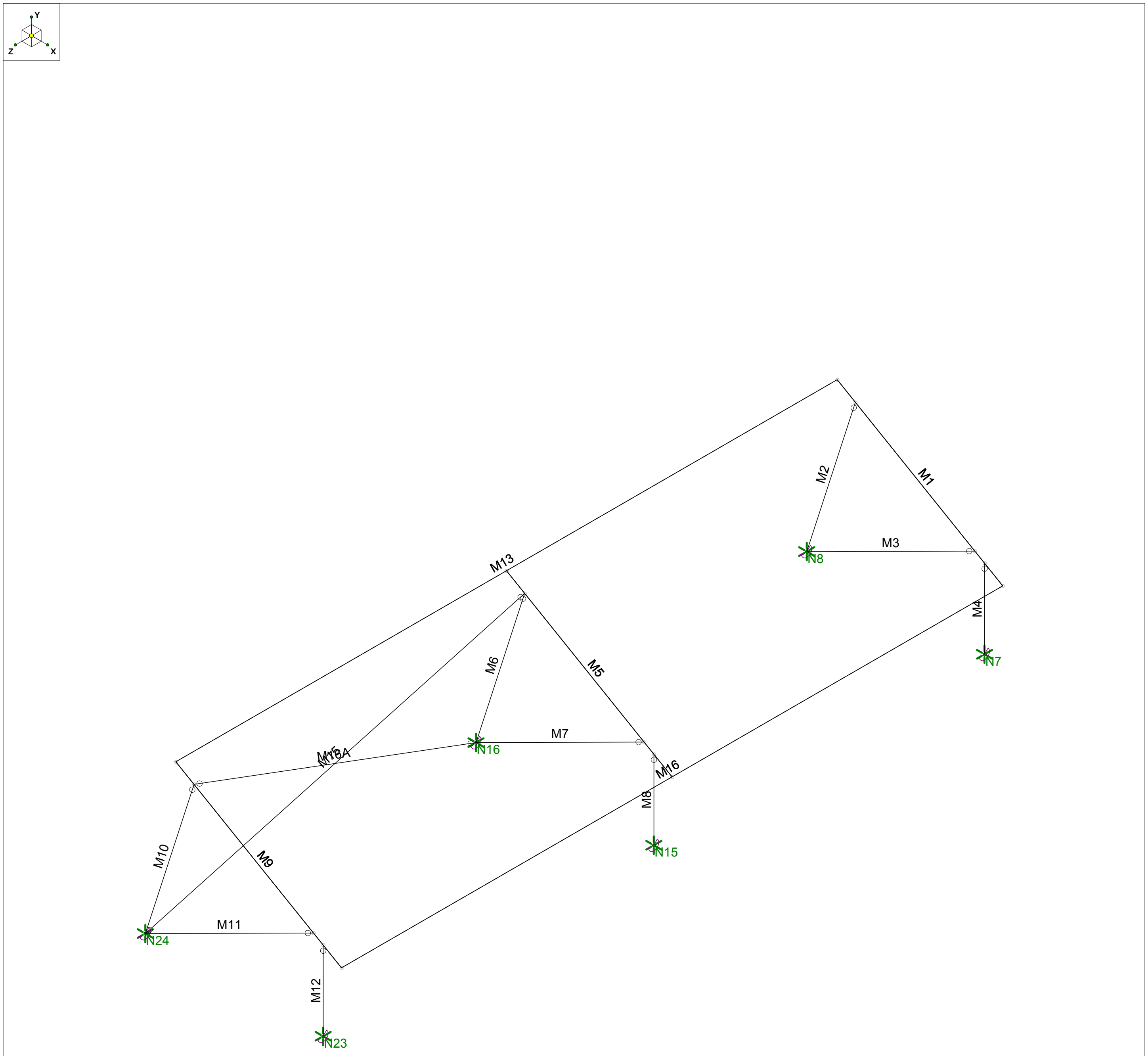


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

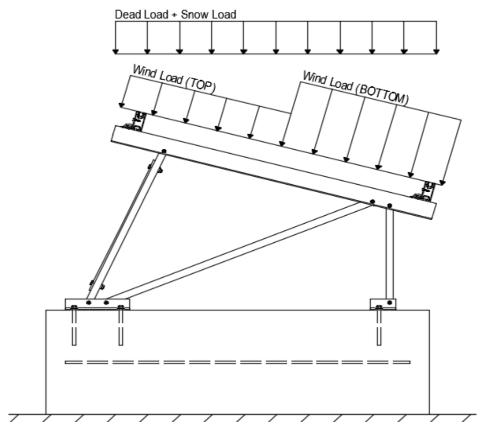
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 30°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

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

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

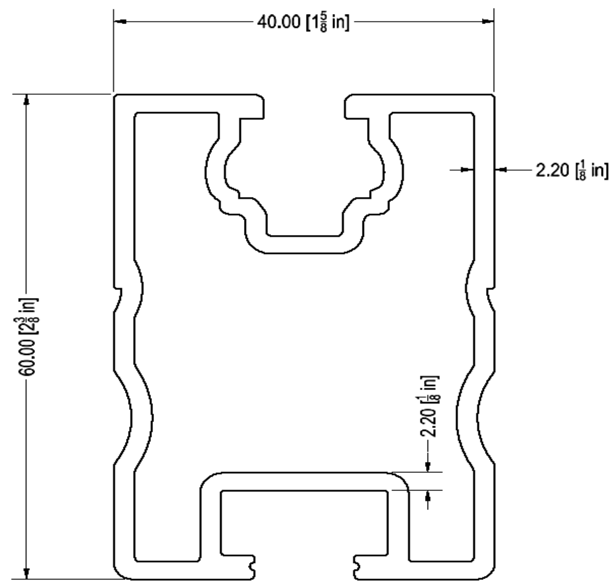
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

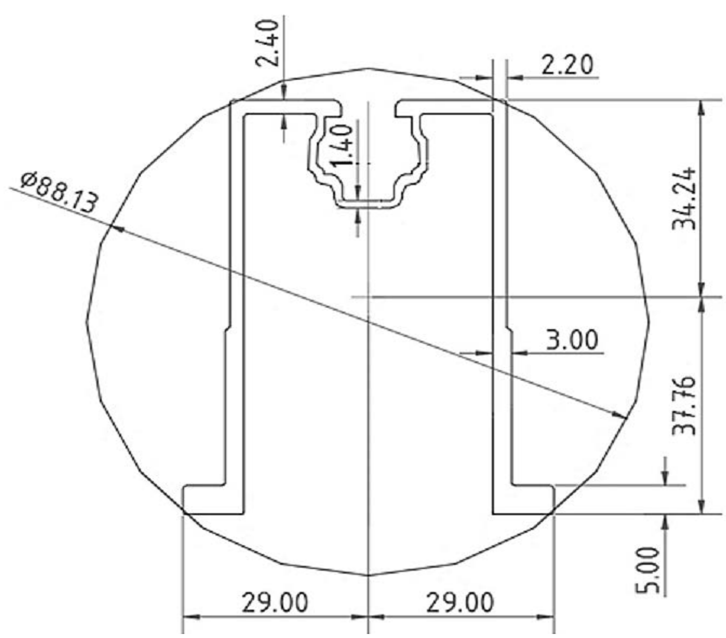
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	57	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.41	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.495	k-ft
M_z =	0.044	k-ft
$M_{y\ allowable}$ =	1.251	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	45%	



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).

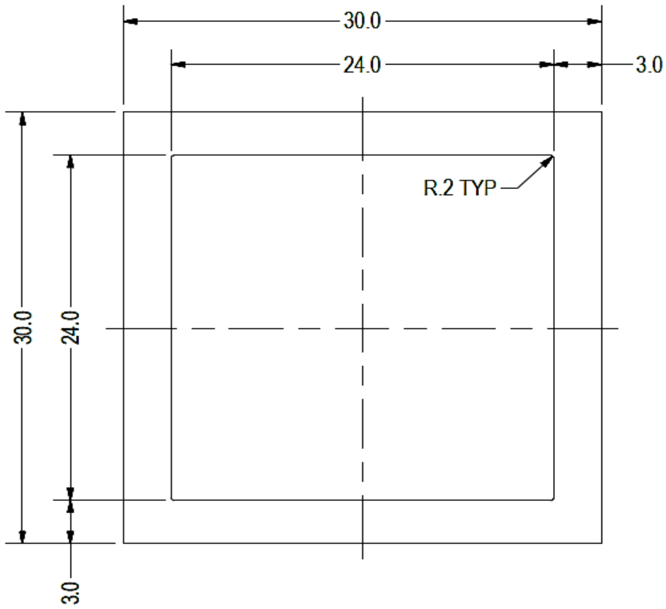
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.565	k-ft
M_z =	0.000	k-ft
P_n =	0.292	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	41%	



4.3 Front Strut Design

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

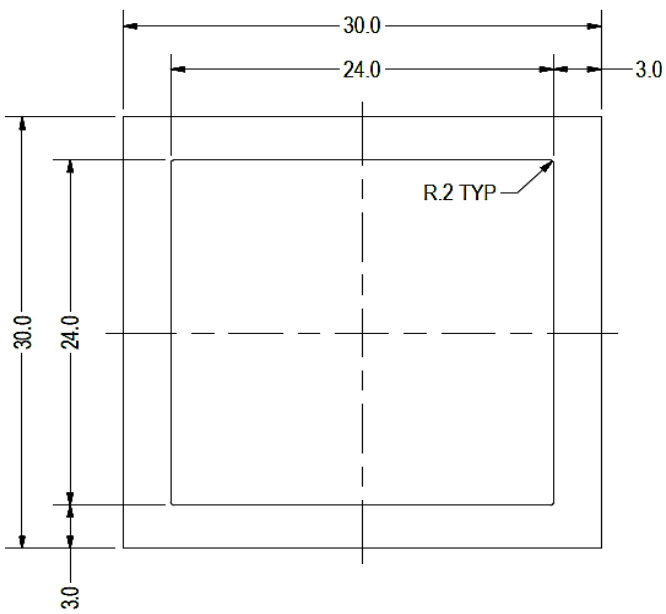
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.846	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	7%	



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).

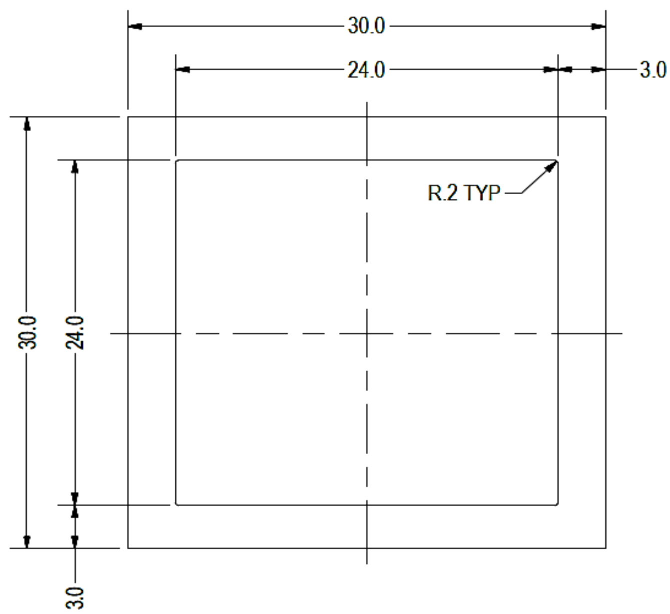
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.624	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	16%	



4.5 Rear Strut Design

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

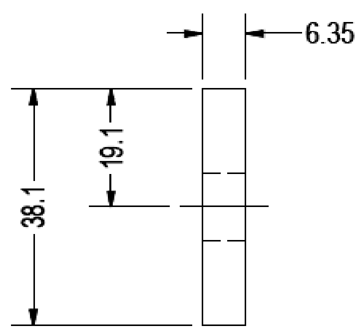
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.700	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	14%	



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.002	k-ft
P_n =	0.092	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	5%	



A cross brace kit is required every 38 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

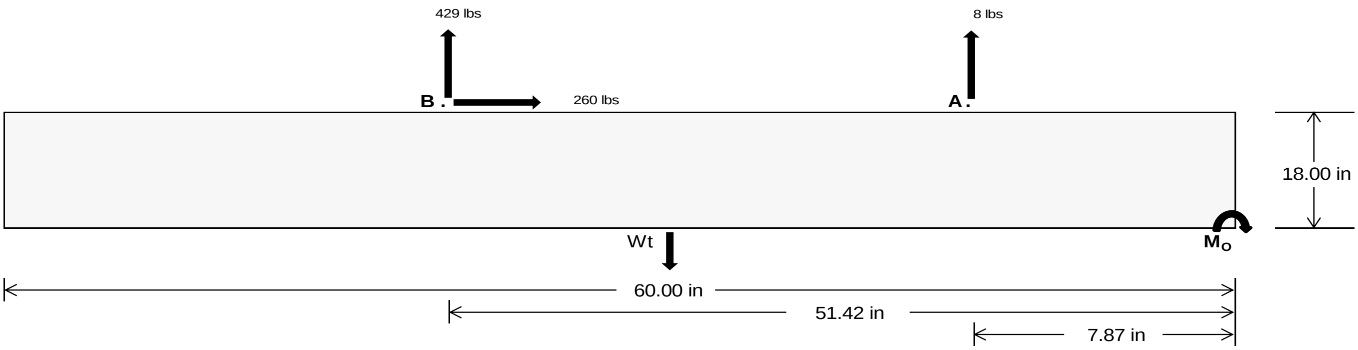
5.1 Helical Pile Foundations

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 =	38.35	1784.76	k
Compressive Load =	1099.40	1210.43	k
Lateral Load =	1.86	1080.09	k
Moment (Weak Axis) =	0.00	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 26772.3 in-lbs
Resisting Force Required = 892.41 lbs
S.F. = 1.67
Weight Required = 1487.35 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 259.57 lbs
Friction = 0.4
Weight Required = 648.93 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 259.57 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in 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			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	380 lbs	380 lbs	380 lbs	380 lbs	402 lbs	402 lbs	402 lbs	402 lbs	552 lbs	552 lbs	552 lbs	552 lbs	-17 lbs	-17 lbs	-17 lbs	-17 lbs
F_B	260 lbs	260 lbs	260 lbs	260 lbs	528 lbs	528 lbs	528 lbs	528 lbs	567 lbs	567 lbs	567 lbs	567 lbs	-857 lbs	-857 lbs	-857 lbs	-857 lbs
F_V	39 lbs	39 lbs	39 lbs	39 lbs	467 lbs	467 lbs	467 lbs	467 lbs	376 lbs	376 lbs	376 lbs	376 lbs	-519 lbs	-519 lbs	-519 lbs	-519 lbs
P_{total}	2634 lbs	2725 lbs	2815 lbs	2906 lbs	2924 lbs	3014 lbs	3105 lbs	3195 lbs	3112 lbs	3203 lbs	3293 lbs	3384 lbs	323 lbs	377 lbs	431 lbs	486 lbs
M	294 lbs-ft	294 lbs-ft	294 lbs-ft	294 lbs-ft	498 lbs-ft	498 lbs-ft	498 lbs-ft	498 lbs-ft	570 lbs-ft	570 lbs-ft	570 lbs-ft	570 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft
e	0.11 ft	0.11 ft	0.10 ft	0.10 ft	0.17 ft	0.17 ft	0.16 ft	0.16 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	2.23 ft	1.91 ft	1.67 ft	1.48 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}	248.8 psf	247.4 psf	246.2 psf	245.0 psf	253.7 psf	252.1 psf	250.7 psf	249.3 psf	264.9 psf	262.8 psf	261.0 psf	259.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	325.9 psf	321.2 psf	316.9 psf	312.9 psf	384.2 psf	376.9 psf	370.3 psf	364.2 psf	414.1 psf	405.5 psf	397.7 psf	390.5 psf	439.9 psf	222.6 psf	173.3 psf	152.8 psf

Maximum Bearing Pressure = 440 psf
Allowable Bearing Pressure = 1500 psf

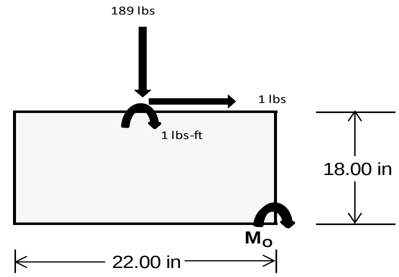
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 171.2 ft-lbs
Resisting Force Required = 186.75 lbs
S.F. = 1.67
Weight Required = 311.26 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

A minimum 60in long x 22in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	60 lbs	147 lbs	56 lbs	189 lbs	531 lbs	186 lbs	17 lbs	43 lbs	17 lbs
F_V	0 lbs	0 lbs	0 lbs	1 lbs	1 lbs	0 lbs	0 lbs	0 lbs	0 lbs
P_{total}	2528 lbs	2616 lbs	2525 lbs	2539 lbs	2881 lbs	2536 lbs	739 lbs	765 lbs	738 lbs
M	0 lbs-ft	0 lbs-ft	0 lbs-ft	2 lbs-ft	1 lbs-ft	1 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	275.7 sqft	285.3 sqft	275.4 sqft	276.1 sqft	314.0 sqft	276.4 sqft	80.6 sqft	83.4 sqft	80.5 sqft
f_{max}	275.9 psf	285.4 psf	275.5 psf	277.8 psf	314.6 psf	276.8 psf	80.7 psf	83.5 psf	80.6 psf

Maximum Bearing Pressure = 315 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

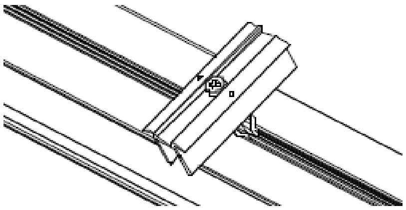
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

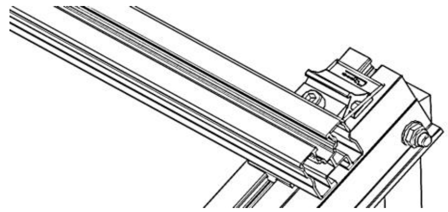
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.657	k
Allowable Uplift =	1.214	k
Utilization =	54%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.112	k
Allowable Uplift =	1.116	k
Utilization =	100%	



6.2 Bolted Connections

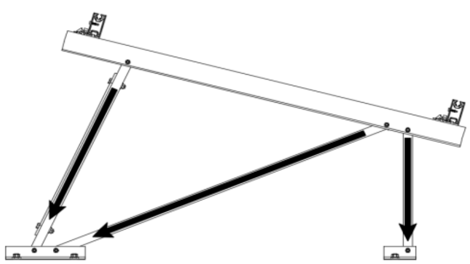
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	0.846	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	15%	

Rear Strut		
Maximum Axial Load =	1.146	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut		
Maximum Axial Load =	0.624	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	11%	

Bracing		
Maximum Axial Load =	0.092	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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

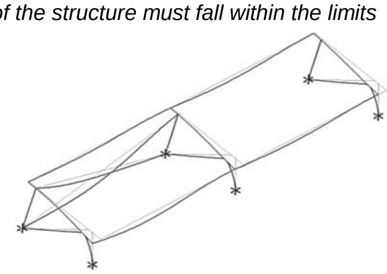
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	32.32	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.646	in
Max Drift, Δ_{MAX} =	0.011	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 57.00 in

J = 0.255

148.425

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 57.00 in

J = 0.255

154.13

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

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= 29.3

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 29.4 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.251 k-ft

3.4.18

h/t = 7.4

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.25
21.9891

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.7 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 = 1.25
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= 29.7 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= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 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

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

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)

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

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

$\varphi F_L = \varphi yFcy$

φF_L = 33.25 ksi

φF_L = 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:
3.4.14

L_b = 46.38 in
J = 0.16
121.663

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0
φF_L= 1.17φyFcy
φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Weak Axis:
3.4.14

L_b = 46.38 in
J = 0.16
121.663

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.68476

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.81587

φF_L= $(\varphi ccFcy)/(\lambda^2)$

φF_L= 10.0603 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= $\varphi yFcy$

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= $\varphi yFcy$

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= $\varphi yFcy$

φF_L= 33.25 ksi

φF_L= 10.06 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.05 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-60.928	-60.928	0	0
2	M16	y	-98.014	-98.014	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	121.855	121.855	0	0
2	M16	y	58.278	58.278	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	224.341	2	286.485	2	0	15	0	15	0	1	0	1
2		min	-268.861	3	-426.527	3	-.136	3	0	3	0	1	0	1
3	N7	max	.002	3	310.925	1	-.029	15	0	15	0	1	0	1
4		min	-.142	2	2.99	12	-.689	1	-.001	1	0	1	0	1
5	N15	max	0	15	845.692	1	.278	1	0	1	0	1	0	1
6		min	-1.431	2	-29.501	3	-.616	3	0	3	0	1	0	1
7	N16	max	760.991	2	931.099	2	0	2	0	9	0	1	0	1
8		min	-830.839	3	-1372.891	3	-74.433	3	0	3	0	1	0	1
9	N23	max	.002	3	310.904	1	1.316	1	.002	1	0	1	0	1
10		min	-.142	2	3.38	12	.039	10	0	10	0	1	0	1
11	N24	max	224.341	2	289.178	2	75.04	3	0	1	0	1	0	1
12		min	-269.269	3	-425.268	3	.001	10	0	3	0	1	0	1
13	Totals:	max	1207.959	2	2784.822	2	0	1						
14		min	-1369.011	3	-2246.471	3	0	3						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	220.364	1	.655	4	.201	1	0	15	0	15	0	1
2			min	-366.808	3	.154	15	-.065	3	0	1	0	1	0	1
3		2	max	220.49	1	.604	4	.201	1	0	15	0	15	0	15
4			min	-366.714	3	.142	15	-.065	3	0	1	0	1	0	4
5		3	max	220.616	1	.553	4	.201	1	0	15	0	15	0	15
6			min	-366.619	3	.13	15	-.065	3	0	1	0	3	0	4
7		4	max	220.742	1	.502	4	.201	1	0	15	0	9	0	15
8			min	-366.525	3	.118	15	-.065	3	0	1	0	3	0	4
9		5	max	220.868	1	.451	4	.201	1	0	15	0	1	0	15
10			min	-366.431	3	.106	15	-.065	3	0	1	0	3	0	4
11		6	max	220.993	1	.4	4	.201	1	0	15	0	1	0	15
12			min	-366.336	3	.094	15	-.065	3	0	1	0	3	0	4
13		7	max	221.119	1	.348	4	.201	1	0	15	0	1	0	15
14			min	-366.242	3	.082	15	-.065	3	0	1	0	3	0	4
15		8	max	221.245	1	.297	4	.201	1	0	15	0	1	0	15
16			min	-366.147	3	.07	15	-.065	3	0	1	0	3	0	4
17		9	max	221.371	1	.246	4	.201	1	0	15	0	1	0	15
18			min	-366.053	3	.058	15	-.065	3	0	1	0	3	0	4
19		10	max	221.497	1	.195	4	.201	1	0	15	0	1	0	15
20			min	-365.959	3	.046	15	-.065	3	0	1	0	3	0	4
21		11	max	221.623	1	.144	4	.201	1	0	15	0	1	0	15
22			min	-365.864	3	.032	12	-.065	3	0	1	0	3	0	4
23		12	max	221.749	1	.103	2	.201	1	0	15	0	1	0	15
24			min	-365.77	3	.012	12	-.065	3	0	1	0	3	0	4
25		13	max	221.874	1	.063	2	.201	1	0	15	0	1	0	15
26			min	-365.675	3	-.014	3	-.065	3	0	1	0	3	0	4
27		14	max	222	1	.023	2	.201	1	0	15	0	1	0	15
28			min	-365.581	3	-.044	3	-.065	3	0	1	0	3	0	4
29		15	max	222.126	1	-.014	15	.201	1	0	15	0	1	0	15
30			min	-365.487	3	-.074	3	-.065	3	0	1	0	3	0	4
31		16	max	222.252	1	-.026	15	.201	1	0	15	0	1	0	15
32			min	-365.392	3	-.112	4	-.065	3	0	1	0	3	0	4
33		17	max	222.378	1	-.038	15	.201	1	0	15	0	1	0	15
34			min	-365.298	3	-.163	4	-.065	3	0	1	0	3	0	4
35		18	max	222.504	1	-.05	15	.201	1	0	15	0	1	0	15
36			min	-365.203	3	-.214	4	-.065	3	0	1	0	3	0	4
37		19	max	222.63	1	-.062	15	.201	1	0	15	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
38			min	-365.109	3	-.265	4	-.065	3	0	1	0	3	0	4
39	M3	1	max	179.651	2	1.758	4	-.009	15	0	15	0	1	0	4
40			min	-176.786	3	.414	15	-.225	1	0	1	0	15	0	15
41		2	max	179.582	2	1.582	4	-.009	15	0	15	0	1	0	2
42			min	-176.838	3	.372	15	-.225	1	0	1	0	15	0	12
43		3	max	179.512	2	1.405	4	-.009	15	0	15	0	1	0	2
44			min	-176.89	3	.33	15	-.225	1	0	1	0	15	0	3
45		4	max	179.443	2	1.228	4	-.009	15	0	15	0	1	0	15
46			min	-176.942	3	.289	15	-.225	1	0	1	0	15	0	4
47		5	max	179.374	2	1.051	4	-.009	15	0	15	0	1	0	15
48			min	-176.994	3	.247	15	-.225	1	0	1	0	15	0	4
49		6	max	179.304	2	.874	4	-.009	15	0	15	0	1	0	15
50			min	-177.046	3	.206	15	-.225	1	0	1	0	15	0	4
51		7	max	179.235	2	.697	4	-.009	15	0	15	0	1	0	15
52			min	-177.098	3	.164	15	-.225	1	0	1	0	15	0	4
53		8	max	179.166	2	.521	4	-.009	15	0	15	0	1	0	15
54			min	-177.15	3	.123	15	-.225	1	0	1	0	15	-.001	4
55		9	max	179.096	2	.344	4	-.009	15	0	15	0	1	0	15
56			min	-177.202	3	.081	15	-.225	1	0	1	0	15	-.001	4
57		10	max	179.027	2	.167	4	-.009	15	0	15	0	1	0	15
58			min	-177.254	3	.039	15	-.225	1	0	1	0	15	-.001	4
59		11	max	178.958	2	.018	2	-.009	15	0	15	0	1	0	15
60			min	-177.306	3	-.038	3	-.225	1	0	1	0	15	-.001	4
61		12	max	178.888	2	-.044	15	-.009	15	0	15	0	1	0	15
62			min	-177.358	3	-.187	4	-.225	1	0	1	0	10	-.001	4
63		13	max	178.819	2	-.085	15	-.009	15	0	15	0	1	0	15
64			min	-177.41	3	-.364	4	-.225	1	0	1	0	10	-.001	4
65		14	max	178.75	2	-.127	15	-.009	15	0	15	0	1	0	15
66			min	-177.462	3	-.54	4	-.225	1	0	1	0	10	-.001	4
67		15	max	178.68	2	-.168	15	-.009	15	0	15	0	1	0	15
68			min	-177.514	3	-.717	4	-.225	1	0	1	0	10	0	4
69		16	max	178.611	2	-.21	15	-.009	15	0	15	0	9	0	15
70			min	-177.566	3	-.894	4	-.225	1	0	1	0	2	0	4
71		17	max	178.542	2	-.252	15	-.009	15	0	15	0	15	0	15
72			min	-177.618	3	-1.071	4	-.225	1	0	1	0	1	0	4
73		18	max	178.473	2	-.293	15	-.009	15	0	15	0	15	0	15
74			min	-177.67	3	-1.248	4	-.225	1	0	1	0	1	0	4
75		19	max	178.403	2	-.335	15	-.009	15	0	15	0	15	0	1
76			min	-177.722	3	-1.425	4	-.225	1	0	1	0	1	0	1
77	M4	1	max	309.76	1	0	1	-.029	15	0	1	0	3	0	1
78			min	2.408	12	0	1	-.727	1	0	1	0	2	0	1
79		2	max	309.825	1	0	1	-.029	15	0	1	0	15	0	1
80			min	2.44	12	0	1	-.727	1	0	1	0	1	0	1
81		3	max	309.89	1	0	1	-.029	15	0	1	0	15	0	1
82			min	2.473	12	0	1	-.727	1	0	1	0	1	0	1
83		4	max	309.954	1	0	1	-.029	15	0	1	0	15	0	1
84			min	2.505	12	0	1	-.727	1	0	1	0	1	0	1
85		5	max	310.019	1	0	1	-.029	15	0	1	0	15	0	1
86			min	2.537	12	0	1	-.727	1	0	1	0	1	0	1
87		6	max	310.084	1	0	1	-.029	15	0	1	0	15	0	1
88			min	2.57	12	0	1	-.727	1	0	1	0	1	0	1
89		7	max	310.148	1	0	1	-.029	15	0	1	0	15	0	1
90			min	2.602	12	0	1	-.727	1	0	1	0	1	0	1
91		8	max	310.213	1	0	1	-.029	15	0	1	0	15	0	1
92			min	2.635	12	0	1	-.727	1	0	1	0	1	0	1
93		9	max	310.278	1	0	1	-.029	15	0	1	0	15	0	1
94			min	2.667	12	0	1	-.727	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	310.343	1	0	1	-.029	15	0	1	0	15	0	1
96			min	2.699	12	0	1	-.727	1	0	1	0	1	0	1
97		11	max	310.407	1	0	1	-.029	15	0	1	0	15	0	1
98			min	2.732	12	0	1	-.727	1	0	1	0	1	0	1
99		12	max	310.472	1	0	1	-.029	15	0	1	0	15	0	1
100			min	2.764	12	0	1	-.727	1	0	1	0	1	0	1
101		13	max	310.537	1	0	1	-.029	15	0	1	0	15	0	1
102			min	2.796	12	0	1	-.727	1	0	1	0	1	0	1
103		14	max	310.601	1	0	1	-.029	15	0	1	0	15	0	1
104			min	2.829	12	0	1	-.727	1	0	1	0	1	0	1
105		15	max	310.666	1	0	1	-.029	15	0	1	0	15	0	1
106			min	2.861	12	0	1	-.727	1	0	1	0	1	0	1
107		16	max	310.731	1	0	1	-.029	15	0	1	0	15	0	1
108			min	2.893	12	0	1	-.727	1	0	1	0	1	0	1
109		17	max	310.796	1	0	1	-.029	15	0	1	0	15	0	1
110			min	2.926	12	0	1	-.727	1	0	1	-.001	1	0	1
111		18	max	310.86	1	0	1	-.029	15	0	1	0	15	0	1
112			min	2.958	12	0	1	-.727	1	0	1	-.001	1	0	1
113		19	max	310.925	1	0	1	-.029	15	0	1	0	15	0	1
114			min	2.99	12	0	1	-.727	1	0	1	-.001	1	0	1
115	M6	1	max	698.172	1	.656	4	.045	9	0	3	0	3	0	1
116			min	-1146.124	3	.154	15	-.234	3	0	2	0	2	0	1
117		2	max	698.298	1	.605	4	.045	9	0	3	0	3	0	15
118			min	-1146.029	3	.142	15	-.234	3	0	2	0	2	0	4
119		3	max	698.424	1	.554	4	.045	9	0	3	0	3	0	15
120			min	-1145.935	3	.13	15	-.234	3	0	2	0	2	0	4
121		4	max	698.55	1	.503	4	.045	9	0	3	0	3	0	15
122			min	-1145.84	3	.118	15	-.234	3	0	2	0	2	0	4
123		5	max	698.676	1	.452	4	.045	9	0	3	0	3	0	15
124			min	-1145.746	3	.102	12	-.234	3	0	2	0	2	0	4
125		6	max	698.802	1	.411	2	.045	9	0	3	0	1	0	15
126			min	-1145.652	3	.082	12	-.234	3	0	2	0	2	0	4
127		7	max	698.928	1	.371	2	.045	9	0	3	0	1	0	15
128			min	-1145.557	3	.062	12	-.234	3	0	2	0	3	0	4
129		8	max	699.054	1	.332	2	.045	9	0	3	0	1	0	15
130			min	-1145.463	3	.042	12	-.234	3	0	2	0	3	0	4
131		9	max	699.179	1	.292	2	.045	9	0	3	0	1	0	12
132			min	-1145.368	3	.023	12	-.234	3	0	2	0	3	0	4
133		10	max	699.305	1	.252	2	.045	9	0	3	0	1	0	12
134			min	-1145.274	3	-.003	3	-.234	3	0	2	0	3	0	2
135		11	max	699.431	1	.212	2	.045	9	0	3	0	1	0	12
136			min	-1145.18	3	-.033	3	-.234	3	0	2	0	3	0	2
137		12	max	699.557	1	.172	2	.045	9	0	3	0	1	0	12
138			min	-1145.085	3	-.063	3	-.234	3	0	2	0	3	0	2
139		13	max	699.683	1	.132	2	.045	9	0	3	0	1	0	12
140			min	-1144.991	3	-.093	3	-.234	3	0	2	0	3	0	2
141		14	max	699.809	1	.092	2	.045	9	0	3	0	1	0	12
142			min	-1144.896	3	-.123	3	-.234	3	0	2	0	3	0	2
143		15	max	699.935	1	.053	2	.045	9	0	3	0	1	0	12
144			min	-1144.802	3	-.153	3	-.234	3	0	2	0	3	0	2
145		16	max	700.06	1	.013	2	.045	9	0	3	0	1	0	12
146			min	-1144.708	3	-.183	3	-.234	3	0	2	0	3	0	2
147		17	max	700.186	1	-.027	2	.045	9	0	3	0	1	0	12
148			min	-1144.613	3	-.213	3	-.234	3	0	2	0	3	0	2
149		18	max	700.312	1	-.05	15	.045	9	0	3	0	1	0	3
150			min	-1144.519	3	-.243	3	-.234	3	0	2	0	3	0	2
151		19	max	700.438	1	-.062	15	.045	9	0	3	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1144.424	3	-.272	3	-.234	3	0	2	0	3	0	2
153	M7	1	max	624.123	2	1.761	4	.031	3	0	1	0	1	0	2
154			min	-524.288	3	.414	15	-.009	1	0	3	0	3	0	3
155		2	max	624.054	2	1.584	4	.031	3	0	1	0	1	0	2
156			min	-524.34	3	.372	15	-.009	1	0	3	0	3	0	3
157		3	max	623.984	2	1.407	4	.031	3	0	1	0	1	0	2
158			min	-524.392	3	.331	15	-.009	1	0	3	0	3	0	3
159		4	max	623.915	2	1.23	4	.031	3	0	1	0	1	0	2
160			min	-524.444	3	.289	15	-.009	1	0	3	0	3	0	3
161		5	max	623.846	2	1.054	4	.031	3	0	1	0	1	0	15
162			min	-524.496	3	.248	15	-.009	1	0	3	0	3	0	3
163		6	max	623.776	2	.877	4	.031	3	0	1	0	1	0	15
164			min	-524.548	3	.206	15	-.009	1	0	3	0	3	0	4
165		7	max	623.707	2	.7	4	.031	3	0	1	0	1	0	15
166			min	-524.6	3	.165	15	-.009	1	0	3	0	3	0	4
167		8	max	623.638	2	.523	4	.031	3	0	1	0	1	0	15
168			min	-524.652	3	.123	15	-.009	1	0	3	0	3	-.001	4
169		9	max	623.568	2	.353	2	.031	3	0	1	0	1	0	15
170			min	-524.704	3	.071	12	-.009	1	0	3	0	3	-.001	4
171		10	max	623.499	2	.216	2	.031	3	0	1	0	1	0	15
172			min	-524.756	3	-.003	3	-.009	1	0	3	0	3	-.001	4
173		11	max	623.43	2	.078	2	.031	3	0	1	0	1	0	15
174			min	-524.808	3	-.106	3	-.009	1	0	3	0	3	-.001	4
175		12	max	623.36	2	-.043	15	.031	3	0	1	0	1	0	15
176			min	-524.86	3	-.21	3	-.009	1	0	3	0	3	-.001	4
177		13	max	623.291	2	-.085	15	.031	3	0	1	0	1	0	15
178			min	-524.912	3	-.361	4	-.009	1	0	3	0	3	-.001	4
179		14	max	623.222	2	-.126	15	.031	3	0	1	0	1	0	15
180			min	-524.964	3	-.538	4	-.009	1	0	3	0	3	-.001	4
181		15	max	623.152	2	-.168	15	.031	3	0	1	0	1	0	15
182			min	-525.015	3	-.715	4	-.009	1	0	3	0	3	0	4
183		16	max	623.083	2	-.21	15	.031	3	0	1	0	1	0	15
184			min	-525.067	3	-.892	4	-.009	1	0	3	0	3	0	4
185		17	max	623.014	2	-.251	15	.031	3	0	1	0	1	0	15
186			min	-525.119	3	-1.068	4	-.009	1	0	3	0	3	0	4
187		18	max	622.944	2	-.293	15	.031	3	0	1	0	1	0	15
188			min	-525.171	3	-1.245	4	-.009	1	0	3	0	3	0	4
189		19	max	622.875	2	-.334	15	.031	3	0	1	0	1	0	1
190			min	-525.223	3	-1.422	4	-.009	1	0	3	0	3	0	1
191	M8	1	max	844.528	1	0	1	.323	1	0	1	0	2	0	1
192			min	-30.374	3	0	1	-.613	3	0	1	0	3	0	1
193		2	max	844.592	1	0	1	.323	1	0	1	0	1	0	1
194			min	-30.326	3	0	1	-.613	3	0	1	0	3	0	1
195		3	max	844.657	1	0	1	.323	1	0	1	0	1	0	1
196			min	-30.277	3	0	1	-.613	3	0	1	0	3	0	1
197		4	max	844.722	1	0	1	.323	1	0	1	0	1	0	1
198			min	-30.229	3	0	1	-.613	3	0	1	0	3	0	1
199		5	max	844.786	1	0	1	.323	1	0	1	0	1	0	1
200			min	-30.18	3	0	1	-.613	3	0	1	0	3	0	1
201		6	max	844.851	1	0	1	.323	1	0	1	0	1	0	1
202			min	-30.132	3	0	1	-.613	3	0	1	0	3	0	1
203		7	max	844.916	1	0	1	.323	1	0	1	0	1	0	1
204			min	-30.083	3	0	1	-.613	3	0	1	0	3	0	1
205		8	max	844.981	1	0	1	.323	1	0	1	0	1	0	1
206			min	-30.034	3	0	1	-.613	3	0	1	0	3	0	1
207		9	max	845.045	1	0	1	.323	1	0	1	0	1	0	1
208			min	-29.986	3	0	1	-.613	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	845.11	1	0	1	.323	1	0	1	0	1	0	1
210			min	-29.937	3	0	1	-.613	3	0	1	0	3	0	1
211		11	max	845.175	1	0	1	.323	1	0	1	0	1	0	1
212			min	-29.889	3	0	1	-.613	3	0	1	0	3	0	1
213		12	max	845.239	1	0	1	.323	1	0	1	0	1	0	1
214			min	-29.84	3	0	1	-.613	3	0	1	0	3	0	1
215		13	max	845.304	1	0	1	.323	1	0	1	0	1	0	1
216			min	-29.792	3	0	1	-.613	3	0	1	0	3	0	1
217		14	max	845.369	1	0	1	.323	1	0	1	0	1	0	1
218			min	-29.743	3	0	1	-.613	3	0	1	0	3	0	1
219		15	max	845.433	1	0	1	.323	1	0	1	0	1	0	1
220			min	-29.695	3	0	1	-.613	3	0	1	0	3	0	1
221		16	max	845.498	1	0	1	.323	1	0	1	0	1	0	1
222			min	-29.646	3	0	1	-.613	3	0	1	0	3	0	1
223		17	max	845.563	1	0	1	.323	1	0	1	0	1	0	1
224			min	-29.598	3	0	1	-.613	3	0	1	0	3	0	1
225		18	max	845.628	1	0	1	.323	1	0	1	0	1	0	1
226			min	-29.549	3	0	1	-.613	3	0	1	0	3	0	1
227		19	max	845.692	1	0	1	.323	1	0	1	0	1	0	1
228			min	-29.501	3	0	1	-.613	3	0	1	0	3	0	1
229	M10	1	max	222.403	1	.655	4	-.004	15	0	1	0	1	0	1
230			min	-314.414	3	.154	15	-.12	1	0	3	0	3	0	1
231		2	max	222.529	1	.604	4	-.004	15	0	1	0	1	0	15
232			min	-314.319	3	.142	15	-.12	1	0	3	0	3	0	4
233		3	max	222.655	1	.553	4	-.004	15	0	1	0	1	0	15
234			min	-314.225	3	.13	15	-.12	1	0	3	0	3	0	4
235		4	max	222.781	1	.502	4	-.004	15	0	1	0	1	0	15
236			min	-314.13	3	.118	15	-.12	1	0	3	0	3	0	4
237		5	max	222.907	1	.451	4	-.004	15	0	1	0	1	0	15
238			min	-314.036	3	.106	15	-.12	1	0	3	0	3	0	4
239		6	max	223.033	1	.4	4	-.004	15	0	1	0	1	0	15
240			min	-313.942	3	.094	15	-.12	1	0	3	0	3	0	4
241		7	max	223.159	1	.348	4	-.004	15	0	1	0	1	0	15
242			min	-313.847	3	.082	15	-.12	1	0	3	0	3	0	4
243		8	max	223.284	1	.297	4	-.004	15	0	1	0	1	0	15
244			min	-313.753	3	.07	15	-.12	1	0	3	0	3	0	4
245		9	max	223.41	1	.246	4	-.004	15	0	1	0	9	0	15
246			min	-313.658	3	.058	15	-.12	1	0	3	0	3	0	4
247		10	max	223.536	1	.195	4	-.004	15	0	1	0	15	0	15
248			min	-313.564	3	.046	15	-.12	1	0	3	0	3	0	4
249		11	max	223.662	1	.144	4	-.004	15	0	1	0	15	0	15
250			min	-313.47	3	.034	15	-.12	1	0	3	0	3	0	4
251		12	max	223.788	1	.103	2	-.004	15	0	1	0	15	0	15
252			min	-313.375	3	.022	15	-.12	1	0	3	0	3	0	4
253		13	max	223.914	1	.063	2	-.004	15	0	1	0	15	0	15
254			min	-313.281	3	.006	12	-.12	1	0	3	0	3	0	4
255		14	max	224.04	1	.023	2	-.004	15	0	1	0	15	0	15
256			min	-313.186	3	-.022	3	-.12	1	0	3	0	3	0	4
257		15	max	224.165	1	-.014	15	-.004	15	0	1	0	15	0	15
258			min	-313.092	3	-.061	4	-.12	1	0	3	0	3	0	4
259		16	max	224.291	1	-.026	15	-.004	15	0	1	0	15	0	15
260			min	-312.998	3	-.112	4	-.12	1	0	3	0	3	0	4
261		17	max	224.417	1	-.038	15	-.004	15	0	1	0	15	0	15
262			min	-312.903	3	-.163	4	-.12	1	0	3	0	3	0	4
263		18	max	224.543	1	-.05	15	-.004	15	0	1	0	15	0	15
264			min	-312.809	3	-.214	4	-.12	1	0	3	0	3	0	4
265		19	max	224.669	1	-.062	15	-.004	15	0	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	-312.714	3	-.265	4	-.12	1	0	3	0	1	0	4
267	M11	1	max	179.174	2	1.758	4	.242	1	0	3	0	3	0	4
268			min	-177.506	3	.414	15	-.044	3	0	10	0	1	0	12
269		2	max	179.104	2	1.582	4	.242	1	0	3	0	3	0	2
270			min	-177.558	3	.372	15	-.044	3	0	10	0	1	0	3
271		3	max	179.035	2	1.405	4	.242	1	0	3	0	3	0	2
272			min	-177.61	3	.33	15	-.044	3	0	10	0	1	0	3
273		4	max	178.966	2	1.228	4	.242	1	0	3	0	3	0	15
274			min	-177.662	3	.289	15	-.044	3	0	10	0	1	0	3
275		5	max	178.897	2	1.051	4	.242	1	0	3	0	3	0	15
276			min	-177.714	3	.247	15	-.044	3	0	10	0	1	0	4
277		6	max	178.827	2	.874	4	.242	1	0	3	0	3	0	15
278			min	-177.766	3	.206	15	-.044	3	0	10	0	1	0	4
279		7	max	178.758	2	.697	4	.242	1	0	3	0	3	0	15
280			min	-177.818	3	.164	15	-.044	3	0	10	0	1	0	4
281		8	max	178.689	2	.521	4	.242	1	0	3	0	3	0	15
282			min	-177.87	3	.123	15	-.044	3	0	10	0	1	-.001	4
283		9	max	178.619	2	.344	4	.242	1	0	3	0	3	0	15
284			min	-177.922	3	.081	15	-.044	3	0	10	0	1	-.001	4
285		10	max	178.55	2	.167	4	.242	1	0	3	0	3	0	15
286			min	-177.974	3	.037	12	-.044	3	0	10	0	1	-.001	4
287		11	max	178.481	2	.018	2	.242	1	0	3	0	3	0	15
288			min	-178.026	3	-.051	3	-.044	3	0	10	0	1	-.001	4
289		12	max	178.411	2	-.044	15	.242	1	0	3	0	3	0	15
290			min	-178.078	3	-.187	4	-.044	3	0	10	0	1	-.001	4
291		13	max	178.342	2	-.085	15	.242	1	0	3	0	3	0	15
292			min	-178.13	3	-.364	4	-.044	3	0	10	0	1	-.001	4
293		14	max	178.273	2	-.127	15	.242	1	0	3	0	3	0	15
294			min	-178.182	3	-.54	4	-.044	3	0	10	0	1	-.001	4
295		15	max	178.203	2	-.168	15	.242	1	0	3	0	3	0	15
296			min	-178.234	3	-.717	4	-.044	3	0	10	0	2	0	4
297		16	max	178.134	2	-.21	15	.242	1	0	3	0	3	0	15
298			min	-178.286	3	-.894	4	-.044	3	0	10	0	10	0	4
299		17	max	178.065	2	-.252	15	.242	1	0	3	0	3	0	15
300			min	-178.338	3	-1.071	4	-.044	3	0	10	0	10	0	4
301		18	max	177.995	2	-.293	15	.242	1	0	3	0	3	0	15
302			min	-178.39	3	-1.248	4	-.044	3	0	10	0	10	0	4
303		19	max	177.926	2	-.335	15	.242	1	0	3	0	3	0	1
304			min	-178.442	3	-1.425	4	-.044	3	0	10	0	10	0	1
305	M12	1	max	309.74	1	0	1	1.387	1	0	1	0	2	0	1
306			min	2.798	12	0	1	.041	10	0	1	0	3	0	1
307		2	max	309.804	1	0	1	1.387	1	0	1	0	1	0	1
308			min	2.83	12	0	1	.041	10	0	1	0	15	0	1
309		3	max	309.869	1	0	1	1.387	1	0	1	0	1	0	1
310			min	2.862	12	0	1	.041	10	0	1	0	15	0	1
311		4	max	309.934	1	0	1	1.387	1	0	1	0	1	0	1
312			min	2.895	12	0	1	.041	10	0	1	0	15	0	1
313		5	max	309.999	1	0	1	1.387	1	0	1	0	1	0	1
314			min	2.927	12	0	1	.041	10	0	1	0	15	0	1
315		6	max	310.063	1	0	1	1.387	1	0	1	0	1	0	1
316			min	2.959	12	0	1	.041	10	0	1	0	15	0	1
317		7	max	310.128	1	0	1	1.387	1	0	1	0	1	0	1
318			min	2.992	12	0	1	.041	10	0	1	0	10	0	1
319		8	max	310.193	1	0	1	1.387	1	0	1	0	1	0	1
320			min	3.024	12	0	1	.041	10	0	1	0	10	0	1
321		9	max	310.257	1	0	1	1.387	1	0	1	.001	1	0	1
322			min	3.056	12	0	1	.041	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	310.322	1	0	1	1.387	1	0	1	.001	1	0	1
324			min	3.089	12	0	1	.041	10	0	1	0	10	0	1
325		11	max	310.387	1	0	1	1.387	1	0	1	.001	1	0	1
326			min	3.121	12	0	1	.041	10	0	1	0	10	0	1
327		12	max	310.452	1	0	1	1.387	1	0	1	.001	1	0	1
328			min	3.154	12	0	1	.041	10	0	1	0	10	0	1
329		13	max	310.516	1	0	1	1.387	1	0	1	.002	1	0	1
330			min	3.186	12	0	1	.041	10	0	1	0	10	0	1
331		14	max	310.581	1	0	1	1.387	1	0	1	.002	1	0	1
332			min	3.218	12	0	1	.041	10	0	1	0	10	0	1
333		15	max	310.646	1	0	1	1.387	1	0	1	.002	1	0	1
334			min	3.251	12	0	1	.041	10	0	1	0	10	0	1
335		16	max	310.71	1	0	1	1.387	1	0	1	.002	1	0	1
336			min	3.283	12	0	1	.041	10	0	1	0	10	0	1
337		17	max	310.775	1	0	1	1.387	1	0	1	.002	1	0	1
338			min	3.315	12	0	1	.041	10	0	1	0	10	0	1
339		18	max	310.84	1	0	1	1.387	1	0	1	.002	1	0	1
340			min	3.348	12	0	1	.041	10	0	1	0	10	0	1
341		19	max	310.904	1	0	1	1.387	1	0	1	.002	1	0	1
342			min	3.38	12	0	1	.041	10	0	1	0	10	0	1
343	M1	1	max	92.896	1	345.269	3	-1.232	15	0	2	.057	1	0	2
344			min	3.8	15	-231.579	2	-28.807	1	0	3	.002	15	0	3
345		2	max	93.036	1	345.088	3	-1.232	15	0	2	.05	1	.051	2
346			min	3.842	15	-231.821	2	-28.807	1	0	3	.002	15	-.075	3
347		3	max	89.446	3	4.914	9	-1.224	15	0	12	.044	1	.1	2
348			min	-15.015	10	-24.676	2	-28.71	1	0	1	.002	15	-.149	3
349		4	max	89.55	3	4.713	9	-1.224	15	0	12	.037	1	.105	2
350			min	-14.899	10	-24.918	2	-28.71	1	0	1	.002	15	-.146	3
351		5	max	89.655	3	4.511	9	-1.224	15	0	12	.031	1	.111	2
352			min	-14.782	10	-25.16	2	-28.71	1	0	1	.001	15	-.143	3
353		6	max	89.76	3	4.31	9	-1.224	15	0	12	.025	1	.116	2
354			min	-14.666	10	-25.402	2	-28.71	1	0	1	.001	15	-.14	3
355		7	max	89.865	3	4.108	9	-1.224	15	0	12	.019	1	.122	2
356			min	-14.55	10	-25.644	2	-28.71	1	0	1	0	15	-.137	3
357		8	max	89.969	3	3.907	9	-1.224	15	0	12	.013	1	.127	2
358			min	-14.433	10	-25.885	2	-28.71	1	0	1	0	15	-.134	3
359		9	max	90.074	3	3.705	9	-1.224	15	0	12	.006	1	.133	2
360			min	-14.317	10	-26.127	2	-28.71	1	0	1	0	15	-.131	3
361		10	max	90.179	3	3.504	9	-1.224	15	0	12	.002	3	.139	2
362			min	-14.201	10	-26.369	2	-28.71	1	0	1	0	10	-.127	3
363		11	max	90.283	3	3.302	9	-1.224	15	0	12	0	3	.144	2
364			min	-14.084	10	-26.611	2	-28.71	1	0	1	-.006	1	-.124	3
365		12	max	90.388	3	3.1	9	-1.224	15	0	12	0	12	.15	2
366			min	-13.968	10	-26.853	2	-28.71	1	0	1	-.012	1	-.121	3
367		13	max	90.493	3	2.899	9	-1.224	15	0	12	0	15	.156	2
368			min	-13.852	10	-27.094	2	-28.71	1	0	1	-.019	1	-.118	3
369		14	max	90.598	3	2.697	9	-1.224	15	0	12	-.001	15	.162	2
370			min	-13.735	10	-27.336	2	-28.71	1	0	1	-.025	1	-.115	3
371		15	max	90.702	3	2.496	9	-1.224	15	0	12	-.001	15	.168	2
372			min	-13.619	10	-27.578	2	-28.71	1	0	1	-.031	1	-.111	3
373		16	max	90.887	2	121.044	2	-1.233	15	0	1	-.002	15	.173	2
374			min	-6.055	3	-164.634	3	-28.906	1	0	12	-.038	1	-.107	3
375		17	max	91.027	2	120.803	2	-1.233	15	0	1	-.002	15	.146	2
376			min	-5.951	3	-164.815	3	-28.906	1	0	12	-.044	1	-.071	3
377		18	max	-3.841	15	338.912	2	-1.262	15	0	3	-.002	15	.074	2
378			min	-93.025	1	-162.664	3	-29.674	1	0	2	-.05	1	-.036	3
379		19	max	-3.799	15	338.67	2	-1.262	15	0	3	-.002	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-92.886	1	-162.846	3	-29.674	1	0	2	-.057	1	0	3
381	M5	1	max	217.883	1	1120.923	3	0	2	0	1	.009	3	0	3
382			min	3.179	12	-746.65	2	-67.266	3	0	3	0	10	0	2
383		2	max	218.023	1	1120.742	3	0	2	0	1	0	1	.161	2
384			min	3.249	12	-746.892	2	-67.266	3	0	3	-.006	3	-.243	3
385		3	max	262.454	3	5.182	9	7.447	3	0	3	0	1	.321	2
386			min	-51.801	2	-86.702	2	-.35	1	0	1	-.019	3	-.48	3
387		4	max	262.559	3	4.981	9	7.447	3	0	3	0	1	.34	2
388			min	-51.661	2	-86.944	2	-.35	1	0	1	-.018	3	-.47	3
389		5	max	262.664	3	4.779	9	7.447	3	0	3	0	1	.359	2
390			min	-51.522	2	-87.186	2	-.35	1	0	1	-.016	3	-.459	3
391		6	max	262.768	3	4.578	9	7.447	3	0	3	0	1	.377	2
392			min	-51.382	2	-87.428	2	-.35	1	0	1	-.015	3	-.448	3
393		7	max	262.873	3	4.376	9	7.447	3	0	3	0	1	.396	2
394			min	-51.243	2	-87.67	2	-.35	1	0	1	-.013	3	-.436	3
395		8	max	262.978	3	4.175	9	7.447	3	0	3	0	1	.416	2
396			min	-51.103	2	-87.911	2	-.35	1	0	1	-.011	3	-.425	3
397		9	max	263.083	3	3.973	9	7.447	3	0	3	0	1	.435	2
398			min	-50.963	2	-88.153	2	-.35	1	0	1	-.01	3	-.414	3
399		10	max	263.187	3	3.772	9	7.447	3	0	3	0	2	.454	2
400			min	-50.824	2	-88.395	2	-.35	1	0	1	-.008	3	-.403	3
401		11	max	263.292	3	3.57	9	7.447	3	0	3	0	2	.473	2
402			min	-50.684	2	-88.637	2	-.35	1	0	1	-.007	3	-.392	3
403		12	max	263.397	3	3.368	9	7.447	3	0	3	0	2	.492	2
404			min	-50.544	2	-88.879	2	-.35	1	0	1	-.005	3	-.381	3
405		13	max	263.501	3	3.167	9	7.447	3	0	3	0	2	.512	2
406			min	-50.405	2	-89.12	2	-.35	1	0	1	-.003	3	-.369	3
407		14	max	263.606	3	2.965	9	7.447	3	0	3	0	2	.531	2
408			min	-50.265	2	-89.362	2	-.35	1	0	1	-.002	3	-.358	3
409		15	max	263.711	3	2.764	9	7.447	3	0	3	0	2	.55	2
410			min	-50.126	2	-89.604	2	-.35	1	0	1	0	1	-.347	3
411		16	max	292.447	2	433.802	2	7.416	3	0	3	.001	3	.565	2
412			min	-23.968	3	-492.086	3	-.366	1	0	2	0	1	-.331	3
413		17	max	292.587	2	433.561	2	7.416	3	0	3	.003	3	.471	2
414			min	-23.863	3	-492.267	3	-.366	1	0	2	0	1	-.225	3
415		18	max	-5.909	12	1093.593	2	6.805	3	0	3	.004	3	.237	2
416			min	-218.041	1	-518.9	3	-.082	1	0	1	0	1	-.112	3
417		19	max	-5.84	12	1093.351	2	6.805	3	0	3	.006	3	0	3
418			min	-217.901	1	-519.082	3	-.082	1	0	1	0	1	0	2
419	M9	1	max	92.642	1	345.201	3	71.958	3	0	3	-.002	15	0	2
420			min	3.786	15	-231.579	2	1.254	15	0	2	-.056	1	0	3
421		2	max	92.781	1	345.02	3	71.958	3	0	3	0	12	.051	2
422			min	3.828	15	-231.821	2	1.254	15	0	2	-.05	1	-.075	3
423		3	max	89.169	3	4.896	9	28.15	1	0	1	.013	3	.1	2
424			min	-14.619	10	-24.646	2	-2.086	3	0	15	-.043	1	-.148	3
425		4	max	89.274	3	4.694	9	28.15	1	0	1	.013	3	.105	2
426			min	-14.503	10	-24.888	2	-2.086	3	0	15	-.037	1	-.146	3
427		5	max	89.378	3	4.493	9	28.15	1	0	1	.013	3	.111	2
428			min	-14.387	10	-25.13	2	-2.086	3	0	15	-.031	1	-.143	3
429		6	max	89.483	3	4.291	9	28.15	1	0	1	.012	3	.116	2
430			min	-14.27	10	-25.372	2	-2.086	3	0	15	-.024	1	-.14	3
431		7	max	89.588	3	4.09	9	28.15	1	0	1	.012	3	.122	2
432			min	-14.154	10	-25.614	2	-2.086	3	0	15	-.018	1	-.137	3
433		8	max	89.692	3	3.888	9	28.15	1	0	1	.011	3	.127	2
434			min	-14.038	10	-25.855	2	-2.086	3	0	15	-.012	1	-.134	3
435		9	max	89.797	3	3.687	9	28.15	1	0	1	.011	3	.133	2
436			min	-13.921	10	-26.097	2	-2.086	3	0	15	-.006	1	-.131	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	89.902	3	3.485	9	28.15	1	0	1	.01	3	.139	2
438			min	-13.805	10	-26.339	2	-2.086	3	0	15	0	1	-.127	3
439		11	max	90.007	3	3.284	9	28.15	1	0	1	.01	3	.144	2
440			min	-13.689	10	-26.581	2	-2.086	3	0	15	0	15	-.124	3
441		12	max	90.111	3	3.082	9	28.15	1	0	1	.012	1	.15	2
442			min	-13.572	10	-26.823	2	-2.086	3	0	15	0	15	-.121	3
443		13	max	90.216	3	2.881	9	28.15	1	0	1	.018	1	.156	2
444			min	-13.456	10	-27.064	2	-2.086	3	0	15	0	15	-.118	3
445		14	max	90.321	3	2.679	9	28.15	1	0	1	.024	1	.162	2
446			min	-13.339	10	-27.306	2	-2.086	3	0	15	.001	15	-.115	3
447		15	max	90.425	3	2.477	9	28.15	1	0	1	.03	1	.168	2
448			min	-13.223	10	-27.548	2	-2.086	3	0	15	.001	15	-.111	3
449		16	max	91.1	2	120.676	2	28.361	1	0	15	.037	1	.173	2
450			min	-6.717	3	-165.143	3	-2.126	3	0	3	.002	15	-.107	3
451		17	max	91.24	2	120.434	2	28.361	1	0	15	.043	1	.146	2
452			min	-6.612	3	-165.325	3	-2.126	3	0	3	.002	15	-.071	3
453		18	max	-3.828	15	338.912	2	29.761	1	0	2	.05	1	.074	2
454			min	-92.773	1	-162.656	3	-1.649	3	0	3	.002	15	-.036	3
455		19	max	-3.785	15	338.67	2	29.761	1	0	2	.056	1	0	2
456			min	-92.633	1	-162.837	3	-1.649	3	0	3	.002	15	0	3
457	M13	1	max	71.953	3	231.468	2	-3.786	15	0	2	.056	1	0	2
458			min	1.254	15	-345.235	3	-92.635	1	0	3	.002	15	0	3
459		2	max	71.953	3	164.326	2	-2.884	15	0	2	.013	1	.156	3
460			min	1.254	15	-244.609	3	-70.222	1	0	3	-.001	10	-.104	2
461		3	max	71.953	3	97.184	2	-1.982	15	0	2	.008	3	.258	3
462			min	1.254	15	-143.984	3	-47.81	1	0	3	-.018	1	-.173	2
463		4	max	71.953	3	30.041	2	-1.079	15	0	2	.005	3	.308	3
464			min	1.254	15	-43.358	3	-25.398	1	0	3	-.037	1	-.207	2
465		5	max	71.953	3	57.268	3	1.308	10	0	2	.003	3	.304	3
466			min	1.254	15	-37.101	2	-4.125	3	0	3	-.045	1	-.205	2
467		6	max	71.953	3	157.894	3	19.427	1	0	2	0	3	.247	3
468			min	1.254	15	-104.243	2	-2.812	3	0	3	-.041	1	-.168	2
469		7	max	71.953	3	258.52	3	41.839	1	0	2	0	12	.137	3
470			min	1.254	15	-171.386	2	-1.499	3	0	3	-.024	1	-.095	2
471		8	max	71.953	3	359.146	3	64.252	1	0	2	.005	2	.014	1
472			min	1.254	15	-238.528	2	-.186	3	0	3	0	3	-.026	3
473		9	max	71.953	3	459.772	3	86.664	1	0	2	.043	1	.157	2
474			min	1.254	15	-305.67	2	.912	12	0	3	0	3	-.242	3
475		10	max	71.953	3	560.398	3	109.076	1	0	2	.095	1	.336	2
476			min	1.254	15	-372.813	2	1.788	12	0	3	-.008	3	-.511	3
477		11	max	28.87	1	305.67	2	-.482	3	0	3	.043	1	.157	2
478			min	1.232	15	-459.772	3	-86.409	1	0	2	-.009	3	-.242	3
479		12	max	28.87	1	238.528	2	.831	3	0	3	.005	2	.014	1
480			min	1.232	15	-359.146	3	-63.997	1	0	2	-.009	3	-.026	3
481		13	max	28.87	1	171.386	2	2.144	3	0	3	-.001	15	.137	3
482			min	1.232	15	-258.52	3	-41.585	1	0	2	-.025	1	-.095	2
483		14	max	28.87	1	104.243	2	3.456	3	0	3	-.002	15	.247	3
484			min	1.232	15	-157.894	3	-19.173	1	0	2	-.041	1	-.168	2
485		15	max	28.87	1	37.101	2	4.769	3	0	3	-.002	15	.304	3
486			min	1.232	15	-57.268	3	-1.308	10	0	2	-.045	1	-.205	2
487		16	max	28.87	1	43.358	3	25.652	1	0	3	-.001	12	.308	3
488			min	1.232	15	-30.041	2	1.094	15	0	2	-.037	1	-.207	2
489		17	max	28.87	1	143.984	3	48.064	1	0	3	.002	3	.258	3
490			min	1.232	15	-97.184	2	1.996	15	0	2	-.018	1	-.173	2
491		18	max	28.87	1	244.61	3	70.477	1	0	3	.013	1	.156	3
492			min	1.232	15	-164.326	2	2.898	15	0	2	-.001	10	-.104	2
493		19	max	28.87	1	345.235	3	92.889	1	0	3	.057	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	1.232	15	-231.468	2	3.8	15	0	2	.002	15	0	3
495	M16	1	max	1.652	3	338.809	2	-3.785	15	0	3	.056	1	0	2
496			min	-29.696	1	-162.864	3	-92.641	1	0	2	.002	15	0	3
497		2	max	1.652	3	240.349	2	-2.883	15	0	3	.013	1	.074	3
498			min	-29.696	1	-115.925	3	-70.228	1	0	2	-.001	10	-.153	2
499		3	max	1.652	3	141.89	2	-1.981	15	0	3	0	12	.122	3
500			min	-29.696	1	-68.987	3	-47.816	1	0	2	-.018	1	-.254	2
501		4	max	1.652	3	43.43	2	-1.079	15	0	3	-.001	15	.146	3
502			min	-29.696	1	-22.048	3	-25.404	1	0	2	-.037	1	-.303	2
503		5	max	1.652	3	24.891	3	1.295	10	0	3	-.002	15	.146	3
504			min	-29.696	1	-55.029	2	-2.992	1	0	2	-.045	1	-.3	2
505		6	max	1.652	3	71.829	3	19.421	1	0	3	-.002	15	.12	3
506			min	-29.696	1	-153.488	2	-1.479	3	0	2	-.041	1	-.245	2
507		7	max	1.652	3	118.768	3	41.833	1	0	3	-.001	15	.07	3
508			min	-29.696	1	-251.948	2	-.166	3	0	2	-.024	1	-.138	2
509		8	max	1.652	3	165.707	3	64.245	1	0	3	.005	2	.021	2
510			min	-29.696	1	-350.407	2	.87	12	0	2	-.006	3	-.005	3
511		9	max	1.652	3	212.645	3	86.658	1	0	3	.043	1	.232	2
512			min	-29.696	1	-448.867	2	1.745	12	0	2	-.005	3	-.105	3
513		10	max	-1.266	15	-8.694	15	109.07	1	0	15	.095	1	.495	2
514			min	-29.696	1	-547.326	2	-4.734	3	0	2	-.003	3	-.23	3
515		11	max	-1.262	15	448.867	2	-2.344	12	0	2	.043	1	.232	2
516			min	-29.611	1	-212.645	3	-86.405	1	0	3	0	3	-.105	3
517		12	max	-1.262	15	350.407	2	-1.469	12	0	2	.005	2	.021	2
518			min	-29.611	1	-165.707	3	-63.993	1	0	3	-.001	3	-.005	3
519		13	max	-1.262	15	251.948	2	-.593	12	0	2	-.001	15	.07	3
520			min	-29.611	1	-118.768	3	-41.58	1	0	3	-.025	1	-.138	2
521		14	max	-1.262	15	153.488	2	.517	3	0	2	-.001	12	.12	3
522			min	-29.611	1	-71.829	3	-19.168	1	0	3	-.041	1	-.245	2
523		15	max	-1.262	15	55.029	2	3.244	1	0	2	-.001	12	.146	3
524			min	-29.611	1	-24.891	3	-1.295	10	0	3	-.045	1	-.3	2
525		16	max	-1.262	15	22.048	3	25.656	1	0	2	0	3	.146	3
526			min	-29.611	1	-43.43	2	1.093	15	0	3	-.037	1	-.303	2
527		17	max	-1.262	15	68.987	3	48.069	1	0	2	.002	3	.122	3
528			min	-29.611	1	-141.89	2	1.995	15	0	3	-.018	1	-.254	2
529		18	max	-1.262	15	115.925	3	70.481	1	0	2	.014	1	.074	3
530			min	-29.611	1	-240.349	2	2.897	15	0	3	-.001	10	-.153	2
531		19	max	-1.262	15	162.864	3	92.893	1	0	2	.057	1	0	2
532			min	-29.611	1	-338.809	2	3.799	15	0	3	.002	15	0	3
533	M15	1	max	0	1	.983	3	.102	3	0	1	0	1	0	1
534			min	-90.654	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.873	3	.102	3	0	1	0	1	0	1
536			min	-90.725	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.764	3	.102	3	0	1	0	1	0	1
538			min	-90.795	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.655	3	.102	3	0	1	0	1	0	1
540			min	-90.866	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.546	3	.102	3	0	1	0	1	0	1
542			min	-90.936	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.437	3	.102	3	0	1	0	1	0	1
544			min	-91.007	3	0	1	0	1	0	3	0	3	-.001	3
545		7	max	0	1	.328	3	.102	3	0	1	0	3	0	1
546			min	-91.077	3	0	1	0	1	0	3	0	1	-.001	3
547		8	max	0	1	.218	3	.102	3	0	1	0	3	0	1
548			min	-91.148	3	0	1	0	1	0	3	0	1	-.001	3
549		9	max	0	1	.109	3	.102	3	0	1	0	3	0	1
550			min	-91.218	3	0	1	0	1	0	3	0	1	-.001	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
551		10	max	0	1	0	1	.102	3	0	1	0	3	0	1
552			min	-91.289	3	0	1	0	1	0	3	0	1	-.001	3
553		11	max	0	1	0	1	.102	3	0	1	0	3	0	1
554			min	-91.359	3	-.109	3	0	1	0	3	0	1	-.001	3
555		12	max	0	1	0	1	.102	3	0	1	0	3	0	1
556			min	-91.43	3	-.218	3	0	1	0	3	0	1	-.001	3
557		13	max	0	1	0	1	.102	3	0	1	0	3	0	1
558			min	-91.5	3	-.328	3	0	1	0	3	0	1	-.001	3
559		14	max	0	1	0	1	.102	3	0	1	0	3	0	1
560			min	-91.571	3	-.437	3	0	1	0	3	0	1	-.001	3
561		15	max	0	1	0	1	.102	3	0	1	0	3	0	1
562			min	-91.641	3	-.546	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.102	3	0	1	0	3	0	1
564			min	-91.712	3	-.655	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.102	3	0	1	0	3	0	1
566			min	-91.782	3	-.764	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.102	3	0	1	0	3	0	1
568			min	-91.853	3	-.873	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.102	3	0	1	0	3	0	1
570			min	-91.923	3	-.983	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	1.681	4	.033	1	0	3	0	3	0	1
572			min	-90.651	3	0	2	-.042	3	0	1	0	1	0	1
573		2	max	0	2	1.495	4	.033	1	0	3	0	3	0	2
574			min	-90.581	3	0	2	-.042	3	0	1	0	1	0	4
575		3	max	0	2	1.308	4	.033	1	0	3	0	3	0	2
576			min	-90.51	3	0	2	-.042	3	0	1	0	1	0	4
577		4	max	0	2	1.121	4	.033	1	0	3	0	3	0	2
578			min	-90.44	3	0	2	-.042	3	0	1	0	1	-.001	4
579		5	max	0	2	.934	4	.033	1	0	3	0	3	0	2
580			min	-90.369	3	0	2	-.042	3	0	1	0	1	-.002	4
581		6	max	0	2	.747	4	.033	1	0	3	0	3	0	2
582			min	-90.299	3	0	2	-.042	3	0	1	0	1	-.002	4
583		7	max	0	2	.56	4	.033	1	0	3	0	3	0	2
584			min	-90.228	3	0	2	-.042	3	0	1	0	1	-.002	4
585		8	max	0	2	.374	4	.033	1	0	3	0	3	0	2
586			min	-90.158	3	0	2	-.042	3	0	1	0	1	-.002	4
587		9	max	0	2	.187	4	.033	1	0	3	0	3	0	2
588			min	-90.087	3	0	2	-.042	3	0	1	0	1	-.002	4
589		10	max	0	2	0	1	.033	1	0	3	0	3	0	2
590			min	-90.017	3	0	1	-.042	3	0	1	0	1	-.002	4
591		11	max	0	2	0	2	.033	1	0	3	0	3	0	2
592			min	-89.946	3	-.187	4	-.042	3	0	1	0	1	-.002	4
593		12	max	0	2	0	2	.033	1	0	3	0	3	0	2
594			min	-89.876	3	-.374	4	-.042	3	0	1	0	1	-.002	4
595		13	max	.06	13	0	2	.033	1	0	3	0	1	0	2
596			min	-89.805	3	-.56	4	-.042	3	0	1	0	3	-.002	4
597		14	max	.157	13	0	2	.033	1	0	3	0	1	0	2
598			min	-89.735	3	-.747	4	-.042	3	0	1	0	3	-.002	4
599		15	max	.254	13	0	2	.033	1	0	3	0	1	0	2
600			min	-89.664	3	-.934	4	-.042	3	0	1	0	3	-.002	4
601		16	max	.351	13	0	2	.033	1	0	3	0	1	0	2
602			min	-89.594	3	-1.121	4	-.042	3	0	1	0	3	-.001	4
603		17	max	.448	13	0	2	.033	1	0	3	0	1	0	2
604			min	-89.523	3	-1.308	4	-.042	3	0	1	0	3	0	4
605		18	max	.545	13	0	2	.033	1	0	3	0	1	0	2
606			min	-89.453	3	-1.495	4	-.042	3	0	1	0	3	0	4
607		19	max	.641	13	0	2	.033	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	-89.382	3	-1.681	4	-.042	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	.002	1	.009	2	.005	1	-1.933e-5	15	NC	3	NC	2
2			min	-.004	3	-.009	3	-.002	3	-4.562e-4	1	4187.093	2	7432.025	1
3		2	max	.002	1	.009	2	.005	1	-1.849e-5	15	NC	3	NC	2
4			min	-.003	3	-.009	3	-.002	3	-4.363e-4	1	4569.089	2	8001.506	1
5		3	max	.002	1	.008	2	.005	1	-1.766e-5	15	NC	3	NC	2
6			min	-.003	3	-.009	3	-.002	3	-4.163e-4	1	5023.276	2	8674.74	1
7		4	max	.002	1	.007	2	.004	1	-1.682e-5	15	NC	1	NC	2
8			min	-.003	3	-.008	3	-.001	3	-3.964e-4	1	5567.037	2	9476.474	1
9		5	max	.002	1	.006	2	.004	1	-1.599e-5	15	NC	1	NC	1
10			min	-.003	3	-.008	3	-.001	3	-3.764e-4	1	6223.528	2	NC	1
11		6	max	.002	1	.006	2	.003	1	-1.515e-5	15	NC	1	NC	1
12			min	-.003	3	-.008	3	-.001	3	-3.564e-4	1	7024.098	2	NC	1
13		7	max	.001	1	.005	2	.003	1	-1.432e-5	15	NC	1	NC	1
14			min	-.002	3	-.007	3	0	3	-3.365e-4	1	8011.998	2	NC	1
15		8	max	.001	1	.004	2	.003	1	-1.348e-5	15	NC	1	NC	1
16			min	-.002	3	-.007	3	0	3	-3.165e-4	1	9248.232	2	NC	1
17		9	max	.001	1	.004	2	.002	1	-1.265e-5	15	NC	1	NC	1
18			min	-.002	3	-.006	3	0	3	-2.965e-4	1	NC	1	NC	1
19		10	max	.001	1	.003	2	.002	1	-1.181e-5	15	NC	1	NC	1
20			min	-.002	3	-.006	3	0	3	-2.766e-4	1	NC	1	NC	1
21		11	max	0	1	.003	2	.002	1	-1.098e-5	15	NC	1	NC	1
22			min	-.002	3	-.005	3	0	3	-2.566e-4	1	NC	1	NC	1
23		12	max	0	1	.002	2	.001	1	-1.004e-5	10	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-2.367e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.001	1	-9.053e-6	10	NC	1	NC	1
26			min	-.001	3	-.004	3	0	3	-2.167e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	0	1	-8.069e-6	10	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-1.967e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	-7.085e-6	10	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-1.768e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-6.101e-6	10	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-1.568e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-5.118e-6	10	NC	1	NC	1
34			min	0	3	-.001	3	0	3	-1.368e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-4.134e-6	10	NC	1	NC	1
36			min	0	3	0	3	0	3	-1.169e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-3.15e-6	10	NC	1	NC	1
38			min	0	1	0	1	0	1	-9.692e-5	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	4.576e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	1.494e-6	10	NC	1	NC	1
41		2	max	0	3	0	2	0	10	5.745e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	2.193e-6	10	NC	1	NC	1
43		3	max	0	3	0	2	0	10	6.914e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	2.892e-6	10	NC	1	NC	1
45		4	max	0	3	0	2	0	3	8.083e-5	1	NC	1	NC	1
46			min	0	2	-.003	3	0	1	3.455e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	9.252e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	3.932e-6	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	1.042e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	0	1	4.408e-6	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	1.159e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	1	4.884e-6	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	1.276e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	9	5.36e-6	15	NC	1	NC	1
55		9	max	0	3	.001	2	0	3	1.393e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	9	5.836e-6	15	NC	1	NC	1
57		10	max	.001	3	.002	2	0	1	1.51e-4	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	15	6.312e-6	15	NC	1	NC	1
59		11	max	.001	3	.002	2	0	1	1.627e-4	1	NC	1	NC	1
60			min	-.001	2	-.007	3	0	15	6.789e-6	15	NC	1	NC	1
61		12	max	.001	3	.003	2	0	1	1.744e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	15	7.265e-6	15	NC	1	NC	1
63		13	max	.001	3	.003	2	.001	1	1.861e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	7.741e-6	15	NC	1	NC	1
65		14	max	.001	3	.004	2	.001	1	1.977e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	15	8.217e-6	15	NC	1	NC	1
67		15	max	.002	3	.005	2	.002	1	2.094e-4	1	NC	1	NC	1
68			min	-.002	2	-.008	3	0	15	8.693e-6	15	8998.4	2	NC	1
69		16	max	.002	3	.006	2	.002	1	2.211e-4	1	NC	1	NC	1
70			min	-.002	2	-.008	3	0	15	9.169e-6	15	7621.071	2	NC	1
71		17	max	.002	3	.007	2	.002	1	2.328e-4	1	NC	1	NC	1
72			min	-.002	2	-.008	3	0	15	9.646e-6	15	6555.983	2	NC	1
73		18	max	.002	3	.008	2	.003	1	2.445e-4	1	NC	1	NC	1
74			min	-.002	2	-.008	3	0	15	1.012e-5	15	5722.961	2	NC	1
75		19	max	.002	3	.009	2	.003	1	2.562e-4	1	NC	3	NC	1
76			min	-.002	2	-.008	3	0	15	1.06e-5	15	5065.618	2	NC	1
77	M4	1	max	.001	1	.011	2	0	15	-1.494e-5	12	NC	1	NC	2
78			min	0	12	-.009	3	-.002	1	-3.598e-4	1	NC	1	8239.628	1
79		2	max	.001	1	.01	2	0	15	-1.494e-5	12	NC	1	NC	2
80			min	0	12	-.009	3	-.002	1	-3.598e-4	1	NC	1	8988.782	1
81		3	max	.001	1	.01	2	0	15	-1.494e-5	12	NC	1	NC	2
82			min	0	12	-.008	3	-.002	1	-3.598e-4	1	NC	1	9880.39	1
83		4	max	.001	1	.009	2	0	15	-1.494e-5	12	NC	1	NC	1
84			min	0	12	-.008	3	-.002	1	-3.598e-4	1	NC	1	NC	1
85		5	max	.001	1	.008	2	0	15	-1.494e-5	12	NC	1	NC	1
86			min	0	12	-.007	3	-.002	1	-3.598e-4	1	NC	1	NC	1
87		6	max	.001	1	.008	2	0	15	-1.494e-5	12	NC	1	NC	1
88			min	0	12	-.007	3	-.001	1	-3.598e-4	1	NC	1	NC	1
89		7	max	0	1	.007	2	0	15	-1.494e-5	12	NC	1	NC	1
90			min	0	12	-.006	3	-.001	1	-3.598e-4	1	NC	1	NC	1
91		8	max	0	1	.007	2	0	15	-1.494e-5	12	NC	1	NC	1
92			min	0	12	-.006	3	-.001	1	-3.598e-4	1	NC	1	NC	1
93		9	max	0	1	.006	2	0	15	-1.494e-5	12	NC	1	NC	1
94			min	0	12	-.005	3	0	1	-3.598e-4	1	NC	1	NC	1
95		10	max	0	1	.005	2	0	15	-1.494e-5	12	NC	1	NC	1
96			min	0	12	-.005	3	0	1	-3.598e-4	1	NC	1	NC	1
97		11	max	0	1	.005	2	0	15	-1.494e-5	12	NC	1	NC	1
98			min	0	12	-.004	3	0	1	-3.598e-4	1	NC	1	NC	1
99		12	max	0	1	.004	2	0	15	-1.494e-5	12	NC	1	NC	1
100			min	0	12	-.004	3	0	1	-3.598e-4	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-1.494e-5	12	NC	1	NC	1
102			min	0	12	-.003	3	0	1	-3.598e-4	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-1.494e-5	12	NC	1	NC	1
104			min	0	12	-.003	3	0	1	-3.598e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-1.494e-5	12	NC	1	NC	1
106			min	0	12	-.002	3	0	1	-3.598e-4	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-1.494e-5	12	NC	1	NC	1
108			min	0	12	-.002	3	0	1	-3.598e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-1.494e-5	12	NC	1	NC	1
110			min	0	12	-.001	3	0	1	-3.598e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-1.494e-5	12	NC	1	NC	1
112			min	0	12	0	3	0	1	-3.598e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-1.494e-5	12	NC	1	NC	1
114			min	0	1	0	1	0	1	-3.598e-4	1	NC	1	NC	1
115	M6	1	max	.007	1	.032	2	.002	1	4.398e-4	3	NC	3	NC	1
116			min	-.011	3	-.029	3	-.006	3	-7.861e-8	2	1249.082	2	6956.694	3
117		2	max	.006	1	.03	2	.002	1	4.262e-4	3	NC	3	NC	1
118			min	-.011	3	-.028	3	-.005	3	-7.414e-8	2	1336.683	2	7387.216	3
119		3	max	.006	1	.027	2	.002	1	4.125e-4	3	NC	3	NC	1
120			min	-.01	3	-.026	3	-.005	3	-1.903e-6	1	1437.08	2	7898.388	3
121		4	max	.006	1	.025	2	.001	1	3.989e-4	3	NC	3	NC	1
122			min	-.009	3	-.025	3	-.005	3	-4.565e-6	1	1552.837	2	8507.429	3
123		5	max	.005	1	.023	2	.001	1	3.853e-4	3	NC	3	NC	1
124			min	-.009	3	-.023	3	-.004	3	-7.227e-6	1	1687.256	2	9237.18	3
125		6	max	.005	1	.021	2	.001	1	3.716e-4	3	NC	3	NC	1
126			min	-.008	3	-.021	3	-.004	3	-9.89e-6	1	1844.664	2	NC	1
127		7	max	.005	1	.019	2	.001	1	3.58e-4	3	NC	3	NC	1
128			min	-.007	3	-.02	3	-.004	3	-1.255e-5	1	2030.83	2	NC	1
129		8	max	.004	1	.017	2	0	1	3.444e-4	3	NC	3	NC	1
130			min	-.007	3	-.018	3	-.003	3	-1.521e-5	1	2253.628	2	NC	1
131		9	max	.004	1	.016	2	0	1	3.307e-4	3	NC	3	NC	1
132			min	-.006	3	-.017	3	-.003	3	-1.788e-5	1	2524.081	2	NC	1
133		10	max	.003	1	.014	2	0	1	3.171e-4	3	NC	3	NC	1
134			min	-.006	3	-.015	3	-.002	3	-2.054e-5	1	2858.114	2	NC	1
135		11	max	.003	1	.012	2	0	1	3.035e-4	3	NC	3	NC	1
136			min	-.005	3	-.013	3	-.002	3	-2.32e-5	1	3279.605	2	NC	1
137		12	max	.003	1	.01	2	0	1	2.898e-4	3	NC	3	NC	1
138			min	-.004	3	-.012	3	-.002	3	-2.586e-5	1	3826.07	2	NC	1
139		13	max	.002	1	.009	2	0	1	2.762e-4	3	NC	3	NC	1
140			min	-.004	3	-.01	3	-.001	3	-2.853e-5	1	4560.022	2	NC	1
141		14	max	.002	1	.007	2	0	1	2.626e-4	3	NC	3	NC	1
142			min	-.003	3	-.009	3	-.001	3	-3.119e-5	1	5593.951	2	NC	1
143		15	max	.002	1	.006	2	0	1	2.489e-4	3	NC	1	NC	1
144			min	-.002	3	-.007	3	0	3	-3.385e-5	1	7152.792	2	NC	1
145		16	max	.001	1	.004	2	0	1	2.353e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-3.651e-5	1	9761.316	2	NC	1
147		17	max	0	1	.003	2	0	1	2.217e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-3.918e-5	1	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.08e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-4.184e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.944e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.45e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.086e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-9.122e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	1.819e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-6.816e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	1.553e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-4.51e-5	3	NC	1	NC	1
159		4	max	0	3	.004	2	.001	3	1.287e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-2.203e-5	3	NC	1	NC	1
161		5	max	.001	3	.005	2	.002	3	1.021e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	0	2	8402.474	2	NC	1
163		6	max	.002	3	.007	2	.002	3	2.409e-5	3	NC	1	NC	1
164			min	-.002	2	-.01	3	0	1	0	2	6733.343	2	NC	1
165		7	max	.002	3	.008	2	.002	3	4.716e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.011	3	0	1	-1.715e-7	13	5592.85	2	NC	1
167		8	max	.002	3	.01	2	.002	3	7.022e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-1.995e-6	9	4757.461	2	NC	1
169		9	max	.003	3	.011	2	.003	3	9.329e-5	3	NC	3	NC	1
170			min	-.003	2	-.015	3	0	1	-4.269e-6	9	4115.778	2	NC	1
171		10	max	.003	3	.013	2	.003	3	1.163e-4	3	NC	3	NC	1
172			min	-.004	2	-.016	3	0	1	-6.543e-6	9	3606.045	2	NC	1
173		11	max	.003	3	.014	2	.003	3	1.394e-4	3	NC	3	NC	1
174			min	-.004	2	-.018	3	0	1	-8.817e-6	9	3191.175	2	NC	1
175		12	max	.004	3	.016	2	.003	3	1.625e-4	3	NC	3	NC	1
176			min	-.004	2	-.019	3	0	1	-1.109e-5	9	2847.442	2	NC	1
177		13	max	.004	3	.018	2	.003	3	1.855e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	0	1	-1.337e-5	9	2558.846	2	NC	1
179		14	max	.004	3	.02	2	.003	3	2.086e-4	3	NC	3	NC	1
180			min	-.005	2	-.021	3	0	1	-1.564e-5	9	2314.12	2	NC	1
181		15	max	.005	3	.022	2	.003	3	2.317e-4	3	NC	3	NC	1
182			min	-.006	2	-.022	3	0	1	-1.791e-5	9	2105.03	2	NC	1
183		16	max	.005	3	.024	2	.003	3	2.547e-4	3	NC	3	NC	1
184			min	-.006	2	-.023	3	0	1	-2.019e-5	9	1925.374	2	NC	1
185		17	max	.005	3	.026	2	.003	3	2.778e-4	3	NC	3	NC	1
186			min	-.006	2	-.024	3	-.001	1	-2.246e-5	9	1770.364	2	NC	1
187		18	max	.006	3	.028	2	.003	3	3.009e-4	3	NC	3	NC	1
188			min	-.007	2	-.025	3	-.001	1	-2.474e-5	9	1636.232	2	NC	1
189		19	max	.006	3	.03	2	.003	3	3.239e-4	3	NC	3	NC	1
190			min	-.007	2	-.026	3	-.001	1	-2.707e-5	1	1519.966	2	NC	1
191	M8	1	max	.004	1	.036	2	.001	1	-1.015e-7	10	NC	1	NC	1
192			min	0	3	-.029	3	-.002	3	-2.447e-4	3	NC	1	9979.848	3
193		2	max	.004	1	.034	2	0	1	-1.015e-7	10	NC	1	NC	1
194			min	0	3	-.027	3	-.002	3	-2.447e-4	3	NC	1	NC	1
195		3	max	.004	1	.032	2	0	1	-1.015e-7	10	NC	1	NC	1
196			min	0	3	-.026	3	-.002	3	-2.447e-4	3	NC	1	NC	1
197		4	max	.003	1	.03	2	0	1	-1.015e-7	10	NC	1	NC	1
198			min	0	3	-.024	3	-.001	3	-2.447e-4	3	NC	1	NC	1
199		5	max	.003	1	.028	2	0	1	-1.015e-7	10	NC	1	NC	1
200			min	0	3	-.023	3	-.001	3	-2.447e-4	3	NC	1	NC	1
201		6	max	.003	1	.026	2	0	1	-1.015e-7	10	NC	1	NC	1
202			min	0	3	-.021	3	-.001	3	-2.447e-4	3	NC	1	NC	1
203		7	max	.003	1	.024	2	0	1	-1.015e-7	10	NC	1	NC	1
204			min	0	3	-.019	3	-.001	3	-2.447e-4	3	NC	1	NC	1
205		8	max	.002	1	.022	2	0	1	-1.015e-7	10	NC	1	NC	1
206			min	0	3	-.018	3	0	3	-2.447e-4	3	NC	1	NC	1
207		9	max	.002	1	.02	2	0	1	-1.015e-7	10	NC	1	NC	1
208			min	0	3	-.016	3	0	3	-2.447e-4	3	NC	1	NC	1
209		10	max	.002	1	.018	2	0	1	-1.015e-7	10	NC	1	NC	1
210			min	0	3	-.015	3	0	3	-2.447e-4	3	NC	1	NC	1
211		11	max	.002	1	.016	2	0	1	-1.015e-7	10	NC	1	NC	1
212			min	0	3	-.013	3	0	3	-2.447e-4	3	NC	1	NC	1
213		12	max	.002	1	.014	2	0	1	-1.015e-7	10	NC	1	NC	1
214			min	0	3	-.011	3	0	3	-2.447e-4	3	NC	1	NC	1
215		13	max	.001	1	.012	2	0	1	-1.015e-7	10	NC	1	NC	1
216			min	0	3	-.01	3	0	3	-2.447e-4	3	NC	1	NC	1
217		14	max	.001	1	.01	2	0	1	-1.015e-7	10	NC	1	NC	1
218			min	0	3	-.008	3	0	3	-2.447e-4	3	NC	1	NC	1
219		15	max	0	1	.008	2	0	1	-1.015e-7	10	NC	1	NC	1
220			min	0	3	-.006	3	0	3	-2.447e-4	3	NC	1	NC	1
221		16	max	0	1	.006	2	0	1	-1.015e-7	10	NC	1	NC	1
222			min	0	3	-.005	3	0	3	-2.447e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.004	2	0	1	-1.015e-7	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-2.447e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-1.015e-7	10	NC	1	NC	1
226			min	0	3	-.002	3	0	3	-2.447e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-1.015e-7	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.447e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.009	2	0	3	4.573e-4	1	NC	3	NC	1
230			min	-.003	3	-.009	3	-.002	1	-5.11e-4	3	4191.678	2	NC	1
231		2	max	.002	1	.009	2	0	3	4.34e-4	1	NC	3	NC	1
232			min	-.003	3	-.009	3	-.001	1	-4.937e-4	3	4574.233	2	NC	1
233		3	max	.002	1	.008	2	0	3	4.108e-4	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.001	1	-4.763e-4	3	5029.113	2	NC	1
235		4	max	.002	1	.007	2	0	3	3.876e-4	1	NC	1	NC	1
236			min	-.003	3	-.008	3	-.001	1	-4.59e-4	3	5573.739	2	NC	1
237		5	max	.002	1	.006	2	0	3	3.644e-4	1	NC	1	NC	1
238			min	-.002	3	-.008	3	-.001	1	-4.416e-4	3	6231.32	2	NC	1
239		6	max	.002	1	.006	2	0	3	3.412e-4	1	NC	1	NC	1
240			min	-.002	3	-.008	3	-.001	1	-4.243e-4	3	7033.283	2	NC	1
241		7	max	.001	1	.005	2	0	3	3.18e-4	1	NC	1	NC	1
242			min	-.002	3	-.007	3	-.001	1	-4.069e-4	3	8022.989	2	NC	1
243		8	max	.001	1	.004	2	0	3	2.948e-4	1	NC	1	NC	1
244			min	-.002	3	-.007	3	0	1	-3.896e-4	3	9261.604	2	NC	1
245		9	max	.001	1	.004	2	0	3	2.716e-4	1	NC	1	NC	1
246			min	-.002	3	-.006	3	0	1	-3.722e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	2.484e-4	1	NC	1	NC	1
248			min	-.002	3	-.006	3	0	1	-3.549e-4	3	NC	1	NC	1
249		11	max	0	1	.003	2	0	3	2.252e-4	1	NC	1	NC	1
250			min	-.001	3	-.005	3	0	1	-3.375e-4	3	NC	1	NC	1
251		12	max	0	1	.002	2	0	3	2.02e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-3.202e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	1.787e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-3.028e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.555e-4	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	-2.855e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.323e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-2.681e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.091e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-2.508e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	8.591e-5	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-2.334e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	6.27e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-2.161e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	3.949e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.987e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	9.38e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-1.898e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	7.095e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-3.609e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	2	4.81e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-5.321e-5	1	NC	1	NC	1
273		4	max	0	3	0	2	0	2	2.525e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-7.033e-5	1	NC	1	NC	1
275		5	max	0	3	0	2	0	2	2.404e-6	3	NC	1	NC	1
276			min	0	2	-.004	3	-.002	3	-8.744e-5	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-4.455e-6	15	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-1.046e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	10	-5.206e-6	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.002	3	-1.217e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	10	-5.958e-6	15	NC	1	NC	1
282			min	0	2	-.006	3	-.002	3	-1.388e-4	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	10	-6.709e-6	15	NC	1	NC	1
284			min	0	2	-.006	3	-.002	3	-1.559e-4	1	NC	1	NC	1
285		10	max	.001	3	.002	2	0	10	-7.46e-6	15	NC	1	NC	1
286			min	-.001	2	-.007	3	-.003	3	-1.73e-4	1	NC	1	NC	1
287		11	max	.001	3	.002	2	0	10	-8.211e-6	15	NC	1	NC	1
288			min	-.001	2	-.007	3	-.003	3	-1.901e-4	1	NC	1	NC	1
289		12	max	.001	3	.003	2	0	10	-8.963e-6	15	NC	1	NC	1
290			min	-.001	2	-.008	3	-.003	3	-2.073e-4	1	NC	1	NC	1
291		13	max	.001	3	.003	2	0	10	-9.714e-6	15	NC	1	NC	1
292			min	-.001	2	-.008	3	-.003	3	-2.244e-4	1	NC	1	NC	1
293		14	max	.001	3	.004	2	0	10	-1.046e-5	10	NC	1	NC	1
294			min	-.001	2	-.008	3	-.003	1	-2.415e-4	1	NC	1	NC	1
295		15	max	.002	3	.005	2	0	10	-1.115e-5	10	NC	1	NC	1
296			min	-.002	2	-.008	3	-.004	1	-2.586e-4	1	9012.154	2	NC	1
297		16	max	.002	3	.006	2	0	10	-1.184e-5	10	NC	1	NC	1
298			min	-.002	2	-.008	3	-.004	1	-2.757e-4	1	7631.593	2	NC	1
299		17	max	.002	3	.007	2	0	10	-1.253e-5	10	NC	1	NC	1
300			min	-.002	2	-.008	3	-.004	1	-2.928e-4	1	6564.253	2	NC	1
301		18	max	.002	3	.008	2	0	10	-1.322e-5	10	NC	1	NC	2
302			min	-.002	2	-.008	3	-.005	1	-3.1e-4	1	5729.631	2	9485.301	1
303		19	max	.002	3	.009	2	0	10	-1.391e-5	10	NC	3	NC	2
304			min	-.002	2	-.008	3	-.005	1	-3.271e-4	1	5071.133	2	8757.046	1
305	M12	1	max	.001	1	.011	2	.004	1	3.378e-4	3	NC	1	NC	2
306			min	0	12	-.009	3	0	10	1.319e-5	15	NC	1	4365.01	1
307		2	max	.001	1	.01	2	.004	1	3.378e-4	3	NC	1	NC	2
308			min	0	12	-.009	3	0	10	1.319e-5	15	NC	1	4760.564	1
309		3	max	.001	1	.01	2	.004	1	3.378e-4	3	NC	1	NC	2
310			min	0	12	-.008	3	0	10	1.319e-5	15	NC	1	5231.397	1
311		4	max	.001	1	.009	2	.003	1	3.378e-4	3	NC	1	NC	2
312			min	0	12	-.008	3	0	10	1.319e-5	15	NC	1	5797.352	1
313		5	max	.001	1	.008	2	.003	1	3.378e-4	3	NC	1	NC	2
314			min	0	12	-.007	3	0	10	1.319e-5	15	NC	1	6485.465	1
315		6	max	.001	1	.008	2	.003	1	3.378e-4	3	NC	1	NC	2
316			min	0	12	-.007	3	0	10	1.319e-5	15	NC	1	7333.336	1
317		7	max	0	1	.007	2	.002	1	3.378e-4	3	NC	1	NC	2
318			min	0	12	-.006	3	0	10	1.319e-5	15	NC	1	8394.526	1
319		8	max	0	1	.007	2	.002	1	3.378e-4	3	NC	1	NC	2
320			min	0	12	-.006	3	0	10	1.319e-5	15	NC	1	9747.468	1
321		9	max	0	1	.006	2	.002	1	3.378e-4	3	NC	1	NC	1
322			min	0	12	-.005	3	0	10	1.319e-5	15	NC	1	NC	1
323		10	max	0	1	.005	2	.001	1	3.378e-4	3	NC	1	NC	1
324			min	0	12	-.005	3	0	10	1.319e-5	15	NC	1	NC	1
325		11	max	0	1	.005	2	.001	1	3.378e-4	3	NC	1	NC	1
326			min	0	12	-.004	3	0	10	1.319e-5	15	NC	1	NC	1
327		12	max	0	1	.004	2	0	1	3.378e-4	3	NC	1	NC	1
328			min	0	12	-.004	3	0	10	1.319e-5	15	NC	1	NC	1
329		13	max	0	1	.004	2	0	1	3.378e-4	3	NC	1	NC	1
330			min	0	12	-.003	3	0	10	1.319e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	0	1	3.378e-4	3	NC	1	NC	1
332			min	0	12	-.003	3	0	10	1.319e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	3.378e-4	3	NC	1	NC	1
334			min	0	12	-.002	3	0	10	1.319e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	3.378e-4	3	NC	1	NC	1
336			min	0	12	-.002	3	0	10	1.319e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	1	3.378e-4	3	NC	1	NC	1
338			min	0	12	-.001	3	0	10	1.319e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	3.378e-4	3	NC	1	NC	1
340			min	0	12	0	3	0	10	1.319e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	3.378e-4	3	NC	1	NC	1
342			min	0	1	0	1	0	1	1.319e-5	15	NC	1	NC	1
343	M1	1	max	.008	3	.025	3	.003	3	7.999e-3	2	NC	1	NC	1
344			min	-.009	2	-.021	2	-.002	1	-1.154e-2	3	NC	1	NC	1
345		2	max	.008	3	.015	3	.002	3	3.931e-3	2	NC	4	NC	1
346			min	-.009	2	-.012	2	-.004	1	-5.697e-3	3	4685.091	3	NC	1
347		3	max	.008	3	.005	3	.002	3	3.738e-5	3	NC	4	NC	1
348			min	-.009	2	-.004	2	-.005	1	-2.641e-4	1	2427.145	3	NC	1
349		4	max	.008	3	.004	2	.001	3	3.909e-5	3	NC	4	NC	1
350			min	-.009	2	-.003	3	-.006	1	-2.251e-4	1	1729.828	3	NC	1
351		5	max	.008	3	.01	2	.001	3	4.08e-5	3	NC	4	NC	1
352			min	-.009	2	-.009	3	-.006	1	-1.861e-4	1	1397.402	3	NC	1
353		6	max	.008	3	.016	2	0	3	4.251e-5	3	NC	4	NC	1
354			min	-.009	2	-.015	3	-.006	1	-1.471e-4	1	1208.644	2	NC	1
355		7	max	.008	3	.02	2	0	3	4.422e-5	3	NC	4	NC	1
356			min	-.009	2	-.019	3	-.005	1	-1.08e-4	1	1075.684	2	NC	1
357		8	max	.008	3	.023	2	0	3	4.593e-5	3	NC	4	NC	1
358			min	-.009	2	-.022	3	-.004	1	-6.901e-5	1	992.044	2	NC	1
359		9	max	.008	3	.025	2	0	3	4.763e-5	3	NC	4	NC	1
360			min	-.009	2	-.023	3	-.003	1	-3.07e-5	9	942.142	2	NC	1
361		10	max	.008	3	.026	2	0	3	4.934e-5	3	NC	4	NC	1
362			min	-.009	2	-.024	3	-.002	1	-3.23e-6	9	918.516	2	NC	1
363		11	max	.008	3	.026	2	0	3	5.105e-5	3	NC	4	NC	1
364			min	-.009	2	-.023	3	0	9	1.692e-6	15	918.439	2	NC	1
365		12	max	.008	3	.024	2	.001	1	8.71e-5	1	NC	4	NC	1
366			min	-.009	2	-.021	3	0	15	3.376e-6	15	942.896	2	NC	1
367		13	max	.008	3	.021	2	.002	1	1.261e-4	1	NC	4	NC	1
368			min	-.009	2	-.018	3	0	15	5.06e-6	15	997.159	2	NC	1
369		14	max	.008	3	.017	2	.003	1	1.652e-4	1	NC	4	NC	1
370			min	-.009	2	-.014	3	0	15	6.744e-6	15	1093.474	2	NC	1
371		15	max	.008	3	.011	2	.003	1	2.042e-4	1	NC	4	NC	1
372			min	-.009	2	-.009	3	0	15	8.428e-6	15	1258.798	2	NC	1
373		16	max	.008	3	.003	2	.003	1	2.316e-4	1	NC	4	NC	1
374			min	-.009	2	-.003	3	0	15	9.607e-6	15	1559.259	2	NC	1
375		17	max	.008	3	.005	3	.002	1	5.544e-5	3	NC	4	NC	1
376			min	-.009	2	-.006	2	0	15	-2.553e-5	9	2207.903	2	NC	1
377		18	max	.008	3	.012	3	0	1	5.738e-3	2	NC	4	NC	1
378			min	-.009	2	-.017	2	0	15	-2.88e-3	3	4278.448	2	NC	1
379		19	max	.008	3	.021	3	0	3	1.156e-2	2	NC	1	NC	1
380			min	-.009	2	-.028	2	-.001	1	-5.871e-3	3	NC	1	NC	1
381	M5	1	max	.026	3	.08	3	.003	3	5.229e-6	3	NC	1	NC	1
382			min	-.029	2	-.069	2	-.002	1	0	15	NC	1	NC	1
383		2	max	.026	3	.047	3	.004	3	1.226e-4	3	NC	4	NC	1
384			min	-.029	2	-.04	2	-.002	1	-3.222e-5	1	1467.753	3	NC	1
385		3	max	.026	3	.017	3	.006	3	2.377e-4	3	NC	5	NC	1
386			min	-.029	2	-.013	2	-.002	1	-6.39e-5	1	760.688	3	NC	1
387		4	max	.026	3	.012	2	.007	3	2.299e-4	3	NC	5	NC	1
388			min	-.029	2	-.009	3	-.002	1	-6.065e-5	1	542.675	3	NC	1
389		5	max	.026	3	.033	2	.007	3	2.221e-4	3	NC	5	NC	1
390			min	-.029	2	-.03	3	-.002	1	-5.74e-5	1	437.347	2	NC	1
391		6	max	.026	3	.051	2	.008	3	2.143e-4	3	NC	5	NC	1
392			min	-.029	2	-.047	3	-.002	1	-5.416e-5	1	371.018	2	9271.772	3
393		7	max	.026	3	.065	2	.008	3	2.066e-4	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.029	2	-.06	3	-.002	1	-5.091e-5	1	330.03	2	8797.604	3
395		8	max	.026	3	.076	2	.008	3	1.988e-4	3	NC	5	NC	1
396			min	-.029	2	-.069	3	-.002	1	-4.766e-5	1	304.228	2	8681.295	3
397		9	max	.026	3	.083	2	.007	3	1.91e-4	3	NC	5	NC	1
398			min	-.029	2	-.074	3	-.002	1	-4.441e-5	1	288.809	2	8853.135	3
399		10	max	.026	3	.086	2	.007	3	1.832e-4	3	NC	5	NC	1
400			min	-.029	2	-.075	3	-.001	1	-4.117e-5	1	281.472	2	9303.089	3
401		11	max	.025	3	.084	2	.006	3	1.754e-4	3	NC	5	NC	1
402			min	-.029	2	-.073	3	-.001	1	-3.792e-5	1	281.372	2	NC	1
403		12	max	.025	3	.079	2	.006	3	1.676e-4	3	NC	5	NC	1
404			min	-.029	2	-.067	3	-.001	1	-3.467e-5	1	288.806	2	NC	1
405		13	max	.025	3	.069	2	.005	3	1.598e-4	3	NC	5	NC	1
406			min	-.029	2	-.057	3	-.001	1	-3.165e-5	9	305.388	2	NC	1
407		14	max	.025	3	.054	2	.004	3	1.52e-4	3	NC	5	NC	1
408			min	-.029	2	-.044	3	-.001	1	-2.906e-5	9	334.875	2	NC	1
409		15	max	.025	3	.034	2	.004	3	1.442e-4	3	NC	5	NC	1
410			min	-.029	2	-.028	3	-.001	1	-2.646e-5	9	385.541	2	NC	1
411		16	max	.025	3	.01	2	.003	3	1.318e-4	3	NC	5	NC	1
412			min	-.029	2	-.008	3	-.001	1	-2.568e-5	9	477.714	2	NC	1
413		17	max	.025	3	.014	3	.002	3	8.88e-6	3	NC	5	NC	1
414			min	-.029	2	-.021	2	-.001	1	-8.058e-5	1	677.139	2	NC	1
415		18	max	.025	3	.039	3	.001	3	2.892e-6	3	NC	4	NC	1
416			min	-.029	2	-.055	2	0	1	-4.123e-5	1	1312.864	2	NC	1
417		19	max	.025	3	.065	3	0	3	0	9	NC	1	NC	1
418			min	-.029	2	-.092	2	0	1	-8.94e-7	3	NC	1	NC	1
419	M9	1	max	.009	3	.025	3	.003	3	1.155e-2	3	NC	1	NC	1
420			min	-.009	2	-.021	2	-.002	1	-7.998e-3	2	NC	1	NC	1
421		2	max	.009	3	.014	3	.001	3	5.692e-3	3	NC	4	NC	1
422			min	-.009	2	-.012	2	0	9	-3.931e-3	2	4686.741	3	NC	1
423		3	max	.009	3	.005	3	.002	1	1.222e-4	1	NC	4	NC	1
424			min	-.009	2	-.004	2	0	3	-5.777e-5	3	2428.015	3	NC	1
425		4	max	.009	3	.004	2	.002	1	8.903e-5	1	NC	4	NC	1
426			min	-.009	2	-.003	3	-.001	3	-6.272e-5	3	1730.426	3	NC	1
427		5	max	.008	3	.01	2	.003	1	5.581e-5	1	NC	4	NC	1
428			min	-.009	2	-.01	3	-.002	3	-6.766e-5	3	1397.842	3	NC	1
429		6	max	.008	3	.016	2	.002	1	2.692e-5	2	NC	4	NC	1
430			min	-.009	2	-.015	3	-.003	3	-7.26e-5	3	1208.969	2	8784.122	3
431		7	max	.008	3	.02	2	.002	1	1.555e-5	2	NC	4	NC	1
432			min	-.009	2	-.019	3	-.004	3	-7.754e-5	3	1075.984	2	8007.387	3
433		8	max	.008	3	.023	2	0	1	4.19e-6	2	NC	4	NC	1
434			min	-.009	2	-.022	3	-.004	3	-8.249e-5	3	992.332	2	7570.532	3
435		9	max	.008	3	.025	2	0	2	-1.612e-6	10	NC	4	NC	1
436			min	-.009	2	-.024	3	-.005	3	-8.743e-5	3	942.425	2	7374.09	3
437		10	max	.008	3	.026	2	0	2	-3.254e-6	10	NC	4	NC	1
438			min	-.009	2	-.024	3	-.005	3	-1.103e-4	1	918.801	2	7375.168	3
439		11	max	.008	3	.026	2	0	10	-4.897e-6	10	NC	4	NC	1
440			min	-.009	2	-.023	3	-.005	3	-1.435e-4	1	918.732	2	7565.411	3
441		12	max	.008	3	.024	2	0	10	-6.54e-6	10	NC	4	NC	1
442			min	-.009	2	-.021	3	-.004	3	-1.767e-4	1	943.204	2	7966.22	3
443		13	max	.008	3	.021	2	0	10	-8.182e-6	10	NC	4	NC	1
444			min	-.009	2	-.018	3	-.005	1	-2.099e-4	1	997.492	2	8636.501	3
445		14	max	.008	3	.017	2	0	10	-9.825e-6	10	NC	4	NC	1
446			min	-.009	2	-.014	3	-.005	1	-2.432e-4	1	1093.844	2	9699.117	3
447		15	max	.008	3	.011	2	0	10	-1.147e-5	10	NC	4	NC	2
448			min	-.009	2	-.009	3	-.005	1	-2.764e-4	1	1259.228	2	9972.988	1
449		16	max	.008	3	.003	2	0	10	-1.269e-5	10	NC	4	NC	1
450			min	-.009	2	-.003	3	-.005	1	-3.019e-4	1	1559.785	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.008	3	.005	3	0	10	6.785e-5	3	NC	4	NC	1
452			min	-.009	2	-.006	2	-.004	1	-1.437e-4	1	2208.596	2	NC	1
453		18	max	.008	3	.012	3	0	10	2.943e-3	3	NC	4	NC	1
454			min	-.009	2	-.017	2	-.003	1	-5.738e-3	2	4279.747	2	NC	1
455		19	max	.008	3	.021	3	0	3	5.869e-3	3	NC	1	NC	1
456			min	-.009	2	-.028	2	0	1	-1.156e-2	2	NC	1	NC	1
457	M13	1	max	.002	1	.025	3	.009	3	3.866e-3	3	NC	1	NC	1
458			min	-.003	3	-.021	2	-.009	2	-3.395e-3	2	NC	1	NC	1
459		2	max	.002	1	.095	3	.007	9	4.813e-3	3	NC	4	NC	1
460			min	-.003	3	-.07	2	-.006	2	-4.243e-3	2	1612.665	3	NC	1
461		3	max	.002	1	.154	3	.017	1	5.761e-3	3	NC	5	NC	2
462			min	-.003	3	-.111	2	-.005	10	-5.09e-3	2	880.648	3	5188.921	1
463		4	max	.002	1	.193	3	.027	1	6.709e-3	3	NC	5	NC	2
464			min	-.003	3	-.139	2	-.005	10	-5.938e-3	2	677.814	3	3644.198	1
465		5	max	.002	1	.208	3	.03	1	7.657e-3	3	NC	5	NC	2
466			min	-.003	3	-.15	2	-.007	10	-6.786e-3	2	622.94	3	3296.445	1
467		6	max	.002	1	.199	3	.026	1	8.605e-3	3	NC	5	NC	2
468			min	-.003	3	-.146	2	-.009	10	-7.633e-3	2	654.475	3	3721.222	1
469		7	max	.002	1	.171	3	.018	9	9.553e-3	3	NC	5	NC	2
470			min	-.003	3	-.128	2	-.012	2	-8.481e-3	2	779.675	3	5656.095	1
471		8	max	.002	1	.133	3	.02	3	1.05e-2	3	NC	5	NC	1
472			min	-.003	3	-.104	2	-.02	2	-9.329e-3	2	1057.891	3	9784.021	3
473		9	max	.002	1	.097	3	.023	3	1.145e-2	3	NC	4	NC	1
474			min	-.003	3	-.08	2	-.026	2	-1.018e-2	2	1590.261	3	6470.477	2
475		10	max	.002	1	.08	3	.026	3	1.24e-2	3	NC	4	NC	4
476			min	-.003	3	-.069	2	-.029	2	-1.102e-2	2	2071.217	3	5524.65	2
477		11	max	.002	1	.097	3	.028	3	1.145e-2	3	NC	4	NC	1
478			min	-.003	3	-.08	2	-.026	2	-1.018e-2	2	1590.259	3	5763.46	3
479		12	max	.002	1	.133	3	.029	3	1.05e-2	3	NC	5	NC	1
480			min	-.003	3	-.104	2	-.02	2	-9.329e-3	2	1057.89	3	5556.896	3
481		13	max	.002	1	.171	3	.028	3	9.558e-3	3	NC	5	NC	2
482			min	-.003	3	-.128	2	-.012	2	-8.481e-3	2	779.674	3	5630.557	1
483		14	max	.002	1	.199	3	.026	3	8.612e-3	3	NC	5	NC	2
484			min	-.003	3	-.146	2	-.009	10	-7.633e-3	2	654.474	3	3717.853	1
485		15	max	.002	1	.208	3	.03	1	7.666e-3	3	NC	5	NC	2
486			min	-.003	3	-.15	2	-.007	10	-6.786e-3	2	622.94	3	3300.841	1
487		16	max	.002	1	.193	3	.027	1	6.72e-3	3	NC	5	NC	2
488			min	-.003	3	-.139	2	-.005	10	-5.938e-3	2	677.813	3	3656.809	1
489		17	max	.002	1	.155	3	.017	1	5.774e-3	3	NC	5	NC	2
490			min	-.003	3	-.111	2	-.005	10	-5.09e-3	2	880.648	3	5221.14	1
491		18	max	.002	1	.096	3	.011	3	4.828e-3	3	NC	4	NC	1
492			min	-.003	3	-.07	2	-.006	2	-4.243e-3	2	1612.664	3	NC	1
493		19	max	.002	1	.025	3	.008	3	3.882e-3	3	NC	1	NC	1
494			min	-.003	3	-.021	2	-.009	2	-3.395e-3	2	NC	1	NC	1
495	M16	1	max	0	1	.021	3	.008	3	4.297e-3	2	NC	1	NC	1
496			min	0	3	-.028	2	-.009	2	-3.136e-3	3	NC	1	NC	1
497		2	max	0	1	.057	3	.011	3	5.377e-3	2	NC	4	NC	1
498			min	0	3	-.099	2	-.006	2	-3.88e-3	3	1608.802	2	NC	1
499		3	max	0	1	.087	3	.017	1	6.457e-3	2	NC	5	NC	2
500			min	0	3	-.158	2	-.005	10	-4.623e-3	3	876.892	2	5196.77	1
501		4	max	0	1	.108	3	.027	1	7.537e-3	2	NC	5	NC	2
502			min	0	3	-.198	2	-.005	10	-5.367e-3	3	672.668	2	3649.699	1
503		5	max	0	1	.118	3	.03	1	8.617e-3	2	NC	5	NC	2
504			min	0	3	-.214	2	-.006	10	-6.111e-3	3	614.85	2	3302.181	1
505		6	max	0	1	.116	3	.026	1	9.697e-3	2	NC	5	NC	2
506			min	0	3	-.206	2	-.009	10	-6.854e-3	3	640.248	2	3730.049	1
507		7	max	0	1	.105	3	.026	3	1.078e-2	2	NC	5	NC	2

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	-.18	2	-.012	2	-7.598e-3	3	751.232	2	5680.04	1
509		8	max	0	1	.088	3	.027	3	1.186e-2	2	NC	5	NC	1
510			min	0	3	-.143	2	-.02	2	-8.342e-3	3	991.844	2	6164.072	3
511		9	max	0	1	.072	3	.026	3	1.294e-2	2	NC	4	NC	1
512			min	0	3	-.108	2	-.026	2	-9.085e-3	3	1422.2	2	6294.385	3
513		10	max	0	1	.065	3	.025	3	1.402e-2	2	NC	4	NC	4
514			min	0	3	-.092	2	-.029	2	-9.829e-3	3	1779.775	2	5550.703	2
515		11	max	0	1	.072	3	.024	3	1.294e-2	2	NC	4	NC	1
516			min	0	3	-.108	2	-.026	2	-9.084e-3	3	1422.2	2	6504.65	2
517		12	max	0	1	.088	3	.022	3	1.186e-2	2	NC	5	NC	1
518			min	0	3	-.143	2	-.02	2	-8.338e-3	3	991.844	2	8025.727	3
519		13	max	.001	1	.105	3	.021	3	1.078e-2	2	NC	5	NC	2
520			min	0	3	-.18	2	-.012	2	-7.593e-3	3	751.232	2	5672.844	1
521		14	max	.001	1	.116	3	.026	1	9.697e-3	2	NC	5	NC	2
522			min	0	3	-.206	2	-.009	10	-6.847e-3	3	640.248	2	3735.549	1
523		15	max	.001	1	.117	3	.03	1	8.618e-3	2	NC	5	NC	2
524			min	0	3	-.214	2	-.006	10	-6.102e-3	3	614.85	2	3313.534	1
525		16	max	.001	1	.108	3	.026	1	7.538e-3	2	NC	5	NC	2
526			min	0	3	-.198	2	-.005	10	-5.357e-3	3	672.668	2	3669.956	1
527		17	max	.001	1	.087	3	.017	1	6.458e-3	2	NC	5	NC	2
528			min	0	3	-.158	2	-.005	10	-4.611e-3	3	876.892	2	5241.064	1
529		18	max	.001	1	.057	3	.01	3	5.379e-3	2	NC	4	NC	1
530			min	0	3	-.099	2	-.006	2	-3.866e-3	3	1608.802	2	NC	1
531		19	max	.001	1	.021	3	.008	3	4.299e-3	2	NC	1	NC	1
532			min	0	3	-.028	2	-.009	2	-3.121e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	4.e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.836e-5	2	NC	1	NC	1
535		2	max	0	3	-.001	15	0	1	8.534e-4	3	NC	1	NC	1
536			min	0	2	-.005	4	0	3	-5.077e-4	2	NC	1	NC	1
537		3	max	0	3	-.002	15	.003	1	1.307e-3	3	NC	3	NC	1
538			min	0	2	-.009	4	-.003	3	-9.57e-4	2	7777.64	4	9908.837	3
539		4	max	0	3	-.003	15	.006	1	1.76e-3	3	NC	5	NC	4
540			min	0	2	-.013	4	-.007	3	-1.406e-3	2	5335.915	4	5498.763	3
541		5	max	0	3	-.004	15	.01	2	2.214e-3	3	NC	5	NC	4
542			min	0	2	-.017	4	-.012	3	-1.856e-3	2	4163.669	4	3622.965	3
543		6	max	0	3	-.005	15	.014	2	2.667e-3	3	NC	15	NC	4
544			min	-.001	2	-.02	4	-.017	3	-2.305e-3	2	3504.167	4	2645.023	3
545		7	max	0	3	-.005	15	.019	2	3.121e-3	3	NC	15	NC	4
546			min	-.001	2	-.023	4	-.023	3	-2.754e-3	2	3107.564	4	2071.731	3
547		8	max	0	3	-.006	15	.023	2	3.574e-3	3	NC	15	NC	4
548			min	-.001	2	-.024	4	-.028	3	-3.203e-3	2	2869.543	4	1710.716	3
549		9	max	0	3	-.006	15	.027	2	4.028e-3	3	NC	15	NC	4
550			min	-.002	2	-.026	4	-.033	3	-3.653e-3	2	2741.426	4	1474.209	3
551		10	max	0	3	-.006	15	.03	2	4.481e-3	3	NC	15	NC	4
552			min	-.002	2	-.026	4	-.037	3	-4.102e-3	2	2700.895	4	1318.041	3
553		11	max	0	3	-.006	15	.032	2	4.935e-3	3	NC	15	NC	5
554			min	-.002	2	-.026	4	-.039	3	-4.551e-3	2	2741.426	4	1219.007	3
555		12	max	.001	3	-.006	15	.032	2	5.388e-3	3	NC	15	NC	5
556			min	-.002	2	-.025	4	-.04	3	-5.001e-3	2	2869.543	4	1165.61	3
557		13	max	.001	3	-.005	15	.031	1	5.841e-3	3	NC	15	NC	5
558			min	-.002	2	-.023	4	-.039	3	-5.45e-3	2	3107.564	4	1154.581	3
559		14	max	.001	3	-.005	15	.028	1	6.295e-3	3	NC	15	NC	4
560			min	-.003	2	-.02	4	-.035	3	-5.899e-3	2	3504.167	4	1191.042	3
561		15	max	.001	3	-.004	15	.023	1	6.748e-3	3	NC	5	NC	4
562			min	-.003	2	-.017	4	-.029	3	-6.349e-3	2	4163.669	4	1293.574	3
563		16	max	.001	3	-.003	15	.016	1	7.202e-3	3	NC	5	NC	4
564			min	-.003	2	-.014	4	-.019	3	-6.798e-3	2	5335.915	4	1512.532	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	.001	3	-.001	2	.007	1	7.655e-3	3	NC	3	NC	4
566			min	-.003	2	-.01	4	-.006	3	-7.247e-3	2	7777.64	4	2005.825	3
567		18	max	.002	3	.002	2	.01	3	8.109e-3	3	NC	1	NC	4
568			min	-.004	2	-.005	4	-.013	2	-7.696e-3	2	NC	1	3572.166	3
569		19	max	.002	3	.006	2	.032	3	8.562e-3	3	NC	1	NC	1
570			min	-.004	2	-.002	9	-.031	2	-8.146e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	.001	2	.01	3	2.46e-3	3	NC	1	NC	1
572			min	-.002	3	0	3	-.01	2	-2.422e-3	2	NC	1	NC	1
573		2	max	0	10	-.001	15	.002	3	2.365e-3	3	NC	1	NC	1
574			min	-.002	3	-.005	4	-.004	2	-2.314e-3	2	NC	1	NC	1
575		3	max	0	10	-.002	15	.005	1	2.27e-3	3	NC	3	NC	4
576			min	-.001	3	-.009	4	-.004	3	-2.205e-3	2	7777.64	4	5706.896	3
577		4	max	0	10	-.003	15	.008	1	2.176e-3	3	NC	5	NC	4
578			min	-.001	3	-.013	4	-.008	3	-2.097e-3	2	5335.915	4	4345.748	3
579		5	max	0	10	-.004	15	.011	1	2.081e-3	3	NC	5	NC	4
580			min	-.001	3	-.017	4	-.011	3	-1.988e-3	2	4163.669	4	3758.387	3
581		6	max	0	10	-.005	15	.012	1	1.986e-3	3	NC	15	NC	4
582			min	-.001	3	-.02	4	-.013	3	-1.88e-3	2	3504.167	4	3505.265	3
583		7	max	0	10	-.005	15	.013	1	1.891e-3	3	NC	15	NC	4
584			min	-.001	3	-.023	4	-.014	3	-1.771e-3	2	3107.564	4	3449.176	3
585		8	max	0	10	-.006	15	.013	1	1.796e-3	3	NC	15	NC	4
586			min	-.001	3	-.024	4	-.014	3	-1.663e-3	2	2869.543	4	3544.055	3
587		9	max	0	10	-.006	15	.012	1	1.702e-3	3	NC	15	NC	4
588			min	0	3	-.026	4	-.013	3	-1.555e-3	2	2741.426	4	3785.385	3
589		10	max	0	10	-.006	15	.011	1	1.607e-3	3	NC	15	NC	4
590			min	0	3	-.026	4	-.012	3	-1.446e-3	2	2700.895	4	4199.357	3
591		11	max	0	10	-.006	15	.009	1	1.512e-3	3	NC	15	NC	4
592			min	0	3	-.026	4	-.01	3	-1.338e-3	2	2741.426	4	4849.433	3
593		12	max	0	10	-.006	15	.008	1	1.417e-3	3	NC	15	NC	4
594			min	0	3	-.024	4	-.008	3	-1.229e-3	2	2869.543	4	5862.299	3
595		13	max	0	10	-.005	15	.006	1	1.323e-3	3	NC	15	NC	2
596			min	0	3	-.022	4	-.006	3	-1.121e-3	2	3107.564	4	7495.076	3
597		14	max	0	10	-.005	15	.004	1	1.228e-3	3	NC	15	NC	1
598			min	0	3	-.02	4	-.004	3	-1.012e-3	2	3504.167	4	NC	1
599		15	max	0	10	-.004	15	.003	1	1.133e-3	3	NC	5	NC	1
600			min	0	3	-.017	4	-.002	3	-9.038e-4	2	4163.669	4	NC	1
601		16	max	0	10	-.003	15	.001	9	1.038e-3	3	NC	5	NC	1
602			min	0	3	-.013	4	0	3	-7.953e-4	2	5335.915	4	NC	1
603		17	max	0	10	-.002	15	0	4	9.434e-4	3	NC	3	NC	1
604			min	0	3	-.009	4	0	2	-6.868e-4	2	7777.64	4	NC	1
605		18	max	0	10	-.001	15	0	3	8.487e-4	3	NC	1	NC	1
606			min	0	3	-.005	4	0	2	-5.784e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	7.539e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.699e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

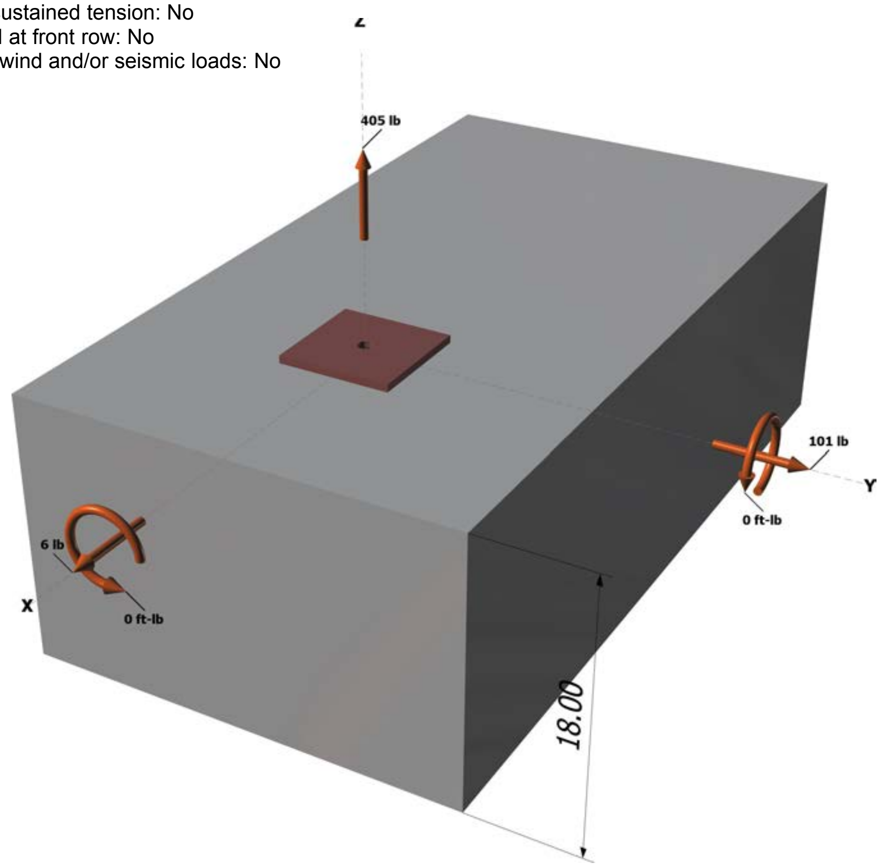
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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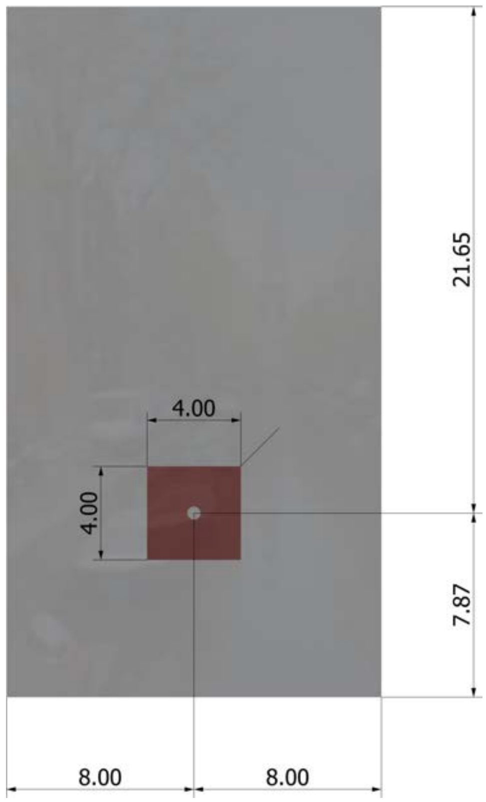


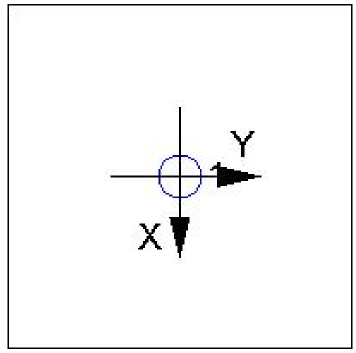
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

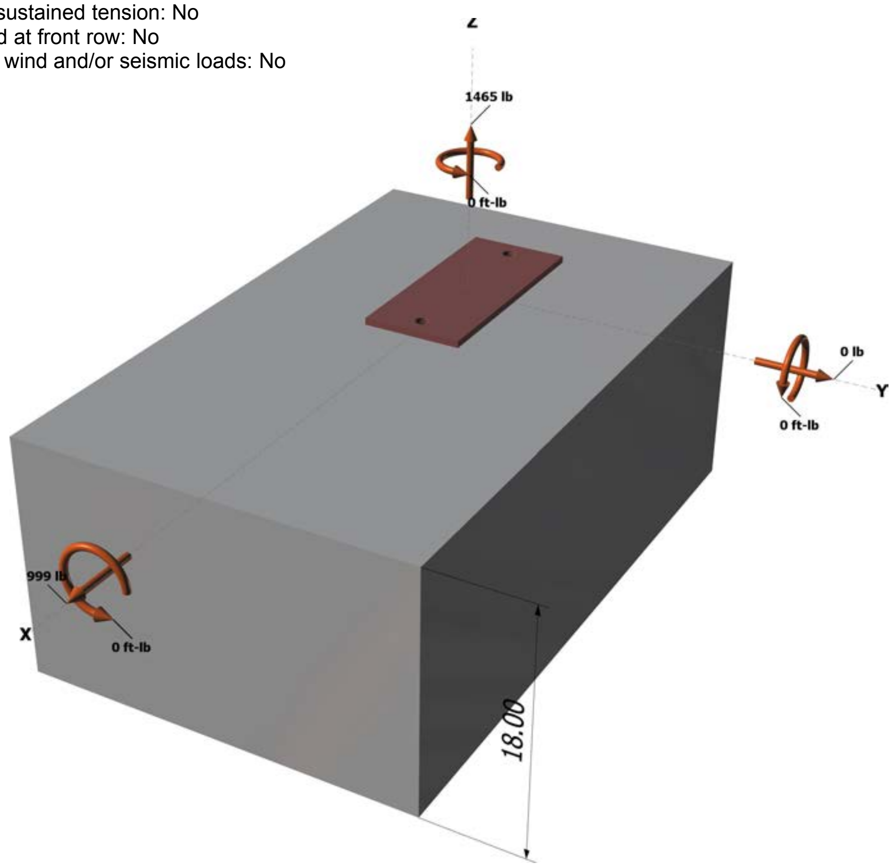
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

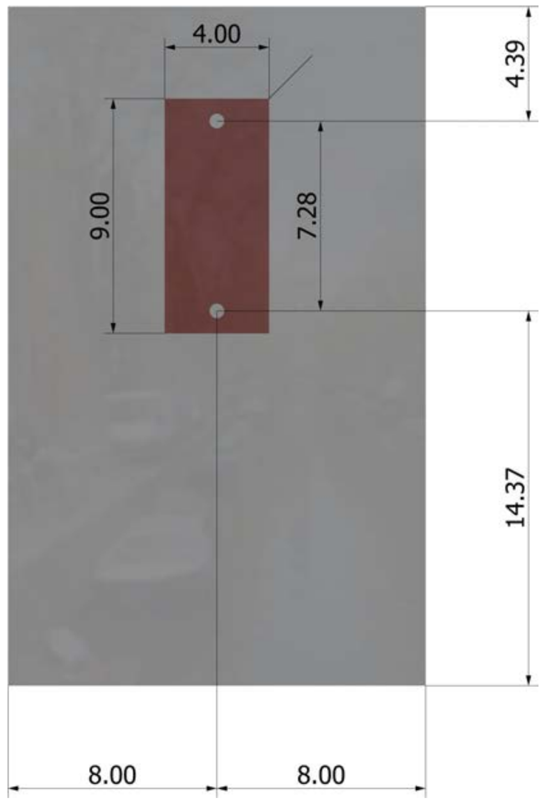
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



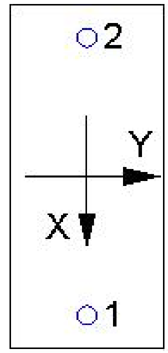
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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