0	1	0	15	0	1
329		13	max	464.722	1	0	1	3.669	1	0	1	.004	1	0	1
330			min	-26.304	3	0	1	.134	15	0	1	0	15	0	1
331		14	max	464.786	1	0	1	3.669	1	0	1	.004	1	0	1
332			min	-26.255	3	0	1	.134	15	0	1	0	15	0	1
333		15	max	464.851	1	0	1	3.669	1	0	1	.005	1	0	1
334			min	-26.207	3	0	1	.134	15	0	1	0	15	0	1
335		16	max	464.916	1	0	1	3.669	1	0	1	.005	1	0	1
336			min	-26.158	3	0	1	.134	15	0	1	0	15	0	1
337		17	max	464.98	1	0	1	3.669	1	0	1	.005	1	0	1
338			min	-26.11	3	0	1	.134	15	0	1	0	15	0	1
339		18	max	465.045	1	0	1	3.669	1	0	1	.006	1	0	1
340			min	-26.061	3	0	1	.134	15	0	1	0	15	0	1
341		19	max	465.11	1	0	1	3.669	1	0	1	.006	1	0	1
342			min	-26.013	3	0	1	.134	15	0	1	0	15	0	1
343	M1	1	max	137.879	1	335.641	3	-2.682	15	0	1	.144	1	0	1
344			min	5.025	15	-320.684	1	-72.802	1	0	3	.005	15	0	3
345		2	max	137.997	1	335.451	3	-2.682	15	0	1	.128	1	.07	1
346			min	5.06	15	-320.937	1	-72.802	1	0	3	.005	15	-.073	3
347		3	max	93.663	1	6.969	9	-2.66	15	0	12	.111	1	.138	1
348			min	-2.461	10	-17.83	3	-72.61	1	0	1	.004	15	-.144	3
349		4	max	93.781	1	6.758	9	-2.66	15	0	12	.095	1	.138	1
350			min	-2.362	10	-18.02	3	-72.61	1	0	1	.003	15	-.14	3
351		5	max	93.899	1	6.547	9	-2.66	15	0	12	.079	1	.139	1
352			min	-2.264	10	-18.214	2	-72.61	1	0	1	.003	15	-.136	3
353		6	max	94.017	1	6.336	9	-2.66	15	0	12	.064	1	.139	1
354			min	-2.166	10	-18.467	2	-72.61	1	0	1	.002	15	-.132	3
355		7	max	94.135	1	6.125	9	-2.66	15	0	12	.048	1	.14	1
356			min	-2.067	10	-18.72	2	-72.61	1	0	1	.002	15	-.128	3
357		8	max	94.253	1	5.914	9	-2.66	15	0	12	.032	1	.14	1
358			min	-1.969	10	-18.974	2	-72.61	1	0	1	.001	15	-.124	3
359		9	max	94.371	1	5.704	9	-2.66	15	0	12	.016	1	.141	1
360			min	-1.871	10	-19.227	2	-72.61	1	0	1	0	15	-.12	3
361		10	max	94.489	1	5.493	9	-2.66	15	0	12	0	3	.143	2
362			min	-1.772	10	-19.48	2	-72.61	1	0	1	0	10	-.116	3
363		11	max	94.607	1	5.282	9	-2.66	15	0	12	0	12	.147	2
364			min	-1.674	10	-19.733	2	-72.61	1	0	1	-.015	1	-.112	3
365		12	max	94.725	1	5.071	9	-2.66	15	0	12	0	12	.152	2
366			min	-1.576	10	-19.986	2	-72.61	1	0	1	-.031	1	-.108	3
367		13	max	94.843	1	4.86	9	-2.66	15	0	12	-.002	12	.156	2
368			min	-1.477	10	-20.239	2	-72.61	1	0	1	-.047	1	-.104	3
369		14	max	94.961	1	4.649	9	-2.66	15	0	12	-.002	15	.16	2
370			min	-1.379	10	-20.492	2	-72.61	1	0	1	-.062	1	-.099	3
371		15	max	95.079	1	4.438	9	-2.66	15	0	12	-.003	15	.165	2
372			min	-1.281	10	-20.745	2	-72.61	1	0	1	-.078	1	-.095	3
373		16	max	86.912	2	60.253	2	-2.683	15	0	1	-.003	15	.169	2
374			min	-19.465	3	-120.88	3	-73.143	1	0	12	-.095	1	-.09	3
375		17	max	87.03	2	60	2	-2.683	15	0	1	-.004	15	.158	1
376			min	-19.376	3	-121.07	3	-73.143	1	0	12	-.11	1	-.063	3
377		18	max	-5.04	15	367.414	1	-2.749	15	0	3	-.005	15	.08	1
378			min	-137.553	1	-146.09	3	-74.969	1	0	1	-.127	1	-.032	3
379		19	max	-5.004	15	367.161	1	-2.749	15	0	3	-.005	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
380			min	-137.435	1	-146.28	3	-74.969	1	0	1	-.143	1	0	3
381	M5	1	max	301.68	1	1110.799	3	-.057	10	0	1	.004	3	0	3
382			min	9.299	12	-1062.505	1	-35.931	3	0	3	0	10	0	1
383		2	max	301.798	1	1110.609	3	-.057	10	0	1	0	2	.23	1
384			min	9.358	12	-1062.758	1	-35.931	3	0	3	-.004	3	-.241	3
385		3	max	179.047	3	7.21	9	4.149	3	0	3	0	2	.456	1
386			min	-21.263	10	-69.922	2	-.37	2	0	1	-.011	3	-.476	3
387		4	max	179.135	3	6.999	9	4.149	3	0	3	0	2	.462	1
388			min	-21.165	10	-70.176	2	-.37	2	0	1	-.01	3	-.462	3
389		5	max	179.224	3	6.789	9	4.149	3	0	3	0	2	.468	1
390			min	-21.066	10	-70.429	2	-.37	2	0	1	-.01	3	-.449	3
391		6	max	179.313	3	6.578	9	4.149	3	0	3	0	2	.474	1
392			min	-20.968	10	-70.682	2	-.37	2	0	1	-.009	3	-.434	3
393		7	max	179.401	3	6.367	9	4.149	3	0	3	0	2	.48	1
394			min	-20.87	10	-70.935	2	-.37	2	0	1	-.008	3	-.42	3
395		8	max	179.49	3	6.156	9	4.149	3	0	3	0	2	.486	1
396			min	-20.771	10	-71.188	2	-.37	2	0	1	-.007	3	-.406	3
397		9	max	179.578	3	5.945	9	4.149	3	0	3	0	2	.492	1
398			min	-20.673	10	-71.441	2	-.37	2	0	1	-.006	3	-.392	3
399		10	max	179.667	3	5.734	9	4.149	3	0	3	0	10	.498	1
400			min	-20.574	10	-71.694	2	-.37	2	0	1	-.005	3	-.378	3
401		11	max	179.755	3	5.523	9	4.149	3	0	3	0	10	.504	1
402			min	-20.476	10	-71.947	2	-.37	2	0	1	-.004	3	-.364	3
403		12	max	179.844	3	5.312	9	4.149	3	0	3	0	10	.518	2
404			min	-20.378	10	-72.2	2	-.37	2	0	1	-.003	3	-.349	3
405		13	max	179.932	3	5.101	9	4.149	3	0	3	0	10	.533	2
406			min	-20.279	10	-72.453	2	-.37	2	0	1	-.002	3	-.335	3
407		14	max	180.021	3	4.891	9	4.149	3	0	3	0	10	.549	2
408			min	-20.181	10	-72.706	2	-.37	2	0	1	-.002	1	-.321	3
409		15	max	180.109	3	4.68	9	4.149	3	0	3	0	10	.565	2
410			min	-20.083	10	-72.959	2	-.37	2	0	1	-.002	1	-.306	3
411		16	max	301.568	2	296.048	2	4.121	3	0	1	0	3	.577	2
412			min	-64.572	3	-374.248	3	-.389	2	0	15	-.001	1	-.289	3
413		17	max	301.686	2	295.795	2	4.121	3	0	1	0	3	.52	1
414			min	-64.484	3	-374.437	3	-.389	2	0	15	-.001	1	-.208	3
415		18	max	-10.052	12	1211.161	1	3.773	3	0	3	.002	3	.262	1
416			min	-302.388	1	-481.336	3	-.092	2	0	1	0	1	-.104	3
417		19	max	-9.993	12	1210.908	1	3.773	3	0	3	.003	3	0	3
418			min	-302.27	1	-481.526	3	-.092	2	0	1	0	2	0	1
419	M9	1	max	137.26	1	335.619	3	91.916	1	0	3	-.005	15	0	1
420			min	5	15	-320.67	1	3.583	15	0	1	-.143	1	0	3
421		2	max	137.378	1	335.429	3	91.916	1	0	3	-.003	12	.07	1
422			min	5.036	15	-320.923	1	3.583	15	0	1	-.123	1	-.073	3
423		3	max	93.62	1	6.945	9	68.99	1	0	1	.004	3	.138	1
424			min	-1.971	10	-17.766	3	.938	12	0	15	-.102	1	-.144	3
425		4	max	93.738	1	6.734	9	68.99	1	0	1	.005	3	.138	1
426			min	-1.873	10	-17.972	2	.938	12	0	15	-.087	1	-.14	3
427		5	max	93.856	1	6.523	9	68.99	1	0	1	.005	3	.139	1
428			min	-1.774	10	-18.225	2	.938	12	0	15	-.072	1	-.136	3
429		6	max	93.974	1	6.312	9	68.99	1	0	1	.005	3	.139	1
430			min	-1.676	10	-18.478	2	.938	12	0	15	-.057	1	-.132	3
431		7	max	94.092	1	6.101	9	68.99	1	0	1	.005	3	.14	1
432			min	-1.578	10	-18.731	2	.938	12	0	15	-.042	1	-.128	3
433		8	max	94.21	1	5.89	9	68.99	1	0	1	.006	3	.14	1
434			min	-1.479	10	-18.984	2	.938	12	0	15	-.027	1	-.124	3
435		9	max	94.328	1	5.68	9	68.99	1	0	1	.006	3	.141	1
436			min	-1.381	10	-19.238	2	.938	12	0	15	-.012	1	-.12	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	94.446	1	5.469	9	68.99	1	0	1	.006	3	.143	2
438			min	-1.283	10	-19.491	2	.938	12	0	15	0	2	-.116	3
439		11	max	94.564	1	5.258	9	68.99	1	0	1	.018	1	.147	2
440			min	-1.184	10	-19.744	2	.938	12	0	15	0	15	-.112	3
441		12	max	94.682	1	5.047	9	68.99	1	0	1	.033	1	.152	2
442			min	-1.086	10	-19.997	2	.938	12	0	15	.001	15	-.108	3
443		13	max	94.8	1	4.836	9	68.99	1	0	1	.048	1	.156	2
444			min	-.988	10	-20.25	2	.938	12	0	15	.002	15	-.104	3
445		14	max	94.918	1	4.625	9	68.99	1	0	1	.063	1	.16	2
446			min	-.889	10	-20.503	2	.938	12	0	15	.002	15	-.099	3
447		15	max	95.036	1	4.414	9	68.99	1	0	1	.078	1	.165	2
448			min	-.791	10	-20.756	2	.938	12	0	15	.003	15	-.095	3
449		16	max	87.184	2	60.034	2	69.633	1	0	15	.094	1	.169	2
450			min	-19.576	3	-121.31	3	.948	12	0	1	.003	15	-.09	3
451		17	max	87.302	2	59.78	2	69.633	1	0	15	.109	1	.158	1
452			min	-19.488	3	-121.5	3	.948	12	0	1	.004	15	-.063	3
453		18	max	-5.029	15	367.414	1	73.336	1	0	1	.125	1	.08	1
454			min	-137.232	1	-146.087	3	1.22	12	0	3	.005	15	-.032	3
455		19	max	-4.994	15	367.161	1	73.336	1	0	1	.141	1	0	1
456			min	-137.114	1	-146.277	3	1.22	12	0	3	.005	15	0	3
457	M13	1	max	92.14	1	320.199	1	-5	15	0	1	.143	1	0	1
458			min	3.583	15	-335.613	3	-137.242	1	0	3	.005	15	0	3
459		2	max	92.14	1	225.822	1	-3.836	15	0	1	.045	1	.23	3
460			min	3.583	15	-236.622	3	-105.197	1	0	3	.002	15	-.22	1
461		3	max	92.14	1	131.444	1	-2.672	15	0	1	.002	3	.381	3
462			min	3.583	15	-137.631	3	-73.151	1	0	3	-.027	1	-.364	1
463		4	max	92.14	1	37.066	1	-1.508	15	0	1	0	12	.452	3
464			min	3.583	15	-38.641	3	-41.106	1	0	3	-.073	1	-.432	1
465		5	max	92.14	1	60.35	3	-.345	15	0	1	-.002	12	.443	3
466			min	3.583	15	-57.311	1	-9.06	1	0	3	-.093	1	-.424	1
467		6	max	92.14	1	159.341	3	22.986	1	0	1	-.002	12	.355	3
468			min	3.583	15	-151.689	1	.204	12	0	3	-.087	1	-.339	1
469		7	max	92.14	1	258.332	3	55.031	1	0	1	-.002	12	.187	3
470			min	3.583	15	-246.067	1	1.333	12	0	3	-.056	1	-.179	1
471		8	max	92.14	1	357.323	3	87.077	1	0	1	.002	2	.057	1
472			min	3.583	15	-340.444	1	2.462	12	0	3	0	3	-.061	3
473		9	max	92.14	1	456.314	3	119.122	1	0	1	.084	1	.369	1
474			min	3.583	15	-434.822	1	3.591	12	0	3	.002	12	-.389	3
475		10	max	92.14	1	555.305	3	151.168	1	0	2	.193	1	.758	1
476			min	3.583	15	-529.2	1	4.72	12	0	1	.006	12	-.796	3
477		11	max	73.043	1	434.822	1	-3.446	12	0	3	.081	1	.369	1
478			min	2.682	15	-456.314	3	-118.499	1	0	1	0	3	-.389	3
479		12	max	73.043	1	340.444	1	-2.317	12	0	3	.001	2	.057	1
480			min	2.682	15	-357.323	3	-86.454	1	0	1	-.004	3	-.061	3
481		13	max	73.043	1	246.067	1	-1.188	12	0	3	-.002	15	.187	3
482			min	2.682	15	-258.332	3	-54.408	1	0	1	-.058	1	-.179	1
483		14	max	73.043	1	151.689	1	.029	3	0	3	-.003	15	.355	3
484			min	2.682	15	-159.341	3	-22.362	1	0	1	-.089	1	-.339	1
485		15	max	73.043	1	57.311	1	9.683	1	0	3	-.003	15	.443	3
486			min	2.682	15	-60.35	3	.369	15	0	1	-.094	1	-.424	1
487		16	max	73.043	1	38.641	3	41.729	1	0	3	-.002	12	.452	3
488			min	2.682	15	-37.066	1	1.533	15	0	1	-.073	1	-.432	1
489		17	max	73.043	1	137.631	3	73.774	1	0	3	0	3	.381	3
490			min	2.682	15	-131.444	1	2.697	15	0	1	-.027	1	-.364	1
491		18	max	73.043	1	236.622	3	105.82	1	0	3	.045	1	.23	3
492			min	2.682	15	-225.822	1	3.861	15	0	1	.002	15	-.22	1
493		19	max	73.043	1	335.613	3	137.865	1	0	3	.144	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	2.682	15	-320.2	1	5.025	15	0	1	.005	15	0	3
495	M16	1	max	-1.219	12	367.665	1	-4.994	15	0	3	.141	1	0	1
496			min	-73.073	1	-146.299	3	-137.129	1	0	1	.005	15	0	3
497		2	max	-1.219	12	259.294	1	-3.83	15	0	3	.043	1	.101	3
498			min	-73.073	1	-103.284	3	-105.083	1	0	1	.002	15	-.252	1
499		3	max	-1.219	12	150.922	1	-2.666	15	0	3	0	12	.166	3
500			min	-73.073	1	-60.27	3	-73.038	1	0	1	-.028	1	-.418	1
501		4	max	-1.219	12	42.55	1	-1.502	15	0	3	-.003	15	.198	3
502			min	-73.073	1	-17.255	3	-40.992	1	0	1	-.074	1	-.496	1
503		5	max	-1.219	12	25.759	3	-.338	15	0	3	-.003	15	.194	3
504			min	-73.073	1	-65.822	1	-8.947	1	0	1	-.094	1	-.486	1
505		6	max	-1.219	12	68.774	3	23.099	1	0	3	-.003	15	.156	3
506			min	-73.073	1	-174.194	1	.387	12	0	1	-.089	1	-.39	1
507		7	max	-1.219	12	111.788	3	55.144	1	0	3	-.002	15	.083	3
508			min	-73.073	1	-282.565	1	1.516	12	0	1	-.057	1	-.206	1
509		8	max	-1.219	12	154.802	3	87.19	1	0	3	.002	2	.066	1
510			min	-73.073	1	-390.937	1	2.645	12	0	1	-.002	3	-.024	3
511		9	max	-1.219	12	197.817	3	119.236	1	0	3	.083	1	.424	1
512			min	-73.073	1	-499.309	1	3.774	12	0	1	.001	12	-.166	3
513		10	max	-2.748	15	-13.996	15	151.281	1	0	15	.192	1	.87	1
514			min	-74.737	1	-607.681	1	-7.6	3	0	1	.006	12	-.343	3
515		11	max	-2.748	15	499.309	1	-3.961	12	0	1	.083	1	.424	1
516			min	-74.737	1	-197.817	3	-118.914	1	0	3	.002	12	-.166	3
517		12	max	-2.748	15	390.937	1	-2.832	12	0	1	.001	2	.066	1
518			min	-74.737	1	-154.802	3	-86.869	1	0	3	0	3	-.024	3
519		13	max	-2.748	15	282.565	1	-1.703	12	0	1	-.002	12	.083	3
520			min	-74.737	1	-111.788	3	-54.823	1	0	3	-.057	1	-.206	1
521		14	max	-2.748	15	174.194	1	-.574	12	0	1	-.003	12	.156	3
522			min	-74.737	1	-68.774	3	-22.777	1	0	3	-.088	1	-.39	1
523		15	max	-2.748	15	65.822	1	9.268	1	0	1	-.003	12	.194	3
524			min	-74.737	1	-25.759	3	.349	15	0	3	-.093	1	-.486	1
525		16	max	-2.748	15	17.255	3	41.314	1	0	1	-.002	12	.198	3
526			min	-74.737	1	-42.55	1	1.513	15	0	3	-.073	1	-.496	1
527		17	max	-2.748	15	60.27	3	73.359	1	0	1	0	12	.166	3
528			min	-74.737	1	-150.922	1	2.677	15	0	3	-.027	1	-.418	1
529		18	max	-2.748	15	103.284	3	105.405	1	0	1	.045	1	.101	3
530			min	-74.737	1	-259.294	1	3.84	15	0	3	.002	15	-.252	1
531		19	max	-2.748	15	146.299	3	137.45	1	0	1	.143	1	0	1
532			min	-74.737	1	-367.665	1	5.004	15	0	3	.005	15	0	3
533	M15	1	max	0	2	2.531	4	.037	3	0	1	0	1	0	1
534			min	-43.098	3	0	2	-.039	1	0	3	0	3	0	1
535		2	max	0	2	2.25	4	.037	3	0	1	0	1	0	2
536			min	-43.163	3	0	2	-.039	1	0	3	0	3	-.001	4
537		3	max	0	2	1.968	4	.037	3	0	1	0	1	0	2
538			min	-43.228	3	0	2	-.039	1	0	3	0	3	-.002	4
539		4	max	0	2	1.687	4	.037	3	0	1	0	1	0	2
540			min	-43.293	3	0	2	-.039	1	0	3	0	3	-.003	4
541		5	max	0	2	1.406	4	.037	3	0	1	0	1	0	2
542			min	-43.358	3	0	2	-.039	1	0	3	0	3	-.003	4
543		6	max	0	2	1.125	4	.037	3	0	1	0	1	0	2
544			min	-43.423	3	0	2	-.039	1	0	3	0	3	-.004	4
545		7	max	0	2	.844	4	.037	3	0	1	0	3	0	2
546			min	-43.489	3	0	2	-.039	1	0	3	0	1	-.004	4
547		8	max	0	2	.562	4	.037	3	0	1	0	3	0	2
548			min	-43.554	3	0	2	-.039	1	0	3	0	1	-.005	4
549		9	max	0	2	.281	4	.037	3	0	1	0	3	0	2
550			min	-43.619	3	0	2	-.039	1	0	3	0	1	-.005	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	.037	3	0	1	0	3	0	2
552			min	-43.684	3	0	1	-.039	1	0	3	0	1	-.005	4
553		11	max	0	2	0	2	.037	3	0	1	0	3	0	2
554			min	-43.749	3	-.281	4	-.039	1	0	3	0	1	-.005	4
555		12	max	0	2	0	2	.037	3	0	1	0	3	0	2
556			min	-43.815	3	-.562	4	-.039	1	0	3	0	1	-.005	4
557		13	max	0	2	0	2	.037	3	0	1	0	3	0	2
558			min	-43.88	3	-.844	4	-.039	1	0	3	0	1	-.004	4
559		14	max	0	2	0	2	.037	3	0	1	0	3	0	2
560			min	-43.945	3	-1.125	4	-.039	1	0	3	0	1	-.004	4
561		15	max	0	2	0	2	.037	3	0	1	0	3	0	2
562			min	-44.01	3	-1.406	4	-.039	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.037	3	0	1	0	3	0	2
564			min	-44.075	3	-1.687	4	-.039	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.037	3	0	1	0	3	0	2
566			min	-44.141	3	-1.968	4	-.039	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.037	3	0	1	0	3	0	2
568			min	-44.206	3	-2.25	4	-.039	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.037	3	0	1	0	3	0	1
570			min	-44.271	3	-2.531	4	-.039	1	0	3	0	1	0	1
571	M16A	1	max	-.823	10	2.531	4	.023	1	0	3	0	3	0	1
572			min	-43.689	3	.595	15	-.014	3	0	1	0	1	0	1
573		2	max	-.75	10	2.25	4	.023	1	0	3	0	3	0	15
574			min	-43.624	3	.529	15	-.014	3	0	1	0	1	-.001	4
575		3	max	-.678	10	1.968	4	.023	1	0	3	0	3	0	15
576			min	-43.559	3	.463	15	-.014	3	0	1	0	1	-.002	4
577		4	max	-.605	10	1.687	4	.023	1	0	3	0	3	0	15
578			min	-43.493	3	.397	15	-.014	3	0	1	0	1	-.003	4
579		5	max	-.533	10	1.406	4	.023	1	0	3	0	3	0	15
580			min	-43.428	3	.331	15	-.014	3	0	1	0	1	-.003	4
581		6	max	-.461	10	1.125	4	.023	1	0	3	0	3	0	15
582			min	-43.363	3	.264	15	-.014	3	0	1	0	1	-.004	4
583		7	max	-.388	10	.844	4	.023	1	0	3	0	3	-.001	15
584			min	-43.298	3	.198	15	-.014	3	0	1	0	1	-.004	4
585		8	max	-.316	10	.562	4	.023	1	0	3	0	3	-.001	15
586			min	-43.233	3	.132	15	-.014	3	0	1	0	1	-.005	4
587		9	max	-.243	10	.281	4	.023	1	0	3	0	3	-.001	15
588			min	-43.168	3	.066	15	-.014	3	0	1	0	1	-.005	4
589		10	max	-.171	10	0	1	.023	1	0	3	0	3	-.001	15
590			min	-43.102	3	0	1	-.014	3	0	1	0	1	-.005	4
591		11	max	-.098	10	-.066	15	.023	1	0	3	0	3	-.001	15
592			min	-43.037	3	-.281	4	-.014	3	0	1	0	1	-.005	4
593		12	max	-.026	10	-.132	15	.023	1	0	3	0	3	-.001	15
594			min	-42.972	3	-.562	4	-.014	3	0	1	0	1	-.005	4
595		13	max	.047	10	-.198	15	.023	1	0	3	0	2	-.001	15
596			min	-42.907	3	-.844	4	-.014	3	0	1	0	3	-.004	4
597		14	max	.119	10	-.264	15	.023	1	0	3	0	1	0	15
598			min	-42.842	3	-1.125	4	-.014	3	0	1	0	3	-.004	4
599		15	max	.191	10	-.331	15	.023	1	0	3	0	1	0	15
600			min	-42.776	3	-1.406	4	-.014	3	0	1	0	3	-.003	4
601		16	max	.264	10	-.397	15	.023	1	0	3	0	1	0	15
602			min	-42.711	3	-1.687	4	-.014	3	0	1	0	3	-.003	4
603		17	max	.336	10	-.463	15	.023	1	0	3	0	1	0	15
604			min	-42.646	3	-1.968	4	-.014	3	0	1	0	3	-.002	4
605		18	max	.409	10	-.529	15	.023	1	0	3	0	1	0	15
606			min	-42.581	3	-2.25	4	-.014	3	0	1	0	3	-.001	4
607		19	max	.481	10	-.595	15	.023	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	-42.516	3	-2.531	4	-.014	3	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.008	2	.014	1	-4.165e-5	15	NC	3	NC	3
2			min	-.003	3	-.007	3	0	3	-1.132e-3	1	4630.139	2	2607.892	1
3		2	max	.003	1	.007	2	.013	1	-3.988e-5	15	NC	3	NC	3
4			min	-.003	3	-.007	3	0	3	-1.084e-3	1	5044.982	2	2815.76	1
5		3	max	.003	1	.007	2	.012	1	-3.811e-5	15	NC	3	NC	3
6			min	-.003	3	-.007	3	0	3	-1.037e-3	1	5536.936	2	3060.944	1
7		4	max	.002	1	.006	2	.011	1	-3.634e-5	15	NC	1	NC	3
8			min	-.003	3	-.007	3	0	3	-9.888e-4	1	6124.441	2	3352.438	1
9		5	max	.002	1	.005	2	.01	1	-3.457e-5	15	NC	1	NC	3
10			min	-.002	3	-.006	3	0	3	-9.411e-4	1	6832.024	2	3702.252	1
11		6	max	.002	1	.005	2	.009	1	-3.28e-5	15	NC	1	NC	2
12			min	-.002	3	-.006	3	0	3	-8.934e-4	1	7692.853	2	4126.711	1
13		7	max	.002	1	.004	2	.008	1	-3.103e-5	15	NC	1	NC	2
14			min	-.002	3	-.006	3	0	3	-8.457e-4	1	8752.646	2	4648.466	1
15		8	max	.002	1	.004	2	.007	1	-2.925e-5	15	NC	1	NC	2
16			min	-.002	3	-.005	3	0	3	-7.979e-4	1	NC	1	5299.71	1
17		9	max	.002	1	.003	2	.006	1	-2.748e-5	15	NC	1	NC	2
18			min	-.002	3	-.005	3	0	3	-7.502e-4	1	NC	1	6127.489	1
19		10	max	.001	1	.003	2	.005	1	-2.571e-5	15	NC	1	NC	2
20			min	-.002	3	-.005	3	0	3	-7.025e-4	1	NC	1	7202.865	1
21		11	max	.001	1	.002	2	.004	1	-2.394e-5	15	NC	1	NC	2
22			min	-.001	3	-.004	3	0	3	-6.548e-4	1	NC	1	8637.497	1
23		12	max	.001	1	.002	2	.003	1	-2.217e-5	15	NC	1	NC	1
24			min	-.001	3	-.004	3	0	3	-6.071e-4	1	NC	1	NC	1
25		13	max	0	1	.001	2	.003	1	-2.04e-5	15	NC	1	NC	1
26			min	-.001	3	-.003	3	0	3	-5.593e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-1.863e-5	15	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-5.116e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	-1.686e-5	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-4.639e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.509e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.162e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.332e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	3	-3.685e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.155e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.207e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-8.243e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.73e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.271e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	3.955e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.58e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	5.701e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.89e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	6.851e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.2e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.001	1	8.e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.51e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	9.149e-6	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.819e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.03e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	3.129e-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	-.004	3	0	1	1.145e-5	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	3.439e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	1.26e-5	15	NC	1	NC	1
55		9	max	0	3	.001	2	0	3	3.748e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	1.375e-5	15	NC	1	NC	1
57		10	max	0	3	.002	2	0	1	4.058e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	15	1.49e-5	15	NC	1	NC	1
59		11	max	0	3	.002	2	.001	1	4.368e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	15	1.605e-5	15	NC	1	NC	1
61		12	max	0	3	.003	2	.002	1	4.678e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	15	1.719e-5	15	NC	1	NC	1
63		13	max	0	3	.003	2	.003	1	4.987e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	15	1.834e-5	15	NC	1	NC	1
65		14	max	.001	3	.004	2	.003	1	5.297e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	15	1.949e-5	15	NC	1	NC	1
67		15	max	.001	3	.005	2	.004	1	5.607e-4	1	NC	1	NC	1
68			min	0	2	-.007	3	0	15	2.064e-5	15	9535.159	2	NC	1
69		16	max	.001	3	.006	2	.005	1	5.916e-4	1	NC	1	NC	2
70			min	0	2	-.007	3	0	15	2.179e-5	15	8041.757	2	9374.939	1
71		17	max	.001	3	.007	2	.006	1	6.226e-4	1	NC	1	NC	2
72			min	-.001	2	-.007	3	0	15	2.294e-5	15	6894.035	2	8063.527	1
73		18	max	.001	3	.008	2	.006	1	6.536e-4	1	NC	3	NC	2
74			min	-.001	2	-.007	3	0	15	2.409e-5	15	6001.125	2	7092.806	1
75		19	max	.001	3	.009	2	.007	1	6.845e-4	1	NC	3	NC	2
76			min	-.001	2	-.007	3	0	15	2.524e-5	15	5299.757	2	6357.541	1
77	M4	1	max	.002	1	.009	2	0	15	-3.284e-5	15	NC	1	NC	3
78			min	0	3	-.007	3	-.005	1	-9.049e-4	1	NC	1	3540.554	1
79		2	max	.002	1	.009	2	0	15	-3.284e-5	15	NC	1	NC	2
80			min	0	3	-.007	3	-.005	1	-9.049e-4	1	NC	1	3862.783	1
81		3	max	.002	1	.008	2	0	15	-3.284e-5	15	NC	1	NC	2
82			min	0	3	-.007	3	-.005	1	-9.049e-4	1	NC	1	4246.27	1
83		4	max	.002	1	.008	2	0	15	-3.284e-5	15	NC	1	NC	2
84			min	0	3	-.006	3	-.004	1	-9.049e-4	1	NC	1	4707.176	1
85		5	max	.002	1	.007	2	0	15	-3.284e-5	15	NC	1	NC	2
86			min	0	3	-.006	3	-.004	1	-9.049e-4	1	NC	1	5267.517	1
87		6	max	.002	1	.007	2	0	15	-3.284e-5	15	NC	1	NC	2
88			min	0	3	-.005	3	-.003	1	-9.049e-4	1	NC	1	5957.917	1
89		7	max	.001	1	.006	2	0	15	-3.284e-5	15	NC	1	NC	2
90			min	0	3	-.005	3	-.003	1	-9.049e-4	1	NC	1	6821.996	1
91		8	max	.001	1	.006	2	0	15	-3.284e-5	15	NC	1	NC	2
92			min	0	3	-.005	3	-.002	1	-9.049e-4	1	NC	1	7923.631	1
93		9	max	.001	1	.005	2	0	15	-3.284e-5	15	NC	1	NC	2
94			min	0	3	-.004	3	-.002	1	-9.049e-4	1	NC	1	9359.458	1
95		10	max	.001	1	.005	2	0	15	-3.284e-5	15	NC	1	NC	1
96			min	0	3	-.004	3	-.002	1	-9.049e-4	1	NC	1	NC	1
97		11	max	0	1	.004	2	0	15	-3.284e-5	15	NC	1	NC	1
98			min	0	3	-.003	3	-.001	1	-9.049e-4	1	NC	1	NC	1
99		12	max	0	1	.004	2	0	15	-3.284e-5	15	NC	1	NC	1
100			min	0	3	-.003	3	-.001	1	-9.049e-4	1	NC	1	NC	1
101		13	max	0	1	.003	2	0	15	-3.284e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-9.049e-4	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-3.284e-5	15	NC	1	NC	1
104			min	0	3	-.002	3	0	1	-9.049e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-3.284e-5	15	NC	1	NC	1
106			min	0	3	-.002	3	0	1	-9.049e-4	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-3.284e-5	15	NC	1	NC	1
108			min	0	3	-.001	3	0	1	-9.049e-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
109		17	max	0	1	.001	2	0	15	-3.284e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-9.049e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-3.284e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-9.049e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-3.284e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.049e-4	1	NC	1	NC	1
115	M6	1	max	.009	1	.029	2	.005	1	2.585e-4	3	NC	3	NC	2
116			min	-.01	3	-.024	3	-.003	3	1.724e-6	10	1260.053	2	8018.894	1
117		2	max	.009	1	.027	2	.004	1	2.508e-4	3	NC	3	NC	2
118			min	-.01	3	-.023	3	-.003	3	1.069e-6	10	1346.382	2	8691.794	1
119		3	max	.008	1	.025	2	.004	1	2.43e-4	3	NC	3	NC	2
120			min	-.009	3	-.021	3	-.003	3	4.144e-7	10	1445.06	2	9488.819	1
121		4	max	.008	1	.023	2	.003	1	2.353e-4	3	NC	3	NC	1
122			min	-.009	3	-.02	3	-.003	3	-2.401e-7	10	1558.558	2	NC	1
123		5	max	.007	1	.022	2	.003	1	2.276e-4	3	NC	3	NC	1
124			min	-.008	3	-.019	3	-.002	3	-8.947e-7	10	1690.054	2	NC	1
125		6	max	.007	1	.02	2	.003	1	2.199e-4	3	NC	3	NC	1
126			min	-.008	3	-.018	3	-.002	3	-2.949e-6	2	1843.712	2	NC	1
127		7	max	.006	1	.018	2	.002	1	2.121e-4	3	NC	3	NC	1
128			min	-.007	3	-.016	3	-.002	3	-6.116e-6	2	2025.085	2	NC	1
129		8	max	.006	1	.016	2	.002	1	2.044e-4	3	NC	3	NC	1
130			min	-.006	3	-.015	3	-.002	3	-9.283e-6	2	2241.75	2	NC	1
131		9	max	.005	1	.015	2	.002	1	1.967e-4	3	NC	3	NC	1
132			min	-.006	3	-.014	3	-.002	3	-1.245e-5	2	2504.317	2	NC	1
133		10	max	.005	1	.013	2	.002	1	1.89e-4	3	NC	3	NC	1
134			min	-.005	3	-.012	3	-.001	3	-1.562e-5	2	2828.112	2	NC	1
135		11	max	.004	1	.011	2	.001	1	1.813e-4	3	NC	3	NC	1
136			min	-.005	3	-.011	3	-.001	3	-1.878e-5	2	3236.125	2	NC	1
137		12	max	.004	1	.01	2	.001	1	1.735e-4	3	NC	3	NC	1
138			min	-.004	3	-.01	3	0	3	-2.195e-5	2	3764.477	2	NC	1
139		13	max	.003	1	.008	2	0	1	1.658e-4	3	NC	3	NC	1
140			min	-.003	3	-.008	3	0	3	-2.512e-5	2	4473.365	2	NC	1
141		14	max	.003	1	.007	2	0	1	1.581e-4	3	NC	3	NC	1
142			min	-.003	3	-.007	3	0	3	-2.828e-5	2	5471.127	2	NC	1
143		15	max	.002	1	.005	2	0	1	1.504e-4	3	NC	3	NC	1
144			min	-.002	3	-.006	3	0	3	-3.145e-5	2	6974.422	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.426e-4	3	NC	1	NC	1
146			min	-.002	3	-.004	3	0	3	-3.462e-5	2	9488.743	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.349e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-3.778e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.272e-4	3	NC	1	NC	1
150			min	0	3	-.001	3	0	3	-4.095e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.195e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.922e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.243e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.533e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	2.072e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-4.096e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	1.901e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-2.659e-5	3	NC	1	NC	1
159		4	max	0	3	.004	2	0	3	1.73e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-1.222e-5	3	NC	1	NC	1
161		5	max	0	3	.006	2	0	3	1.559e-5	1	NC	1	NC	1
162			min	-.001	2	-.007	3	0	1	4.359e-7	15	8101.877	2	NC	1
163		6	max	.001	3	.007	2	.001	3	1.651e-5	3	NC	3	NC	1
164			min	-.001	2	-.009	3	0	1	4.621e-7	15	6496.892	2	NC	1
165		7	max	.001	3	.009	2	.001	3	3.088e-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	-.01	3	0	1	4.884e-7	15	5400.857	2	NC	1
167		8	max	.002	3	.01	2	.001	3	4.525e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-2.486e-6	2	4598.375	2	NC	1
169		9	max	.002	3	.012	2	.002	3	5.962e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	-.001	1	-5.747e-6	2	3982.104	2	NC	1
171		10	max	.002	3	.013	2	.002	3	7.399e-5	3	NC	3	NC	1
172			min	-.003	2	-.015	3	-.001	1	-9.007e-6	2	3492.547	2	NC	1
173		11	max	.002	3	.015	2	.002	3	8.836e-5	3	NC	3	NC	1
174			min	-.003	2	-.016	3	-.001	1	-1.227e-5	2	3093.997	2	NC	1
175		12	max	.003	3	.017	2	.002	3	1.027e-4	3	NC	3	NC	1
176			min	-.003	2	-.017	3	-.001	1	-1.553e-5	2	2763.627	2	NC	1
177		13	max	.003	3	.019	2	.002	3	1.171e-4	3	NC	3	NC	1
178			min	-.004	2	-.018	3	-.002	1	-1.879e-5	2	2486.068	2	NC	1
179		14	max	.003	3	.02	2	.002	3	1.315e-4	3	NC	3	NC	1
180			min	-.004	2	-.019	3	-.002	1	-2.205e-5	2	2250.511	2	NC	1
181		15	max	.003	3	.022	2	.002	3	1.458e-4	3	NC	3	NC	1
182			min	-.004	2	-.02	3	-.002	1	-2.531e-5	2	2049.068	2	NC	1
183		16	max	.004	3	.025	2	.002	3	1.602e-4	3	NC	3	NC	1
184			min	-.004	2	-.021	3	-.002	1	-2.857e-5	2	1875.808	2	NC	1
185		17	max	.004	3	.027	2	.002	3	1.746e-4	3	NC	3	NC	1
186			min	-.005	2	-.022	3	-.002	1	-3.183e-5	2	1726.157	2	NC	1
187		18	max	.004	3	.029	2	.002	3	1.889e-4	3	NC	3	NC	1
188			min	-.005	2	-.023	3	-.002	1	-3.509e-5	2	1596.517	2	NC	1
189		19	max	.004	3	.031	2	.002	3	2.033e-4	3	NC	3	NC	1
190			min	-.005	2	-.024	3	-.002	1	-3.835e-5	2	1484.016	2	NC	1
191	M8	1	max	.006	1	.033	2	.002	1	-2.176e-6	10	NC	1	NC	2
192			min	0	3	-.024	3	-.001	3	-1.596e-4	3	NC	1	8208.644	1
193		2	max	.006	1	.031	2	.002	1	-2.176e-6	10	NC	1	NC	2
194			min	0	3	-.023	3	-.001	3	-1.596e-4	3	NC	1	8949.654	1
195		3	max	.005	1	.029	2	.002	1	-2.176e-6	10	NC	1	NC	2
196			min	0	3	-.021	3	0	3	-1.596e-4	3	NC	1	9831.828	1
197		4	max	.005	1	.027	2	.002	1	-2.176e-6	10	NC	1	NC	1
198			min	0	3	-.02	3	0	3	-1.596e-4	3	NC	1	NC	1
199		5	max	.005	1	.025	2	.002	1	-2.176e-6	10	NC	1	NC	1
200			min	0	3	-.019	3	0	3	-1.596e-4	3	NC	1	NC	1
201		6	max	.004	1	.024	2	.001	1	-2.176e-6	10	NC	1	NC	1
202			min	0	3	-.017	3	0	3	-1.596e-4	3	NC	1	NC	1
203		7	max	.004	1	.022	2	.001	1	-2.176e-6	10	NC	1	NC	1
204			min	0	3	-.016	3	0	3	-1.596e-4	3	NC	1	NC	1
205		8	max	.004	1	.02	2	.001	1	-2.176e-6	10	NC	1	NC	1
206			min	0	3	-.015	3	0	3	-1.596e-4	3	NC	1	NC	1
207		9	max	.003	1	.018	2	0	1	-2.176e-6	10	NC	1	NC	1
208			min	0	3	-.013	3	0	3	-1.596e-4	3	NC	1	NC	1
209		10	max	.003	1	.016	2	0	1	-2.176e-6	10	NC	1	NC	1
210			min	0	3	-.012	3	0	3	-1.596e-4	3	NC	1	NC	1
211		11	max	.003	1	.015	2	0	1	-2.176e-6	10	NC	1	NC	1
212			min	0	3	-.011	3	0	3	-1.596e-4	3	NC	1	NC	1
213		12	max	.002	1	.013	2	0	1	-2.176e-6	10	NC	1	NC	1
214			min	0	3	-.009	3	0	3	-1.596e-4	3	NC	1	NC	1
215		13	max	.002	1	.011	2	0	1	-2.176e-6	10	NC	1	NC	1
216			min	0	3	-.008	3	0	3	-1.596e-4	3	NC	1	NC	1
217		14	max	.002	1	.009	2	0	1	-2.176e-6	10	NC	1	NC	1
218			min	0	3	-.007	3	0	3	-1.596e-4	3	NC	1	NC	1
219		15	max	.001	1	.007	2	0	1	-2.176e-6	10	NC	1	NC	1
220			min	0	3	-.005	3	0	3	-1.596e-4	3	NC	1	NC	1
221		16	max	.001	1	.005	2	0	1	-2.176e-6	10	NC	1	NC	1
222			min	0	3	-.004	3	0	3	-1.596e-4	3	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	-2.176e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-1.596e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-2.176e-6	10	NC	1	NC	1
226			min	0	3	-.001	3	0	3	-1.596e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-2.176e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.596e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.008	2	0	3	9.934e-4	1	NC	3	NC	1
230			min	-.003	3	-.007	3	-.002	1	-2.648e-4	3	4634.417	2	NC	1
231		2	max	.003	1	.007	2	0	3	9.426e-4	1	NC	3	NC	1
232			min	-.003	3	-.007	3	-.002	1	-2.568e-4	3	5049.774	2	NC	1
233		3	max	.003	1	.007	2	0	3	8.917e-4	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.002	1	-2.488e-4	3	5542.363	2	NC	1
235		4	max	.003	1	.006	2	0	3	8.409e-4	1	NC	1	NC	1
236			min	-.003	3	-.007	3	-.002	1	-2.408e-4	3	6130.658	2	NC	1
237		5	max	.002	1	.005	2	0	3	7.901e-4	1	NC	1	NC	1
238			min	-.002	3	-.006	3	-.002	1	-2.328e-4	3	6839.236	2	NC	1
239		6	max	.002	1	.005	2	0	3	7.393e-4	1	NC	1	NC	1
240			min	-.002	3	-.006	3	-.001	1	-2.248e-4	3	7701.332	2	NC	1
241		7	max	.002	1	.004	2	0	3	6.885e-4	1	NC	1	NC	1
242			min	-.002	3	-.006	3	-.001	1	-2.168e-4	3	8762.763	2	NC	1
243		8	max	.002	1	.004	2	0	3	6.376e-4	1	NC	1	NC	1
244			min	-.002	3	-.005	3	-.001	1	-2.088e-4	3	NC	1	NC	1
245		9	max	.002	1	.003	2	0	3	5.868e-4	1	NC	1	NC	1
246			min	-.002	3	-.005	3	-.001	1	-2.008e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	5.36e-4	1	NC	1	NC	1
248			min	-.002	3	-.005	3	0	1	-1.928e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	4.852e-4	1	NC	1	NC	1
250			min	-.001	3	-.004	3	0	1	-1.848e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.343e-4	1	NC	1	NC	1
252			min	-.001	3	-.004	3	0	1	-1.768e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	3.835e-4	1	NC	1	NC	1
254			min	-.001	3	-.003	3	0	1	-1.688e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.327e-4	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	-1.608e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.819e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.528e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.311e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.447e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.802e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-1.367e-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	-1.287e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	7.86e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.207e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.62e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.783e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	4.035e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.399e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	11	2.451e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.501e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	8.659e-6	3	NC	1	NC	1
274			min	0	2	-.002	3	0	3	-2.063e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-5.271e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-2.625e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-1.159e-5	15	NC	1	NC	1
278			min	0	2	-.004	3	-.001	1	-3.186e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	15	-1.372e-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	-3.748e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	15	-1.585e-5	15	NC	1	NC	1
282			min	0	2	-.005	3	-.003	1	-4.309e-4	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	15	-1.798e-5	15	NC	1	NC	1
284			min	0	2	-.006	3	-.004	1	-4.871e-4	1	NC	1	NC	1
285		10	max	0	3	.002	2	0	15	-2.011e-5	15	NC	1	NC	2
286			min	0	2	-.006	3	-.005	1	-5.432e-4	1	NC	1	9979.514	1
287		11	max	0	3	.002	2	0	15	-2.224e-5	15	NC	1	NC	2
288			min	0	2	-.007	3	-.006	1	-5.994e-4	1	NC	1	8164.887	1
289		12	max	0	3	.003	2	0	15	-2.437e-5	15	NC	1	NC	2
290			min	0	2	-.007	3	-.007	1	-6.555e-4	1	NC	1	6862.068	1
291		13	max	0	3	.003	2	0	15	-2.65e-5	15	NC	1	NC	2
292			min	0	2	-.007	3	-.008	1	-7.117e-4	1	NC	1	5895.364	1
293		14	max	.001	3	.004	2	0	15	-2.862e-5	15	NC	1	NC	2
294			min	0	2	-.007	3	-.009	1	-7.678e-4	1	NC	1	5159.303	1
295		15	max	.001	3	.005	2	0	15	-3.075e-5	15	NC	1	NC	2
296			min	0	2	-.007	3	-.01	1	-8.24e-4	1	9548.282	2	4587.394	1
297		16	max	.001	3	.006	2	0	15	-3.288e-5	15	NC	1	NC	2
298			min	0	2	-.008	3	-.011	1	-8.801e-4	1	8051.738	2	4136.035	1
299		17	max	.001	3	.007	2	0	15	-3.501e-5	15	NC	3	NC	2
300			min	-.001	2	-.008	3	-.012	1	-9.363e-4	1	6901.846	2	3775.699	1
301		18	max	.001	3	.008	2	0	15	-3.714e-5	15	NC	3	NC	3
302			min	-.001	2	-.007	3	-.013	1	-9.925e-4	1	6007.404	2	3485.881	1
303		19	max	.001	3	.009	2	0	15	-3.927e-5	15	NC	3	NC	3
304			min	-.001	2	-.007	3	-.014	1	-1.049e-3	1	5304.934	2	3252.055	1
305	M12	1	max	.002	1	.009	2	.012	1	9.397e-4	1	NC	1	NC	3
306			min	0	3	-.007	3	0	15	3.581e-5	15	NC	1	1649.477	1
307		2	max	.002	1	.009	2	.011	1	9.397e-4	1	NC	1	NC	3
308			min	0	3	-.007	3	0	15	3.581e-5	15	NC	1	1798.96	1
309		3	max	.002	1	.008	2	.01	1	9.397e-4	1	NC	1	NC	3
310			min	0	3	-.007	3	0	15	3.581e-5	15	NC	1	1976.892	1
311		4	max	.002	1	.008	2	.009	1	9.397e-4	1	NC	1	NC	3
312			min	0	3	-.006	3	0	15	3.581e-5	15	NC	1	2190.772	1
313		5	max	.002	1	.007	2	.008	1	9.397e-4	1	NC	1	NC	3
314			min	0	3	-.006	3	0	15	3.581e-5	15	NC	1	2450.815	1
315		6	max	.002	1	.007	2	.007	1	9.397e-4	1	NC	1	NC	3
316			min	0	3	-.005	3	0	15	3.581e-5	15	NC	1	2771.232	1
317		7	max	.001	1	.006	2	.006	1	9.397e-4	1	NC	1	NC	3
318			min	0	3	-.005	3	0	15	3.581e-5	15	NC	1	3172.263	1
319		8	max	.001	1	.006	2	.005	1	9.397e-4	1	NC	1	NC	2
320			min	0	3	-.005	3	0	15	3.581e-5	15	NC	1	3683.55	1
321		9	max	.001	1	.005	2	.004	1	9.397e-4	1	NC	1	NC	2
322			min	0	3	-.004	3	0	15	3.581e-5	15	NC	1	4349.928	1
323		10	max	.001	1	.005	2	.004	1	9.397e-4	1	NC	1	NC	2
324			min	0	3	-.004	3	0	15	3.581e-5	15	NC	1	5241.89	1
325		11	max	0	1	.004	2	.003	1	9.397e-4	1	NC	1	NC	2
326			min	0	3	-.003	3	0	15	3.581e-5	15	NC	1	6475.546	1
327		12	max	0	1	.004	2	.002	1	9.397e-4	1	NC	1	NC	2
328			min	0	3	-.003	3	0	15	3.581e-5	15	NC	1	8253.456	1
329		13	max	0	1	.003	2	.002	1	9.397e-4	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	3.581e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	.001	1	9.397e-4	1	NC	1	NC	1
332			min	0	3	-.002	3	0	15	3.581e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	9.397e-4	1	NC	1	NC	1
334			min	0	3	-.002	3	0	15	3.581e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	9.397e-4	1	NC	1	NC	1
336			min	0	3	-.001	3	0	15	3.581e-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	9.397e-4	1	NC	1	NC	1
338			min	0	3	0	3	0	15	3.581e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	9.397e-4	1	NC	1	NC	1
340			min	0	3	0	3	0	15	3.581e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	9.397e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	3.581e-5	15	NC	1	NC	1
343	M1	1	max	.007	3	.023	3	.002	3	2.299e-2	1	NC	1	NC	1
344			min	-.007	2	-.023	1	-.005	1	-2.396e-2	3	NC	1	NC	1
345		2	max	.007	3	.013	3	.001	3	1.105e-2	1	NC	4	NC	2
346			min	-.007	2	-.013	1	-.01	1	-1.187e-2	3	4467.927	1	8347.069	1
347		3	max	.007	3	.004	3	0	3	1.011e-5	3	NC	4	NC	2
348			min	-.007	2	-.003	1	-.014	1	-6.573e-4	1	2305.103	1	5062.989	1
349		4	max	.007	3	.005	1	0	3	1.403e-5	3	NC	5	NC	2
350			min	-.007	2	-.003	3	-.016	1	-5.565e-4	1	1629.22	1	4190.964	1
351		5	max	.007	3	.012	1	0	3	1.794e-5	3	NC	5	NC	2
352			min	-.007	2	-.01	3	-.016	1	-4.556e-4	1	1304.442	1	4026.123	1
353		6	max	.007	3	.018	1	0	3	2.186e-5	3	NC	5	NC	2
354			min	-.007	2	-.015	3	-.015	1	-3.548e-4	1	1120.85	1	4310.789	1
355		7	max	.007	3	.022	1	0	3	2.578e-5	3	NC	5	NC	2
356			min	-.007	2	-.018	3	-.013	1	-2.539e-4	1	1009.639	1	5138.055	1
357		8	max	.007	3	.025	1	0	3	2.97e-5	3	NC	5	NC	2
358			min	-.007	2	-.021	3	-.011	1	-1.53e-4	1	942.203	1	7066.631	1
359		9	max	.007	3	.027	1	0	3	3.362e-5	3	NC	5	NC	1
360			min	-.007	2	-.022	3	-.008	1	-5.219e-5	1	905.184	1	NC	1
361		10	max	.007	3	.028	2	0	3	4.867e-5	1	NC	5	NC	1
362			min	-.008	2	-.023	3	-.004	1	2.121e-6	15	886.881	2	NC	1
363		11	max	.007	3	.028	2	0	3	1.495e-4	1	NC	5	NC	1
364			min	-.008	2	-.022	3	-.001	1	5.798e-6	15	889.832	2	NC	1
365		12	max	.007	3	.026	2	.002	1	2.504e-4	1	NC	5	NC	2
366			min	-.008	2	-.02	3	0	15	9.475e-6	15	916.454	2	8001.506	1
367		13	max	.007	3	.023	2	.005	1	3.512e-4	1	NC	5	NC	2
368			min	-.008	2	-.017	3	0	15	1.315e-5	15	972.041	2	5580.545	1
369		14	max	.007	3	.018	2	.007	1	4.521e-4	1	NC	5	NC	2
370			min	-.008	2	-.013	3	0	15	1.683e-5	15	1068.654	2	4585.35	1
371		15	max	.007	3	.012	2	.007	1	5.53e-4	1	NC	5	NC	2
372			min	-.008	2	-.009	3	0	15	2.051e-5	15	1232.625	2	4228.861	1
373		16	max	.007	3	.004	1	.007	1	6.25e-4	1	NC	4	NC	2
374			min	-.008	2	-.003	3	0	15	2.315e-5	15	1527.972	2	4362.436	1
375		17	max	.007	3	.003	3	.006	1	2.986e-5	3	NC	4	NC	2
376			min	-.008	2	-.005	2	0	15	1.193e-6	15	2156.442	2	5237.532	1
377		18	max	.007	3	.01	3	.002	1	1.307e-2	1	NC	4	NC	2
378			min	-.008	2	-.016	2	0	15	-5.286e-3	3	4173.404	2	8598.108	1
379		19	max	.007	3	.017	3	0	3	2.639e-2	1	NC	1	NC	1
380			min	-.008	2	-.027	2	-.003	1	-1.07e-2	3	NC	1	NC	1
381	M5	1	max	.022	3	.074	3	.002	3	1.082e-6	3	NC	1	NC	1
382			min	-.027	2	-.081	1	-.006	1	5.05e-8	15	NC	1	NC	1
383		2	max	.022	3	.043	3	.002	3	6.805e-5	3	NC	5	NC	1
384			min	-.028	2	-.045	1	-.005	1	-7.407e-5	1	1299.179	1	NC	1
385		3	max	.022	3	.013	3	.003	3	1.337e-4	3	NC	5	NC	1
386			min	-.028	2	-.012	1	-.005	1	-1.473e-4	1	669.389	1	NC	1
387		4	max	.022	3	.017	1	.004	3	1.308e-4	3	NC	5	NC	1
388			min	-.028	2	-.011	3	-.004	1	-1.391e-4	1	471.918	1	NC	1
389		5	max	.022	3	.041	1	.004	3	1.279e-4	3	NC	5	NC	1
390			min	-.028	2	-.032	3	-.004	1	-1.31e-4	1	376.856	1	NC	1
391		6	max	.022	3	.061	1	.004	3	1.25e-4	3	NC	15	NC	1
392			min	-.028	2	-.048	3	-.003	1	-1.229e-4	1	322.978	1	NC	1
393		7	max	.022	3	.077	1	.004	3	1.221e-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	-.028	2	-.06	3	-.003	1	-1.147e-4	1	290.196	1	NC	1
395		8	max	.022	3	.089	1	.004	3	1.192e-4	3	NC	15	NC	1
396			min	-.028	2	-.068	3	-.003	1	-1.066e-4	1	270.152	1	NC	1
397		9	max	.022	3	.096	1	.004	3	1.163e-4	3	NC	15	NC	1
398			min	-.028	2	-.073	3	-.003	1	-9.845e-5	1	258.93	1	NC	1
399		10	max	.022	3	.098	1	.004	3	1.133e-4	3	NC	15	NC	1
400			min	-.028	2	-.073	3	-.002	1	-9.032e-5	1	254.711	1	NC	1
401		11	max	.022	3	.096	1	.004	3	1.104e-4	3	NC	15	NC	1
402			min	-.028	2	-.071	3	-.002	1	-8.218e-5	1	256.915	1	NC	1
403		12	max	.022	3	.089	1	.003	3	1.075e-4	3	NC	15	NC	1
404			min	-.028	2	-.065	3	-.002	1	-7.404e-5	1	265.972	1	NC	1
405		13	max	.022	3	.078	1	.003	3	1.046e-4	3	NC	15	NC	1
406			min	-.028	2	-.056	3	-.002	1	-6.591e-5	1	283.515	1	NC	1
407		14	max	.021	3	.061	1	.003	3	1.017e-4	3	NC	15	NC	1
408			min	-.028	2	-.044	3	-.002	1	-5.777e-5	1	313.169	1	NC	1
409		15	max	.021	3	.04	1	.002	3	9.878e-5	3	NC	5	NC	1
410			min	-.028	2	-.029	3	-.002	1	-4.964e-5	1	362.764	1	NC	1
411		16	max	.021	3	.015	1	.002	3	9.27e-5	3	NC	5	NC	1
412			min	-.028	2	-.011	3	-.002	1	-4.837e-5	1	450.596	2	NC	1
413		17	max	.021	3	.01	3	.001	3	1.116e-5	3	NC	5	NC	1
414			min	-.028	2	-.018	2	-.002	1	-2.107e-4	1	636.919	1	NC	1
415		18	max	.021	3	.033	3	0	3	4.768e-6	3	NC	5	NC	1
416			min	-.028	2	-.054	2	-.002	1	-1.079e-4	1	1233.176	1	NC	1
417		19	max	.021	3	.057	3	0	3	0	15	NC	1	NC	1
418			min	-.028	2	-.093	2	-.003	1	-2.091e-7	3	NC	1	NC	1
419	M9	1	max	.007	3	.022	3	.001	3	2.397e-2	3	NC	1	NC	1
420			min	-.007	2	-.024	1	-.007	1	-2.299e-2	1	NC	1	NC	1
421		2	max	.007	3	.013	3	0	3	1.187e-2	3	NC	4	NC	2
422			min	-.007	2	-.013	1	-.001	1	-1.13e-2	1	4468.938	1	9508.211	1
423		3	max	.007	3	.004	3	.002	1	1.705e-4	1	NC	4	NC	2
424			min	-.007	2	-.003	1	0	3	-1.036e-5	3	2305.638	1	5886.371	1
425		4	max	.007	3	.005	1	.004	1	8.539e-5	1	NC	5	NC	2
426			min	-.007	2	-.004	3	0	3	-1.86e-5	3	1629.589	1	4973.35	1
427		5	max	.007	3	.012	1	.004	1	1.428e-5	2	NC	5	NC	2
428			min	-.007	2	-.01	3	-.001	3	-2.683e-5	3	1304.715	1	4909.642	1
429		6	max	.007	3	.018	1	.003	1	1.886e-6	10	NC	5	NC	2
430			min	-.007	2	-.015	3	-.002	3	-8.477e-5	1	1121.06	1	5476.085	1
431		7	max	.007	3	.022	1	.002	1	-5.753e-6	10	NC	5	NC	2
432			min	-.007	2	-.018	3	-.002	3	-1.699e-4	1	1009.803	1	7001.483	1
433		8	max	.007	3	.025	1	0	2	-9.287e-6	15	NC	5	NC	1
434			min	-.007	2	-.021	3	-.003	3	-2.549e-4	1	942.333	1	NC	1
435		9	max	.007	3	.027	2	0	10	-1.241e-5	15	NC	5	NC	1
436			min	-.007	2	-.022	3	-.003	1	-3.4e-4	1	905.286	1	NC	1
437		10	max	.007	3	.028	2	0	10	-1.554e-5	15	NC	5	NC	1
438			min	-.007	2	-.023	3	-.006	1	-4.251e-4	1	887.259	2	NC	1
439		11	max	.007	3	.028	2	0	15	-1.867e-5	15	NC	5	NC	2
440			min	-.007	2	-.022	3	-.009	1	-5.102e-4	1	890.203	2	9523.033	1
441		12	max	.007	3	.026	2	0	15	-2.18e-5	15	NC	5	NC	2
442			min	-.008	2	-.02	3	-.011	1	-5.953e-4	1	916.828	2	6078.186	1
443		13	max	.007	3	.023	2	0	15	-2.492e-5	15	NC	5	NC	2
444			min	-.008	2	-.017	3	-.013	1	-6.803e-4	1	972.427	2	4690.171	1
445		14	max	.007	3	.018	2	0	15	-2.805e-5	15	NC	5	NC	2
446			min	-.008	2	-.013	3	-.015	1	-7.654e-4	1	1069.067	2	4062.527	1
447		15	max	.007	3	.012	2	0	15	-3.118e-5	15	NC	5	NC	2
448			min	-.008	2	-.009	3	-.015	1	-8.505e-4	1	1233.086	2	3869.668	1
449		16	max	.007	3	.004	1	0	15	-3.344e-5	15	NC	4	NC	2
450			min	-.008	2	-.003	3	-.014	1	-9.127e-4	1	1528.521	2	4079.04	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	.007	3	.003	3	0	15	4.214e-6	3	NC	4	NC	2
452			min	-.008	2	-.005	2	-.012	1	-4.312e-4	1	2157.165	2	4973.043	1
453		18	max	.007	3	.01	3	0	15	5.304e-3	3	NC	4	NC	2
454			min	-.008	2	-.016	2	-.008	1	-1.329e-2	1	4174.757	2	8256.705	1
455		19	max	.007	3	.017	3	0	3	1.07e-2	3	NC	1	NC	1
456			min	-.008	2	-.027	2	-.002	1	-2.639e-2	1	NC	1	NC	1
457	M13	1	max	.007	1	.022	3	.007	3	3.644e-3	3	NC	1	NC	1
458			min	-.001	3	-.024	1	-.007	2	-3.93e-3	1	NC	1	NC	1
459		2	max	.006	1	.246	3	.04	1	4.568e-3	3	NC	5	NC	2
460			min	-.001	3	-.238	1	0	10	-4.989e-3	1	777.881	3	3939.584	1
461		3	max	.006	1	.429	3	.102	1	5.491e-3	3	NC	5	NC	3
462			min	-.001	3	-.414	1	.004	15	-6.048e-3	1	428.328	3	1633.773	1
463		4	max	.006	1	.542	3	.155	1	6.414e-3	3	NC	15	NC	3
464			min	-.001	3	-.523	1	.006	15	-7.106e-3	1	334.66	3	1091.536	1
465		5	max	.006	1	.574	3	.181	1	7.338e-3	3	NC	15	NC	3
466			min	-.001	3	-.555	1	.007	15	-8.165e-3	1	315.369	3	939.488	1
467		6	max	.006	1	.526	3	.172	1	8.261e-3	3	NC	15	NC	3
468			min	-.002	3	-.509	1	.007	15	-9.224e-3	1	345.753	3	987.872	1
469		7	max	.006	1	.413	3	.13	1	9.184e-3	3	NC	5	NC	3
470			min	-.002	3	-.403	1	.003	10	-1.028e-2	1	445.309	3	1295.124	1
471		8	max	.006	1	.268	3	.068	1	1.011e-2	3	NC	5	NC	3
472			min	-.002	3	-.265	1	-.005	10	-1.134e-2	1	709.832	3	2419.337	1
473		9	max	.006	1	.135	3	.021	3	1.103e-2	3	NC	5	NC	1
474			min	-.002	3	-.138	1	-.016	2	-1.24e-2	1	1515.893	1	NC	1
475		10	max	.006	1	.074	3	.022	3	1.195e-2	3	NC	4	NC	1
476			min	-.002	3	-.081	1	-.027	2	-1.346e-2	1	3035.052	1	8676.921	2
477		11	max	.006	1	.135	3	.025	3	1.103e-2	3	NC	5	NC	1
478			min	-.002	3	-.138	1	-.015	2	-1.24e-2	1	1515.894	1	9430.755	3
479		12	max	.005	1	.268	3	.073	1	1.011e-2	3	NC	5	NC	5
480			min	-.002	3	-.265	1	-.005	10	-1.134e-2	1	709.831	3	2259.409	1
481		13	max	.005	1	.413	3	.136	1	9.186e-3	3	NC	5	NC	5
482			min	-.002	3	-.403	1	.003	10	-1.028e-2	1	445.309	3	1240.051	1
483		14	max	.005	1	.526	3	.178	1	8.263e-3	3	NC	15	NC	5
484			min	-.002	3	-.509	1	.007	15	-9.223e-3	1	345.753	3	955.398	1
485		15	max	.005	1	.574	3	.186	1	7.34e-3	3	NC	15	NC	5
486			min	-.002	3	-.555	1	.007	15	-8.164e-3	1	315.369	3	913.14	1
487		16	max	.005	1	.543	3	.16	1	6.418e-3	3	NC	15	NC	3
488			min	-.002	3	-.523	1	.006	15	-7.105e-3	1	334.659	3	1063.312	1
489		17	max	.005	1	.429	3	.105	1	5.495e-3	3	NC	5	NC	3
490			min	-.002	3	-.413	1	.004	15	-6.046e-3	1	428.328	3	1591.323	1
491		18	max	.005	1	.246	3	.041	1	4.572e-3	3	NC	5	NC	2
492			min	-.002	3	-.238	1	0	10	-4.988e-3	1	777.881	3	3821.367	1
493		19	max	.005	1	.023	3	.007	3	3.649e-3	3	NC	1	NC	1
494			min	-.002	3	-.023	1	-.007	2	-3.929e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.017	3	.007	3	4.369e-3	2	NC	1	NC	1
496			min	0	3	-.027	2	-.008	2	-2.781e-3	3	NC	1	NC	1
497		2	max	.002	1	.117	3	.042	1	5.527e-3	2	NC	5	NC	2
498			min	0	3	-.272	1	0	10	-3.474e-3	3	706.278	1	3740.179	1
499		3	max	.002	1	.199	3	.106	1	6.686e-3	2	NC	5	NC	3
500			min	0	3	-.473	1	.004	15	-4.166e-3	3	388.696	1	1574.193	1
501		4	max	.002	1	.251	3	.16	1	7.844e-3	2	NC	15	NC	3
502			min	0	3	-.599	1	.006	15	-4.859e-3	3	303.402	1	1057.931	1
503		5	max	.002	1	.268	3	.186	1	9.003e-3	2	NC	15	NC	5
504			min	0	3	-.635	1	.007	15	-5.552e-3	3	285.446	1	912.452	1
505		6	max	.002	1	.249	3	.177	1	1.016e-2	2	NC	15	NC	5
506			min	0	3	-.583	1	.007	15	-6.245e-3	3	312.048	1	958.812	1
507		7	max	.002	1	.201	3	.134	1	1.132e-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	-.461	1	.003	10	-6.938e-3	3	399.666	1	1251.79	1
509		8	max	.002	1	.14	3	.071	1	1.248e-2	2	NC	5	NC	5
510			min	0	3	-.302	1	-.005	10	-7.63e-3	3	628.924	1	2308.291	1
511		9	max	.002	1	.083	3	.024	3	1.364e-2	2	NC	5	NC	1
512			min	0	3	-.158	2	-.016	2	-8.323e-3	3	1324.533	1	NC	1
513		10	max	.003	1	.057	3	.021	3	1.48e-2	2	NC	4	NC	1
514			min	0	3	-.093	2	-.028	2	-9.016e-3	3	2645.721	2	8668.323	2
515		11	max	.003	1	.083	3	.021	3	1.364e-2	2	NC	5	NC	1
516			min	0	3	-.158	2	-.015	2	-8.323e-3	3	1324.533	1	NC	1
517		12	max	.003	1	.14	3	.069	1	1.248e-2	2	NC	5	NC	3
518			min	0	3	-.302	1	-.005	10	-7.629e-3	3	628.925	1	2358.944	1
519		13	max	.003	1	.201	3	.132	1	1.132e-2	2	NC	5	NC	3
520			min	0	3	-.461	1	.003	10	-6.936e-3	3	399.666	1	1273.592	1
521		14	max	.003	1	.249	3	.174	1	1.016e-2	2	NC	15	NC	3
522			min	0	3	-.583	1	.007	15	-6.242e-3	3	312.049	1	974.794	1
523		15	max	.003	1	.268	3	.183	1	9.004e-3	2	NC	15	NC	3
524			min	0	3	-.635	1	.007	15	-5.549e-3	3	285.446	1	928.554	1
525		16	max	.003	1	.251	3	.157	1	7.846e-3	2	NC	15	NC	3
526			min	0	3	-.599	1	.006	15	-4.856e-3	3	303.403	1	1079.422	1
527		17	max	.003	1	.199	3	.103	1	6.687e-3	2	NC	5	NC	3
528			min	0	3	-.473	1	.004	15	-4.162e-3	3	388.696	1	1614.79	1
529		18	max	.003	1	.117	3	.04	1	5.529e-3	2	NC	5	NC	2
530			min	0	3	-.272	1	0	10	-3.469e-3	3	706.278	1	3883.817	1
531		19	max	.003	1	.017	3	.007	3	4.371e-3	2	NC	1	NC	1
532			min	0	3	-.027	2	-.008	2	-2.775e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.382e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.316e-5	2	NC	1	NC	1
535		2	max	0	3	-.004	15	.001	1	8.412e-4	3	NC	5	NC	1
536			min	0	10	-.017	4	0	3	-6.435e-4	1	5486.812	4	NC	1
537		3	max	0	3	-.008	15	.004	1	1.344e-3	3	NC	15	NC	1
538			min	0	10	-.034	4	-.003	3	-1.253e-3	1	2792.052	4	NC	1
539		4	max	0	3	-.012	15	.008	1	1.847e-3	3	8148.857	15	NC	4
540			min	0	10	-.049	4	-.007	3	-1.863e-3	1	1915.51	4	7607.965	1
541		5	max	0	3	-.015	15	.013	1	2.35e-3	3	6358.636	15	NC	4
542			min	0	10	-.063	4	-.011	3	-2.473e-3	1	1494.692	4	5036.85	1
543		6	max	0	3	-.018	15	.019	1	2.853e-3	3	5351.464	15	NC	4
544			min	0	10	-.075	4	-.016	3	-3.083e-3	1	1257.942	4	3689.635	1
545		7	max	0	3	-.02	15	.024	1	3.356e-3	3	4745.783	15	NC	4
546			min	0	10	-.085	4	-.021	3	-3.693e-3	1	1115.567	4	2897.098	1
547		8	max	0	3	-.022	15	.03	1	3.859e-3	3	4382.283	15	NC	4
548			min	0	10	-.092	4	-.026	3	-4.303e-3	1	1030.121	4	2396.812	1
549		9	max	0	3	-.023	15	.034	1	4.362e-3	3	4186.626	15	NC	4
550			min	0	10	-.096	4	-.031	3	-4.913e-3	1	984.129	4	2068.565	1
551		10	max	0	3	-.023	15	.038	1	4.865e-3	3	4124.73	15	NC	5
552			min	0	10	-.098	4	-.034	3	-5.523e-3	1	969.579	4	1851.698	1
553		11	max	0	3	-.023	15	.041	1	5.368e-3	3	4186.626	15	NC	5
554			min	0	10	-.097	4	-.037	3	-6.133e-3	1	984.129	4	1714.3	1
555		12	max	0	3	-.022	15	.042	1	5.871e-3	3	4382.283	15	NC	5
556			min	0	10	-.092	4	-.038	3	-6.743e-3	1	1030.121	4	1640.605	1
557		13	max	0	3	-.02	15	.041	1	6.374e-3	3	4745.783	15	NC	5
558			min	0	10	-.085	4	-.037	3	-7.353e-3	1	1115.567	4	1626.262	1
559		14	max	0	3	-.018	15	.038	1	6.877e-3	3	5351.464	15	NC	5
560			min	0	10	-.076	4	-.034	3	-7.963e-3	1	1257.942	4	1678.671	1
561		15	max	0	3	-.015	15	.032	1	7.38e-3	3	6358.636	15	NC	4
562			min	0	10	-.064	4	-.028	3	-8.573e-3	1	1494.692	4	1824.178	1
563		16	max	0	3	-.012	15	.023	1	7.883e-3	3	8148.857	15	NC	4
564			min	0	10	-.05	4	-.02	3	-9.183e-3	1	1915.51	4	2133.976	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
565		17	max	0	3	-.008	15	.011	1	8.386e-3	3	NC	15	NC	4
566			min	0	10	-.035	4	-.008	3	-9.793e-3	1	2792.052	4	2831.151	1
567		18	max	.001	3	-.004	15	.007	3	8.889e-3	3	NC	5	NC	4
568			min	0	10	-.018	4	-.011	2	-1.04e-2	1	5486.812	4	5043.906	1
569		19	max	.001	3	.003	3	.026	3	9.392e-3	3	NC	1	NC	1
570			min	-.001	10	-.003	9	-.03	2	-1.101e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.008	3	2.794e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	1	-.008	2	-2.832e-3	2	NC	1	NC	1
573		2	max	0	10	-.004	15	.004	1	2.678e-3	3	NC	5	NC	2
574			min	-.001	3	-.018	4	-.001	10	-2.706e-3	2	5486.812	4	9702.6	1
575		3	max	0	10	-.008	15	.012	1	2.561e-3	3	NC	15	NC	4
576			min	0	3	-.034	4	-.004	3	-2.58e-3	2	2792.052	4	5487.448	1
577		4	max	0	10	-.012	15	.018	1	2.445e-3	3	8148.857	15	NC	4
578			min	0	3	-.05	4	-.007	3	-2.454e-3	2	1915.51	4	4171.642	1
579		5	max	0	10	-.015	15	.022	1	2.329e-3	3	6358.636	15	NC	4
580			min	0	3	-.064	4	-.01	3	-2.328e-3	2	1494.692	4	3600.861	1
581		6	max	0	10	-.018	15	.024	1	2.212e-3	3	5351.464	15	NC	4
582			min	0	3	-.075	4	-.012	3	-2.202e-3	2	1257.942	4	3350.827	1
583		7	max	0	10	-.02	15	.025	1	2.096e-3	3	4745.783	15	NC	4
584			min	0	3	-.085	4	-.012	3	-2.076e-3	2	1115.567	4	3288.519	1
585		8	max	0	10	-.022	15	.025	1	1.98e-3	3	4382.283	15	NC	4
586			min	0	3	-.092	4	-.012	3	-1.95e-3	2	1030.121	4	3368.345	1
587		9	max	0	10	-.023	15	.023	1	1.864e-3	3	4186.626	15	NC	4
588			min	0	3	-.096	4	-.012	3	-1.824e-3	2	984.129	4	3583.957	1
589		10	max	0	10	-.023	15	.021	1	1.747e-3	3	4124.73	15	NC	4
590			min	0	3	-.098	4	-.011	3	-1.698e-3	2	969.579	4	3957.046	1
591		11	max	0	10	-.023	15	.018	1	1.631e-3	3	4186.626	15	NC	4
592			min	0	3	-.096	4	-.009	3	-1.572e-3	2	984.129	4	4542.017	1
593		12	max	0	10	-.022	15	.015	1	1.515e-3	3	4382.283	15	NC	4
594			min	0	3	-.092	4	-.007	3	-1.446e-3	2	1030.121	4	5447.025	1
595		13	max	0	10	-.02	15	.012	1	1.398e-3	3	4745.783	15	NC	2
596			min	0	3	-.085	4	-.006	3	-1.32e-3	2	1115.567	4	6887.97	1
597		14	max	0	10	-.018	15	.009	1	1.282e-3	3	5351.464	15	NC	2
598			min	0	3	-.075	4	-.004	3	-1.194e-3	2	1257.942	4	9332.175	1
599		15	max	0	10	-.015	15	.006	1	1.166e-3	3	6358.636	15	NC	1
600			min	0	3	-.063	4	-.002	3	-1.068e-3	2	1494.692	4	NC	1
601		16	max	0	10	-.012	15	.003	1	1.05e-3	3	8148.857	15	NC	1
602			min	0	3	-.049	4	0	3	-9.423e-4	2	1915.51	4	NC	1
603		17	max	0	10	-.008	15	.001	1	9.332e-4	3	NC	15	NC	1
604			min	0	3	-.034	4	0	10	-8.163e-4	2	2792.052	4	NC	1
605		18	max	0	10	-.004	15	0	3	8.169e-4	3	NC	5	NC	1
606			min	0	3	-.017	4	0	2	-6.903e-4	2	5486.812	4	NC	1
607		19	max	0	1	0	1	0	1	7.007e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.643e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

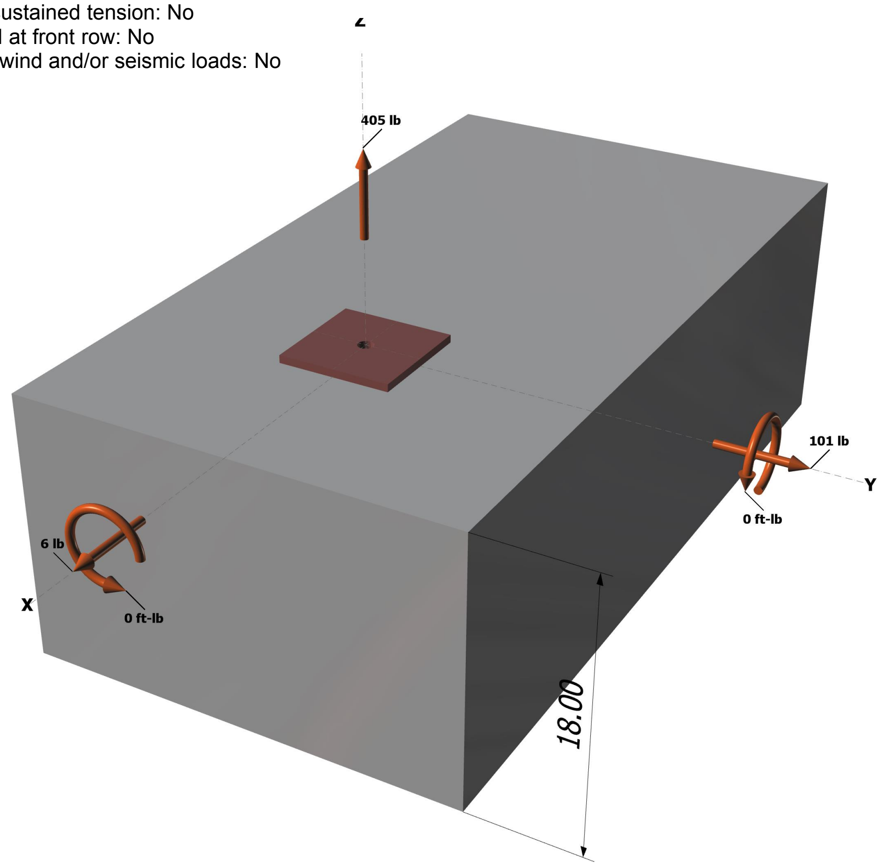
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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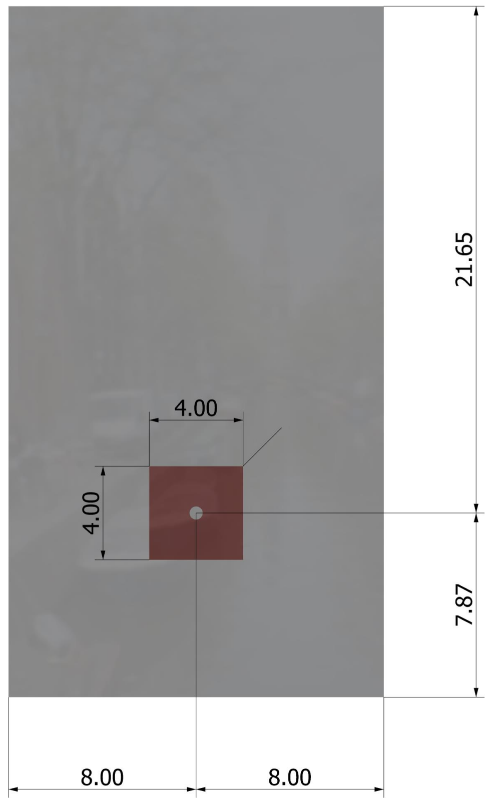


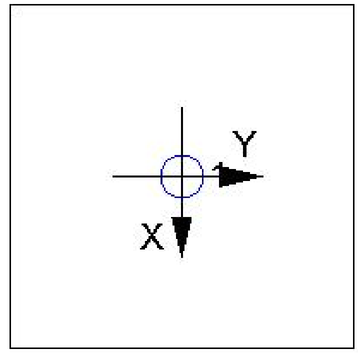
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

SIMPSON Strong-Tie®

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

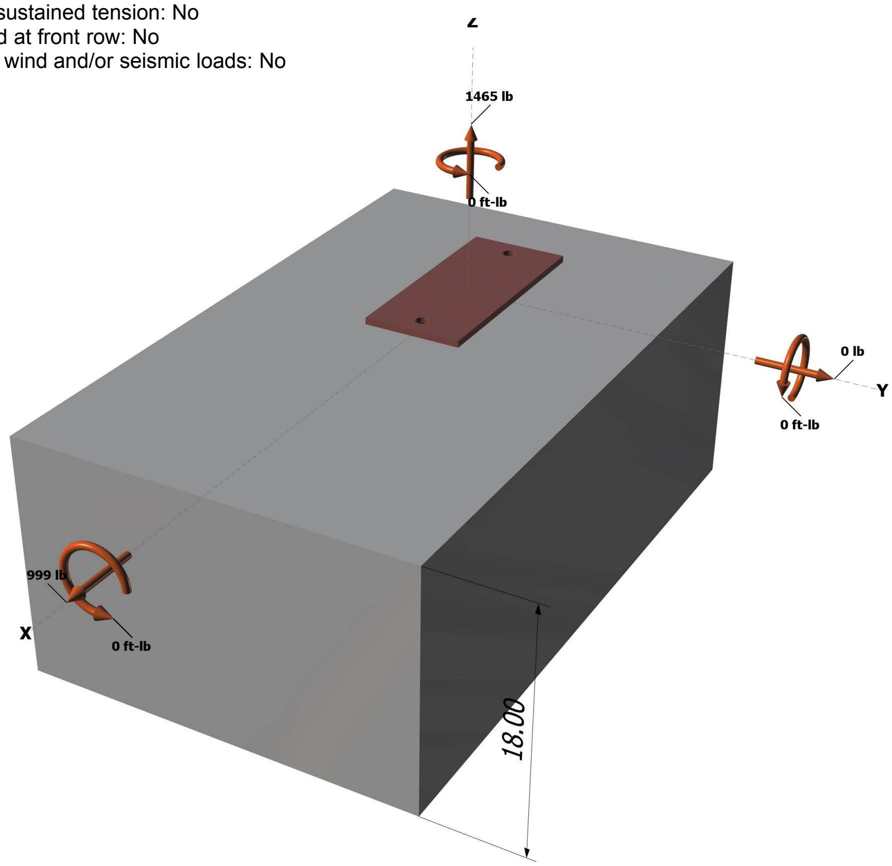
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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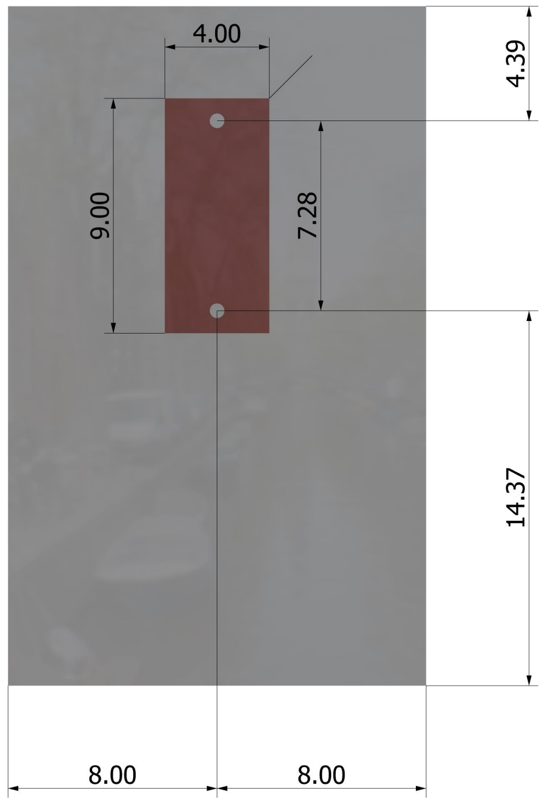


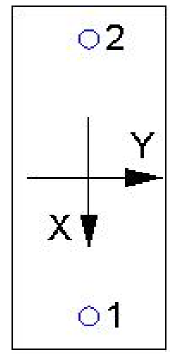
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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