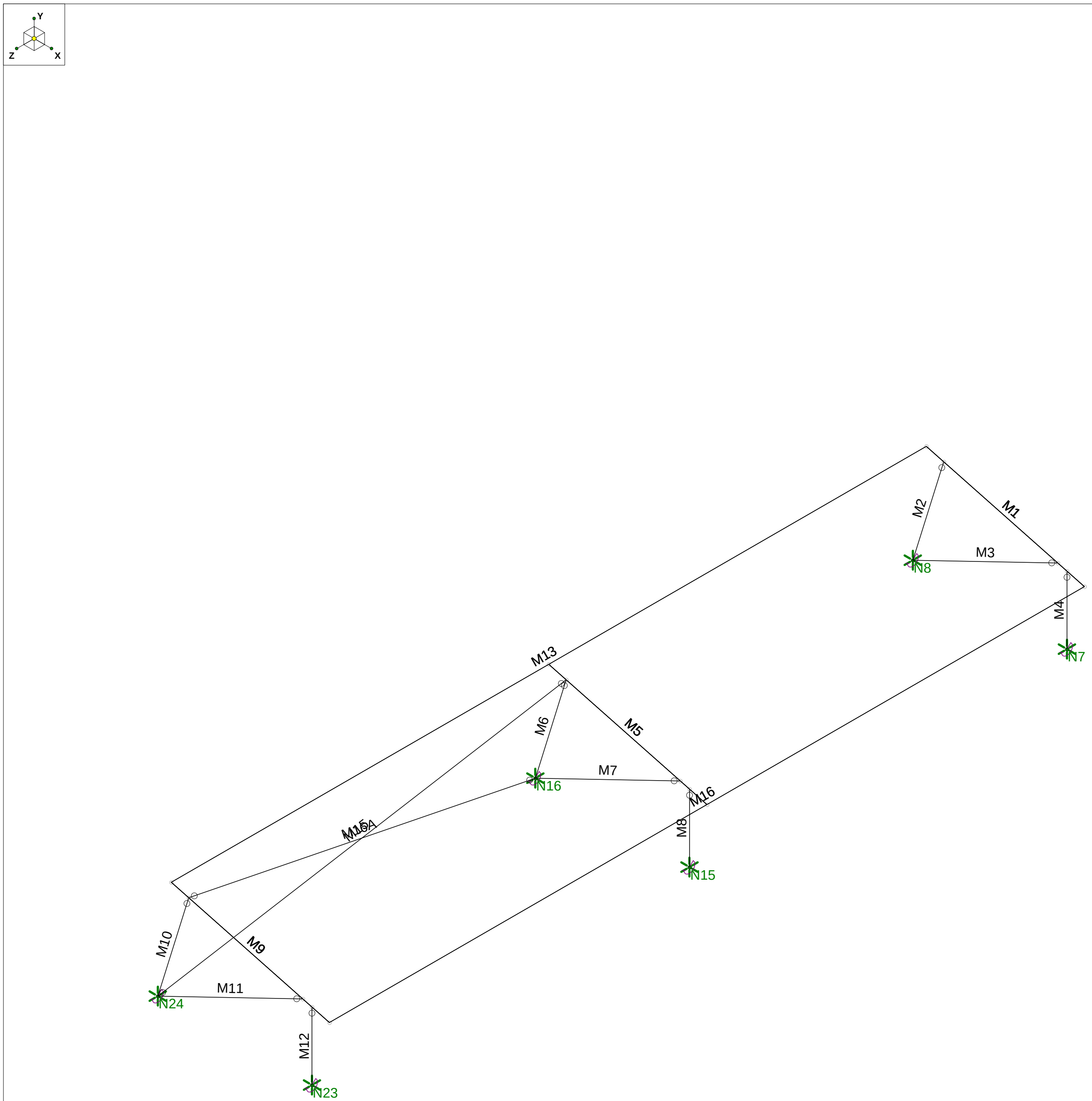


Schletter, Inc.		15ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

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.

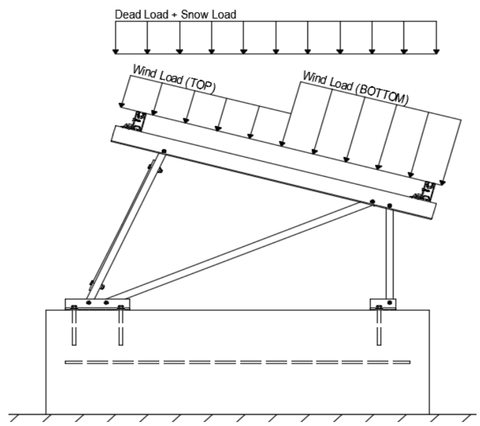
1.2 Construction

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 = 15°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

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

2.3 Wind Loads

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

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

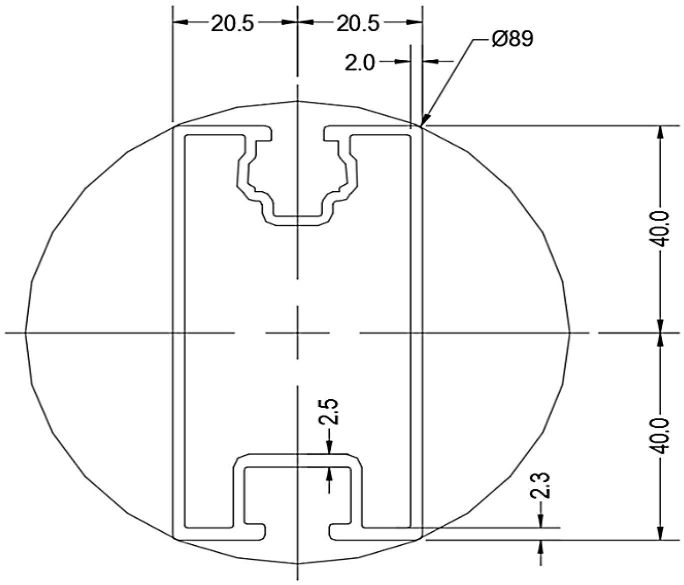
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

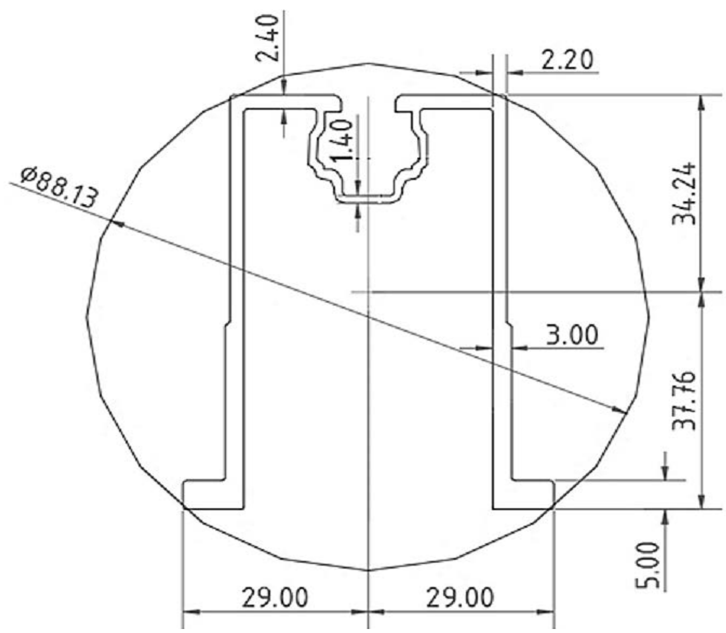
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.344	k-ft
M_z =	0.193	k-ft
$M_{y\ allowable}$ =	1.778	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	99%	



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).

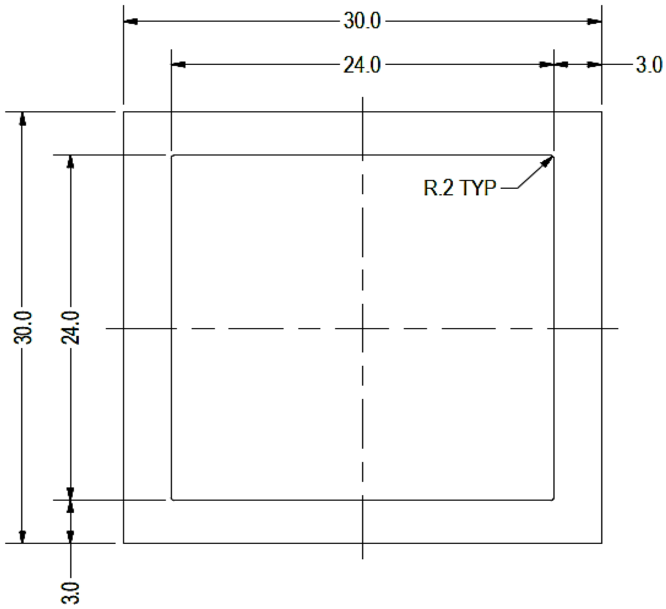
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.93	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.655	k-ft
M_z =	0.000	k-ft
P_n =	0.201	k
$M_{y\ allowable}$ =	1.469	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	46%	



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).

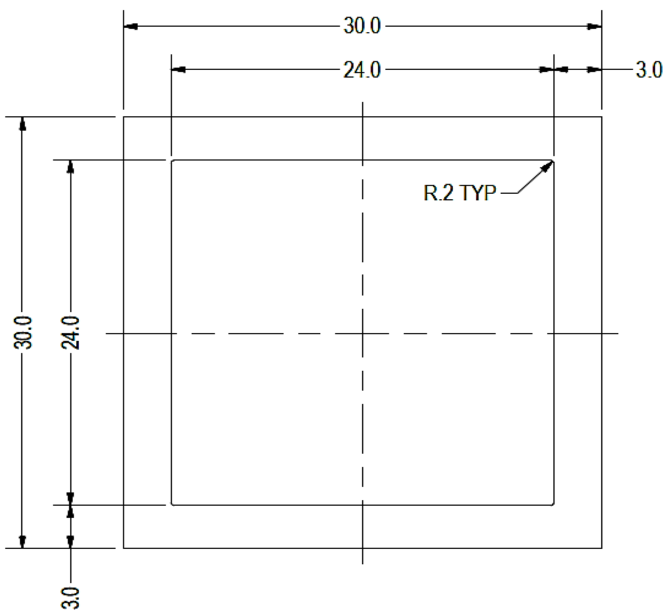
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.776	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	15%	



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).

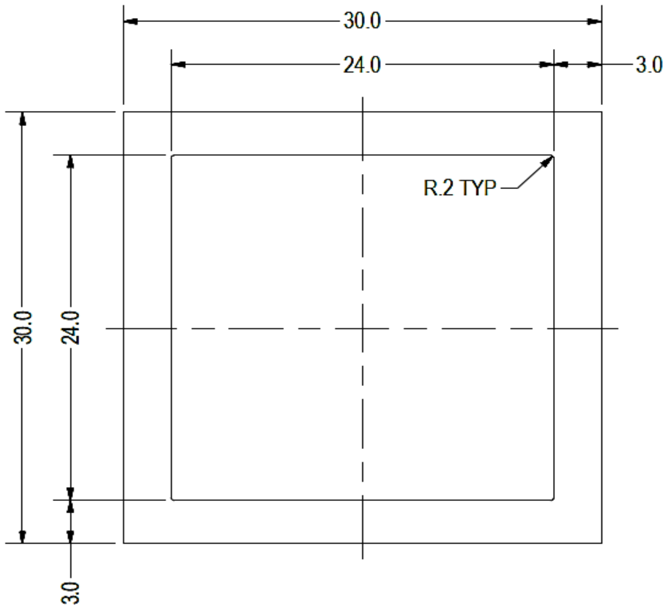
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.151	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	4%	



4.5 Rear Strut Design

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

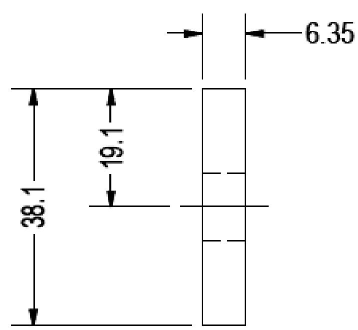
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.433	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	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 =	0.007	k-ft
P_n =	0.032	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	16%	



A cross brace kit is required every 12 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

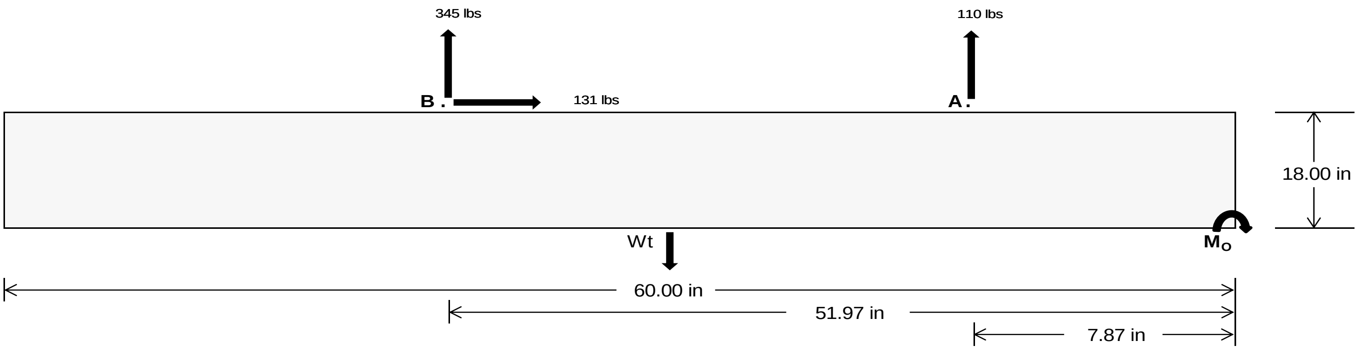
5.1 Helical Pile Foundations

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 =	486.43	1503.16	k
Compressive Load =	2308.74	1694.29	k
Lateral Load =	4.36	566.11	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 = 21156.3 in-lbs
Resisting Force Required = 705.21 lbs
S.F. = 1.67
Weight Required = 1175.35 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 = 130.53 lbs
Friction = 0.4
Weight Required = 326.33 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 = 130.53 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	885 lbs	885 lbs	885 lbs	885 lbs	611 lbs	611 lbs	611 lbs	611 lbs	1062 lbs	1062 lbs	1062 lbs	1062 lbs	-220 lbs	-220 lbs	-220 lbs	-220 lbs
F_B	652 lbs	652 lbs	652 lbs	652 lbs	447 lbs	447 lbs	447 lbs	447 lbs	778 lbs	778 lbs	778 lbs	778 lbs	-690 lbs	-690 lbs	-690 lbs	-690 lbs
F_V	62 lbs	62 lbs	62 lbs	62 lbs	234 lbs	234 lbs	234 lbs	234 lbs	218 lbs	218 lbs	218 lbs	218 lbs	-261 lbs	-261 lbs	-261 lbs	-261 lbs
P_{total}	3440 lbs	3531 lbs	3622 lbs	3712 lbs	2961 lbs	3052 lbs	3142 lbs	3233 lbs	3743 lbs	3834 lbs	3925 lbs	4015 lbs	231 lbs	286 lbs	340 lbs	395 lbs
M	532 lbs-ft	532 lbs-ft	532 lbs-ft	532 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft	659 lbs-ft	861 lbs-ft	861 lbs-ft	861 lbs-ft	861 lbs-ft	467 lbs-ft	467 lbs-ft	467 lbs-ft	467 lbs-ft
e	0.15 ft	0.15 ft	0.15 ft	0.14 ft	0.22 ft	0.22 ft	0.21 ft	0.20 ft	0.23 ft	0.22 ft	0.22 ft	0.21 ft	2.02 ft	1.63 ft	1.37 ft	1.18 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	320.2 psf	315.5 psf	311.2 psf	307.3 psf	248.0 psf	246.6 psf	245.4 psf	244.2 psf	309.8 psf	305.6 psf	301.8 psf	298.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	466.2 psf	454.9 psf	444.6 psf	435.1 psf	428.8 psf	419.2 psf	410.4 psf	402.4 psf	545.8 psf	530.9 psf	517.3 psf	504.8 psf	182.4 psf	119.9 psf	104.9 psf	99.9 psf

Maximum Bearing Pressure = 546 psf
Allowable Bearing Pressure = 1500 psf

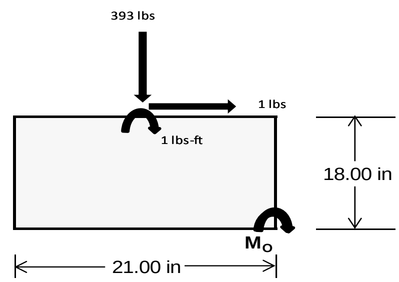
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

<u>Overturning Check</u>

M_O = 341.8 ft-lbs
Resisting Force Required = 390.64 lbs
S.F. = 1.67
Weight Required = 651.06 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.



<u>Bearing Pressure</u>

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	93 lbs	263 lbs	88 lbs	398 lbs	1244 lbs	393 lbs	27 lbs	77 lbs	26 lbs
F_V	4 lbs	3 lbs	0 lbs	18 lbs	18 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2449 lbs	2619 lbs	2444 lbs	2641 lbs	3487 lbs	2636 lbs	716 lbs	766 lbs	715 lbs
M	5 lbs-ft	5 lbs-ft	0 lbs-ft	32 lbs-ft	26 lbs-ft	2 lbs-ft	2 lbs-ft	1 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}	277.8 sqft	297.3 sqft	279.2 sqft	289.5 sqft	388.2 sqft	300.4 sqft	81.2 sqft	86.9 sqft	81.6 sqft
f_{max}	282.0 psf	301.3 psf	279.4 psf	314.2 psf	408.8 psf	302.2 psf	82.5 psf	88.1 psf	81.7 psf

Maximum Bearing Pressure = 409 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

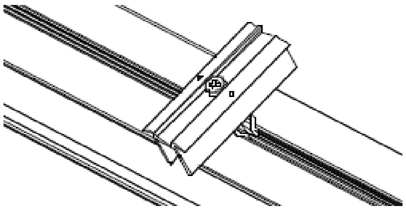
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

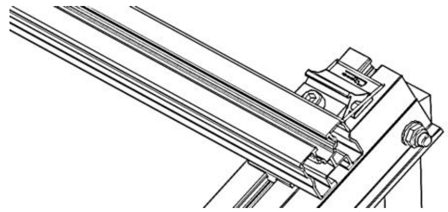
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.357	k
Allowable Uplift =	1.214	k
Utilization =	29%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.058	k
Allowable Uplift =	1.116	k
Utilization =	95%	



6.2 Bolted Connections

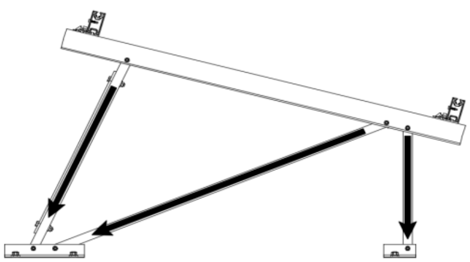
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.776	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	31%	

Rear Strut		
Maximum Axial Load =	1.433	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

Diagonal Strut		
Maximum Axial Load =	0.151	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	

Bracing		
Maximum Axial Load =	0.032	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	0%	



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.

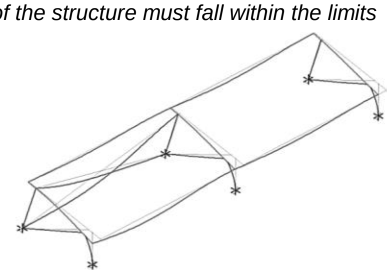
7. SEISMIC DESIGN

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} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.053	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 102.00 in

J = 0.427

212.736

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 102.00 in

J = 0.427

231.168

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.6 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.778 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

<u>Compression</u>

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.45
20.4426

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.9 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 = 1.45
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= 29.9 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= 29.9 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.469 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L = φcc(Bc-Dc*λ)

φF_L = 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φyFcy

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.5 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.5

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.28467

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.75985

φF_L= (φccFcy)/(λ^2)

φF_L= 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-52.98	-52.98	0	0
2	M16	y	-84.769	-84.769	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	108.08	108.08	0	0
2	M16	y	52.98	52.98	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	96.702	2	362.375	1	.029	2	0	1	0	1	0	1
2		min	-136.404	3	-351.109	3	-.099	3	0	3	0	1	0	1
3	N7	max	0	15	596.231	1	-.054	15	0	15	0	1	0	1
4		min	-.193	1	-106.31	3	-1.497	1	-.003	1	0	1	0	1
5	N15	max	0	15	1775.955	1	.511	1	.001	1	0	1	0	1
6		min	-2.076	1	-374.174	3	-.209	3	0	3	0	1	0	1
7	N16	max	414.162	2	1303.301	1	-.228	10	0	1	0	1	0	1
8		min	-435.466	3	-1156.28	3	-29.591	1	0	3	0	1	0	1
9	N23	max	0	15	596.137	1	3.353	1	.006	1	0	1	0	1
10		min	-.193	1	-105.903	3	.113	15	0	15	0	1	0	1
11	N24	max	97.116	2	367.98	1	27.319	1	.002	1	0	1	0	1
12		min	-136.448	3	-348.02	3	.046	10	0	3	0	1	0	1
13	Totals:	max	606.085	2	5001.979	1	0	1						
14		min	-708.652	3	-2441.795	3	0	10						

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	435.476	1	.659	4	.912	1	0	15	0	3	0	1
2			min	-352.758	3	.157	15	-.047	3	-.001	1	0	2	0	1
3		2	max	435.573	1	.622	4	.912	1	0	15	0	1	0	15
4			min	-352.686	3	.148	15	-.047	3	-.001	1	0	10	0	4
5		3	max	435.669	1	.584	4	.912	1	0	15	0	1	0	15
6			min	-352.613	3	.139	15	-.047	3	-.001	1	0	15	0	4
7		4	max	435.765	1	.546	4	.912	1	0	15	0	1	0	15
8			min	-352.541	3	.13	15	-.047	3	-.001	1	0	12	0	4
9		5	max	435.862	1	.508	4	.912	1	0	15	0	1	0	15
10			min	-352.469	3	.121	15	-.047	3	-.001	1	0	3	0	4
11		6	max	435.958	1	.47	4	.912	1	0	15	0	1	0	15
12			min	-352.396	3	.112	15	-.047	3	-.001	1	0	3	0	4
13		7	max	436.055	1	.433	4	.912	1	0	15	0	1	0	15
14			min	-352.324	3	.103	15	-.047	3	-.001	1	0	3	0	4
15		8	max	436.151	1	.395	4	.912	1	0	15	0	1	0	15
16			min	-352.252	3	.095	15	-.047	3	-.001	1	0	3	0	4
17		9	max	436.247	1	.357	4	.912	1	0	15	.001	1	0	15
18			min	-352.18	3	.086	15	-.047	3	-.001	1	0	3	0	4
19		10	max	436.344	1	.319	4	.912	1	0	15	.001	1	0	15
20			min	-352.107	3	.077	15	-.047	3	-.001	1	0	3	0	4
21		11	max	436.44	1	.281	4	.912	1	0	15	.001	1	0	15
22			min	-352.035	3	.068	15	-.047	3	-.001	1	0	3	0	4
23		12	max	436.536	1	.243	4	.912	1	0	15	.001	1	0	15
24			min	-351.963	3	.059	15	-.047	3	-.001	1	0	3	0	4
25		13	max	436.633	1	.206	4	.912	1	0	15	.002	1	0	15
26			min	-351.891	3	.05	15	-.047	3	-.001	1	0	3	0	4
27		14	max	436.729	1	.168	4	.912	1	0	15	.002	1	0	15
28			min	-351.818	3	.041	15	-.047	3	-.001	1	0	3	0	4
29		15	max	436.825	1	.13	4	.912	1	0	15	.002	1	0	15
30			min	-351.746	3	.032	15	-.047	3	-.001	1	0	3	0	4
31		16	max	436.922	1	.092	4	.912	1	0	15	.002	1	0	15
32			min	-351.674	3	.023	15	-.047	3	-.001	1	0	3	0	4
33		17	max	437.018	1	.054	4	.912	1	0	15	.002	1	0	15
34			min	-351.601	3	-.003	1	-.047	3	-.001	1	0	3	0	4
35		18	max	437.115	1	.028	10	.912	1	0	15	.002	1	0	15
36			min	-351.529	3	-.032	1	-.047	3	-.001	1	0	3	0	4
37		19	max	437.211	1	.004	10	.912	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	-351.457	3	-.062	1	-.047	3	-.001	1	0	3	0	4
39	M3	1	max	32.303	10	1.811	4	-.024	15	0	15	.002	1	0	4
40			min	-130.842	1	.427	15	-.79	1	0	1	0	15	0	15
41		2	max	32.248	10	1.633	4	-.024	15	0	15	.002	1	0	4
42			min	-130.909	1	.385	15	-.79	1	0	1	0	15	0	15
43		3	max	32.192	10	1.455	4	-.024	15	0	15	.002	1	0	10
44			min	-130.976	1	.343	15	-.79	1	0	1	0	15	0	1
45		4	max	32.136	10	1.277	4	-.024	15	0	15	.002	1	0	15
46			min	-131.043	1	.301	15	-.79	1	0	1	0	15	0	1
47		5	max	32.08	10	1.099	4	-.024	15	0	15	.002	1	0	15
48			min	-131.11	1	.259	15	-.79	1	0	1	0	15	0	4
49		6	max	32.024	10	.921	4	-.024	15	0	15	.001	1	0	15
50			min	-131.177	1	.218	15	-.79	1	0	1	0	15	0	4
51		7	max	31.968	10	.743	4	-.024	15	0	15	.001	1	0	15
52			min	-131.244	1	.176	15	-.79	1	0	1	0	15	0	4
53		8	max	31.912	10	.565	4	-.024	15	0	15	.001	1	0	15
54			min	-131.311	1	.134	15	-.79	1	0	1	0	15	0	4
55		9	max	31.856	10	.387	4	-.024	15	0	15	0	1	0	15
56			min	-131.378	1	.092	15	-.79	1	0	1	0	15	-.001	4
57		10	max	31.8	10	.209	4	-.024	15	0	15	0	1	0	15
58			min	-131.445	1	.05	15	-.79	1	0	1	0	15	-.001	4
59		11	max	31.744	10	.031	10	-.024	15	0	15	0	1	0	15
60			min	-131.513	1	-.006	1	-.79	1	0	1	0	12	-.001	4
61		12	max	31.688	10	-.033	15	-.024	15	0	15	0	1	0	15
62			min	-131.58	1	-.147	4	-.79	1	0	1	0	12	-.001	4
63		13	max	31.633	10	-.075	15	-.024	15	0	15	0	1	0	15
64			min	-131.647	1	-.325	4	-.79	1	0	1	0	12	-.001	4
65		14	max	31.577	10	-.117	15	-.024	15	0	15	0	1	0	15
66			min	-131.714	1	-.503	4	-.79	1	0	1	0	3	-.001	4
67		15	max	31.521	10	-.159	15	-.024	15	0	15	0	15	0	15
68			min	-131.781	1	-.681	4	-.79	1	0	1	0	1	0	4
69		16	max	31.465	10	-.201	15	-.024	15	0	15	0	15	0	15
70			min	-131.848	1	-.859	4	-.79	1	0	1	0	1	0	4
71		17	max	31.409	10	-.243	15	-.024	15	0	15	0	15	0	15
72			min	-131.915	1	-1.037	4	-.79	1	0	1	0	1	0	4
73		18	max	31.353	10	-.285	15	-.024	15	0	15	0	15	0	15
74			min	-131.982	1	-1.216	4	-.79	1	0	1	0	1	0	4
75		19	max	31.297	10	-.326	15	-.024	15	0	15	0	15	0	1
76			min	-132.049	1	-1.394	4	-.79	1	0	1	0	1	0	1
77	M4	1	max	595.067	1	0	1	-.054	15	0	1	0	3	0	1
78			min	-107.184	3	0	1	-1.662	1	0	1	0	1	0	1
79		2	max	595.131	1	0	1	-.054	15	0	1	0	12	0	1
80			min	-107.135	3	0	1	-1.662	1	0	1	0	1	0	1
81		3	max	595.196	1	0	1	-.054	15	0	1	0	15	0	1
82			min	-107.086	3	0	1	-1.662	1	0	1	0	1	0	1
83		4	max	595.261	1	0	1	-.054	15	0	1	0	15	0	1
84			min	-107.038	3	0	1	-1.662	1	0	1	0	1	0	1
85		5	max	595.326	1	0	1	-.054	15	0	1	0	15	0	1
86			min	-106.989	3	0	1	-1.662	1	0	1	0	1	0	1
87		6	max	595.39	1	0	1	-.054	15	0	1	0	15	0	1
88			min	-106.941	3	0	1	-1.662	1	0	1	0	1	0	1
89		7	max	595.455	1	0	1	-.054	15	0	1	0	15	0	1
90			min	-106.892	3	0	1	-1.662	1	0	1	0	1	0	1
91		8	max	595.52	1	0	1	-.054	15	0	1	0	15	0	1
92			min	-106.844	3	0	1	-1.662	1	0	1	-.001	1	0	1
93		9	max	595.584	1	0	1	-.054	15	0	1	0	15	0	1
94			min	-106.795	3	0	1	-1.662	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	595.649	1	0	1	-.054	15	0	1	0	15	0	1
96			min	-106.747	3	0	1	-1.662	1	0	1	-.001	1	0	1
97		11	max	595.714	1	0	1	-.054	15	0	1	0	15	0	1
98			min	-106.698	3	0	1	-1.662	1	0	1	-.002	1	0	1
99		12	max	595.779	1	0	1	-.054	15	0	1	0	15	0	1
100			min	-106.65	3	0	1	-1.662	1	0	1	-.002	1	0	1
101		13	max	595.843	1	0	1	-.054	15	0	1	0	15	0	1
102			min	-106.601	3	0	1	-1.662	1	0	1	-.002	1	0	1
103		14	max	595.908	1	0	1	-.054	15	0	1	0	15	0	1
104			min	-106.553	3	0	1	-1.662	1	0	1	-.002	1	0	1
105		15	max	595.973	1	0	1	-.054	15	0	1	0	15	0	1
106			min	-106.504	3	0	1	-1.662	1	0	1	-.002	1	0	1
107		16	max	596.037	1	0	1	-.054	15	0	1	0	15	0	1
108			min	-106.456	3	0	1	-1.662	1	0	1	-.002	1	0	1
109		17	max	596.102	1	0	1	-.054	15	0	1	0	15	0	1
110			min	-106.407	3	0	1	-1.662	1	0	1	-.002	1	0	1
111		18	max	596.167	1	0	1	-.054	15	0	1	0	15	0	1
112			min	-106.359	3	0	1	-1.662	1	0	1	-.003	1	0	1
113		19	max	596.231	1	0	1	-.054	15	0	1	0	15	0	1
114			min	-106.31	3	0	1	-1.662	1	0	1	-.003	1	0	1
115	M6	1	max	1431.416	1	.642	4	.347	1	0	1	0	3	0	1
116			min	-1159.118	3	.154	15	-.11	3	0	15	0	1	0	1
117		2	max	1431.512	1	.604	4	.347	1	0	1	0	3	0	15
118			min	-1159.046	3	.146	15	-.11	3	0	15	0	2	0	4
119		3	max	1431.608	1	.566	4	.347	1	0	1	0	1	0	15
120			min	-1158.973	3	.137	15	-.11	3	0	15	0	12	0	4
121		4	max	1431.705	1	.528	4	.347	1	0	1	0	1	0	15
122			min	-1158.901	3	.128	15	-.11	3	0	15	0	3	0	4
123		5	max	1431.801	1	.49	4	.347	1	0	1	0	1	0	15
124			min	-1158.829	3	.119	15	-.11	3	0	15	0	3	0	4
125		6	max	1431.897	1	.452	4	.347	1	0	1	0	1	0	15
126			min	-1158.756	3	.11	15	-.11	3	0	15	0	3	0	4
127		7	max	1431.994	1	.415	4	.347	1	0	1	0	1	0	15
128			min	-1158.684	3	.101	15	-.11	3	0	15	0	3	0	4
129		8	max	1432.09	1	.377	4	.347	1	0	1	0	1	0	15
130			min	-1158.612	3	.092	15	-.11	3	0	15	0	3	0	4
131		9	max	1432.186	1	.339	4	.347	1	0	1	0	1	0	15
132			min	-1158.54	3	.083	15	-.11	3	0	15	0	3	0	4
133		10	max	1432.283	1	.301	4	.347	1	0	1	0	1	0	15
134			min	-1158.467	3	.074	15	-.11	3	0	15	0	3	0	4
135		11	max	1432.379	1	.263	4	.347	1	0	1	0	1	0	15
136			min	-1158.395	3	.066	15	-.11	3	0	15	0	3	0	4
137		12	max	1432.476	1	.225	4	.347	1	0	1	0	1	0	15
138			min	-1158.323	3	.057	15	-.11	3	0	15	0	3	0	4
139		13	max	1432.572	1	.188	4	.347	1	0	1	0	1	0	15
140			min	-1158.251	3	.048	15	-.11	3	0	15	0	3	0	4
141		14	max	1432.668	1	.15	2	.347	1	0	1	0	1	0	15
142			min	-1158.178	3	.03	9	-.11	3	0	15	0	3	0	4
143		15	max	1432.765	1	.121	2	.347	1	0	1	0	1	0	15
144			min	-1158.106	3	.006	9	-.11	3	0	15	0	3	0	4
145		16	max	1432.861	1	.094	10	.347	1	0	1	0	1	0	15
146			min	-1158.034	3	-.023	1	-.11	3	0	15	0	3	0	4
147		17	max	1432.957	1	.069	10	.347	1	0	1	0	1	0	15
148			min	-1157.961	3	-.053	1	-.11	3	0	15	0	3	0	4
149		18	max	1433.054	1	.045	10	.347	1	0	1	0	1	0	15
150			min	-1157.889	3	-.082	1	-.11	3	0	15	0	3	0	4
151		19	max	1433.15	1	.02	10	.347	1	0	1	0	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
152			min	-1157.817	3	-.112	1	-.11	3	0	15	0	3	0	4
153	M7	1	max	151.341	2	1.803	4	.015	1	0	2	0	2	0	4
154			min	-176.683	9	.426	15	-.007	3	0	3	0	3	0	15
155		2	max	151.273	2	1.625	4	.015	1	0	2	0	2	0	2
156			min	-176.739	9	.384	15	-.007	3	0	3	0	3	0	15
157		3	max	151.206	2	1.447	4	.015	1	0	2	0	2	0	2
158			min	-176.795	9	.342	15	-.007	3	0	3	0	3	0	9
159		4	max	151.139	2	1.269	4	.015	1	0	2	0	2	0	10
160			min	-176.851	9	.3	15	-.007	3	0	3	0	3	0	1
161		5	max	151.072	2	1.091	4	.015	1	0	2	0	2	0	15
162			min	-176.907	9	.258	15	-.007	3	0	3	0	3	0	1
163		6	max	151.005	2	.913	4	.015	1	0	2	0	2	0	15
164			min	-176.963	9	.217	15	-.007	3	0	3	0	3	0	4
165		7	max	150.938	2	.735	4	.015	1	0	2	0	2	0	15
166			min	-177.019	9	.175	15	-.007	3	0	3	0	3	0	4
167		8	max	150.871	2	.557	4	.015	1	0	2	0	2	0	15
168			min	-177.075	9	.133	15	-.007	3	0	3	0	3	0	4
169		9	max	150.804	2	.379	4	.015	1	0	2	0	2	0	15
170			min	-177.131	9	.091	15	-.007	3	0	3	0	3	-.001	4
171		10	max	150.737	2	.201	4	.015	1	0	2	0	2	0	15
172			min	-177.186	9	.049	15	-.007	3	0	3	0	3	-.001	4
173		11	max	150.67	2	.05	2	.015	1	0	2	0	2	0	15
174			min	-177.242	9	-.023	9	-.007	3	0	3	0	3	-.001	4
175		12	max	150.603	2	-.034	15	.015	1	0	2	0	2	0	15
176			min	-177.298	9	-.16	1	-.007	3	0	3	0	3	-.001	4
177		13	max	150.535	2	-.076	15	.015	1	0	2	0	2	0	15
178			min	-177.354	9	-.333	4	-.007	3	0	3	0	3	-.001	4
179		14	max	150.468	2	-.118	15	.015	1	0	2	0	2	0	15
180			min	-177.41	9	-.511	4	-.007	3	0	3	0	3	-.001	4
181		15	max	150.401	2	-.16	15	.015	1	0	2	0	2	0	15
182			min	-177.466	9	-.689	4	-.007	3	0	3	0	3	0	4
183		16	max	150.334	2	-.202	15	.015	1	0	2	0	2	0	15
184			min	-177.522	9	-.867	4	-.007	3	0	3	0	3	0	4
185		17	max	150.267	2	-.244	15	.015	1	0	2	0	2	0	15
186			min	-177.578	9	-1.045	4	-.007	3	0	3	0	3	0	4
187		18	max	150.2	2	-.286	15	.015	1	0	2	0	2	0	15
188			min	-177.634	9	-1.223	4	-.007	3	0	3	0	3	0	4
189		19	max	150.133	2	-.327	15	.015	1	0	2	0	2	0	1
190			min	-177.69	9	-1.401	4	-.007	3	0	3	0	3	0	1
191	M8	1	max	1774.79	1	0	1	.72	1	0	1	0	15	0	1
192			min	-375.047	3	0	1	-.197	3	0	1	0	1	0	1
193		2	max	1774.855	1	0	1	.72	1	0	1	0	1	0	1
194			min	-374.999	3	0	1	-.197	3	0	1	0	3	0	1
195		3	max	1774.919	1	0	1	.72	1	0	1	0	1	0	1
196			min	-374.95	3	0	1	-.197	3	0	1	0	3	0	1
197		4	max	1774.984	1	0	1	.72	1	0	1	0	1	0	1
198			min	-374.902	3	0	1	-.197	3	0	1	0	3	0	1
199		5	max	1775.049	1	0	1	.72	1	0	1	0	1	0	1
200			min	-374.853	3	0	1	-.197	3	0	1	0	3	0	1
201		6	max	1775.113	1	0	1	.72	1	0	1	0	1	0	1
202			min	-374.805	3	0	1	-.197	3	0	1	0	3	0	1
203		7	max	1775.178	1	0	1	.72	1	0	1	0	1	0	1
204			min	-374.756	3	0	1	-.197	3	0	1	0	3	0	1
205		8	max	1775.243	1	0	1	.72	1	0	1	0	1	0	1
206			min	-374.708	3	0	1	-.197	3	0	1	0	3	0	1
207		9	max	1775.307	1	0	1	.72	1	0	1	0	1	0	1
208			min	-374.659	3	0	1	-.197	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	1775.372	1	0	1	.72	1	0	1	0	1	0	1
210			min	-374.611	3	0	1	-.197	3	0	1	0	3	0	1
211		11	max	1775.437	1	0	1	.72	1	0	1	0	1	0	1
212			min	-374.562	3	0	1	-.197	3	0	1	0	3	0	1
213		12	max	1775.502	1	0	1	.72	1	0	1	0	1	0	1
214			min	-374.514	3	0	1	-.197	3	0	1	0	3	0	1
215		13	max	1775.566	1	0	1	.72	1	0	1	0	1	0	1
216			min	-374.465	3	0	1	-.197	3	0	1	0	3	0	1
217		14	max	1775.631	1	0	1	.72	1	0	1	0	1	0	1
218			min	-374.417	3	0	1	-.197	3	0	1	0	3	0	1
219		15	max	1775.696	1	0	1	.72	1	0	1	0	1	0	1
220			min	-374.368	3	0	1	-.197	3	0	1	0	3	0	1
221		16	max	1775.76	1	0	1	.72	1	0	1	0	1	0	1
222			min	-374.319	3	0	1	-.197	3	0	1	0	3	0	1
223		17	max	1775.825	1	0	1	.72	1	0	1	.001	1	0	1
224			min	-374.271	3	0	1	-.197	3	0	1	0	3	0	1
225		18	max	1775.89	1	0	1	.72	1	0	1	.001	1	0	1
226			min	-374.222	3	0	1	-.197	3	0	1	0	3	0	1
227		19	max	1775.955	1	0	1	.72	1	0	1	.001	1	0	1
228			min	-374.174	3	0	1	-.197	3	0	1	0	3	0	1
229	M10	1	max	446.511	1	.647	4	-.004	15	.001	1	0	2	0	1
230			min	-344.015	3	.155	15	-.13	1	0	3	0	3	0	1
231		2	max	446.607	1	.609	4	-.004	15	.001	1	0	2	0	15
232			min	-343.942	3	.146	15	-.13	1	0	3	0	3	0	4
233		3	max	446.704	1	.571	4	-.004	15	.001	1	0	2	0	15
234			min	-343.87	3	.137	15	-.13	1	0	3	0	3	0	4
235		4	max	446.8	1	.533	4	-.004	15	.001	1	0	2	0	15
236			min	-343.798	3	.128	15	-.13	1	0	3	0	3	0	4
237		5	max	446.897	1	.495	4	-.004	15	.001	1	0	2	0	15
238			min	-343.725	3	.12	15	-.13	1	0	3	0	1	0	4
239		6	max	446.993	1	.458	4	-.004	15	.001	1	0	15	0	15
240			min	-343.653	3	.111	15	-.13	1	0	3	0	1	0	4
241		7	max	447.089	1	.42	4	-.004	15	.001	1	0	15	0	15
242			min	-343.581	3	.102	15	-.13	1	0	3	0	1	0	4
243		8	max	447.186	1	.382	4	-.004	15	.001	1	0	15	0	15
244			min	-343.509	3	.093	15	-.13	1	0	3	0	1	0	4
245		9	max	447.282	1	.344	4	-.004	15	.001	1	0	15	0	15
246			min	-343.436	3	.084	15	-.13	1	0	3	0	1	0	4
247		10	max	447.378	1	.306	4	-.004	15	.001	1	0	15	0	15
248			min	-343.364	3	.075	15	-.13	1	0	3	0	1	0	4
249		11	max	447.475	1	.268	4	-.004	15	.001	1	0	15	0	15
250			min	-343.292	3	.066	15	-.13	1	0	3	0	1	0	4
251		12	max	447.571	1	.231	4	-.004	15	.001	1	0	15	0	15
252			min	-343.22	3	.057	15	-.13	1	0	3	0	1	0	4
253		13	max	447.667	1	.193	4	-.004	15	.001	1	0	15	0	15
254			min	-343.147	3	.048	15	-.13	1	0	3	0	1	0	4
255		14	max	447.764	1	.155	4	-.004	15	.001	1	0	15	0	15
256			min	-343.075	3	.023	1	-.13	1	0	3	0	1	0	4
257		15	max	447.86	1	.117	4	-.004	15	.001	1	0	15	0	15
258			min	-343.003	3	-.007	1	-.13	1	0	3	0	1	0	4
259		16	max	447.957	1	.095	3	-.004	15	.001	1	0	15	0	15
260			min	-342.93	3	-.036	1	-.13	1	0	3	0	1	0	4
261		17	max	448.053	1	.073	3	-.004	15	.001	1	0	15	0	15
262			min	-342.858	3	-.066	1	-.13	1	0	3	0	1	0	4
263		18	max	448.149	1	.051	3	-.004	15	.001	1	0	15	0	15
264			min	-342.786	3	-.095	1	-.13	1	0	3	0	1	0	4
265		19	max	448.246	1	.028	3	-.004	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	-342.714	3	-.125	1	-.13	1	0	3	0	1	0	4
267	M11	1	max	31.731	10	1.816	4	.932	1	.001	1	0	3	0	4
268			min	-130.66	1	.427	15	.022	12	0	15	-.002	1	0	15
269		2	max	31.675	10	1.638	4	.932	1	.001	1	0	3	0	4
270			min	-130.727	1	.386	15	.022	12	0	15	-.002	1	0	15
271		3	max	31.619	10	1.46	4	.932	1	.001	1	0	3	0	2
272			min	-130.794	1	.344	15	.022	12	0	15	-.002	1	0	3
273		4	max	31.563	10	1.282	4	.932	1	.001	1	0	3	0	15
274			min	-130.861	1	.302	15	.022	12	0	15	-.002	1	0	4
275		5	max	31.507	10	1.104	4	.932	1	.001	1	0	3	0	15
276			min	-130.928	1	.26	15	.022	12	0	15	-.001	1	0	4
277		6	max	31.451	10	.926	4	.932	1	.001	1	0	3	0	15
278			min	-130.995	1	.218	15	.022	12	0	15	-.001	1	0	4
279		7	max	31.395	10	.748	4	.932	1	.001	1	0	3	0	15
280			min	-131.062	1	.176	15	.022	12	0	15	-.001	1	0	4
281		8	max	31.339	10	.57	4	.932	1	.001	1	0	3	0	15
282			min	-131.129	1	.135	15	.022	12	0	15	0	1	0	4
283		9	max	31.283	10	.392	4	.932	1	.001	1	0	3	0	15
284			min	-131.196	1	.093	15	.022	12	0	15	0	1	-.001	4
285		10	max	31.227	10	.214	4	.932	1	.001	1	0	3	0	15
286			min	-131.263	1	.051	15	.022	12	0	15	0	1	-.001	4
287		11	max	31.172	10	.049	2	.932	1	.001	1	0	3	0	15
288			min	-131.331	1	.003	3	.022	12	0	15	0	1	-.001	4
289		12	max	31.116	10	-.033	15	.932	1	.001	1	0	3	0	15
290			min	-131.398	1	-.142	4	.022	12	0	15	0	2	-.001	4
291		13	max	31.06	10	-.075	15	.932	1	.001	1	0	1	0	15
292			min	-131.465	1	-.32	4	.022	12	0	15	0	10	-.001	4
293		14	max	31.004	10	-.117	15	.932	1	.001	1	0	1	0	15
294			min	-131.532	1	-.498	4	.022	12	0	15	0	15	-.001	4
295		15	max	30.948	10	-.158	15	.932	1	.001	1	0	1	0	15
296			min	-131.599	1	-.676	4	.022	12	0	15	0	15	0	4
297		16	max	30.892	10	-.2	15	.932	1	.001	1	0	1	0	15
298			min	-131.666	1	-.854	4	.022	12	0	15	0	15	0	4
299		17	max	30.836	10	-.242	15	.932	1	.001	1	0	1	0	15
300			min	-131.733	1	-1.032	4	.022	12	0	15	0	15	0	4
301		18	max	30.78	10	-.284	15	.932	1	.001	1	.001	1	0	15
302			min	-131.8	1	-1.21	4	.022	12	0	15	0	15	0	4
303		19	max	30.724	10	-.326	15	.932	1	.001	1	.001	1	0	1
304			min	-131.867	1	-1.388	4	.022	12	0	15	0	15	0	1
305	M12	1	max	594.972	1	0	1	3.718	1	0	1	0	1	0	1
306			min	-106.776	3	0	1	.113	15	0	1	0	3	0	1
307		2	max	595.037	1	0	1	3.718	1	0	1	0	1	0	1
308			min	-106.728	3	0	1	.113	15	0	1	0	12	0	1
309		3	max	595.102	1	0	1	3.718	1	0	1	0	1	0	1
310			min	-106.679	3	0	1	.113	15	0	1	0	15	0	1
311		4	max	595.166	1	0	1	3.718	1	0	1	.001	1	0	1
312			min	-106.63	3	0	1	.113	15	0	1	0	15	0	1
313		5	max	595.231	1	0	1	3.718	1	0	1	.001	1	0	1
314			min	-106.582	3	0	1	.113	15	0	1	0	15	0	1
315		6	max	595.296	1	0	1	3.718	1	0	1	.002	1	0	1
316			min	-106.533	3	0	1	.113	15	0	1	0	15	0	1
317		7	max	595.361	1	0	1	3.718	1	0	1	.002	1	0	1
318			min	-106.485	3	0	1	.113	15	0	1	0	15	0	1
319		8	max	595.425	1	0	1	3.718	1	0	1	.002	1	0	1
320			min	-106.436	3	0	1	.113	15	0	1	0	15	0	1
321		9	max	595.49	1	0	1	3.718	1	0	1	.003	1	0	1
322			min	-106.388	3	0	1	.113	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	595.555	1	0	1	3.718	1	0	1	.003	1	0	1
324			min	-106.339	3	0	1	.113	15	0	1	0	15	0	1
325		11	max	595.619	1	0	1	3.718	1	0	1	.003	1	0	1
326			min	-106.291	3	0	1	.113	15	0	1	0	15	0	1
327		12	max	595.684	1	0	1	3.718	1	0	1	.004	1	0	1
328			min	-106.242	3	0	1	.113	15	0	1	0	15	0	1
329		13	max	595.749	1	0	1	3.718	1	0	1	.004	1	0	1
330			min	-106.194	3	0	1	.113	15	0	1	0	15	0	1
331		14	max	595.814	1	0	1	3.718	1	0	1	.004	1	0	1
332			min	-106.145	3	0	1	.113	15	0	1	0	15	0	1
333		15	max	595.878	1	0	1	3.718	1	0	1	.005	1	0	1
334			min	-106.097	3	0	1	.113	15	0	1	0	15	0	1
335		16	max	595.943	1	0	1	3.718	1	0	1	.005	1	0	1
336			min	-106.048	3	0	1	.113	15	0	1	0	15	0	1
337		17	max	596.008	1	0	1	3.718	1	0	1	.005	1	0	1
338			min	-106	3	0	1	.113	15	0	1	0	15	0	1
339		18	max	596.072	1	0	1	3.718	1	0	1	.006	1	0	1
340			min	-105.951	3	0	1	.113	15	0	1	0	15	0	1
341		19	max	596.137	1	0	1	3.718	1	0	1	.006	1	0	1
342			min	-105.903	3	0	1	.113	15	0	1	0	15	0	1
343	M1	1	max	118.469	1	330.551	3	-2.263	15	0	1	.144	1	.015	1
344			min	3.632	15	-434.12	1	-73.133	1	0	3	.004	15	-.009	3
345		2	max	118.542	1	330.348	3	-2.263	15	0	1	.128	1	.109	1
346			min	3.654	15	-434.39	1	-73.133	1	0	3	.004	15	-.081	3
347		3	max	134.269	1	7.176	9	-2.236	15	0	12	.111	1	.201	1
348			min	-6.05	3	-22.43	3	-72.712	1	0	1	.003	15	-.151	3
349		4	max	134.342	1	6.951	9	-2.236	15	0	12	.096	1	.201	1
350			min	-5.995	3	-22.632	3	-72.712	1	0	1	.003	15	-.146	3
351		5	max	134.414	1	6.726	9	-2.236	15	0	12	.08	1	.201	1
352			min	-5.941	3	-22.834	3	-72.712	1	0	1	.002	15	-.142	3
353		6	max	134.486	1	6.501	9	-2.236	15	0	12	.064	1	.201	1
354			min	-5.887	3	-23.037	3	-72.712	1	0	1	.002	15	-.137	3
355		7	max	134.558	1	6.277	9	-2.236	15	0	12	.048	1	.201	1
356			min	-5.833	3	-23.239	3	-72.712	1	0	1	.001	15	-.132	3
357		8	max	134.631	1	6.052	9	-2.236	15	0	12	.032	1	.201	1
358			min	-5.778	3	-23.441	3	-72.712	1	0	1	0	15	-.126	3
359		9	max	134.703	1	5.827	9	-2.236	15	0	12	.017	1	.201	1
360			min	-5.724	3	-23.644	3	-72.712	1	0	1	0	15	-.121	3
361		10	max	134.775	1	5.602	9	-2.236	15	0	12	0	1	.201	1
362			min	-5.67	3	-23.846	3	-72.712	1	0	1	0	15	-.116	3
363		11	max	134.847	1	5.377	9	-2.236	15	0	12	0	12	.201	1
364			min	-5.616	3	-24.048	3	-72.712	1	0	1	-.015	1	-.111	3
365		12	max	134.92	1	5.153	9	-2.236	15	0	12	0	12	.201	1
366			min	-5.562	3	-24.25	3	-72.712	1	0	1	-.031	1	-.106	3
367		13	max	134.992	1	4.928	9	-2.236	15	0	12	-.001	12	.202	1
368			min	-5.507	3	-24.453	3	-72.712	1	0	1	-.046	1	-.1	3
369		14	max	135.064	1	4.703	9	-2.236	15	0	12	-.002	15	.202	1
370			min	-5.453	3	-24.655	3	-72.712	1	0	1	-.062	1	-.095	3
371		15	max	135.137	1	4.478	9	-2.236	15	0	12	-.002	15	.203	1
372			min	-5.399	3	-24.857	3	-72.712	1	0	1	-.078	1	-.09	3
373		16	max	66.481	2	8.019	10	-2.26	15	0	1	-.003	15	.204	1
374			min	-33.314	3	-89.315	1	-73.415	1	0	12	-.095	1	-.084	3
375		17	max	66.554	2	7.794	10	-2.26	15	0	1	-.003	15	.223	1
376			min	-33.26	3	-89.585	1	-73.415	1	0	12	-.111	1	-.073	3
377		18	max	-3.638	15	484.039	1	-2.314	15	0	3	-.004	15	.12	1
378			min	-118.042	1	-154.206	3	-75.136	1	0	1	-.127	1	-.04	3
379		19	max	-3.616	12	483.769	1	-2.314	15	0	3	-.004	15	.016	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	-117.97	1	-154.408	3	-75.136	1	0	1	-.143	1	-.007	3
381	M5	1	max	259.127	1	1093.598	3	-.085	10	0	1	.004	1	.019	3
382			min	7.128	12	-1437.035	1	-24.937	1	0	3	0	10	-.029	1
383		2	max	259.199	1	1093.395	3	-.085	10	0	1	0	2	.282	1
384			min	7.164	12	-1437.304	1	-24.937	1	0	3	-.002	3	-.218	3
385		3	max	309.298	1	10.668	9	2.446	3	0	3	0	10	.588	1
386			min	-29.776	3	-74.129	3	-.162	2	0	1	-.007	3	-.451	3
387		4	max	309.37	1	10.444	9	2.446	3	0	3	0	10	.591	1
388			min	-29.722	3	-74.331	3	-.162	2	0	1	-.006	3	-.434	3
389		5	max	309.442	1	10.219	9	2.446	3	0	3	0	10	.594	1
390			min	-29.668	3	-74.533	3	-.162	2	0	1	-.006	3	-.418	3
391		6	max	309.515	1	9.994	9	2.446	3	0	3	0	10	.597	1
392			min	-29.614	3	-74.736	3	-.162	2	0	1	-.005	3	-.402	3
393		7	max	309.587	1	9.769	9	2.446	3	0	3	0	10	.6	1
394			min	-29.559	3	-74.938	3	-.162	2	0	1	-.005	1	-.386	3
395		8	max	309.659	1	9.545	9	2.446	3	0	3	0	10	.603	1
396			min	-29.505	3	-75.14	3	-.162	2	0	1	-.004	1	-.37	3
397		9	max	309.731	1	9.32	9	2.446	3	0	3	0	10	.606	1
398			min	-29.451	3	-75.342	3	-.162	2	0	1	-.004	1	-.353	3
399		10	max	309.804	1	9.095	9	2.446	3	0	3	0	10	.61	1
400			min	-29.397	3	-75.545	3	-.162	2	0	1	-.003	1	-.337	3
401		11	max	309.876	1	8.87	9	2.446	3	0	3	0	10	.613	1
402			min	-29.343	3	-75.747	3	-.162	2	0	1	-.003	1	-.321	3
403		12	max	309.948	1	8.646	9	2.446	3	0	3	0	10	.616	1
404			min	-29.288	3	-75.949	3	-.162	2	0	1	-.003	1	-.304	3
405		13	max	310.02	1	8.421	9	2.446	3	0	3	0	10	.62	1
406			min	-29.234	3	-76.152	3	-.162	2	0	1	-.002	1	-.288	3
407		14	max	310.093	1	8.196	9	2.446	3	0	3	0	15	.623	1
408			min	-29.18	3	-76.354	3	-.162	2	0	1	-.002	1	-.271	3
409		15	max	310.165	1	7.971	9	2.446	3	0	3	0	15	.627	1
410			min	-29.126	3	-76.556	3	-.162	2	0	1	-.002	1	-.254	3
411		16	max	249.019	2	48.417	10	2.426	3	0	1	0	3	.631	1
412			min	-108.13	3	-145.294	3	-.159	2	0	15	-.001	1	-.237	3
413		17	max	249.092	2	48.192	10	2.426	3	0	1	0	3	.655	1
414			min	-108.075	3	-145.497	3	-.159	2	0	15	0	1	-.206	3
415		18	max	-7.51	12	1596.696	1	2.251	1	0	3	.001	3	.315	1
416			min	-259.87	1	-508.696	3	-.013	10	0	1	0	2	-.097	3
417		19	max	-7.474	12	1596.426	1	2.251	1	0	3	.002	3	.014	3
418			min	-259.798	1	-508.899	3	-.013	10	0	1	0	2	-.031	1
419	M9	1	max	117.925	1	330.541	3	98.03	1	0	3	-.004	15	.015	1
420			min	3.615	15	-434.101	1	3.115	15	0	1	-.144	1	-.009	3
421		2	max	117.997	1	330.339	3	98.03	1	0	3	-.003	12	.109	1
422			min	3.636	15	-434.371	1	3.115	15	0	1	-.123	1	-.081	3
423		3	max	134.342	1	7.156	9	68.407	1	0	1	.001	3	.201	1
424			min	-5.606	3	-22.377	3	1.136	12	0	15	-.1	1	-.151	3
425		4	max	134.414	1	6.931	9	68.407	1	0	1	.002	3	.201	1
426			min	-5.552	3	-22.579	3	1.136	12	0	15	-.085	1	-.146	3
427		5	max	134.487	1	6.706	9	68.407	1	0	1	.002	3	.201	1
428			min	-5.498	3	-22.781	3	1.136	12	0	15	-.07	1	-.141	3
429		6	max	134.559	1	6.481	9	68.407	1	0	1	.002	3	.201	1
430			min	-5.443	3	-22.984	3	1.136	12	0	15	-.056	1	-.137	3
431		7	max	134.631	1	6.256	9	68.407	1	0	1	.003	3	.201	1
432			min	-5.389	3	-23.186	3	1.136	12	0	15	-.041	1	-.131	3
433		8	max	134.703	1	6.032	9	68.407	1	0	1	.003	3	.201	1
434			min	-5.335	3	-23.388	3	1.136	12	0	15	-.026	1	-.126	3
435		9	max	134.776	1	5.807	9	68.407	1	0	1	.003	3	.201	1
436			min	-5.281	3	-23.59	3	1.136	12	0	15	-.011	1	-.121	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	134.848	1	5.582	9	68.407	1	0	1	.004	1	.201	1
438			min	-5.227	3	-23.793	3	1.136	12	0	15	0	10	-.116	3
439		11	max	134.92	1	5.357	9	68.407	1	0	1	.019	1	.201	1
440			min	-5.172	3	-23.995	3	1.136	12	0	15	0	15	-.111	3
441		12	max	134.993	1	5.133	9	68.407	1	0	1	.033	1	.201	1
442			min	-5.118	3	-24.197	3	1.136	12	0	15	.001	15	-.106	3
443		13	max	135.065	1	4.908	9	68.407	1	0	1	.048	1	.202	1
444			min	-5.064	3	-24.4	3	1.136	12	0	15	.001	15	-.101	3
445		14	max	135.137	1	4.683	9	68.407	1	0	1	.063	1	.202	1
446			min	-5.01	3	-24.602	3	1.136	12	0	15	.002	15	-.095	3
447		15	max	135.209	1	4.458	9	68.407	1	0	1	.078	1	.203	1
448			min	-4.956	3	-24.804	3	1.136	12	0	15	.002	15	-.09	3
449		16	max	66.679	2	7.66	10	69.282	1	0	15	.095	1	.204	1
450			min	-33.362	3	-89.224	1	1.161	12	0	1	.003	15	-.084	3
451		17	max	66.751	2	7.436	10	69.282	1	0	15	.11	1	.223	1
452			min	-33.308	3	-89.494	1	1.161	12	0	1	.003	15	-.073	3
453		18	max	-3.631	15	484.039	1	72.897	1	0	1	.125	1	.12	1
454			min	-117.825	1	-154.205	3	1.348	12	0	3	.004	15	-.04	3
455		19	max	-3.609	15	483.769	1	72.897	1	0	1	.141	1	.016	1
456			min	-117.753	1	-154.407	3	1.348	12	0	3	.004	15	-.007	3
457	M13	1	max	98.217	1	433.506	1	-3.615	15	.015	1	.144	1	0	1
458			min	3.115	15	-330.531	3	-117.912	1	-.009	3	.004	15	0	3
459		2	max	98.217	1	305.748	1	-2.772	15	.015	1	.045	1	.266	3
460			min	3.115	15	-233.057	3	-90.383	1	-.009	3	.001	15	-.349	1
461		3	max	98.217	1	177.99	1	-1.93	15	.015	1	0	3	.44	3
462			min	3.115	15	-135.583	3	-62.854	1	-.009	3	-.027	1	-.577	1
463		4	max	98.217	1	50.232	1	-1.087	15	.015	1	-.001	12	.522	3
464			min	3.115	15	-38.109	3	-35.325	1	-.009	3	-.073	1	-.685	1
465		5	max	98.217	1	59.366	3	-.245	15	.015	1	-.002	12	.512	3
466			min	3.115	15	-77.526	1	-7.796	1	-.009	3	-.094	1	-.672	1
467		6	max	98.217	1	156.84	3	19.733	1	.015	1	-.002	12	.41	3
468			min	3.115	15	-205.284	1	.315	12	-.009	3	-.088	1	-.539	1
469		7	max	98.217	1	254.314	3	47.262	1	.015	1	-.001	12	.216	3
470			min	3.115	15	-333.042	1	1.137	12	-.009	3	-.056	1	-.285	1
471		8	max	98.217	1	351.788	3	74.791	1	.015	1	.001	1	.09	1
472			min	3.115	15	-460.8	1	1.959	12	-.009	3	0	12	-.07	3
473		9	max	98.217	1	449.262	3	102.32	1	.015	1	.085	1	.586	1
474			min	3.115	15	-588.558	1	2.781	12	-.009	3	.002	12	-.449	3
475		10	max	98.217	1	546.736	3	129.849	1	.011	2	.195	1	1.202	1
476			min	3.115	15	-716.316	1	3.602	12	-.015	1	.005	12	-.919	3
477		11	max	73.344	1	588.558	1	-2.702	12	.009	3	.081	1	.586	1
478			min	2.263	15	-449.262	3	-101.772	1	-.015	1	0	12	-.449	3
479		12	max	73.344	1	460.8	1	-1.88	12	.009	3	0	10	.09	1
480			min	2.263	15	-351.788	3	-74.243	1	-.015	1	-.002	3	-.07	3
481		13	max	73.344	1	333.042	1	-1.058	12	.009	3	-.002	15	.216	3
482			min	2.263	15	-254.314	3	-46.714	1	-.015	1	-.059	1	-.285	1
483		14	max	73.344	1	205.284	1	-.236	12	.009	3	-.003	15	.41	3
484			min	2.263	15	-156.84	3	-19.185	1	-.015	1	-.09	1	-.539	1
485		15	max	73.344	1	77.526	1	8.344	1	.009	3	-.003	15	.512	3
486			min	2.263	15	-59.365	3	.263	15	-.015	1	-.095	1	-.672	1
487		16	max	73.344	1	38.109	3	35.873	1	.009	3	-.002	12	.522	3
488			min	2.263	15	-50.232	1	1.105	15	-.015	1	-.074	1	-.685	1
489		17	max	73.344	1	135.583	3	63.402	1	.009	3	0	12	.44	3
490			min	2.263	15	-177.99	1	1.948	15	-.015	1	-.028	1	-.577	1
491		18	max	73.344	1	233.057	3	90.931	1	.009	3	.045	1	.266	3
492			min	2.263	15	-305.748	1	2.79	15	-.015	1	.001	15	-.349	1
493		19	max	73.344	1	330.531	3	118.46	1	.009	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	2.263	15	-433.506	1	3.632	15	-.015	1	.004	15	0	3
495	M16	1	max	-1.348	12	484.398	1	-3.609	15	.007	3	.141	1	0	1
496			min	-72.668	1	-154.422	3	-117.763	1	-.016	1	.004	15	0	3
497		2	max	-1.348	12	341.628	1	-2.767	15	.007	3	.043	1	.124	3
498			min	-72.668	1	-108.987	3	-90.234	1	-.016	1	.001	15	-.39	1
499		3	max	-1.348	12	198.859	1	-1.924	15	.007	3	0	12	.206	3
500			min	-72.668	1	-63.552	3	-62.705	1	-.016	1	-.029	1	-.645	1
501		4	max	-1.348	12	56.089	1	-1.082	15	.007	3	-.002	15	.244	3
502			min	-72.668	1	-18.116	3	-35.176	1	-.016	1	-.075	1	-.766	1
503		5	max	-1.348	12	27.319	3	-.239	15	.007	3	-.003	15	.24	3
504			min	-72.668	1	-86.68	1	-7.647	1	-.016	1	-.096	1	-.751	1
505		6	max	-1.348	12	72.754	3	19.882	1	.007	3	-.003	15	.193	3
506			min	-72.668	1	-229.45	1	.403	12	-.016	1	-.09	1	-.602	1
507		7	max	-1.348	12	118.189	3	47.411	1	.007	3	-.002	15	.103	3
508			min	-72.668	1	-372.219	1	1.225	12	-.016	1	-.058	1	-.318	1
509		8	max	-1.348	12	163.624	3	74.94	1	.007	3	0	2	.101	1
510			min	-72.668	1	-514.989	1	2.047	12	-.016	1	-.001	3	-.03	3
511		9	max	-1.348	12	209.059	3	102.469	1	.007	3	.083	1	.655	1
512			min	-72.668	1	-657.758	1	2.869	12	-.016	1	.001	12	-.206	3
513		10	max	-2.314	15	-17.629	15	129.998	1	0	15	.193	1	1.344	1
514			min	-74.936	1	-800.528	1	-5.66	3	-.016	1	.006	12	-.425	3
515		11	max	-2.314	15	657.758	1	-2.961	12	.016	1	.084	1	.655	1
516			min	-74.936	1	-209.059	3	-102.251	1	-.007	3	.002	12	-.206	3
517		12	max	-2.314	15	514.989	1	-2.139	12	.016	1	0	2	.101	1
518			min	-74.936	1	-163.624	3	-74.722	1	-.007	3	0	3	-.03	3
519		13	max	-2.314	15	372.219	1	-1.317	12	.016	1	-.002	12	.103	3
520			min	-74.936	1	-118.189	3	-47.193	1	-.007	3	-.057	1	-.318	1
521		14	max	-2.314	15	229.45	1	-.495	12	.016	1	-.003	12	.193	3
522			min	-74.936	1	-72.754	3	-19.664	1	-.007	3	-.089	1	-.602	1
523		15	max	-2.314	15	86.68	1	7.865	1	.016	1	-.003	12	.24	3
524			min	-74.936	1	-27.319	3	.246	15	-.007	3	-.094	1	-.751	1
525		16	max	-2.314	15	18.116	3	35.394	1	.016	1	-.002	12	.244	3
526			min	-74.936	1	-56.089	1	1.088	15	-.007	3	-.074	1	-.766	1
527		17	max	-2.314	15	63.552	3	62.923	1	.016	1	0	12	.206	3
528			min	-74.936	1	-198.859	1	1.931	15	-.007	3	-.028	1	-.645	1
529		18	max	-2.314	15	108.987	3	90.452	1	.016	1	.045	1	.124	3
530			min	-74.936	1	-341.628	1	2.773	15	-.007	3	.001	15	-.39	1
531		19	max	-2.314	15	154.422	3	117.981	1	.016	1	.143	1	0	1
532			min	-74.936	1	-484.398	1	3.615	12	-.007	3	.004	15	0	3
533	M15	1	max	0	10	2.956	4	.02	3	0	1	0	1	0	1
534			min	-26.929	1	0	10	-.029	1	0	3	0	3	0	1
535		2	max	0	10	2.628	4	.02	3	0	1	0	1	0	10
536			min	-27.001	1	0	10	-.029	1	0	3	0	3	-.001	4
537		3	max	0	10	2.299	4	.02	3	0	1	0	1	0	10
538			min	-27.073	1	0	10	-.029	1	0	3	0	3	-.003	4
539		4	max	0	10	1.971	4	.02	3	0	1	0	1	0	10
540			min	-27.145	1	0	10	-.029	1	0	3	0	3	-.004	4
541		5	max	0	10	1.642	4	.02	3	0	1	0	1	0	10
542			min	-27.217	1	0	10	-.029	1	0	3	0	3	-.005	4
543		6	max	0	10	1.314	4	.02	3	0	1	0	1	0	10
544			min	-27.289	1	0	10	-.029	1	0	3	0	3	-.005	4
545		7	max	0	10	.985	4	.02	3	0	1	0	3	0	10
546			min	-27.361	1	0	10	-.029	1	0	3	0	1	-.006	4
547		8	max	0	10	.657	4	.02	3	0	1	0	3	0	10
548			min	-27.433	1	0	10	-.029	1	0	3	0	1	-.006	4
549		9	max	0	10	.328	4	.02	3	0	1	0	3	0	10
550			min	-27.505	1	0	10	-.029	1	0	3	0	1	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	10	0	1	.02	3	0	1	0	3	0	10
552			min	-27.577	1	0	1	-.029	1	0	3	0	1	-.007	4
553		11	max	0	10	0	10	.02	3	0	1	0	3	0	10
554			min	-27.649	1	-.328	4	-.029	1	0	3	0	1	-.006	4
555		12	max	0	10	0	10	.02	3	0	1	0	3	0	10
556			min	-27.721	1	-.657	4	-.029	1	0	3	0	1	-.006	4
557		13	max	0	10	0	10	.02	3	0	1	0	3	0	10
558			min	-27.793	1	-.985	4	-.029	1	0	3	0	1	-.006	4
559		14	max	0	10	0	10	.02	3	0	1	0	3	0	10
560			min	-27.865	1	-1.314	4	-.029	1	0	3	0	1	-.005	4
561		15	max	0	10	0	10	.02	3	0	1	0	3	0	10
562			min	-27.937	1	-1.642	4	-.029	1	0	3	0	1	-.005	4
563		16	max	0	10	0	10	.02	3	0	1	0	3	0	10
564			min	-28.009	1	-1.971	4	-.029	1	0	3	0	1	-.004	4
565		17	max	0	10	0	10	.02	3	0	1	0	3	0	10
566			min	-28.081	1	-2.299	4	-.029	1	0	3	0	1	-.003	4
567		18	max	0	10	0	10	.02	3	0	1	0	3	0	10
568			min	-28.152	1	-2.628	4	-.029	1	0	3	0	1	-.001	4
569		19	max	0	10	0	10	.02	3	0	1	0	3	0	1
570			min	-28.224	1	-2.956	4	-.029	1	0	3	0	1	0	1
571	M16A	1	max	-.796	10	2.956	4	.018	1	0	3	0	3	0	1
572			min	-31.691	1	.695	15	-.008	3	0	1	0	1	0	1
573		2	max	-.736	10	2.628	4	.018	1	0	3	0	3	0	15
574			min	-31.619	1	.618	15	-.008	3	0	1	0	1	-.001	4
575		3	max	-.676	10	2.299	4	.018	1	0	3	0	3	0	15
576			min	-31.547	1	.54	15	-.008	3	0	1	0	1	-.003	4
577		4	max	-.616	10	1.971	4	.018	1	0	3	0	3	0	15
578			min	-31.475	1	.463	15	-.008	3	0	1	0	1	-.004	4
579		5	max	-.556	10	1.642	4	.018	1	0	3	0	3	-.001	15
580			min	-31.403	1	.386	15	-.008	3	0	1	0	1	-.005	4
581		6	max	-.496	10	1.314	4	.018	1	0	3	0	3	-.001	15
582			min	-31.331	1	.309	15	-.008	3	0	1	0	1	-.005	4
583		7	max	-.436	10	.985	4	.018	1	0	3	0	3	-.001	15
584			min	-31.259	1	.232	15	-.008	3	0	1	0	1	-.006	4
585		8	max	-.377	10	.657	4	.018	1	0	3	0	3	-.001	15
586			min	-31.187	1	.154	15	-.008	3	0	1	0	1	-.006	4
587		9	max	-.317	10	.328	4	.018	1	0	3	0	3	-.002	15
588			min	-31.115	1	.077	15	-.008	3	0	1	0	1	-.006	4
589		10	max	-.257	10	0	1	.018	1	0	3	0	3	-.002	15
590			min	-31.043	1	0	1	-.008	3	0	1	0	1	-.007	4
591		11	max	-.197	10	-.077	15	.018	1	0	3	0	3	-.002	15
592			min	-30.971	1	-.328	4	-.008	3	0	1	0	1	-.006	4
593		12	max	-.137	10	-.154	15	.018	1	0	3	0	3	-.001	15
594			min	-30.899	1	-.657	4	-.008	3	0	1	0	1	-.006	4
595		13	max	-.077	10	-.232	15	.018	1	0	3	0	1	-.001	15
596			min	-30.827	1	-.985	4	-.008	3	0	1	0	13	-.006	4
597		14	max	-.017	10	-.309	15	.018	1	0	3	0	1	-.001	15
598			min	-30.755	1	-1.314	4	-.008	3	0	1	0	3	-.005	4
599		15	max	.043	10	-.386	15	.018	1	0	3	0	1	-.001	15
600			min	-30.683	1	-1.642	4	-.008	3	0	1	0	3	-.005	4
601		16	max	.103	10	-.463	15	.018	1	0	3	0	1	0	15
602			min	-30.611	1	-1.971	4	-.008	3	0	1	0	3	-.004	4
603		17	max	.163	10	-.54	15	.018	1	0	3	0	1	0	15
604			min	-30.539	1	-2.299	4	-.008	3	0	1	0	3	-.003	4
605		18	max	.223	10	-.618	15	.018	1	0	3	0	1	0	15
606			min	-30.467	1	-2.628	4	-.008	3	0	1	0	3	-.001	4
607		19	max	.283	10	-.695	15	.018	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	-30.395	1	-2.956	4	-.008	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	.006	2	.014	1	-3.239e-5	15	NC	3	NC	3
2			min	-.003	3	-.005	3	0	3	-1.053e-3	1	4988.179	2	2210.585	1
3		2	max	.003	1	.006	2	.013	1	-3.11e-5	15	NC	3	NC	3
4			min	-.002	3	-.004	3	0	3	-1.011e-3	1	5401.385	2	2396.361	1
5		3	max	.003	1	.005	2	.012	1	-2.981e-5	15	NC	3	NC	3
6			min	-.002	3	-.004	3	0	3	-9.698e-4	1	5885.723	2	2614.915	1
7		4	max	.003	1	.005	2	.01	1	-2.852e-5	15	NC	3	NC	3
8			min	-.002	3	-.004	3	0	3	-9.283e-4	1	6457.248	2	2874.23	1
9		5	max	.003	1	.004	2	.009	1	-2.723e-5	15	NC	3	NC	3
10			min	-.002	3	-.004	3	0	3	-8.868e-4	1	7137.056	2	3184.965	1
11		6	max	.002	1	.004	2	.008	1	-2.595e-5	15	NC	1	NC	3
12			min	-.002	3	-.004	3	0	3	-8.453e-4	1	7953.307	2	3561.598	1
13		7	max	.002	1	.003	2	.007	1	-2.466e-5	15	NC	1	NC	2
14			min	-.002	3	-.004	3	0	3	-8.038e-4	1	8944.305	2	4024.219	1
15		8	max	.002	1	.003	2	.007	1	-2.337e-5	15	NC	1	NC	2
16			min	-.002	3	-.003	3	0	3	-7.623e-4	1	NC	1	4601.38	1
17		9	max	.002	1	.003	2	.006	1	-2.208e-5	15	NC	1	NC	2
18			min	-.001	3	-.003	3	0	3	-7.208e-4	1	NC	1	5334.811	1
19		10	max	.002	1	.002	2	.005	1	-2.079e-5	15	NC	1	NC	2
20			min	-.001	3	-.003	3	0	3	-6.793e-4	1	NC	1	6287.544	1
21		11	max	.001	1	.002	2	.004	1	-1.95e-5	15	NC	1	NC	2
22			min	-.001	3	-.003	3	0	3	-6.378e-4	1	NC	1	7558.64	1
23		12	max	.001	1	.002	2	.003	1	-1.822e-5	15	NC	1	NC	2
24			min	-.001	3	-.002	3	0	3	-5.963e-4	1	NC	1	9311.485	1
25		13	max	.001	1	.001	2	.003	1	-1.693e-5	15	NC	1	NC	1
26			min	0	3	-.002	3	0	3	-5.548e-4	1	NC	1	NC	1
27		14	max	0	1	0	2	.002	1	-1.564e-5	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-5.133e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	-1.435e-5	15	NC	1	NC	1
30			min	0	3	-.001	3	0	3	-4.718e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.306e-5	15	NC	1	NC	1
32			min	0	3	-.001	3	0	3	-4.303e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.178e-5	15	NC	1	NC	1
34			min	0	3	0	3	0	3	-3.888e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.043e-5	12	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.473e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-7.456e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.058e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.39e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	3.487e-6	12	NC	1	NC	1
41		2	max	0	1	0	2	0	12	1.773e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	5.27e-6	12	NC	1	NC	1
43		3	max	0	1	0	2	0	12	2.156e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	-.001	1	6.556e-6	15	NC	1	NC	1
45		4	max	0	1	0	2	0	12	2.538e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	7.742e-6	15	NC	1	NC	1
47		5	max	0	1	0	2	0	12	2.921e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	8.928e-6	15	NC	1	NC	1
49		6	max	0	1	0	2	0	3	3.303e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	1.011e-5	15	NC	1	NC	1
51		7	max	0	1	0	2	0	3	3.686e-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	10	-.004	3	0	1	1.13e-5	15	NC	1	NC	1
53		8	max	0	1	.001	2	0	3	4.068e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	1.249e-5	15	NC	1	NC	1
55		9	max	0	1	.002	2	0	3	4.451e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	1.367e-5	15	NC	1	NC	1
57		10	max	0	1	.002	2	0	1	4.833e-4	1	NC	1	NC	1
58			min	0	10	-.005	3	0	15	1.486e-5	15	NC	1	NC	1
59		11	max	0	1	.002	2	.001	1	5.216e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	15	1.605e-5	15	NC	1	NC	1
61		12	max	0	1	.003	2	.002	1	5.599e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	15	1.723e-5	15	NC	1	NC	1
63		13	max	0	1	.004	1	.003	1	5.981e-4	1	NC	1	NC	1
64			min	0	10	-.006	3	0	15	1.842e-5	15	NC	1	NC	1
65		14	max	.001	1	.005	1	.003	1	6.364e-4	1	NC	3	NC	1
66			min	0	10	-.007	3	0	15	1.96e-5	15	9841.508	1	NC	1
67		15	max	.001	1	.006	1	.004	1	6.746e-4	1	NC	3	NC	1
68			min	0	10	-.007	3	0	15	2.079e-5	15	8221.128	1	NC	1
69		16	max	.001	1	.007	1	.005	1	7.129e-4	1	NC	3	NC	2
70			min	0	10	-.007	3	0	15	2.198e-5	15	6981.609	1	9104.213	1
71		17	max	.001	1	.008	1	.006	1	7.511e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	15	2.316e-5	15	6020.409	1	7925.564	1
73		18	max	.001	1	.009	1	.007	1	7.894e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	15	2.435e-5	15	5266.44	1	7065.435	1
75		19	max	.001	1	.01	1	.007	1	8.276e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	15	2.553e-5	15	4669.686	1	6428.849	1
77	M4	1	max	.003	1	.007	2	0	15	-2.836e-5	15	NC	1	NC	2
78			min	0	3	-.005	3	-.005	1	-9.288e-4	1	NC	1	3605.231	1
79		2	max	.003	1	.007	2	0	15	-2.836e-5	15	NC	1	NC	2
80			min	0	3	-.005	3	-.005	1	-9.288e-4	1	NC	1	3933.009	1
81		3	max	.003	1	.006	2	0	15	-2.836e-5	15	NC	1	NC	2
82			min	0	3	-.004	3	-.004	1	-9.288e-4	1	NC	1	4323.115	1
83		4	max	.002	1	.006	2	0	15	-2.836e-5	15	NC	1	NC	2
84			min	0	3	-.004	3	-.004	1	-9.288e-4	1	NC	1	4791.991	1
85		5	max	.002	1	.006	2	0	15	-2.836e-5	15	NC	1	NC	2
86			min	0	3	-.004	3	-.004	1	-9.288e-4	1	NC	1	5362.034	1
87		6	max	.002	1	.005	2	0	15	-2.836e-5	15	NC	1	NC	2
88			min	0	3	-.004	3	-.003	1	-9.288e-4	1	NC	1	6064.394	1
89		7	max	.002	1	.005	2	0	15	-2.836e-5	15	NC	1	NC	2
90			min	0	3	-.003	3	-.003	1	-9.288e-4	1	NC	1	6943.447	1
91		8	max	.002	1	.004	2	0	15	-2.836e-5	15	NC	1	NC	2
92			min	0	3	-.003	3	-.002	1	-9.288e-4	1	NC	1	8064.175	1
93		9	max	.002	1	.004	2	0	15	-2.836e-5	15	NC	1	NC	2
94			min	0	3	-.003	3	-.002	1	-9.288e-4	1	NC	1	9524.879	1
95		10	max	.001	1	.004	2	0	15	-2.836e-5	15	NC	1	NC	1
96			min	0	3	-.003	3	-.002	1	-9.288e-4	1	NC	1	NC	1
97		11	max	.001	1	.003	2	0	15	-2.836e-5	15	NC	1	NC	1
98			min	0	3	-.002	3	-.001	1	-9.288e-4	1	NC	1	NC	1
99		12	max	.001	1	.003	2	0	15	-2.836e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	-.001	1	-9.288e-4	1	NC	1	NC	1
101		13	max	0	1	.002	2	0	15	-2.836e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-9.288e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-2.836e-5	15	NC	1	NC	1
104			min	0	3	-.001	3	0	1	-9.288e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-2.836e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-9.288e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-2.836e-5	15	NC	1	NC	1
108			min	0	3	0	3	0	1	-9.288e-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	0	2	0	15	-2.836e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-9.288e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-2.836e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-9.288e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-2.836e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.288e-4	1	NC	1	NC	1
115	M6	1	max	.011	1	.019	2	.004	1	2.321e-4	1	NC	3	NC	2
116			min	-.009	3	-.013	3	-.002	3	4.679e-6	10	1547.634	2	7634.685	1
117		2	max	.01	1	.018	2	.004	1	2.175e-4	1	NC	3	NC	2
118			min	-.008	3	-.012	3	-.002	3	3.867e-6	10	1650.376	2	8282.118	1
119		3	max	.009	1	.017	2	.003	1	2.029e-4	1	NC	3	NC	2
120			min	-.008	3	-.012	3	-.002	3	3.056e-6	10	1767.405	2	9051.421	1
121		4	max	.009	1	.016	2	.003	1	1.883e-4	1	NC	3	NC	2
122			min	-.007	3	-.011	3	-.001	3	2.244e-6	10	1901.568	2	9973.637	1
123		5	max	.008	1	.015	2	.003	1	1.737e-4	1	NC	3	NC	1
124			min	-.007	3	-.01	3	-.001	3	1.432e-6	10	2056.527	2	NC	1
125		6	max	.008	1	.013	2	.002	1	1.591e-4	1	NC	3	NC	1
126			min	-.006	3	-.01	3	-.001	3	6.205e-7	10	2237.077	2	NC	1
127		7	max	.007	1	.012	2	.002	1	1.445e-4	1	NC	3	NC	1
128			min	-.006	3	-.009	3	-.001	3	-1.912e-7	10	2449.609	2	NC	1
129		8	max	.006	1	.011	2	.002	1	1.299e-4	1	NC	3	NC	1
130			min	-.005	3	-.008	3	0	3	-1.003e-6	10	2702.846	2	NC	1
131		9	max	.006	1	.01	2	.002	1	1.154e-4	1	NC	3	NC	1
132			min	-.005	3	-.008	3	0	3	-1.815e-6	10	3008.998	2	NC	1
133		10	max	.005	1	.009	2	.001	1	1.093e-4	3	NC	3	NC	1
134			min	-.004	3	-.007	3	0	3	-2.626e-6	10	3385.701	2	NC	1
135		11	max	.005	1	.008	2	.001	1	1.059e-4	3	NC	3	NC	1
136			min	-.004	3	-.006	3	0	3	-3.438e-6	10	3859.413	2	NC	1
137		12	max	.004	1	.007	2	0	1	1.026e-4	3	NC	3	NC	1
138			min	-.003	3	-.006	3	0	3	-8.007e-6	2	4471.705	2	NC	1
139		13	max	.004	1	.006	2	0	1	9.921e-5	3	NC	3	NC	1
140			min	-.003	3	-.005	3	0	3	-1.266e-5	2	5291.859	2	NC	1
141		14	max	.003	1	.005	2	0	1	9.584e-5	3	NC	3	NC	1
142			min	-.002	3	-.004	3	0	3	-1.731e-5	2	6444.573	2	NC	1
143		15	max	.002	1	.004	2	0	1	9.248e-5	3	NC	3	NC	1
144			min	-.002	3	-.003	3	0	3	-2.196e-5	2	8179.23	2	NC	1
145		16	max	.002	1	.003	2	0	1	8.912e-5	3	NC	1	NC	1
146			min	-.001	3	-.003	3	0	3	-2.662e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	8.575e-5	3	NC	1	NC	1
148			min	0	3	-.002	3	0	3	-3.127e-5	2	NC	1	NC	1
149		18	max	0	1	0	2	0	1	8.239e-5	3	NC	1	NC	1
150			min	0	3	0	3	0	3	-3.592e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	7.903e-5	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.057e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.817e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-3.58e-5	3	NC	1	NC	1
155		2	max	0	9	.001	1	0	3	1.54e-5	2	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-2.732e-5	3	NC	1	NC	1
157		3	max	0	9	.003	1	0	3	1.39e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-1.884e-5	3	NC	1	NC	1
159		4	max	0	9	.004	1	0	3	1.421e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	2	-1.036e-5	3	NC	1	NC	1
161		5	max	0	9	.005	1	0	3	1.451e-5	1	NC	3	NC	1
162			min	0	2	-.005	3	0	2	-1.887e-6	3	8893.567	1	NC	1
163		6	max	0	9	.007	1	0	3	1.481e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	3.806e-7	15	7039.404	1	NC	1
165		7	max	0	9	.008	1	0	3	1.512e-5	1	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	0	2	-.008	3	0	1	4.299e-7	15	5777.992	1	NC	1
167		8	max	0	9	.009	1	0	3	2.354e-5	3	NC	3	NC	1
168			min	0	2	-.009	3	0	1	-1.227e-6	2	4859.964	1	NC	1
169		9	max	0	9	.011	1	.001	3	3.202e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-3.997e-6	2	4160.559	1	NC	1
171		10	max	.001	9	.013	1	.001	3	4.05e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	0	1	-6.768e-6	2	3610.218	1	NC	1
173		11	max	.001	9	.015	1	.001	3	4.897e-5	3	NC	3	NC	1
174			min	0	2	-.013	3	-.001	1	-9.539e-6	2	3166.881	1	NC	1
175		12	max	.001	9	.016	1	.001	3	5.745e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-1.231e-5	2	2803.441	1	NC	1
177		13	max	.001	9	.018	1	.001	3	6.593e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-1.508e-5	2	2501.514	1	NC	1
179		14	max	.001	9	.02	1	.001	3	7.441e-5	3	NC	3	NC	1
180			min	-.001	2	-.015	3	-.001	1	-1.785e-5	2	2248.098	1	NC	1
181		15	max	.002	9	.023	1	.001	3	8.288e-5	3	NC	3	NC	1
182			min	-.001	2	-.016	3	-.002	1	-2.062e-5	2	2033.68	1	NC	1
183		16	max	.002	9	.025	1	.001	3	9.136e-5	3	NC	3	NC	1
184			min	-.001	2	-.017	3	-.002	1	-2.339e-5	2	1851.11	1	NC	1
185		17	max	.002	9	.027	1	.001	3	9.984e-5	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-2.616e-5	2	1694.891	1	NC	1
187		18	max	.002	9	.029	1	.001	3	1.083e-4	3	NC	3	NC	1
188			min	-.002	2	-.018	3	-.002	1	-2.893e-5	2	1560.727	1	NC	1
189		19	max	.002	9	.032	1	0	3	1.168e-4	3	NC	3	NC	1
190			min	-.002	2	-.019	3	-.002	1	-3.17e-5	2	1445.214	1	NC	1
191	M8	1	max	.008	1	.023	2	.002	1	-3.06e-7	10	NC	1	NC	2
192			min	-.002	3	-.014	3	0	3	-1.095e-4	1	NC	1	8506.352	1
193		2	max	.008	1	.021	2	.002	1	-3.06e-7	10	NC	1	NC	2
194			min	-.002	3	-.013	3	0	3	-1.095e-4	1	NC	1	9274.25	1
195		3	max	.008	1	.02	2	.002	1	-3.06e-7	10	NC	1	NC	1
196			min	-.002	3	-.013	3	0	3	-1.095e-4	1	NC	1	NC	1
197		4	max	.007	1	.019	2	.002	1	-3.06e-7	10	NC	1	NC	1
198			min	-.001	3	-.012	3	0	3	-1.095e-4	1	NC	1	NC	1
199		5	max	.007	1	.018	2	.002	1	-3.06e-7	10	NC	1	NC	1
200			min	-.001	3	-.011	3	0	3	-1.095e-4	1	NC	1	NC	1
201		6	max	.006	1	.016	2	.001	1	-3.06e-7	10	NC	1	NC	1
202			min	-.001	3	-.01	3	0	3	-1.095e-4	1	NC	1	NC	1
203		7	max	.006	1	.015	2	.001	1	-3.06e-7	10	NC	1	NC	1
204			min	-.001	3	-.01	3	0	3	-1.095e-4	1	NC	1	NC	1
205		8	max	.005	1	.014	2	.001	1	-3.06e-7	10	NC	1	NC	1
206			min	-.001	3	-.009	3	0	3	-1.095e-4	1	NC	1	NC	1
207		9	max	.005	1	.013	2	0	1	-3.06e-7	10	NC	1	NC	1
208			min	0	3	-.008	3	0	3	-1.095e-4	1	NC	1	NC	1
209		10	max	.004	1	.011	2	0	1	-3.06e-7	10	NC	1	NC	1
210			min	0	3	-.007	3	0	3	-1.095e-4	1	NC	1	NC	1
211		11	max	.004	1	.01	2	0	1	-3.06e-7	10	NC	1	NC	1
212			min	0	3	-.006	3	0	3	-1.095e-4	1	NC	1	NC	1
213		12	max	.003	1	.009	2	0	1	-3.06e-7	10	NC	1	NC	1
214			min	0	3	-.006	3	0	3	-1.095e-4	1	NC	1	NC	1
215		13	max	.003	1	.008	2	0	1	-3.06e-7	10	NC	1	NC	1
216			min	0	3	-.005	3	0	3	-1.095e-4	1	NC	1	NC	1
217		14	max	.002	1	.006	2	0	1	-3.06e-7	10	NC	1	NC	1
218			min	0	3	-.004	3	0	3	-1.095e-4	1	NC	1	NC	1
219		15	max	.002	1	.005	2	0	1	-3.06e-7	10	NC	1	NC	1
220			min	0	3	-.003	3	0	3	-1.095e-4	1	NC	1	NC	1
221		16	max	.001	1	.004	2	0	1	-3.06e-7	10	NC	1	NC	1
222			min	0	3	-.002	3	0	3	-1.095e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.003	2	0	1	-3.06e-7	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.095e-4	1	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	-3.06e-7	10	NC	1	NC	1
226			min	0	3	0	3	0	3	-1.095e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-3.06e-7	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.095e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.006	2	0	3	9.271e-4	1	NC	3	NC	1
230			min	-.003	3	-.005	3	-.002	1	-1.411e-4	3	4997.773	2	NC	1
231		2	max	.003	1	.006	2	0	3	8.789e-4	1	NC	3	NC	1
232			min	-.002	3	-.004	3	-.002	1	-1.376e-4	3	5396.919	2	NC	1
233		3	max	.003	1	.005	2	0	3	8.306e-4	1	NC	3	NC	1
234			min	-.002	3	-.004	3	-.002	1	-1.34e-4	3	5862.203	2	NC	1
235		4	max	.003	1	.005	2	0	3	7.823e-4	1	NC	3	NC	1
236			min	-.002	3	-.004	3	-.001	1	-1.305e-4	3	6407.97	2	NC	1
237		5	max	.003	1	.004	2	0	3	7.341e-4	1	NC	3	NC	1
238			min	-.002	3	-.004	3	-.001	1	-1.27e-4	3	7052.923	2	NC	1
239		6	max	.002	1	.004	2	0	3	6.858e-4	1	NC	1	NC	1
240			min	-.002	3	-.004	3	-.001	1	-1.235e-4	3	7821.83	2	NC	1
241		7	max	.002	1	.003	2	0	3	6.376e-4	1	NC	1	NC	1
242			min	-.002	3	-.004	3	-.001	1	-1.199e-4	3	8748.1	2	NC	1
243		8	max	.002	1	.003	2	0	3	5.893e-4	1	NC	1	NC	1
244			min	-.002	3	-.003	3	0	1	-1.164e-4	3	9877.773	2	NC	1
245		9	max	.002	1	.003	2	0	3	5.411e-4	1	NC	1	NC	1
246			min	-.001	3	-.003	3	0	1	-1.129e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	4.928e-4	1	NC	1	NC	1
248			min	-.001	3	-.003	3	0	1	-1.094e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	4.446e-4	1	NC	1	NC	1
250			min	-.001	3	-.003	3	0	1	-1.058e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	3.963e-4	1	NC	1	NC	1
252			min	0	3	-.002	3	0	1	-1.023e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	3.481e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	-9.879e-5	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	2.998e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-9.526e-5	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.515e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-9.173e-5	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.033e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	-8.821e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.55e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	-8.468e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.068e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-8.116e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.852e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-7.763e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	3.537e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-2.812e-5	1	NC	1	NC	1
269		2	max	0	1	0	2	0	2	2.501e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-9.509e-5	1	NC	1	NC	1
271		3	max	0	1	0	2	0	2	1.465e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.621e-4	1	NC	1	NC	1
273		4	max	0	1	0	2	0	10	4.281e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-2.291e-4	1	NC	1	NC	1
275		5	max	0	1	0	2	0	10	-4.547e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	-.001	1	-2.96e-4	1	NC	1	NC	1
277		6	max	0	1	0	2	0	15	-1.097e-5	12	NC	1	NC	1
278			min	0	10	-.003	3	-.002	1	-3.63e-4	1	NC	1	NC	1
279		7	max	0	1	.001	2	0	15	-1.321e-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	10	-.004	3	-.003	1	-4.3e-4	1	NC	1	NC	1
281		8	max	0	1	.001	2	0	15	-1.53e-5	15	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-4.97e-4	1	NC	1	NC	1
283		9	max	0	1	.002	2	0	15	-1.739e-5	15	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-5.639e-4	1	NC	1	NC	1
285		10	max	0	1	.002	2	0	15	-1.948e-5	15	NC	1	NC	2
286			min	0	10	-.006	3	-.005	1	-6.309e-4	1	NC	1	8479.713	1
287		11	max	0	1	.003	2	0	15	-2.157e-5	15	NC	1	NC	2
288			min	0	10	-.006	3	-.007	1	-6.979e-4	1	NC	1	7064.286	1
289		12	max	0	1	.003	1	0	15	-2.366e-5	15	NC	1	NC	2
290			min	0	10	-.006	3	-.008	1	-7.649e-4	1	NC	1	6035.479	1
291		13	max	0	1	.004	1	0	15	-2.575e-5	15	NC	1	NC	2
292			min	0	10	-.007	3	-.009	1	-8.319e-4	1	NC	1	5266.47	1
293		14	max	.001	1	.005	1	0	15	-2.784e-5	15	NC	3	NC	2
294			min	0	10	-.007	3	-.01	1	-8.988e-4	1	9555.086	1	4679.448	1
295		15	max	.001	1	.006	1	0	15	-2.992e-5	15	NC	3	NC	2
296			min	0	10	-.007	3	-.011	1	-9.658e-4	1	8056.581	1	4224.592	1
297		16	max	.001	1	.007	1	0	15	-3.201e-5	15	NC	3	NC	2
298			min	0	10	-.007	3	-.012	1	-1.033e-3	1	6891.527	1	3868.926	1
299		17	max	.001	1	.008	1	0	15	-3.41e-5	15	NC	3	NC	2
300			min	0	10	-.007	3	-.013	1	-1.1e-3	1	5976.43	1	3590.096	1
301		18	max	.001	1	.009	1	0	15	-3.619e-5	15	NC	3	NC	3
302			min	0	10	-.007	3	-.014	1	-1.167e-3	1	5251.311	1	3372.736	1
303		19	max	.001	1	.01	1	0	15	-3.828e-5	15	NC	3	NC	3
304			min	0	10	-.007	3	-.014	1	-1.234e-3	1	4672.758	1	3206.305	1
305	M12	1	max	.003	1	.007	2	.012	1	1.056e-3	1	NC	1	NC	3
306			min	0	3	-.005	3	0	15	3.317e-5	15	NC	1	1630.624	1
307		2	max	.003	1	.007	2	.011	1	1.056e-3	1	NC	1	NC	3
308			min	0	3	-.005	3	0	15	3.317e-5	15	NC	1	1778.315	1
309		3	max	.003	1	.006	2	.01	1	1.056e-3	1	NC	1	NC	3
310			min	0	3	-.004	3	0	15	3.317e-5	15	NC	1	1954.118	1
311		4	max	.002	1	.006	2	.009	1	1.056e-3	1	NC	1	NC	3
312			min	0	3	-.004	3	0	15	3.317e-5	15	NC	1	2165.441	1
313		5	max	.002	1	.006	2	.008	1	1.056e-3	1	NC	1	NC	3
314			min	0	3	-.004	3	0	15	3.317e-5	15	NC	1	2422.379	1
315		6	max	.002	1	.005	2	.007	1	1.056e-3	1	NC	1	NC	3
316			min	0	3	-.004	3	0	15	3.317e-5	15	NC	1	2738.972	1
317		7	max	.002	1	.005	2	.006	1	1.056e-3	1	NC	1	NC	3
318			min	0	3	-.003	3	0	15	3.317e-5	15	NC	1	3135.219	1
319		8	max	.002	1	.004	2	.005	1	1.056e-3	1	NC	1	NC	3
320			min	0	3	-.003	3	0	15	3.317e-5	15	NC	1	3640.407	1
321		9	max	.002	1	.004	2	.004	1	1.056e-3	1	NC	1	NC	2
322			min	0	3	-.003	3	0	15	3.317e-5	15	NC	1	4298.834	1
323		10	max	.001	1	.004	2	.004	1	1.056e-3	1	NC	1	NC	2
324			min	0	3	-.003	3	0	15	3.317e-5	15	NC	1	5180.15	1
325		11	max	.001	1	.003	2	.003	1	1.056e-3	1	NC	1	NC	2
326			min	0	3	-.002	3	0	15	3.317e-5	15	NC	1	6399.073	1
327		12	max	.001	1	.003	2	.002	1	1.056e-3	1	NC	1	NC	2
328			min	0	3	-.002	3	0	15	3.317e-5	15	NC	1	8155.737	1
329		13	max	0	1	.002	2	.002	1	1.056e-3	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	3.317e-5	15	NC	1	NC	1
331		14	max	0	1	.002	2	.001	1	1.056e-3	1	NC	1	NC	1
332			min	0	3	-.001	3	0	15	3.317e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	1.056e-3	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	3.317e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	1.056e-3	1	NC	1	NC	1
336			min	0	3	0	3	0	15	3.317e-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	0	2	0	1	1.056e-3	1	NC	1	NC	1
338			min	0	3	0	3	0	15	3.317e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	1.056e-3	1	NC	1	NC	1
340			min	0	3	0	3	0	15	3.317e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	1.056e-3	1	NC	1	NC	1
342			min	0	1	0	1	0	1	3.317e-5	15	NC	1	NC	1
343	M1	1	max	.005	3	.021	3	0	3	2.156e-2	1	NC	1	NC	1
344			min	-.006	2	-.032	1	-.004	1	-1.635e-2	3	NC	1	NC	1
345		2	max	.005	3	.011	3	0	3	1.038e-2	1	NC	4	NC	2
346			min	-.006	2	-.017	1	-.01	1	-8.093e-3	3	3104.714	1	8288.182	1
347		3	max	.005	3	.002	3	0	3	1.472e-5	3	NC	5	NC	2
348			min	-.006	2	-.003	1	-.014	1	-5.917e-4	1	1605.999	1	5023.944	1
349		4	max	.005	3	.009	1	0	3	1.76e-5	3	NC	5	NC	2
350			min	-.006	2	-.005	3	-.016	1	-4.857e-4	1	1136.684	1	4154.701	1
351		5	max	.005	3	.019	1	0	3	2.048e-5	3	NC	5	NC	2
352			min	-.006	2	-.012	3	-.016	1	-3.798e-4	1	911.244	1	3985.909	1
353		6	max	.005	3	.027	1	0	3	2.336e-5	3	NC	5	NC	2
354			min	-.006	2	-.016	3	-.015	1	-2.738e-4	1	783.948	1	4259.159	1
355		7	max	.005	3	.034	1	0	3	2.624e-5	3	NC	5	NC	2
356			min	-.006	2	-.02	3	-.013	1	-1.679e-4	1	707.012	1	5059.841	1
357		8	max	.005	3	.038	1	0	3	2.912e-5	3	NC	5	NC	2
358			min	-.006	2	-.023	3	-.011	1	-6.195e-5	1	660.573	1	6915.026	1
359		9	max	.005	3	.041	1	0	3	4.4e-5	1	NC	5	NC	1
360			min	-.006	2	-.024	3	-.008	1	1.587e-6	15	635.366	1	NC	1
361		10	max	.005	3	.042	1	0	3	1.499e-4	1	NC	5	NC	1
362			min	-.006	2	-.024	3	-.004	1	4.832e-6	15	627.133	1	NC	1
363		11	max	.005	3	.041	1	0	3	2.559e-4	1	NC	5	NC	1
364			min	-.006	2	-.023	3	-.001	1	8.078e-6	15	634.596	1	NC	1
365		12	max	.005	3	.038	1	.002	1	3.618e-4	1	NC	5	NC	2
366			min	-.006	2	-.021	3	0	15	1.132e-5	15	658.936	1	8171.488	1
367		13	max	.005	3	.033	1	.005	1	4.678e-4	1	NC	5	NC	2
368			min	-.006	2	-.019	3	0	15	1.457e-5	15	704.282	1	5652.809	1
369		14	max	.005	3	.027	1	.006	1	5.737e-4	1	NC	5	NC	2
370			min	-.006	2	-.015	3	0	15	1.781e-5	15	779.661	1	4626.143	1
371		15	max	.005	3	.018	1	.007	1	6.797e-4	1	NC	5	NC	2
372			min	-.006	2	-.01	3	0	15	2.106e-5	15	904.406	1	4255.928	1
373		16	max	.005	3	.008	1	.007	1	7.577e-4	1	NC	5	NC	2
374			min	-.006	2	-.005	3	0	15	2.346e-5	15	1124.594	1	4382.33	1
375		17	max	.005	3	.002	3	.005	1	1.714e-4	1	NC	5	NC	2
376			min	-.006	2	-.004	1	0	15	5.888e-6	15	1578.485	1	5254.013	1
377		18	max	.005	3	.009	3	.002	1	1.2e-2	1	NC	4	NC	2
378			min	-.006	2	-.019	1	0	15	-3.838e-3	3	3042.672	1	8616.532	1
379		19	max	.005	3	.016	3	0	3	2.407e-2	1	NC	1	NC	1
380			min	-.006	2	-.034	1	-.003	1	-7.775e-3	3	NC	1	NC	1
381	M5	1	max	.013	3	.064	3	0	3	4.19e-7	1	NC	1	NC	1
382			min	-.02	2	-.095	1	-.005	1	3.587e-8	15	NC	1	NC	1
383		2	max	.013	3	.035	3	.001	3	3.497e-5	3	NC	5	NC	1
384			min	-.02	2	-.051	1	-.005	1	-9.635e-5	1	1044.076	1	NC	1
385		3	max	.013	3	.008	3	.002	3	6.892e-5	3	NC	5	NC	1
386			min	-.02	2	-.009	1	-.004	1	-1.911e-4	1	537.747	1	NC	1
387		4	max	.013	3	.026	1	.002	3	6.85e-5	3	NC	5	NC	1
388			min	-.02	2	-.015	3	-.003	1	-1.78e-4	1	379.816	1	NC	1
389		5	max	.013	3	.057	1	.002	3	6.807e-5	3	NC	15	NC	1
390			min	-.02	2	-.033	3	-.003	1	-1.65e-4	1	303.936	1	NC	1
391		6	max	.013	3	.082	1	.002	3	6.764e-5	3	NC	15	NC	1
392			min	-.02	2	-.047	3	-.003	1	-1.519e-4	1	261.039	1	NC	1
393		7	max	.013	3	.101	1	.003	3	6.721e-5	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	-.02	2	-.058	3	-.002	1	-1.389e-4	1	235.049	1	NC	1
395		8	max	.013	3	.115	1	.003	3	6.678e-5	3	9833.078	15	NC	1
396			min	-.02	2	-.065	3	-.002	1	-1.258e-4	1	219.282	1	NC	1
397		9	max	.013	3	.123	1	.002	3	6.635e-5	3	9485.444	15	NC	1
398			min	-.02	2	-.069	3	-.002	1	-1.128e-4	1	210.618	1	NC	1
399		10	max	.013	3	.126	1	.002	3	6.593e-5	3	9388.568	15	NC	1
400			min	-.02	2	-.069	3	-.002	1	-9.975e-5	1	207.614	1	NC	1
401		11	max	.013	3	.123	1	.002	3	6.55e-5	3	9525.389	15	NC	1
402			min	-.02	2	-.067	3	-.002	1	-8.67e-5	1	209.83	1	NC	1
403		12	max	.013	3	.115	1	.002	3	6.507e-5	3	9915.42	15	NC	1
404			min	-.02	2	-.061	3	-.002	1	-7.365e-5	1	217.642	1	NC	1
405		13	max	.013	3	.101	1	.002	3	6.464e-5	3	NC	15	NC	1
406			min	-.02	2	-.053	3	-.002	1	-6.06e-5	1	232.408	1	NC	1
407		14	max	.013	3	.081	1	.001	3	6.421e-5	3	NC	15	NC	1
408			min	-.02	2	-.042	3	-.002	1	-4.756e-5	1	257.114	1	NC	1
409		15	max	.013	3	.055	1	.001	3	6.378e-5	3	NC	15	NC	1
410			min	-.02	2	-.029	3	-.002	1	-3.451e-5	1	298.18	1	NC	1
411		16	max	.013	3	.024	1	0	3	6.179e-5	3	NC	5	NC	1
412			min	-.02	2	-.013	3	-.002	1	-3.111e-5	2	370.995	1	NC	1
413		17	max	.013	3	.005	3	0	3	2.245e-5	3	NC	5	NC	1
414			min	-.02	2	-.013	1	-.002	1	-1.94e-4	1	522.446	1	NC	1
415		18	max	.013	3	.025	3	0	3	1.092e-5	3	NC	5	NC	1
416			min	-.02	2	-.057	1	-.002	1	-9.947e-5	1	1011.93	1	NC	1
417		19	max	.013	3	.046	3	0	3	0	5	NC	1	NC	1
418			min	-.02	2	-.104	1	-.003	1	-8.39e-8	4	NC	1	NC	1
419	M9	1	max	.005	3	.021	3	0	3	1.635e-2	3	NC	1	NC	1
420			min	-.006	2	-.032	1	-.006	1	-2.156e-2	1	NC	1	NC	1
421		2	max	.005	3	.011	3	0	3	8.111e-3	3	NC	4	NC	2
422			min	-.006	2	-.017	1	-.001	1	-1.065e-2	1	3105.543	1	9770.334	1
423		3	max	.005	3	.002	3	.002	1	4.98e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	1.741e-6	15	1606.44	1	6085.253	1
425		4	max	.005	3	.009	1	.004	1	1.022e-5	3	NC	5	NC	2
426			min	-.006	2	-.005	3	0	3	-3.872e-5	1	1136.997	1	5171.686	1
427		5	max	.005	3	.019	1	.004	1	1.556e-6	3	NC	5	NC	2
428			min	-.006	2	-.012	3	0	3	-1.272e-4	1	911.488	1	5145.839	1
429		6	max	.005	3	.027	1	.003	1	-4.887e-6	12	NC	5	NC	2
430			min	-.006	2	-.017	3	-.001	3	-2.158e-4	1	784.148	1	5810.403	1
431		7	max	.005	3	.034	1	.001	1	-9.206e-6	15	NC	5	NC	2
432			min	-.006	2	-.02	3	-.001	3	-3.043e-4	1	707.182	1	7598.818	1
433		8	max	.005	3	.038	1	0	2	-1.194e-5	15	NC	5	NC	1
434			min	-.006	2	-.023	3	-.002	3	-3.928e-4	1	660.722	1	NC	1
435		9	max	.005	3	.041	1	0	10	-1.468e-5	15	NC	5	NC	1
436			min	-.006	2	-.024	3	-.004	1	-4.813e-4	1	635.5	1	NC	1
437		10	max	.005	3	.042	1	0	15	-1.742e-5	15	NC	5	NC	1
438			min	-.006	2	-.024	3	-.006	1	-5.698e-4	1	627.255	1	NC	1
439		11	max	.005	3	.041	1	0	15	-2.015e-5	15	NC	5	NC	2
440			min	-.006	2	-.023	3	-.009	1	-6.584e-4	1	634.709	1	8652.558	1
441		12	max	.005	3	.038	1	0	15	-2.289e-5	15	NC	5	NC	2
442			min	-.006	2	-.021	3	-.012	1	-7.469e-4	1	659.044	1	5739.114	1
443		13	max	.005	3	.033	1	0	15	-2.563e-5	15	NC	5	NC	2
444			min	-.006	2	-.019	3	-.014	1	-8.354e-4	1	704.386	1	4506.538	1
445		14	max	.005	3	.027	1	0	15	-2.836e-5	15	NC	5	NC	2
446			min	-.006	2	-.015	3	-.015	1	-9.239e-4	1	779.763	1	3942.263	1
447		15	max	.005	3	.018	1	0	15	-3.11e-5	15	NC	5	NC	2
448			min	-.006	2	-.01	3	-.015	1	-1.012e-3	1	904.512	1	3778.637	1
449		16	max	.005	3	.008	1	0	15	-3.313e-5	15	NC	5	NC	2
450			min	-.006	2	-.005	3	-.014	1	-1.079e-3	1	1124.71	1	3999.451	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	.005	3	.002	3	0	15	-1.841e-5	15	NC	5	NC	2
452			min	-.006	2	-.004	1	-.012	1	-6.182e-4	1	1578.637	1	4890	1
453		18	max	.005	3	.009	3	0	15	3.837e-3	3	NC	4	NC	2
454			min	-.006	2	-.019	1	-.008	1	-1.223e-2	1	3042.952	1	8137.276	1
455		19	max	.005	3	.016	3	0	3	7.774e-3	3	NC	1	NC	1
456			min	-.006	2	-.034	1	-.002	1	-2.407e-2	1	NC	1	NC	1
457	M13	1	max	.006	1	.021	3	.005	3	3.756e-3	3	NC	1	NC	1
458			min	0	3	-.032	1	-.006	2	-5.702e-3	1	NC	1	NC	1
459		2	max	.006	1	.2	3	.045	1	4.549e-3	3	NC	5	NC	2
460			min	0	3	-.268	1	0	10	-6.931e-3	1	865.013	1	4069.812	1
461		3	max	.006	1	.346	3	.116	1	5.343e-3	3	NC	5	NC	3
462			min	0	3	-.46	1	.004	15	-8.161e-3	1	476.016	1	1691.257	1
463		4	max	.006	1	.437	3	.176	1	6.136e-3	3	NC	15	NC	3
464			min	0	3	-.581	1	.006	15	-9.39e-3	1	371.506	1	1129.863	1
465		5	max	.006	1	.463	3	.205	1	6.93e-3	3	NC	15	NC	3
466			min	0	3	-.616	1	.006	15	-1.062e-2	1	349.43	1	970.948	1
467		6	max	.006	1	.424	3	.196	1	7.724e-3	3	NC	5	NC	3
468			min	0	3	-.566	1	.006	15	-1.185e-2	1	381.829	1	1017.105	1
469		7	max	.006	1	.334	3	.15	1	8.517e-3	3	NC	5	NC	3
470			min	0	3	-.449	1	.005	15	-1.308e-2	1	488.637	1	1321.602	1
471		8	max	.005	1	.218	3	.08	1	9.311e-3	3	NC	5	NC	3
472			min	0	3	-.298	1	0	10	-1.431e-2	1	767.529	1	2400.165	1
473		9	max	.005	1	.112	3	.013	9	1.01e-2	3	NC	5	NC	1
474			min	0	3	-.159	1	-.007	10	-1.554e-2	1	1608.27	1	NC	1
475		10	max	.005	1	.064	3	.013	3	1.09e-2	3	NC	4	NC	1
476			min	0	3	-.095	1	-.02	2	-1.677e-2	1	3203.778	1	NC	1
477		11	max	.005	1	.112	3	.017	1	1.01e-2	3	NC	5	NC	2
478			min	0	3	-.159	1	-.007	10	-1.554e-2	1	1608.271	1	9443.499	1
479		12	max	.005	1	.218	3	.088	1	9.311e-3	3	NC	5	NC	3
480			min	0	3	-.298	1	0	10	-1.431e-2	1	767.529	1	2209.453	1
481		13	max	.005	1	.334	3	.158	1	8.518e-3	3	NC	5	NC	3
482			min	0	3	-.449	1	.005	15	-1.308e-2	1	488.637	1	1250.557	1
483		14	max	.005	1	.424	3	.205	1	7.724e-3	3	NC	5	NC	3
484			min	0	3	-.566	1	.006	15	-1.185e-2	1	381.829	1	973.394	1
485		15	max	.005	1	.463	3	.214	1	6.931e-3	3	NC	15	NC	3
486			min	0	3	-.616	1	.007	15	-1.062e-2	1	349.43	1	934.177	1
487		16	max	.005	1	.437	3	.183	1	6.138e-3	3	NC	15	NC	3
488			min	0	3	-.581	1	.006	15	-9.39e-3	1	371.506	1	1088.972	1
489		17	max	.005	1	.346	3	.121	1	5.344e-3	3	NC	5	NC	3
490			min	0	3	-.46	1	.004	15	-8.16e-3	1	476.016	1	1627.084	1
491		18	max	.005	1	.2	3	.048	1	4.551e-3	3	NC	5	NC	2
492			min	0	3	-.268	1	0	10	-6.931e-3	1	865.013	1	3882.1	1
493		19	max	.004	1	.021	3	.005	3	3.758e-3	3	NC	1	NC	1
494			min	0	3	-.032	1	-.006	2	-5.701e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.016	3	.005	3	5.908e-3	1	NC	1	NC	1
496			min	0	3	-.034	1	-.006	2	-2.816e-3	3	NC	1	NC	1
497		2	max	.002	1	.101	3	.048	1	7.212e-3	1	NC	5	NC	2
498			min	0	3	-.297	1	0	10	-3.385e-3	3	774.705	1	3801.527	1
499		3	max	.002	1	.171	3	.121	1	8.516e-3	1	NC	5	NC	3
500			min	0	3	-.513	1	.004	15	-3.953e-3	3	426.351	1	1610.729	1
501		4	max	.002	1	.215	3	.183	1	9.82e-3	1	NC	15	NC	3
502			min	0	3	-.647	1	.006	15	-4.522e-3	3	332.789	1	1084.577	1
503		5	max	.002	1	.228	3	.213	1	1.112e-2	1	NC	15	NC	3
504			min	0	3	-.686	1	.007	15	-5.09e-3	3	313.084	1	934.804	1
505		6	max	.002	1	.212	3	.203	1	1.243e-2	1	NC	5	NC	3
506			min	0	3	-.63	1	.006	15	-5.659e-3	3	342.248	1	978.823	1
507		7	max	.002	1	.171	3	.156	1	1.373e-2	1	NC	5	NC	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.499	1	.005	15	-6.227e-3	3	438.317	1	1266.14	1
509		8	max	.002	1	.117	3	.085	1	1.504e-2	1	NC	5	NC	3
510			min	0	3	-.33	1	-.001	10	-6.796e-3	3	689.687	1	2268.44	1
511		9	max	.003	1	.068	3	.015	3	1.634e-2	1	NC	5	NC	1
512			min	0	3	-.174	1	-.007	10	-7.364e-3	3	1452.478	1	NC	1
513		10	max	.003	1	.046	3	.013	3	1.764e-2	1	NC	4	NC	1
514			min	0	3	-.104	1	-.02	2	-7.933e-3	3	2921.211	1	NC	1
515		11	max	.003	1	.068	3	.014	3	1.634e-2	1	NC	5	NC	1
516			min	0	3	-.175	1	-.007	10	-7.364e-3	3	1452.478	1	NC	1
517		12	max	.003	1	.117	3	.082	1	1.504e-2	1	NC	5	NC	3
518			min	0	3	-.33	1	-.001	10	-6.795e-3	3	689.687	1	2338.358	1
519		13	max	.003	1	.171	3	.152	1	1.373e-2	1	NC	5	NC	3
520			min	0	3	-.499	1	.005	15	-6.226e-3	3	438.317	1	1296.074	1
521		14	max	.003	1	.212	3	.199	1	1.243e-2	1	NC	5	NC	3
522			min	0	3	-.63	1	.006	15	-5.657e-3	3	342.248	1	1000.07	1
523		15	max	.003	1	.228	3	.208	1	1.113e-2	1	NC	15	NC	3
524			min	0	3	-.686	1	.007	15	-5.089e-3	3	313.084	1	955.475	1
525		16	max	.003	1	.215	3	.178	1	9.822e-3	1	NC	15	NC	3
526			min	0	3	-.647	1	.006	15	-4.52e-3	3	332.789	1	1111.239	1
527		17	max	.003	1	.171	3	.118	1	8.519e-3	1	NC	5	NC	3
528			min	0	3	-.513	1	.004	15	-3.951e-3	3	426.351	1	1659.408	1
529		18	max	.003	1	.101	3	.046	1	7.215e-3	1	NC	5	NC	2
530			min	0	3	-.297	1	0	10	-3.382e-3	3	774.706	1	3967.152	1
531		19	max	.003	1	.016	3	.005	3	5.911e-3	1	NC	1	NC	1
532			min	0	3	-.034	1	-.006	2	-2.813e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.738e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-1.039e-4	2	NC	1	NC	1
535		2	max	0	1	-.007	15	.001	1	7.566e-4	3	NC	5	NC	1
536			min	0	10	-.029	4	0	3	-8.764e-4	1	3692.493	4	NC	1
537		3	max	0	1	-.013	15	.004	1	1.239e-3	3	7993.466	15	NC	1
538			min	0	10	-.057	4	-.003	3	-1.664e-3	1	1878.984	4	NC	1
539		4	max	0	1	-.019	15	.008	1	1.722e-3	3	5483.984	15	NC	2
540			min	0	10	-.083	4	-.006	3	-2.452e-3	1	1289.092	4	8992.134	1
541		5	max	0	1	-.025	15	.014	1	2.205e-3	3	4279.209	15	NC	4
542			min	0	10	-.106	4	-.009	3	-3.24e-3	1	1005.892	4	5842.892	1
543		6	max	0	1	-.03	15	.019	1	2.687e-3	3	3601.406	15	NC	4
544			min	0	10	-.126	4	-.013	3	-4.028e-3	1	846.564	4	4225.222	1
545		7	max	0	1	-.033	15	.025	1	3.17e-3	3	3193.798	15	NC	4
546			min	0	10	-.142	4	-.017	3	-4.816e-3	1	750.75	4	3286.488	1
547		8	max	0	1	-.036	15	.031	1	3.653e-3	3	2949.171	15	NC	4
548			min	0	10	-.154	4	-.021	3	-5.604e-3	1	693.247	4	2699.453	1
549		9	max	0	1	-.038	15	.037	1	4.136e-3	3	2817.499	15	NC	4
550			min	0	10	-.161	4	-.025	3	-6.392e-3	1	662.295	4	2316.574	1
551		10	max	0	1	-.038	15	.041	1	4.618e-3	3	2775.844	15	NC	4
552			min	0	10	-.164	4	-.028	3	-7.18e-3	1	652.504	4	2064.212	1
553		11	max	0	1	-.038	15	.044	1	5.101e-3	3	2817.499	15	NC	4
554			min	0	10	-.161	4	-.03	3	-7.968e-3	1	662.295	4	1903.822	1
555		12	max	0	1	-.036	15	.046	1	5.584e-3	3	2949.171	15	NC	5
556			min	0	10	-.154	4	-.032	3	-8.756e-3	1	693.247	4	1816.197	1
557		13	max	0	1	-.033	15	.045	1	6.067e-3	3	3193.798	15	NC	5
558			min	0	10	-.143	4	-.031	3	-9.544e-3	1	750.75	4	1795.455	1
559		14	max	0	1	-.03	15	.043	1	6.549e-3	3	3601.406	15	NC	4
560			min	0	10	-.127	4	-.029	3	-1.033e-2	1	846.564	4	1849	1
561		15	max	0	1	-.025	15	.037	1	7.032e-3	3	4279.209	15	NC	4
562			min	0	10	-.107	4	-.025	3	-1.112e-2	1	1005.892	4	2005.198	1
563		16	max	0	1	-.02	15	.028	1	7.515e-3	3	5483.984	15	NC	4
564			min	0	10	-.084	4	-.019	3	-1.191e-2	1	1289.092	4	2341.561	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	1	-.013	15	.016	1	7.997e-3	3	7993.466	15	NC	4
566			min	0	10	-.058	4	-.011	3	-1.27e-2	1	1878.984	4	3101.655	1
567		18	max	0	1	-.007	15	.002	9	8.48e-3	3	NC	5	NC	4
568			min	0	10	-.03	4	-.005	2	-1.348e-2	1	3692.493	4	5518.058	1
569		19	max	0	1	.004	3	.015	3	8.963e-3	3	NC	1	NC	1
570			min	0	10	-.005	1	-.021	2	-1.427e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	3.022e-3	3	NC	1	NC	1
572			min	0	1	-.002	1	-.006	2	-4.482e-3	1	NC	1	NC	1
573		2	max	0	10	-.007	15	.006	1	2.884e-3	3	NC	5	NC	2
574			min	0	1	-.029	4	0	10	-4.261e-3	1	3692.493	4	9383.262	1
575		3	max	0	10	-.013	15	.015	1	2.745e-3	3	7993.466	15	NC	3
576			min	0	1	-.057	4	-.004	3	-4.04e-3	1	1878.984	4	5305.363	1
577		4	max	0	10	-.019	15	.022	1	2.606e-3	3	5483.984	15	NC	4
578			min	0	1	-.083	4	-.007	3	-3.819e-3	1	1289.092	4	4031.939	1
579		5	max	0	10	-.025	15	.026	1	2.467e-3	3	4279.209	15	NC	4
580			min	0	1	-.106	4	-.009	3	-3.597e-3	1	1005.892	4	3479.006	1
581		6	max	0	10	-.03	15	.029	1	2.328e-3	3	3601.406	15	NC	4
582			min	0	1	-.126	4	-.011	3	-3.376e-3	1	846.564	4	3236.066	1
583		7	max	0	10	-.033	15	.03	1	2.19e-3	3	3193.798	15	NC	4
584			min	0	1	-.142	4	-.011	3	-3.155e-3	1	750.75	4	3174.319	1
585		8	max	0	10	-.036	15	.029	1	2.051e-3	3	2949.171	15	NC	4
586			min	0	1	-.154	4	-.011	3	-2.934e-3	1	693.247	4	3249.456	1
587		9	max	0	10	-.038	15	.028	1	1.912e-3	3	2817.499	15	NC	4
588			min	0	1	-.161	4	-.011	3	-2.713e-3	1	662.295	4	3454.991	1
589		10	max	0	10	-.038	15	.025	1	1.773e-3	3	2775.844	15	NC	4
590			min	0	1	-.163	4	-.01	3	-2.492e-3	1	652.504	4	3811.293	1
591		11	max	0	10	-.038	15	.022	1	1.634e-3	3	2817.499	15	NC	4
592			min	0	1	-.161	4	-.008	3	-2.271e-3	1	662.295	4	4369.838	1
593		12	max	0	10	-.036	15	.018	1	1.496e-3	3	2949.171	15	NC	3
594			min	0	1	-.154	4	-.007	3	-2.049e-3	1	693.247	4	5232.902	1
595		13	max	0	10	-.033	15	.014	1	1.357e-3	3	3193.798	15	NC	2
596			min	0	1	-.142	4	-.005	3	-1.828e-3	1	750.75	4	6604.069	1
597		14	max	0	10	-.03	15	.01	1	1.218e-3	3	3601.406	15	NC	2
598			min	0	1	-.126	4	-.004	3	-1.607e-3	1	846.564	4	8921.917	1
599		15	max	0	10	-.025	15	.007	1	1.079e-3	3	4279.209	15	NC	1
600			min	0	1	-.106	4	-.002	3	-1.386e-3	1	1005.892	4	NC	1
601		16	max	0	10	-.019	15	.004	1	9.403e-4	3	5483.984	15	NC	1
602			min	0	1	-.083	4	-.001	3	-1.165e-3	1	1289.092	4	NC	1
603		17	max	0	10	-.013	15	.001	1	8.015e-4	3	7993.466	15	NC	1
604			min	0	1	-.057	4	0	3	-9.437e-4	1	1878.984	4	NC	1
605		18	max	0	10	-.007	15	0	4	6.627e-4	3	NC	5	NC	1
606			min	0	1	-.029	4	0	2	-7.226e-4	1	3692.493	4	NC	1
607		19	max	0	1	0	1	0	1	5.239e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.057e-4	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

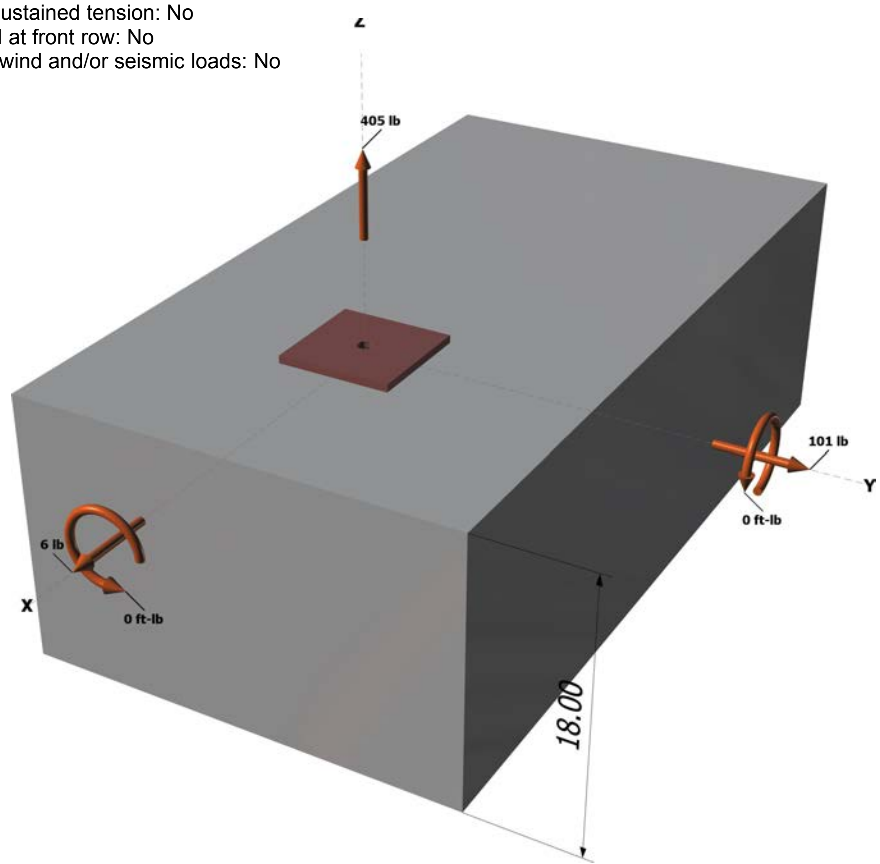
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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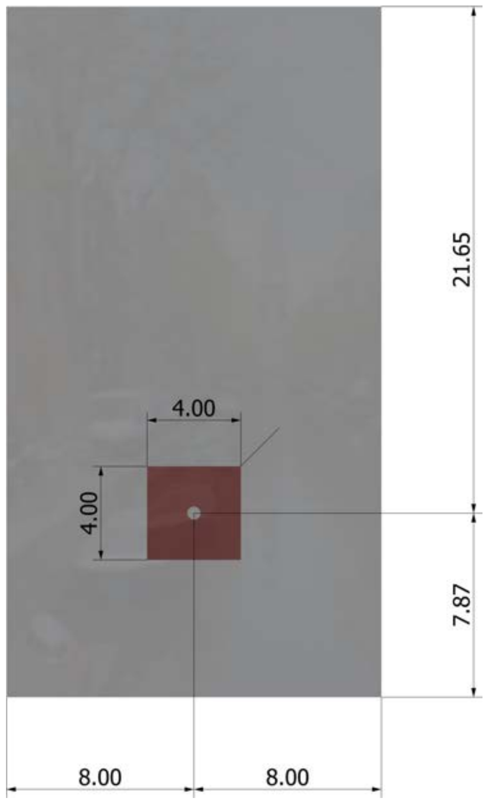


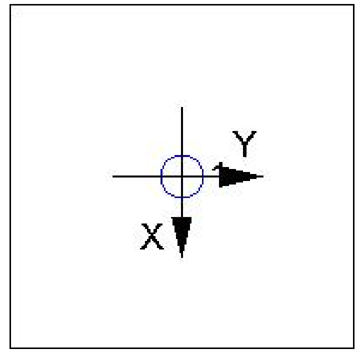
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

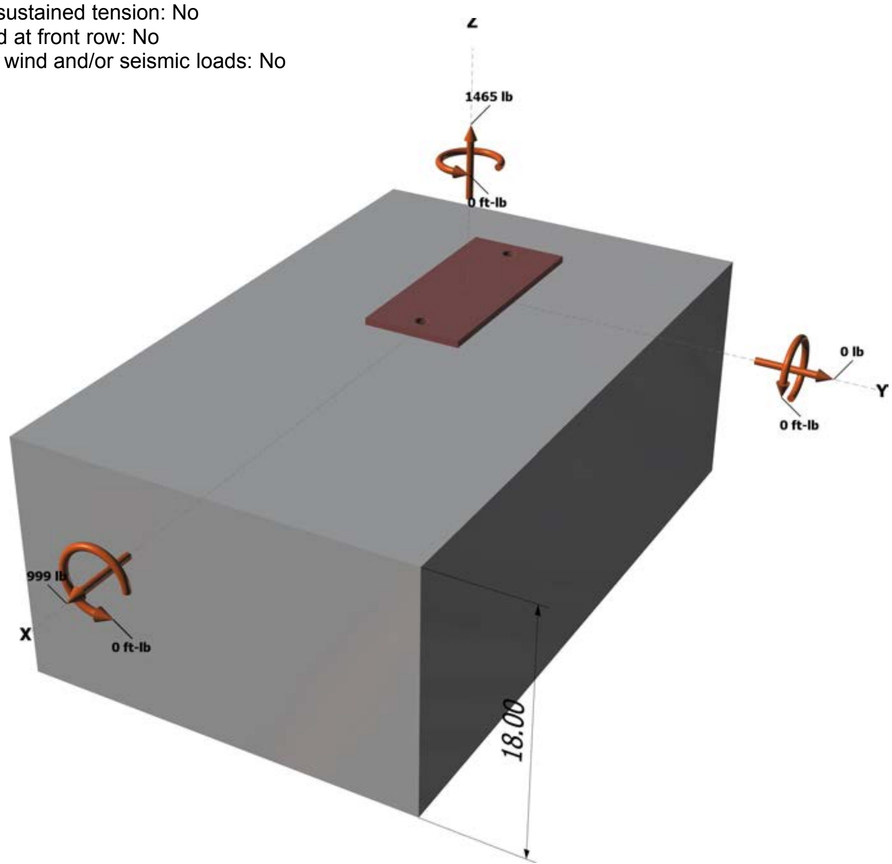
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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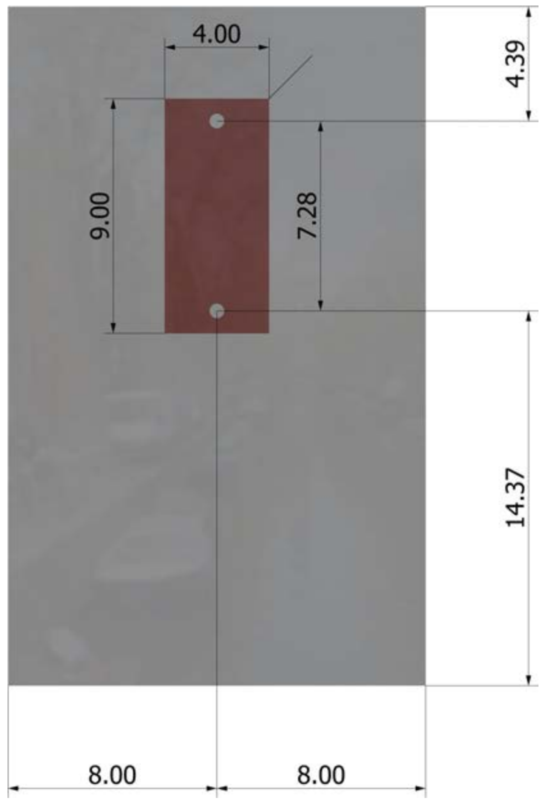


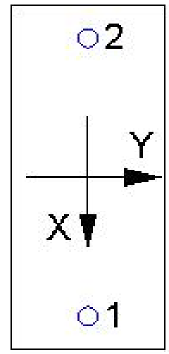
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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