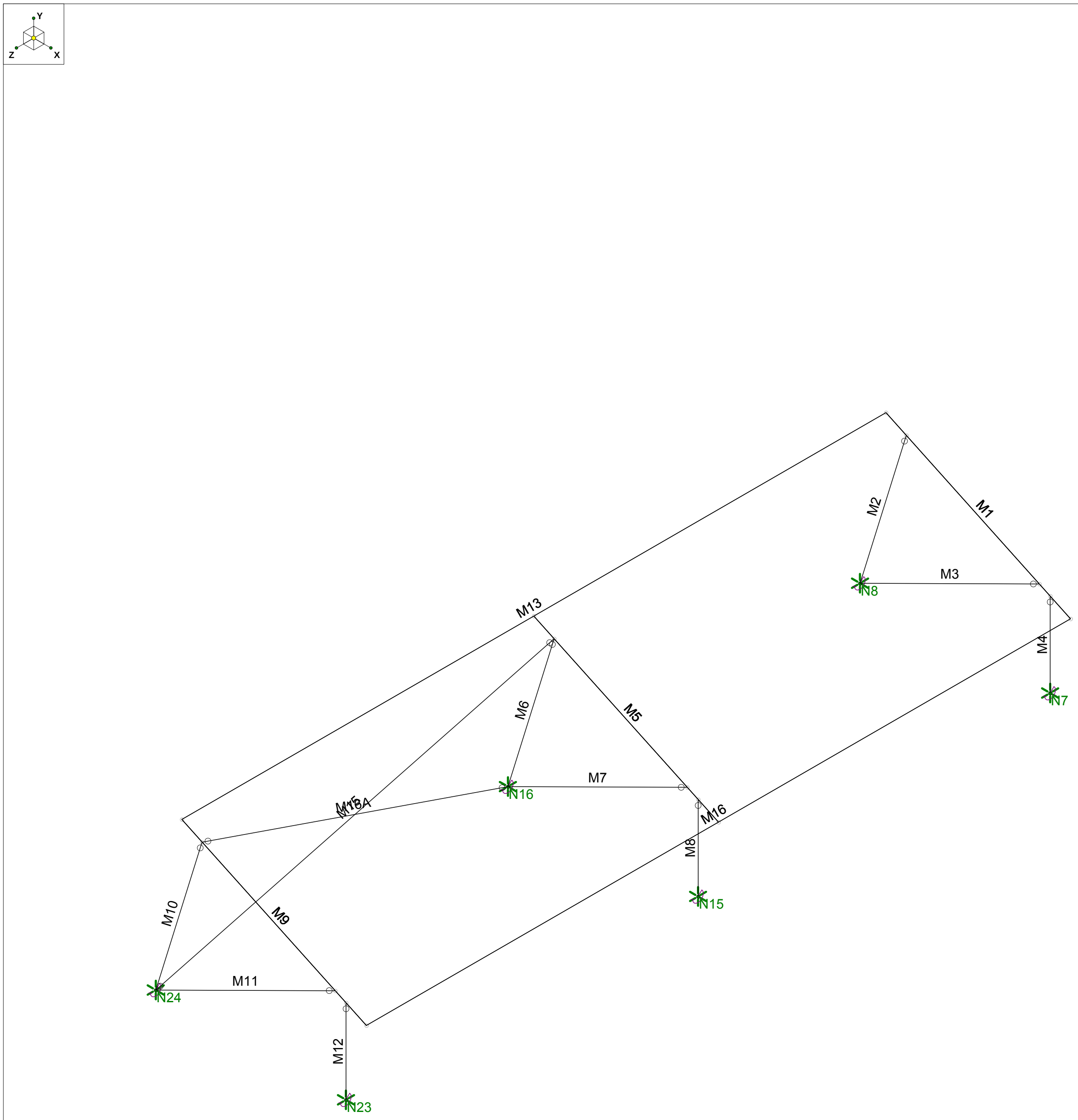


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

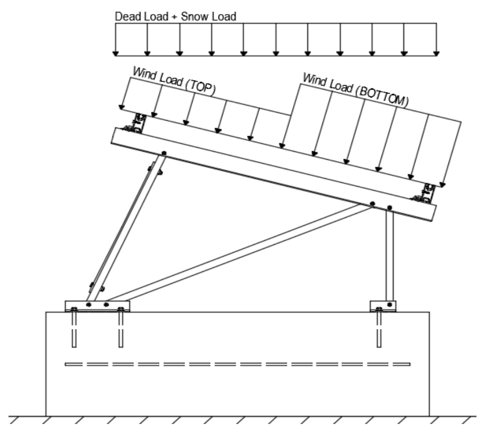
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 25°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes
- ASCE 7-05 - 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 = 18.56 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 110 mph — Exposure Category = C
Height ≤ 15 ft — 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

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

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.04	C_d =	1.25

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
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.

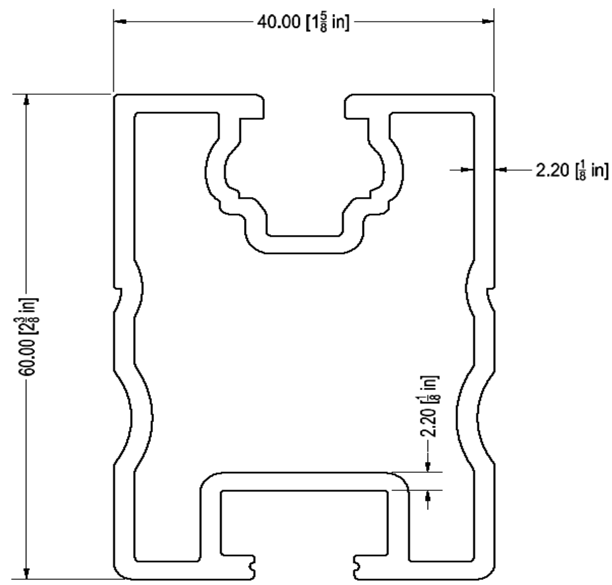
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24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

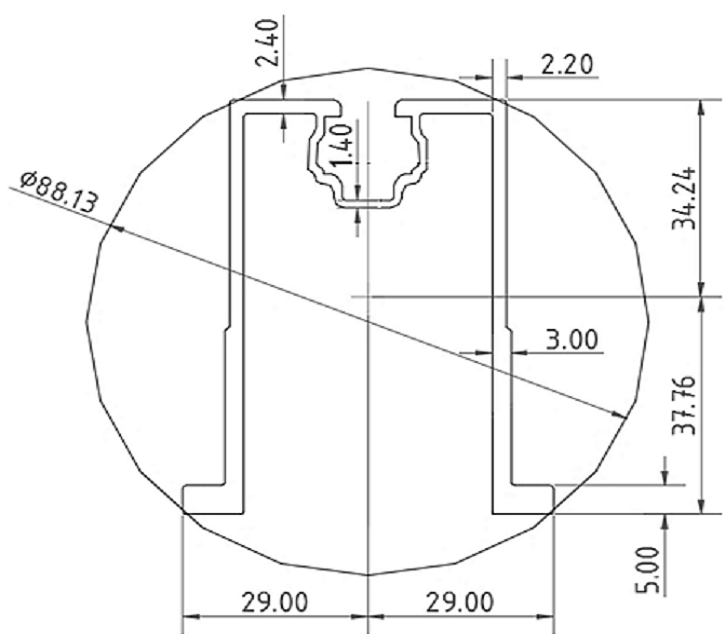
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	60	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.31	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.469	k-ft
M_z =	0.097	k-ft
$M_{y\ allowable}$ =	1.247	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	49%	



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).

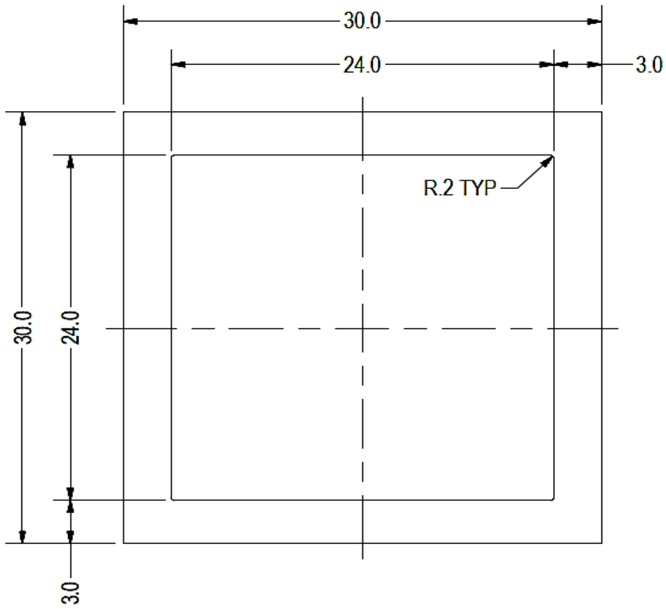
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.65	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.539	k-ft
M_z =	0.000	k-ft
P_n =	0.288	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	39%	



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).

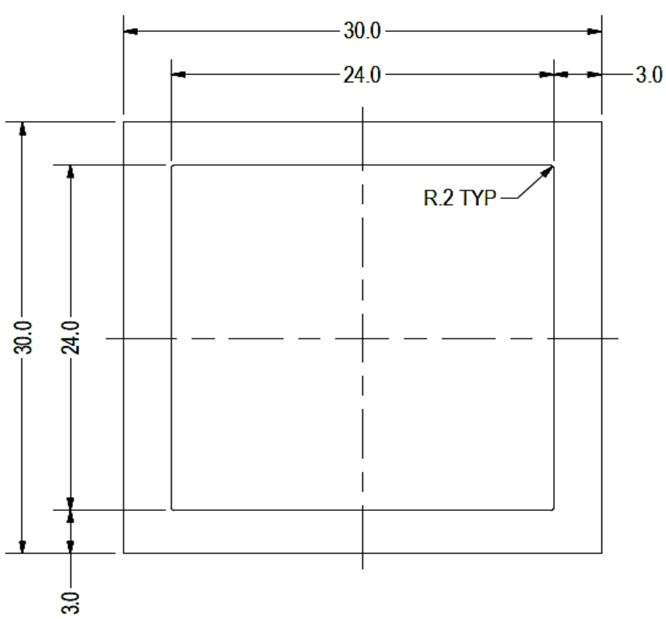
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.033	k-ft
P_n =	0.182	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	9%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

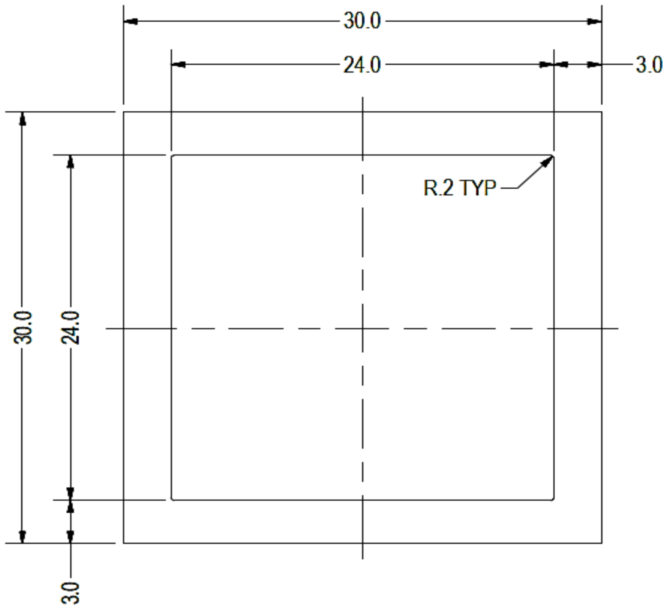
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.478	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	13%	



4.5 Rear Strut Design

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

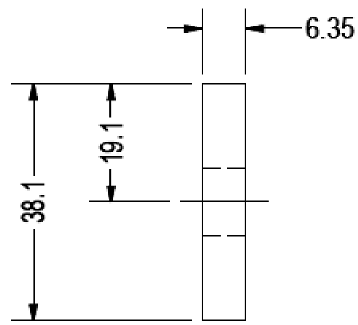
Strut Type =	30x30x3	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.800	k
$M_{y\ allowable}$ =	0.410	k-ft
$M_{z\ allowable}$ =	0.410	k-ft
$P_{n\ allowable}$ =	5.820	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 =	0.004	k-ft
P_n =	0.189	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	10%	



A cross brace kit is required every 19 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

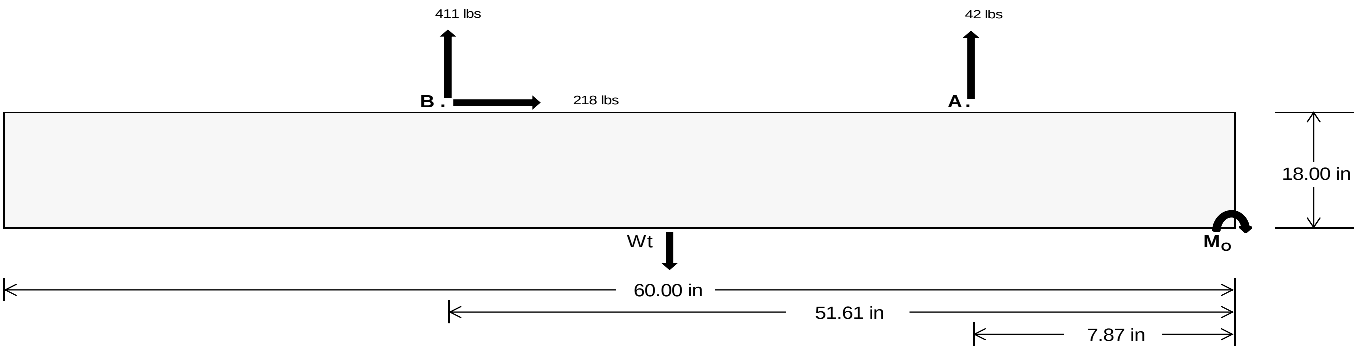
5.1 Helical Pile Foundations

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 =	177.04	1713.48	k
Compressive Load =	1276.52	1183.21	k
Lateral Load =	27.32	906.80	k
Moment (Weak Axis) =	0.04	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC 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 =	25482.0 in-lbs
Resisting Force Required =	849.40 lbs
S.F. =	1.67
Weight Required =	1415.67 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 =	217.93 lbs
Friction =	0.4
Weight Required =	544.83 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 =	217.93 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	439 lbs	439 lbs	439 lbs	439 lbs	459 lbs	459 lbs	459 lbs	459 lbs	637 lbs	637 lbs	637 lbs	637 lbs	-83 lbs	-83 lbs	-83 lbs	-83 lbs
F_B	311 lbs	311 lbs	311 lbs	311 lbs	501 lbs	501 lbs	501 lbs	501 lbs	583 lbs	583 lbs	583 lbs	583 lbs	-823 lbs	-823 lbs	-823 lbs	-823 lbs
F_V	41 lbs	41 lbs	41 lbs	41 lbs	390 lbs	390 lbs	390 lbs	390 lbs	320 lbs	320 lbs	320 lbs	320 lbs	-436 lbs	-436 lbs	-436 lbs	-436 lbs
P_{total}	2744 lbs	2835 lbs	2925 lbs	3016 lbs	2954 lbs	3045 lbs	3135 lbs	3226 lbs	3214 lbs	3304 lbs	3395 lbs	3486 lbs	290 lbs	345 lbs	399 lbs	453 lbs
M	310 lbs-ft	310 lbs-ft	310 lbs-ft	310 lbs-ft	528 lbs-ft	528 lbs-ft	528 lbs-ft	528 lbs-ft	605 lbs-ft	605 lbs-ft	605 lbs-ft	605 lbs-ft	675 lbs-ft	675 lbs-ft	675 lbs-ft	675 lbs-ft
e	0.11 ft	0.11 ft	0.11 ft	0.10 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.19 ft	0.18 ft	0.18 ft	0.17 ft	2.32 ft	1.96 ft	1.69 ft	1.49 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}	258.8 psf	257.0 psf	255.4 psf	253.9 psf	253.1 psf	251.6 psf	250.1 psf	248.8 psf	271.4 psf	269.1 psf	266.9 psf	265.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	339.9 psf	334.5 psf	329.7 psf	325.2 psf	391.4 psf	383.8 psf	376.9 psf	370.5 psf	429.8 psf	420.5 psf	412.1 psf	404.3 psf	598.4 psf	220.8 psf	164.3 psf	143.3 psf

Maximum Bearing Pressure = 598 psf
Allowable Bearing Pressure = 1500 psf

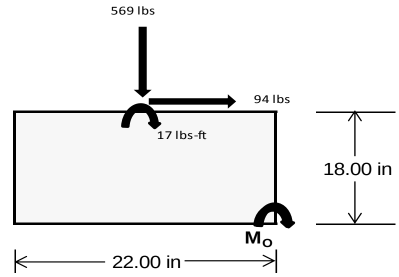
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 363.3 ft-lbs
Resisting Force Required = 396.33 lbs
S.F. = 1.67
Weight Required = 660.55 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	120 lbs	92 lbs	63 lbs	257 lbs	569 lbs	213 lbs	77 lbs	-18 lbs	22 lbs
F_V	15 lbs	125 lbs	15 lbs	11 lbs	94 lbs	12 lbs	15 lbs	125 lbs	15 lbs
P_{total}	2588 lbs	2561 lbs	2531 lbs	2606 lbs	2919 lbs	2562 lbs	798 lbs	704 lbs	743 lbs
M	43 lbs-ft	209 lbs-ft	45 lbs-ft	30 lbs-ft	158 lbs-ft	35 lbs-ft	44 lbs-ft	209 lbs-ft	45 lbs-ft
e	0.02 ft	0.08 ft	0.02 ft	0.01 ft	0.05 ft	0.01 ft	0.06 ft	0.30 ft	0.06 ft
L/6	0.31 ft	1.67 ft	1.80 ft	1.81 ft	1.72 ft	1.81 ft	1.72 ft	1.24 ft	1.71 ft
f_{min}	267.1 sqft	204.6 sqft	260.0 sqft	273.6 sqft	261.9 sqft	267.1 sqft	71.4 sqft	2.1 sqft	65.0 sqft
f_{max}	297.6 psf	354.1 psf	292.2 psf	295.0 psf	374.9 psf	291.9 psf	102.8 psf	151.4 psf	97.1 psf

Maximum Bearing Pressure = 375 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

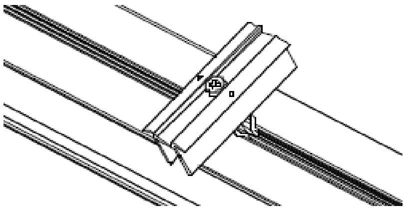
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

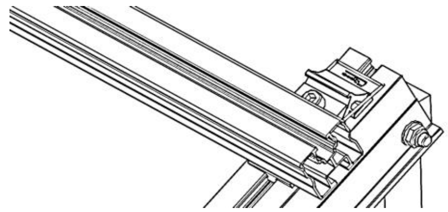
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.627	k
Allowable Uplift =	1.214	k
Utilization =	52%	



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



6.2 Bolted Connections

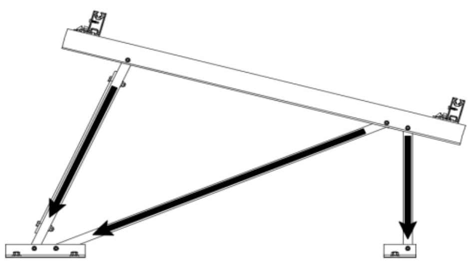
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	0.982	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	17%	

Rear Strut		
Maximum Axial Load =	1.166	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	20%	

Diagonal Strut		
Maximum Axial Load =	0.478	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	8%	

Bracing		
Maximum Axial Load =	0.189	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	2%	



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

7. SEISMIC DESIGN

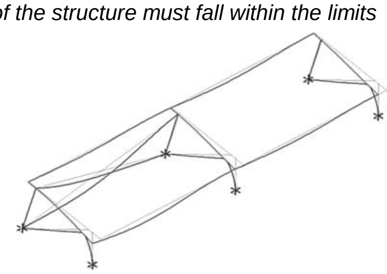
7.1 Seismic Drift

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

Mean Height, h_{sx} =	30.83	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.617	in
Max Drift, Δ_{MAX} =	0.069	in

$0.069 \leq 0.617$, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 60.00 in

J = 0.255

156.237

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

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 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 = 60.00 in

J = 0.255

162.242

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

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= 29.2

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

$\varphi F_L St$= 29.3 ksi
Ix = 250988 mm^4
0.603 in^4
y = 30 mm
Sx = 0.511 in^3
$M_{max}St$ = 1.247 k-ft

3.4.18

h/t = 7.4

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.24
22.039

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

S1 = 1.37733

$$S2 = 1.2C_c$$

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

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.24
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

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

3.4.15

b/t = 24.46

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

S1 = 3.8

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

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

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.6 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 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

$\lambda =$ 0.77182

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

$b/t =$ 7.75

$S1 =$ 12.21 (See 3.4.16 above for formula)

$S2 =$ 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

$b/t =$ 7.75

$S1 =$ 12.21

$S2 =$ 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

$Rb/t =$ 0.0

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

$S1 =$ 6.87

$S2 =$ 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

$A =$ 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.410 k-ft

Weak Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.5514

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7972

φF_L= (φccFcy)/(λ²)

φF_L= 11.5927 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 11.59 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.82 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.8			4		

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-51.748	-51.748	0	0
2	M16	Y	-51.748	-51.748	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-58.278	-58.278	0	0
2	M16	y	-90.067	-90.067	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	116.557	116.557	0	0
2	M16	y	52.98	52.98	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	182.86	2	276.995	2	-.002	10	0	9	0	1	0	1
2		min	-224.181	3	-406.481	3	-2.221	4	0	3	0	1	0	1
3	N7	max	0	5	349.648	1	-.047	10	0	10	0	1	0	1
4		min	-.137	2	-31.935	3	-20.634	4	-.033	4	0	1	0	1
5	N15	max	0	15	981.941	1	.317	1	0	1	0	1	0	1
6		min	-1.421	2	-136.181	3	-21.015	5	-.033	4	0	1	0	1
7	N16	max	639.066	2	910.163	2	0	2	0	1	0	1	0	1
8		min	-697.535	3	-1318.06	3	-165.043	4	0	3	0	1	0	1
9	N23	max	0	15	349.58	1	1.419	1	.002	1	0	1	0	1
10		min	-.137	2	-31.446	3	-19.504	5	-.031	5	0	1	0	1
11	N24	max	182.861	2	279.769	2	62.99	3	0	4	0	1	0	1
12		min	-224.479	3	-405.004	3	-3.313	5	0	3	0	1	0	1
13	Totals:	max	1003.093	2	2997.939	1	0	11						
14		min	-1146.391	3	-2329.106	3	-230.914	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	249.71	1	.64	6	1.083	4	0	10	0	12	0	1
2			min	-367.032	3	.149	15	-.076	3	0	4	0	4	0	1
3		2	max	249.826	1	.595	6	.977	4	0	10	0	5	0	15
4			min	-366.945	3	.139	15	-.076	3	0	4	0	1	0	6
5		3	max	249.943	1	.549	6	.872	4	0	10	0	4	0	15
6			min	-366.858	3	.128	15	-.076	3	0	4	0	3	0	6
7		4	max	250.059	1	.503	6	.766	4	0	10	0	4	0	15
8			min	-366.77	3	.117	15	-.076	3	0	4	0	3	0	6
9		5	max	250.176	1	.458	6	.661	4	0	10	0	4	0	15
10			min	-366.683	3	.107	15	-.076	3	0	4	0	3	0	6
11		6	max	250.292	1	.412	6	.555	4	0	10	0	4	0	15
12			min	-366.596	3	.096	15	-.076	3	0	4	0	3	0	6
13		7	max	250.408	1	.366	6	.45	4	0	10	0	4	0	15
14			min	-366.508	3	.085	15	-.076	3	0	4	0	3	0	6
15		8	max	250.525	1	.321	6	.345	4	0	10	0	4	0	15
16			min	-366.421	3	.074	15	-.076	3	0	4	0	3	0	6
17		9	max	250.641	1	.275	6	.26	1	0	10	0	4	0	15
18			min	-366.334	3	.064	15	-.076	3	0	4	0	3	0	6
19		10	max	250.758	1	.229	6	.26	1	0	10	0	4	0	15
20			min	-366.247	3	.053	15	-.076	3	0	4	0	3	0	6
21		11	max	250.874	1	.184	6	.26	1	0	10	0	4	0	15
22			min	-366.159	3	.042	15	-.076	3	0	4	0	3	0	6
23		12	max	250.99	1	.139	2	.26	1	0	10	0	4	0	15
24			min	-366.072	3	.031	15	-.14	5	0	4	0	3	0	6
25		13	max	251.107	1	.103	2	.26	1	0	10	0	4	0	15
26			min	-365.985	3	.017	12	-.246	5	0	4	0	3	0	6
27		14	max	251.223	1	.068	2	.26	1	0	10	0	4	0	15
28			min	-365.897	3	-.003	3	-.351	5	0	4	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	251.34	1	.032	2	.26	1	0	10	0	4	0	15
30			min	-365.81	3	-.03	3	-.456	5	0	4	0	3	0	6
31		16	max	251.456	1	-.003	2	.26	1	0	10	0	4	0	15
32			min	-365.723	3	-.056	3	-.562	5	0	4	0	3	0	6
33		17	max	251.573	1	-.022	15	.26	1	0	10	0	1	0	15
34			min	-365.635	3	-.09	4	-.667	5	0	4	0	3	0	6
35		18	max	251.689	1	-.033	15	.26	1	0	10	0	1	0	15
36			min	-365.548	3	-.136	4	-.773	5	0	4	0	3	0	6
37		19	max	251.805	1	-.044	15	.26	1	0	10	0	1	0	15
38			min	-365.461	3	-.182	4	-.878	5	0	4	0	3	0	6
39	M3	1	max	130.85	2	1.776	6	-.014	10	0	5	0	1	0	6
40			min	-130.29	3	.417	15	-1.362	4	0	1	0	10	0	15
41		2	max	130.782	2	1.599	6	-.014	10	0	5	0	1	0	2
42			min	-130.342	3	.375	15	-1.228	4	0	1	0	10	0	15
43		3	max	130.713	2	1.422	6	-.014	10	0	5	0	1	0	2
44			min	-130.393	3	.333	15	-1.095	4	0	1	0	5	0	3
45		4	max	130.645	2	1.244	6	-.014	10	0	5	0	1	0	15
46			min	-130.444	3	.292	15	-.961	4	0	1	0	5	0	4
47		5	max	130.576	2	1.067	6	-.014	10	0	5	0	1	0	15
48			min	-130.496	3	.25	15	-.828	4	0	1	0	5	0	4
49		6	max	130.507	2	.89	6	-.014	10	0	5	0	1	0	15
50			min	-130.547	3	.208	15	-.694	4	0	1	0	5	0	4
51		7	max	130.439	2	.713	6	-.014	10	0	5	0	1	0	15
52			min	-130.599	3	.167	15	-.56	4	0	1	0	5	0	4
53		8	max	130.37	2	.536	6	-.014	10	0	5	0	1	0	15
54			min	-130.65	3	.125	15	-.427	4	0	1	0	5	-.001	4
55		9	max	130.302	2	.358	6	-.014	10	0	5	0	1	0	15
56			min	-130.702	3	.083	15	-.293	4	0	1	0	5	-.001	4
57		10	max	130.233	2	.181	6	-.014	10	0	5	0	1	0	15
58			min	-130.753	3	.042	15	-.262	1	0	1	0	5	-.001	4
59		11	max	130.164	2	.028	2	.031	5	0	5	0	1	0	15
60			min	-130.805	3	-.022	3	-.262	1	0	1	0	5	-.001	4
61		12	max	130.096	2	-.042	15	.165	5	0	5	0	1	0	15
62			min	-130.856	3	-.173	4	-.262	1	0	1	0	5	-.001	4
63		13	max	130.027	2	-.083	15	.298	5	0	5	0	1	0	15
64			min	-130.908	3	-.351	4	-.262	1	0	1	0	5	-.001	4
65		14	max	129.959	2	-.125	15	.432	5	0	5	0	1	0	15
66			min	-130.959	3	-.528	4	-.262	1	0	1	0	5	-.001	4
67		15	max	129.89	2	-.167	15	.565	5	0	5	0	1	0	15
68			min	-131.01	3	-.705	4	-.262	1	0	1	0	5	0	4
69		16	max	129.821	2	-.208	15	.699	5	0	5	0	10	0	15
70			min	-131.062	3	-.882	4	-.262	1	0	1	0	4	0	4
71		17	max	129.753	2	-.25	15	.833	5	0	5	0	10	0	15
72			min	-131.113	3	-1.059	4	-.262	1	0	1	0	4	0	4
73		18	max	129.684	2	-.291	15	.966	5	0	5	0	10	0	15
74			min	-131.165	3	-1.237	4	-.262	1	0	1	0	4	0	4
75		19	max	129.616	2	-.333	15	1.1	5	0	5	0	5	0	1
76			min	-131.216	3	-1.414	4	-.262	1	0	1	0	1	0	1
77	M4	1	max	348.483	1	0	1	-.048	10	0	1	0	5	0	1
78			min	-32.808	3	0	1	-19.913	4	0	1	0	2	0	1
79		2	max	348.548	1	0	1	-.048	10	0	1	0	12	0	1
80			min	-32.76	3	0	1	-19.969	4	0	1	-.002	4	0	1
81		3	max	348.613	1	0	1	-.048	10	0	1	0	10	0	1
82			min	-32.711	3	0	1	-20.025	4	0	1	-.004	4	0	1
83		4	max	348.678	1	0	1	-.048	10	0	1	0	10	0	1
84			min	-32.663	3	0	1	-20.081	4	0	1	-.005	4	0	1
85		5	max	348.742	1	0	1	-.048	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-32.614	3	0	1	-20.138	4	0	1	-.007	4	0	1
87		6	max	348.807	1	0	1	-.048	10	0	1	0	10	0	1
88			min	-32.566	3	0	1	-20.194	4	0	1	-.009	4	0	1
89		7	max	348.872	1	0	1	-.048	10	0	1	0	10	0	1
90			min	-32.517	3	0	1	-20.25	4	0	1	-.011	4	0	1
91		8	max	348.936	1	0	1	-.048	10	0	1	0	10	0	1
92			min	-32.468	3	0	1	-20.306	4	0	1	-.013	4	0	1
93		9	max	349.001	1	0	1	-.048	10	0	1	0	10	0	1
94			min	-32.42	3	0	1	-20.362	4	0	1	-.014	4	0	1
95		10	max	349.066	1	0	1	-.048	10	0	1	0	10	0	1
96			min	-32.371	3	0	1	-20.418	4	0	1	-.016	4	0	1
97		11	max	349.131	1	0	1	-.048	10	0	1	0	10	0	1
98			min	-32.323	3	0	1	-20.474	4	0	1	-.018	4	0	1
99		12	max	349.195	1	0	1	-.048	10	0	1	0	10	0	1
100			min	-32.274	3	0	1	-20.53	4	0	1	-.02	4	0	1
101		13	max	349.26	1	0	1	-.048	10	0	1	0	10	0	1
102			min	-32.226	3	0	1	-20.586	4	0	1	-.022	4	0	1
103		14	max	349.325	1	0	1	-.048	10	0	1	0	10	0	1
104			min	-32.177	3	0	1	-20.642	4	0	1	-.024	4	0	1
105		15	max	349.389	1	0	1	-.048	10	0	1	0	10	0	1
106			min	-32.129	3	0	1	-20.698	4	0	1	-.025	4	0	1
107		16	max	349.454	1	0	1	-.048	10	0	1	0	10	0	1
108			min	-32.08	3	0	1	-20.754	4	0	1	-.027	4	0	1
109		17	max	349.519	1	0	1	-.048	10	0	1	0	10	0	1
110			min	-32.032	3	0	1	-20.811	4	0	1	-.029	4	0	1
111		18	max	349.583	1	0	1	-.048	10	0	1	0	10	0	1
112			min	-31.983	3	0	1	-20.867	4	0	1	-.031	4	0	1
113		19	max	349.648	1	0	1	-.048	10	0	1	0	10	0	1
114			min	-31.935	3	0	1	-20.923	4	0	1	-.033	4	0	1
115	M6	1	max	797.699	1	.629	6	1.03	4	0	3	0	3	0	1
116			min	-1165.673	3	.142	15	-.221	3	0	5	0	2	0	1
117		2	max	797.816	1	.584	6	.924	4	0	3	0	4	0	15
118			min	-1165.585	3	.131	15	-.221	3	0	5	0	2	0	6
119		3	max	797.932	1	.538	6	.819	4	0	3	0	4	0	15
120			min	-1165.498	3	.121	15	-.221	3	0	5	0	2	0	6
121		4	max	798.048	1	.492	6	.714	4	0	3	0	4	0	15
122			min	-1165.411	3	.11	15	-.221	3	0	5	0	2	0	6
123		5	max	798.165	1	.455	2	.608	4	0	3	0	4	0	15
124			min	-1165.323	3	.099	15	-.221	3	0	5	0	2	0	6
125		6	max	798.281	1	.42	2	.503	4	0	3	0	4	0	15
126			min	-1165.236	3	.088	15	-.221	3	0	5	0	3	0	6
127		7	max	798.398	1	.384	2	.397	4	0	3	0	4	0	15
128			min	-1165.149	3	.078	15	-.221	3	0	5	0	3	0	6
129		8	max	798.514	1	.349	2	.292	4	0	3	0	4	0	15
130			min	-1165.062	3	.064	12	-.221	3	0	5	0	3	0	2
131		9	max	798.63	1	.313	2	.186	4	0	3	0	4	0	15
132			min	-1164.974	3	.047	12	-.221	3	0	5	0	3	0	2
133		10	max	798.747	1	.277	2	.083	14	0	3	0	4	0	15
134			min	-1164.887	3	.029	12	-.221	3	0	5	0	3	0	2
135		11	max	798.863	1	.242	2	.074	1	0	3	0	4	0	15
136			min	-1164.8	3	.011	3	-.221	3	0	5	0	3	0	2
137		12	max	798.98	1	.206	2	.074	1	0	3	0	4	0	15
138			min	-1164.712	3	-.016	3	-.221	3	0	5	0	3	0	2
139		13	max	799.096	1	.171	2	.074	1	0	3	0	4	0	15
140			min	-1164.625	3	-.043	3	-.26	5	0	5	0	3	0	2
141		14	max	799.212	1	.135	2	.074	1	0	3	0	4	0	15
142			min	-1164.538	3	-.07	3	-.366	5	0	5	0	3	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
143		15	max	799.329	1	.1	2	.074	1	0	3	0	4	0	12
144			min	-1164.45	3	-.096	3	-.471	5	0	5	0	3	0	2
145		16	max	799.445	1	.064	2	.074	1	0	3	0	4	0	12
146			min	-1164.363	3	-.123	3	-.577	5	0	5	0	3	0	2
147		17	max	799.562	1	.028	2	.074	1	0	3	0	4	0	12
148			min	-1164.276	3	-.15	3	-.682	5	0	5	0	3	0	2
149		18	max	799.678	1	-.007	2	.074	1	0	3	0	4	0	12
150			min	-1164.189	3	-.176	3	-.788	5	0	5	0	3	0	2
151		19	max	799.794	1	-.043	2	.074	1	0	3	0	4	0	12
152			min	-1164.101	3	-.203	3	-.893	5	0	5	0	3	0	2
153	M7	1	max	478.203	2	1.79	4	.015	3	0	1	0	4	0	2
154			min	-385.038	3	.425	15	-1.36	4	0	3	0	3	0	12
155		2	max	478.134	2	1.613	4	.015	3	0	1	0	4	0	2
156			min	-385.09	3	.384	15	-1.227	4	0	3	0	3	0	3
157		3	max	478.066	2	1.435	4	.015	3	0	1	0	1	0	2
158			min	-385.141	3	.342	15	-1.093	4	0	3	0	3	0	3
159		4	max	477.997	2	1.258	4	.015	3	0	1	0	1	0	2
160			min	-385.192	3	.3	15	-.96	4	0	3	0	3	0	3
161		5	max	477.929	2	1.081	4	.015	3	0	1	0	1	0	15
162			min	-385.244	3	.259	15	-.826	4	0	3	0	5	0	3
163		6	max	477.86	2	.904	4	.015	3	0	1	0	1	0	15
164			min	-385.295	3	.217	15	-.692	4	0	3	0	5	0	6
165		7	max	477.791	2	.727	4	.015	3	0	1	0	1	0	15
166			min	-385.347	3	.175	15	-.559	4	0	3	0	5	0	6
167		8	max	477.723	2	.549	4	.015	3	0	1	0	1	0	15
168			min	-385.398	3	.134	15	-.425	4	0	3	0	5	0	6
169		9	max	477.654	2	.372	4	.015	3	0	1	0	1	0	15
170			min	-385.45	3	.09	12	-.291	4	0	3	0	5	-.001	6
171		10	max	477.586	2	.219	2	.015	3	0	1	0	1	0	15
172			min	-385.501	3	.021	12	-.158	4	0	3	0	5	-.001	6
173		11	max	477.517	2	.081	2	.015	3	0	1	0	1	0	15
174			min	-385.553	3	-.078	3	-.024	4	0	3	0	5	-.001	6
175		12	max	477.448	2	-.033	15	.11	5	0	1	0	1	0	15
176			min	-385.604	3	-.181	3	-.007	11	0	3	0	5	-.001	6
177		13	max	477.38	2	-.075	15	.243	5	0	1	0	1	0	15
178			min	-385.656	3	-.337	6	-.007	11	0	3	0	5	-.001	6
179		14	max	477.311	2	-.116	15	.377	5	0	1	0	1	0	15
180			min	-385.707	3	-.514	6	-.007	11	0	3	0	5	-.001	6
181		15	max	477.243	2	-.158	15	.511	5	0	1	0	1	0	15
182			min	-385.758	3	-.691	6	-.007	11	0	3	0	5	0	6
183		16	max	477.174	2	-.199	15	.644	5	0	1	0	1	0	15
184			min	-385.81	3	-.869	6	-.007	11	0	3	0	5	0	6
185		17	max	477.105	2	-.241	15	.778	5	0	1	0	1	0	15
186			min	-385.861	3	-1.046	6	-.007	11	0	3	0	5	0	6
187		18	max	477.037	2	-.283	15	.912	5	0	1	0	1	0	15
188			min	-385.913	3	-1.223	6	-.007	11	0	3	0	5	0	6
189		19	max	476.968	2	-.324	15	1.045	5	0	1	0	1	0	1
190			min	-385.964	3	-1.4	6	-.007	11	0	3	0	3	0	1
191	M8	1	max	980.776	1	0	1	.377	1	0	1	0	4	0	1
192			min	-137.054	3	0	1	-20.194	4	0	1	0	1	0	1
193		2	max	980.841	1	0	1	.377	1	0	1	0	1	0	1
194			min	-137.006	3	0	1	-20.25	4	0	1	-.002	4	0	1
195		3	max	980.905	1	0	1	.377	1	0	1	0	1	0	1
196			min	-136.957	3	0	1	-20.306	4	0	1	-.004	4	0	1
197		4	max	980.97	1	0	1	.377	1	0	1	0	1	0	1
198			min	-136.909	3	0	1	-20.362	4	0	1	-.005	4	0	1
199		5	max	981.035	1	0	1	.377	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-136.86	3	0	1	-20.418	4	0	1	-.007	4	0	1
201		6	max	981.099	1	0	1	.377	1	0	1	0	1	0	1
202			min	-136.812	3	0	1	-20.474	4	0	1	-.009	4	0	1
203		7	max	981.164	1	0	1	.377	1	0	1	0	1	0	1
204			min	-136.763	3	0	1	-20.531	4	0	1	-.011	4	0	1
205		8	max	981.229	1	0	1	.377	1	0	1	0	1	0	1
206			min	-136.715	3	0	1	-20.587	4	0	1	-.013	4	0	1
207		9	max	981.294	1	0	1	.377	1	0	1	0	1	0	1
208			min	-136.666	3	0	1	-20.643	4	0	1	-.015	4	0	1
209		10	max	981.358	1	0	1	.377	1	0	1	0	1	0	1
210			min	-136.618	3	0	1	-20.699	4	0	1	-.016	4	0	1
211		11	max	981.423	1	0	1	.377	1	0	1	0	1	0	1
212			min	-136.569	3	0	1	-20.755	4	0	1	-.018	4	0	1
213		12	max	981.488	1	0	1	.377	1	0	1	0	1	0	1
214			min	-136.52	3	0	1	-20.811	4	0	1	-.02	4	0	1
215		13	max	981.552	1	0	1	.377	1	0	1	0	1	0	1
216			min	-136.472	3	0	1	-20.867	4	0	1	-.022	4	0	1
217		14	max	981.617	1	0	1	.377	1	0	1	0	1	0	1
218			min	-136.423	3	0	1	-20.923	4	0	1	-.024	4	0	1
219		15	max	981.682	1	0	1	.377	1	0	1	0	1	0	1
220			min	-136.375	3	0	1	-20.979	4	0	1	-.026	4	0	1
221		16	max	981.746	1	0	1	.377	1	0	1	0	1	0	1
222			min	-136.326	3	0	1	-21.035	4	0	1	-.028	4	0	1
223		17	max	981.811	1	0	1	.377	1	0	1	0	1	0	1
224			min	-136.278	3	0	1	-21.091	4	0	1	-.03	4	0	1
225		18	max	981.876	1	0	1	.377	1	0	1	0	1	0	1
226			min	-136.229	3	0	1	-21.147	4	0	1	-.031	4	0	1
227		19	max	981.941	1	0	1	.377	1	0	1	0	1	0	1
228			min	-136.181	3	0	1	-21.204	4	0	1	-.033	4	0	1
229	M10	1	max	251.853	1	.669	4	1.168	5	0	1	0	1	0	1
230			min	-328.2	3	.169	15	-.117	1	-.001	5	0	3	0	1
231		2	max	251.969	1	.624	4	1.063	5	0	1	0	4	0	15
232			min	-328.113	3	.158	15	-.117	1	-.001	5	0	3	0	4
233		3	max	252.086	1	.578	4	.957	5	0	1	0	4	0	15
234			min	-328.026	3	.148	15	-.117	1	-.001	5	0	3	0	4
235		4	max	252.202	1	.532	4	.852	5	0	1	0	4	0	15
236			min	-327.938	3	.137	15	-.117	1	-.001	5	0	3	0	4
237		5	max	252.318	1	.487	4	.746	5	0	1	0	4	0	15
238			min	-327.851	3	.126	15	-.117	1	-.001	5	0	3	0	4
239		6	max	252.435	1	.441	4	.641	5	0	1	0	4	0	15
240			min	-327.764	3	.115	15	-.117	1	-.001	5	0	3	0	4
241		7	max	252.551	1	.395	4	.535	5	0	1	0	4	0	15
242			min	-327.676	3	.105	15	-.117	1	-.001	5	0	3	0	4
243		8	max	252.668	1	.35	4	.43	5	0	1	0	4	0	15
244			min	-327.589	3	.094	15	-.117	1	-.001	5	0	3	0	4
245		9	max	252.784	1	.304	4	.324	5	0	1	0	4	0	15
246			min	-327.502	3	.083	15	-.117	1	-.001	5	0	3	0	4
247		10	max	252.9	1	.259	4	.219	5	0	1	0	4	0	15
248			min	-327.415	3	.072	15	-.117	1	-.001	5	0	3	0	4
249		11	max	253.017	1	.213	4	.113	5	0	1	.001	5	0	15
250			min	-327.327	3	.062	15	-.117	1	-.001	5	0	3	0	4
251		12	max	253.133	1	.167	4	.008	5	0	1	.001	5	0	15
252			min	-327.24	3	.051	15	-.117	1	-.001	5	0	3	0	4
253		13	max	253.25	1	.122	4	-.012	10	0	1	.001	5	0	15
254			min	-327.153	3	.035	12	-.117	1	-.001	5	0	3	0	4
255		14	max	253.366	1	.076	4	-.012	10	0	1	.001	5	0	15
256			min	-327.065	3	.017	12	-.218	4	-.001	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	253.482	1	.032	2	-.012	10	0	1	0	5	0	15
258			min	-326.978	3	-.004	9	-.324	4	-.001	5	0	3	0	4
259		16	max	253.599	1	.011	5	-.012	10	0	1	0	5	0	15
260			min	-326.891	3	-.034	9	-.429	4	-.001	5	0	3	0	4
261		17	max	253.715	1	-.003	15	-.012	10	0	1	0	5	0	15
262			min	-326.803	3	-.064	1	-.535	4	-.001	5	0	3	0	4
263		18	max	253.832	1	-.013	15	-.012	10	0	1	0	5	0	15
264			min	-326.716	3	-.108	6	-.64	4	-.001	5	0	3	0	4
265		19	max	253.948	1	-.024	15	-.012	10	0	1	0	5	0	15
266			min	-326.629	3	-.153	6	-.746	4	-.001	5	0	1	0	4
267	M11	1	max	130.37	2	1.77	6	.288	1	.001	4	0	5	0	6
268			min	-130.947	3	.412	15	-1.238	5	0	10	0	1	0	15
269		2	max	130.301	2	1.592	6	.288	1	.001	4	0	5	0	2
270			min	-130.999	3	.371	15	-1.105	5	0	10	0	1	0	12
271		3	max	130.233	2	1.415	6	.288	1	.001	4	0	5	0	2
272			min	-131.05	3	.329	15	-.971	5	0	10	0	1	0	3
273		4	max	130.164	2	1.238	6	.288	1	.001	4	0	3	0	15
274			min	-131.101	3	.287	15	-.837	5	0	10	0	1	0	4
275		5	max	130.096	2	1.061	6	.288	1	.001	4	0	3	0	15
276			min	-131.153	3	.246	15	-.704	5	0	10	0	1	0	4
277		6	max	130.027	2	.884	6	.288	1	.001	4	0	3	0	15
278			min	-131.204	3	.204	15	-.57	5	0	10	0	1	0	4
279		7	max	129.958	2	.706	6	.288	1	.001	4	0	3	0	15
280			min	-131.256	3	.162	15	-.437	5	0	10	0	1	0	4
281		8	max	129.89	2	.529	6	.288	1	.001	4	0	3	0	15
282			min	-131.307	3	.121	15	-.303	5	0	10	0	1	-.001	4
283		9	max	129.821	2	.352	6	.288	1	.001	4	0	3	0	15
284			min	-131.359	3	.079	15	-.169	5	0	10	0	4	-.001	4
285		10	max	129.753	2	.175	6	.288	1	.001	4	0	3	0	15
286			min	-131.41	3	.037	15	-.036	5	0	10	0	4	-.001	4
287		11	max	129.684	2	.028	2	.288	1	.001	4	0	3	0	15
288			min	-131.462	3	-.038	3	-.028	3	0	10	0	4	-.001	4
289		12	max	129.615	2	-.046	15	.294	4	.001	4	0	3	0	15
290			min	-131.513	3	-.18	4	-.028	3	0	10	0	4	-.001	4
291		13	max	129.547	2	-.088	15	.428	4	.001	4	0	3	0	15
292			min	-131.565	3	-.357	4	-.028	3	0	10	0	4	-.001	4
293		14	max	129.478	2	-.129	15	.561	4	.001	4	0	3	0	15
294			min	-131.616	3	-.534	4	-.028	3	0	10	0	4	-.001	4
295		15	max	129.41	2	-.171	15	.695	4	.001	4	0	3	0	15
296			min	-131.667	3	-.712	4	-.028	3	0	10	0	2	0	4
297		16	max	129.341	2	-.213	15	.829	4	.001	4	0	3	0	15
298			min	-131.719	3	-.889	4	-.028	3	0	10	0	10	0	4
299		17	max	129.272	2	-.254	15	.962	4	.001	4	0	4	0	15
300			min	-131.77	3	-1.066	4	-.028	3	0	10	0	10	0	4
301		18	max	129.204	2	-.296	15	1.096	4	.001	4	0	4	0	15
302			min	-131.822	3	-1.243	4	-.028	3	0	10	0	10	0	4
303		19	max	129.135	2	-.338	15	1.229	4	.001	4	0	4	0	1
304			min	-131.873	3	-1.42	4	-.028	3	0	10	0	10	0	1
305	M12	1	max	348.415	1	0	1	1.505	1	0	1	0	4	0	1
306			min	-32.32	3	0	1	-18.512	5	0	1	0	3	0	1
307		2	max	348.48	1	0	1	1.505	1	0	1	0	1	0	1
308			min	-32.271	3	0	1	-18.568	5	0	1	-.002	5	0	1
309		3	max	348.545	1	0	1	1.505	1	0	1	0	1	0	1
310			min	-32.223	3	0	1	-18.624	5	0	1	-.003	5	0	1
311		4	max	348.609	1	0	1	1.505	1	0	1	0	1	0	1
312			min	-32.174	3	0	1	-18.68	5	0	1	-.005	5	0	1
313		5	max	348.674	1	0	1	1.505	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-32.125	3	0	1	-18.736	5	0	1	-.007	5	0	1
315		6	max	348.739	1	0	1	1.505	1	0	1	0	1	0	1
316			min	-32.077	3	0	1	-18.793	5	0	1	-.008	5	0	1
317		7	max	348.804	1	0	1	1.505	1	0	1	0	1	0	1
318			min	-32.028	3	0	1	-18.849	5	0	1	-.01	5	0	1
319		8	max	348.868	1	0	1	1.505	1	0	1	0	1	0	1
320			min	-31.98	3	0	1	-18.905	5	0	1	-.012	5	0	1
321		9	max	348.933	1	0	1	1.505	1	0	1	.001	1	0	1
322			min	-31.931	3	0	1	-18.961	5	0	1	-.013	5	0	1
323		10	max	348.998	1	0	1	1.505	1	0	1	.001	1	0	1
324			min	-31.883	3	0	1	-19.017	5	0	1	-.015	5	0	1
325		11	max	349.062	1	0	1	1.505	1	0	1	.001	1	0	1
326			min	-31.834	3	0	1	-19.073	5	0	1	-.017	5	0	1
327		12	max	349.127	1	0	1	1.505	1	0	1	.001	1	0	1
328			min	-31.786	3	0	1	-19.129	5	0	1	-.018	5	0	1
329		13	max	349.192	1	0	1	1.505	1	0	1	.002	1	0	1
330			min	-31.737	3	0	1	-19.185	5	0	1	-.02	5	0	1
331		14	max	349.257	1	0	1	1.505	1	0	1	.002	1	0	1
332			min	-31.689	3	0	1	-19.241	5	0	1	-.022	5	0	1
333		15	max	349.321	1	0	1	1.505	1	0	1	.002	1	0	1
334			min	-31.64	3	0	1	-19.297	5	0	1	-.024	5	0	1
335		16	max	349.386	1	0	1	1.505	1	0	1	.002	1	0	1
336			min	-31.592	3	0	1	-19.353	5	0	1	-.025	5	0	1
337		17	max	349.451	1	0	1	1.505	1	0	1	.002	1	0	1
338			min	-31.543	3	0	1	-19.409	5	0	1	-.027	5	0	1
339		18	max	349.515	1	0	1	1.505	1	0	1	.002	1	0	1
340			min	-31.495	3	0	1	-19.466	5	0	1	-.029	5	0	1
341		19	max	349.58	1	0	1	1.505	1	0	1	.002	1	0	1
342			min	-31.446	3	0	1	-19.522	5	0	1	-.031	5	0	1
343	M1	1	max	92.151	1	345.805	3	-1.569	10	0	1	.06	1	0	2
344			min	5.409	12	-251.529	1	-30.675	1	0	3	.003	10	0	3
345		2	max	92.269	1	345.616	3	-1.569	10	0	1	.054	1	.055	1
346			min	5.468	12	-251.782	1	-30.675	1	0	3	.003	10	-.075	3
347		3	max	59.861	3	5.265	14	-1.558	10	0	3	.046	1	.108	1
348			min	-7.626	10	-19.461	2	-30.538	1	0	1	.002	10	-.149	3
349		4	max	59.949	3	5.017	14	-1.558	10	0	3	.04	1	.109	1
350			min	-7.527	10	-19.714	2	-30.538	1	0	1	.002	10	-.145	3
351		5	max	60.038	3	4.768	14	-1.558	10	0	3	.033	1	.113	2
352			min	-7.429	10	-19.967	2	-30.538	1	0	1	.002	10	-.141	3
353		6	max	60.126	3	4.519	14	-1.558	10	0	3	.027	1	.117	2
354			min	-7.331	10	-20.22	2	-30.538	1	0	1	.001	10	-.137	3
355		7	max	60.215	3	4.271	14	-1.558	10	0	3	.02	1	.122	2
356			min	-7.232	10	-20.473	2	-30.538	1	0	1	.001	10	-.133	3
357		8	max	60.303	3	4.049	9	-1.558	10	0	3	.013	1	.126	2
358			min	-7.134	10	-20.726	2	-30.538	1	0	1	0	10	-.129	3
359		9	max	60.392	3	3.838	9	-1.558	10	0	3	.007	1	.131	2
360			min	-7.036	10	-20.979	2	-30.538	1	0	1	0	10	-.125	3
361		10	max	60.48	3	3.627	9	-1.558	10	0	3	.001	3	.135	2
362			min	-6.937	10	-21.232	2	-30.538	1	0	1	0	10	-.12	3
363		11	max	60.569	3	3.416	9	-1.558	10	0	3	0	3	.14	2
364			min	-6.839	10	-21.486	2	-30.538	1	0	1	-.007	1	-.116	3
365		12	max	60.657	3	3.206	9	-1.558	10	0	3	0	12	.145	2
366			min	-6.74	10	-21.739	2	-30.538	1	0	1	-.013	1	-.112	3
367		13	max	60.746	3	2.995	9	-1.558	10	0	3	0	12	.149	2
368			min	-6.642	10	-21.992	2	-30.538	1	0	1	-.02	1	-.108	3
369		14	max	60.834	3	2.784	9	-1.558	10	0	3	-.001	10	.154	2
370			min	-6.544	10	-22.245	2	-30.538	1	0	1	-.026	1	-.103	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	60.923	3	2.573	9	-1.558	10	0	3	-.002	10	.159	2
372			min	-6.445	10	-22.498	2	-30.538	1	0	1	-.033	1	-.099	3
373		16	max	87.137	2	78.216	2	-1.571	10	0	1	-.002	10	.163	2
374			min	-20.167	3	-123.537	3	-30.77	1	0	5	-.04	1	-.094	3
375		17	max	87.255	2	77.963	2	-1.571	10	0	1	-.002	10	.146	2
376			min	-20.078	3	-123.727	3	-30.77	1	0	5	-.047	1	-.067	3
377		18	max	-4.045	12	338.803	2	-1.619	10	0	3	-.003	10	.074	2
378			min	-92.251	1	-153.69	3	-34.246	4	0	2	-.053	1	-.034	3
379		19	max	-3.986	12	338.55	2	-1.619	10	0	3	-.003	10	0	2
380			min	-92.133	1	-153.88	3	-34.004	4	0	2	-.06	1	0	3
381	M5	1	max	213.783	1	1128.384	3	0	2	0	1	.034	4	0	3
382			min	3.537	12	-819.068	1	-56.406	3	0	5	0	10	0	2
383		2	max	213.901	1	1128.195	3	0	2	0	1	.029	4	.177	1
384			min	3.596	12	-819.321	1	-56.406	3	0	5	-.005	3	-.244	3
385		3	max	172.773	3	5.84	9	6.276	3	0	3	.024	4	.352	1
386			min	-27.006	10	-70.752	2	-18.652	4	0	4	-.017	3	-.484	3
387		4	max	172.861	3	5.629	9	6.276	3	0	3	.02	4	.358	1
388			min	-26.908	10	-71.005	2	-18.41	4	0	4	-.015	3	-.47	3
389		5	max	172.95	3	5.419	9	6.276	3	0	3	.016	4	.369	2
390			min	-26.809	10	-71.258	2	-18.168	4	0	4	-.014	3	-.455	3
391		6	max	173.038	3	5.208	9	6.276	3	0	3	.012	4	.384	2
392			min	-26.711	10	-71.511	2	-17.926	4	0	4	-.012	3	-.441	3
393		7	max	173.127	3	4.997	9	6.276	3	0	3	.008	4	.4	2
394			min	-26.613	10	-71.764	2	-17.684	4	0	4	-.011	3	-.427	3
395		8	max	173.215	3	4.786	9	6.276	3	0	3	.005	4	.415	2
396			min	-26.514	10	-72.017	2	-17.442	4	0	4	-.01	3	-.412	3
397		9	max	173.304	3	4.575	9	6.276	3	0	3	0	4	.431	2
398			min	-26.416	10	-72.27	2	-17.2	4	0	4	-.008	3	-.398	3
399		10	max	173.392	3	4.364	9	6.276	3	0	3	0	2	.447	2
400			min	-26.318	10	-72.523	2	-16.958	4	0	4	-.007	3	-.384	3
401		11	max	173.481	3	4.153	9	6.276	3	0	3	0	2	.462	2
402			min	-26.219	10	-72.776	2	-16.716	4	0	4	-.006	4	-.369	3
403		12	max	173.569	3	3.942	9	6.276	3	0	3	0	2	.478	2
404			min	-26.121	10	-73.029	2	-16.474	4	0	4	-.01	4	-.355	3
405		13	max	173.658	3	3.731	9	6.276	3	0	3	0	2	.494	2
406			min	-26.023	10	-73.283	2	-16.232	4	0	4	-.014	4	-.34	3
407		14	max	173.746	3	3.52	9	6.276	3	0	3	0	2	.51	2
408			min	-25.924	10	-73.536	2	-15.99	4	0	4	-.017	4	-.326	3
409		15	max	173.835	3	3.31	9	6.276	3	0	3	0	2	.526	2
410			min	-25.826	10	-73.789	2	-15.748	4	0	4	-.021	4	-.311	3
411		16	max	287.776	2	301.59	2	6.243	3	0	3	0	3	.539	2
412			min	-66.211	3	-369.411	3	-14.467	4	0	4	-.024	4	-.294	3
413		17	max	287.894	2	301.337	2	6.243	3	0	3	.002	3	.473	2
414			min	-66.122	3	-369.601	3	-14.225	4	0	4	-.027	4	-.214	3
415		18	max	-5.635	12	1099.959	2	5.736	3	0	4	.003	3	.238	2
416			min	-213.934	1	-494.536	3	-33.677	5	0	1	-.034	4	-.107	3
417		19	max	-5.576	12	1099.706	2	5.736	3	0	4	.005	3	0	3
418			min	-213.816	1	-494.726	3	-33.435	5	0	1	-.042	4	0	2
419	M9	1	max	91.873	1	345.754	3	140.596	4	0	3	0	15	0	2
420			min	1.362	15	-251.528	1	1.569	10	0	1	-.06	1	0	3
421		2	max	91.991	1	345.564	3	140.838	4	0	3	.029	5	.055	1
422			min	1.397	15	-251.781	1	1.569	10	0	1	-.053	1	-.075	3
423		3	max	59.713	3	5.083	9	29.879	1	0	1	.056	5	.108	1
424			min	-7.241	10	-19.433	2	-24.192	5	0	5	-.045	1	-.149	3
425		4	max	59.801	3	4.872	9	29.879	1	0	1	.051	5	.109	1
426			min	-7.143	10	-19.686	2	-23.95	5	0	5	-.039	1	-.145	3
427		5	max	59.89	3	4.661	9	29.879	1	0	1	.045	5	.113	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
428			min	-7.044	10	-19.939	2	-23.708	5	0	5	-.032	1	-.141	3
429		6	max	59.978	3	4.45	9	29.879	1	0	1	.04	5	.117	2
430			min	-6.946	10	-20.192	2	-23.466	5	0	5	-.026	1	-.137	3
431		7	max	60.067	3	4.239	9	29.879	1	0	1	.035	5	.122	2
432			min	-6.848	10	-20.445	2	-23.224	5	0	5	-.02	1	-.133	3
433		8	max	60.155	3	4.028	9	29.879	1	0	1	.03	5	.126	2
434			min	-6.749	10	-20.698	2	-22.982	5	0	5	-.013	1	-.129	3
435		9	max	60.244	3	3.817	9	29.879	1	0	1	.025	5	.131	2
436			min	-6.651	10	-20.951	2	-22.74	5	0	5	-.007	1	-.125	3
437		10	max	60.332	3	3.606	9	29.879	1	0	1	.02	4	.135	2
438			min	-6.553	10	-21.204	2	-22.498	5	0	5	0	1	-.12	3
439		11	max	60.421	3	3.395	9	29.879	1	0	1	.017	4	.14	2
440			min	-6.454	10	-21.457	2	-22.256	5	0	5	0	10	-.116	3
441		12	max	60.509	3	3.184	9	29.879	1	0	1	.014	4	.145	2
442			min	-6.356	10	-21.71	2	-22.014	5	0	5	0	10	-.112	3
443		13	max	60.598	3	2.974	9	29.879	1	0	1	.019	1	.149	2
444			min	-6.258	10	-21.963	2	-21.772	5	0	5	.001	10	-.108	3
445		14	max	60.686	3	2.763	9	29.879	1	0	1	.026	1	.154	2
446			min	-6.159	10	-22.216	2	-21.53	5	0	5	0	15	-.103	3
447		15	max	60.775	3	2.552	9	29.879	1	0	1	.032	1	.159	2
448			min	-6.061	10	-22.47	2	-21.288	5	0	5	-.003	5	-.099	3
449		16	max	87.299	2	77.869	2	30.137	1	0	10	.039	1	.163	2
450			min	-20.713	3	-123.974	3	-19.881	5	0	4	-.007	5	-.094	3
451		17	max	87.417	2	77.616	2	30.137	1	0	10	.046	1	.146	2
452			min	-20.624	3	-124.164	3	-19.639	5	0	4	-.011	5	-.067	3
453		18	max	5.446	5	338.804	2	31.643	1	0	2	.053	1	.074	2
454			min	-91.975	1	-153.684	3	-37.888	5	0	3	-.019	5	-.034	3
455		19	max	5.501	5	338.55	2	31.643	1	0	2	.06	1	0	2
456			min	-91.857	1	-153.874	3	-37.646	5	0	3	-.027	5	0	3
457	M13	1	max	140.598	4	251.264	1	-1.362	15	0	2	.06	1	0	1
458			min	1.569	10	-345.778	3	-91.866	1	0	3	0	15	0	3
459		2	max	135.141	4	177.968	1	-.559	15	0	2	.015	1	.164	3
460			min	1.569	10	-244.676	3	-69.765	1	0	3	0	10	-.119	1
461		3	max	129.685	4	104.672	1	.259	5	0	2	.007	3	.272	3
462			min	1.569	10	-143.575	3	-47.665	1	0	3	-.018	1	-.198	1
463		4	max	124.228	4	31.377	1	1.501	5	0	2	.004	3	.324	3
464			min	1.569	10	-42.474	3	-25.564	1	0	3	-.038	1	-.236	1
465		5	max	118.772	4	58.628	3	2.743	5	0	2	.002	3	.319	3
466			min	1.569	10	-41.919	1	-3.464	1	0	3	-.046	1	-.233	1
467		6	max	113.315	4	159.729	3	18.636	1	0	2	.003	5	.258	3
468			min	1.569	10	-115.215	1	-1.955	3	0	3	-.042	1	-.189	1
469		7	max	107.859	4	260.83	3	40.737	1	0	2	.005	5	.142	3
470			min	1.569	10	-188.511	1	-.787	3	0	3	-.026	1	-.105	1
471		8	max	102.402	4	361.932	3	62.837	1	0	2	.009	4	.021	1
472			min	1.569	10	-261.806	1	.374	12	0	3	0	3	-.031	3
473		9	max	96.946	4	463.033	3	84.938	1	0	2	.044	1	.186	1
474			min	1.569	10	-335.102	1	1.152	12	0	3	0	3	-.261	3
475		10	max	91.489	4	564.135	3	107.038	1	0	2	.097	1	.393	1
476			min	1.569	10	-408.398	1	1.931	12	0	3	-.006	3	-.546	3
477		11	max	64.504	4	335.102	1	3.899	5	0	3	.044	1	.186	1
478			min	1.569	10	-463.033	3	-84.659	1	0	2	-.014	5	-.261	3
479		12	max	59.048	4	261.806	1	5.14	5	0	3	.004	2	.021	1
480			min	1.569	10	-361.932	3	-62.559	1	0	2	-.012	5	-.031	3
481		13	max	53.591	4	188.511	1	6.382	5	0	3	-.001	10	.142	3
482			min	1.569	10	-260.83	3	-40.459	1	0	2	-.026	1	-.105	1
483		14	max	48.135	4	115.215	1	7.624	5	0	3	-.003	15	.258	3
484			min	1.569	10	-159.729	3	-18.358	1	0	2	-.042	1	-.189	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	42.678	4	41.919	1	9.957	4	0	3	0	15	.319	3
486			min	1.569	10	-58.628	3	-.897	10	0	2	-.046	1	-.233	1
487		16	max	37.222	4	42.474	3	25.843	1	0	3	.005	5	.324	3
488			min	1.569	10	-31.377	1	1.32	10	0	2	-.038	1	-.236	1
489		17	max	31.765	4	143.575	3	47.943	1	0	3	.011	5	.272	3
490			min	1.569	10	-104.673	1	3.537	10	0	2	-.018	1	-.198	1
491		18	max	30.742	1	244.676	3	70.043	1	0	3	.022	4	.164	3
492			min	1.569	10	-177.968	1	4.631	12	0	2	0	10	-.119	1
493		19	max	30.742	1	345.778	3	92.144	1	0	3	.06	1	0	1
494			min	1.569	10	-251.264	1	5.409	12	0	2	.003	10	0	3
495	M16	1	max	37.636	5	338.682	2	5.501	5	0	3	.06	1	0	2
496			min	-31.574	1	-153.895	3	-91.865	1	0	2	-.027	5	0	3
497		2	max	32.179	5	239.889	2	6.743	5	0	3	.015	1	.073	3
498			min	-31.574	1	-109.306	3	-69.764	1	0	2	-.024	5	-.161	2
499		3	max	26.723	5	141.096	2	7.984	5	0	3	0	12	.121	3
500			min	-31.574	1	-64.718	3	-47.664	1	0	2	-.023	4	-.267	2
501		4	max	21.266	5	42.303	2	9.226	5	0	3	-.002	12	.145	3
502			min	-31.574	1	-20.129	3	-25.563	1	0	2	-.038	1	-.317	2
503		5	max	15.81	5	24.459	3	10.468	5	0	3	-.003	12	.144	3
504			min	-31.574	1	-56.49	2	-3.463	1	0	2	-.046	1	-.314	2
505		6	max	10.353	5	69.048	3	18.637	1	0	3	-.002	15	.118	3
506			min	-31.574	1	-155.284	2	-.96	3	0	2	-.042	1	-.255	2
507		7	max	4.897	5	113.636	3	40.738	1	0	3	.003	5	.067	3
508			min	-31.574	1	-254.077	2	.208	3	0	2	-.026	1	-.141	2
509		8	max	1.387	3	158.225	3	62.838	1	0	3	.011	4	.028	2
510			min	-31.574	1	-352.87	2	.996	12	0	2	-.005	3	-.008	3
511		9	max	1.387	3	202.813	3	84.939	1	0	3	.044	1	.251	2
512			min	-31.574	1	-451.663	2	1.775	12	0	2	-.004	3	-.109	3
513		10	max	21.974	5	-9.584	15	107.039	1	0	14	.097	1	.529	2
514			min	-31.574	1	-550.456	2	-4.466	3	0	2	.002	12	-.234	3
515		11	max	16.518	5	451.663	2	3.402	5	0	2	.044	1	.251	2
516			min	-31.476	1	-202.813	3	-84.663	1	0	3	-.012	5	-.109	3
517		12	max	11.061	5	352.87	2	4.644	5	0	2	.004	2	.028	2
518			min	-31.476	1	-158.225	3	-62.562	1	0	3	-.009	5	-.008	3
519		13	max	5.605	5	254.077	2	5.886	5	0	2	-.001	12	.067	3
520			min	-31.476	1	-113.636	3	-40.462	1	0	3	-.026	1	-.141	2
521		14	max	.148	5	155.284	2	7.127	5	0	2	-.001	12	.118	3
522			min	-31.476	1	-69.048	3	-18.361	1	0	3	-.042	1	-.255	2
523		15	max	-1.619	10	56.49	2	9.438	4	0	2	.002	5	.144	3
524			min	-31.476	1	-24.459	3	-.891	10	0	3	-.046	1	-.314	2
525		16	max	-1.619	10	20.129	3	25.839	1	0	2	.007	5	.145	3
526			min	-31.476	1	-42.303	2	1.326	10	0	3	-.038	1	-.317	2
527		17	max	-1.619	10	64.718	3	47.94	1	0	2	.012	5	.121	3
528			min	-31.476	1	-141.096	2	2.429	12	0	3	-.018	1	-.267	2
529		18	max	-1.619	10	109.306	3	70.04	1	0	2	.022	4	.073	3
530			min	-31.476	1	-239.889	2	3.207	12	0	3	0	10	-.161	2
531		19	max	-1.619	10	153.895	3	92.141	1	0	2	.06	1	0	2
532			min	-34.037	4	-338.682	2	3.986	12	0	3	.003	10	0	3
533	M15	1	max	0	1	1.028	3	.09	3	0	1	0	1	0	1
534			min	-73.111	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.914	3	.09	3	0	1	0	1	0	1
536			min	-73.176	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.8	3	.09	3	0	1	0	1	0	1
538			min	-73.242	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.686	3	.09	3	0	1	0	1	0	1
540			min	-73.307	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.571	3	.09	3	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-73.372	3	0	1	0	1	0	3	0	3	-.001	3
543		6	max	0	1	.457	3	.09	3	0	1	0	1	0	1
544			min	-73.437	3	0	1	0	1	0	3	0	3	-.001	3
545		7	max	0	1	.343	3	.09	3	0	1	0	3	0	1
546			min	-73.502	3	0	1	0	1	0	3	0	1	-.001	3
547		8	max	0	1	.229	3	.09	3	0	1	0	3	0	1
548			min	-73.568	3	0	1	0	1	0	3	0	1	-.001	3
549		9	max	0	1	.114	3	.09	3	0	1	0	3	0	1
550			min	-73.633	3	0	1	0	1	0	3	0	1	-.001	3
551		10	max	0	1	0	1	.09	3	0	1	0	3	0	1
552			min	-73.698	3	0	1	0	1	0	3	0	1	-.002	3
553		11	max	0	1	0	1	.09	3	0	1	0	3	0	1
554			min	-73.763	3	-.114	3	0	1	0	3	0	1	-.001	3
555		12	max	0	1	0	1	.09	3	0	1	0	3	0	1
556			min	-73.828	3	-.229	3	0	1	0	3	0	1	-.001	3
557		13	max	0	1	0	1	.09	3	0	1	0	3	0	1
558			min	-73.894	3	-.343	3	0	1	0	3	0	1	-.001	3
559		14	max	0	1	0	1	.09	3	0	1	0	3	0	1
560			min	-73.959	3	-.457	3	0	1	0	3	0	1	-.001	3
561		15	max	0	1	0	1	.09	3	0	1	0	3	0	1
562			min	-74.024	3	-.571	3	0	1	0	3	0	1	-.001	3
563		16	max	0	1	0	1	.09	3	0	1	0	3	0	1
564			min	-74.089	3	-.686	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.09	3	0	1	0	3	0	1
566			min	-74.154	3	-.8	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.09	3	0	1	0	3	0	1
568			min	-74.22	3	-.914	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.09	3	0	1	0	3	0	1
570			min	-74.285	3	-1.028	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	2.427	4	.272	4	0	3	0	3	0	1
572			min	-188.615	4	0	2	-.036	3	0	1	0	4	0	1
573		2	max	0	2	2.157	4	.246	4	0	3	0	3	0	2
574			min	-188.633	4	0	2	-.036	3	0	1	0	4	0	4
575		3	max	0	2	1.888	4	.219	4	0	3	0	3	0	2
576			min	-188.652	4	0	2	-.036	3	0	1	0	4	-.001	4
577		4	max	0	2	1.618	4	.193	4	0	3	0	3	0	2
578			min	-188.67	4	0	2	-.036	3	0	1	0	1	-.002	4
579		5	max	0	2	1.348	4	.166	4	0	3	0	3	0	2
580			min	-188.688	4	0	2	-.036	3	0	1	0	1	-.002	4
581		6	max	0	2	1.079	4	.14	4	0	3	0	3	0	2
582			min	-188.707	4	0	2	-.036	3	0	1	0	1	-.003	4
583		7	max	0	2	.809	4	.113	4	0	3	0	5	0	2
584			min	-188.725	4	0	2	-.036	3	0	1	0	1	-.003	4
585		8	max	0	2	.539	4	.087	4	0	3	0	5	0	2
586			min	-188.744	4	0	2	-.036	3	0	1	0	1	-.003	4
587		9	max	0	2	.27	4	.06	4	0	3	0	5	0	2
588			min	-188.762	4	0	2	-.036	3	0	1	0	1	-.004	4
589		10	max	0	2	0	1	.034	4	0	3	0	5	0	2
590			min	-188.781	4	0	1	-.036	3	0	1	0	1	-.004	4
591		11	max	0	2	0	2	.033	1	0	3	0	5	0	2
592			min	-188.799	4	-.27	4	-.036	3	0	1	0	1	-.004	4
593		12	max	0	2	0	2	.033	1	0	3	0	5	0	2
594			min	-188.818	4	-.539	4	-.036	3	0	1	0	1	-.003	4
595		13	max	0	2	0	2	.033	1	0	3	0	5	0	2
596			min	-188.836	4	-.809	4	-.05	5	0	1	0	3	-.003	4
597		14	max	0	2	0	2	.033	1	0	3	0	5	0	2
598			min	-188.855	4	-1.079	4	-.076	5	0	1	0	3	-.003	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	0	2	0	2	.033	1	0	3	0	4	0	2
600			min	-188.873	4	-1.348	4	-.103	5	0	1	0	3	-.002	4
601		16	max	0	2	0	2	.033	1	0	3	0	4	0	2
602			min	-188.891	4	-1.618	4	-.129	5	0	1	0	3	-.002	4
603		17	max	0	2	0	2	.033	1	0	3	0	1	0	2
604			min	-188.91	4	-1.888	4	-.156	5	0	1	0	3	-.001	4
605		18	max	.001	11	0	2	.033	1	0	3	0	1	0	2
606			min	-188.928	4	-2.157	4	-.182	5	0	1	0	3	0	4
607		19	max	.074	11	0	2	.033	1	0	3	0	1	0	1
608			min	-188.947	4	-2.427	4	-.209	5	0	1	0	5	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	.008	2	.006	1	1.16e-3	5	NC	3	NC	2
2			min	-.003	3	-.008	3	-.011	5	-4.676e-4	1	4536.008	2	6214.07	1
3		2	max	.002	1	.007	2	.005	1	1.181e-3	5	NC	3	NC	2
4			min	-.003	3	-.007	3	-.011	5	-4.478e-4	1	4941.184	2	6710.987	1
5		3	max	.002	1	.007	2	.005	1	1.202e-3	5	NC	3	NC	2
6			min	-.003	3	-.007	3	-.011	5	-4.28e-4	1	5421.455	2	7297.266	1
7		4	max	.002	1	.006	2	.005	1	1.223e-3	5	NC	1	NC	2
8			min	-.003	3	-.007	3	-.01	5	-4.082e-4	1	5994.736	2	7994.5	1
9		5	max	.002	1	.005	2	.004	1	1.243e-3	5	NC	1	NC	2
10			min	-.003	3	-.006	3	-.01	5	-3.884e-4	1	6684.853	2	8831.533	1
11		6	max	.002	1	.005	2	.004	1	1.264e-3	5	NC	1	NC	2
12			min	-.002	3	-.006	3	-.009	5	-3.686e-4	1	7524.005	2	9847.592	1
13		7	max	.001	1	.004	2	.003	1	1.285e-3	5	NC	1	NC	1
14			min	-.002	3	-.006	3	-.009	5	-3.489e-4	1	8556.553	2	NC	1
15		8	max	.001	1	.004	2	.003	1	1.306e-3	5	NC	1	NC	1
16			min	-.002	3	-.005	3	-.008	5	-3.291e-4	1	9844.984	2	NC	1
17		9	max	.001	1	.003	2	.002	1	1.327e-3	5	NC	1	NC	1
18			min	-.002	3	-.005	3	-.008	5	-3.093e-4	1	NC	1	NC	1
19		10	max	.001	1	.003	2	.002	1	1.348e-3	5	NC	1	NC	1
20			min	-.002	3	-.005	3	-.007	5	-2.895e-4	1	NC	1	NC	1
21		11	max	0	1	.002	2	.002	1	1.369e-3	5	NC	1	NC	1
22			min	-.001	3	-.004	3	-.007	5	-2.697e-4	1	NC	1	NC	1
23		12	max	0	1	.002	2	.001	1	1.39e-3	5	NC	1	NC	1
24			min	-.001	3	-.004	3	-.006	5	-2.499e-4	1	NC	1	NC	1
25		13	max	0	1	.001	2	.001	1	1.41e-3	5	NC	1	NC	1
26			min	-.001	3	-.003	3	-.005	5	-2.302e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	0	1	1.431e-3	5	NC	1	NC	1
28			min	0	3	-.003	3	-.004	5	-2.104e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.452e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.004	5	-1.906e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.473e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.003	5	-1.708e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.494e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.002	5	-1.51e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.515e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-1.312e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.536e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.115e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	5.187e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-7.144e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.004	5	6.529e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-7.201e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.007	5	7.87e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-7.258e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.011	5	9.211e-5	1	NC	1	NC	1
46			min	0	2	-.002	3	0	1	-7.315e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.015	5	1.055e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	-7.373e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.019	4	1.189e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	0	1	-7.43e-4	5	NC	1	NC	1
51		7	max	0	3	0	2	.022	4	1.323e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	0	1	-7.487e-4	5	NC	1	NC	1
53		8	max	0	3	0	2	.026	4	1.458e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	9	-7.544e-4	5	NC	1	NC	1
55		9	max	0	3	.001	2	.029	4	1.592e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	9	-7.601e-4	5	NC	1	NC	1
57		10	max	0	3	.002	2	.033	4	1.726e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-7.658e-4	5	NC	1	NC	1
59		11	max	0	3	.002	2	.036	4	1.86e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-7.715e-4	5	NC	1	NC	1
61		12	max	0	3	.003	2	.039	4	1.994e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	10	-7.772e-4	5	NC	1	NC	1
63		13	max	0	3	.003	2	.043	4	2.128e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	10	-7.829e-4	5	NC	1	NC	1
65		14	max	.001	3	.004	2	.046	4	2.262e-4	1	NC	1	NC	1
66			min	-.001	2	-.007	3	0	10	-7.886e-4	5	NC	1	NC	1
67		15	max	.001	3	.005	2	.049	4	2.396e-4	1	NC	1	NC	1
68			min	-.001	2	-.008	3	0	10	-7.943e-4	5	9588.696	2	NC	1
69		16	max	.001	3	.006	2	.052	4	2.53e-4	1	NC	1	NC	1
70			min	-.001	2	-.008	3	0	10	-8.e-4	5	8089.178	2	NC	1
71		17	max	.001	3	.007	2	.055	4	2.665e-4	1	NC	1	NC	1
72			min	-.001	2	-.008	3	0	10	-8.057e-4	5	6935.985	2	NC	1
73		18	max	.001	3	.008	2	.058	4	2.799e-4	1	NC	3	NC	1
74			min	-.001	2	-.008	3	0	10	-8.114e-4	5	6038.409	2	NC	1
75		19	max	.001	3	.009	2	.061	4	2.933e-4	1	NC	3	NC	1
76			min	-.001	2	-.008	3	0	10	-8.171e-4	5	5333.168	2	NC	1
77	M4	1	max	.002	1	.009	2	0	10	3.628e-3	5	NC	1	NC	2
78			min	0	3	-.008	3	-.064	4	-3.834e-4	1	NC	1	301.818	4
79		2	max	.002	1	.009	2	0	10	3.628e-3	5	NC	1	NC	2
80			min	0	3	-.007	3	-.059	4	-3.834e-4	1	NC	1	329.003	4
81		3	max	.001	1	.008	2	0	10	3.628e-3	5	NC	1	NC	2
82			min	0	3	-.007	3	-.053	4	-3.834e-4	1	NC	1	361.355	4
83		4	max	.001	1	.008	2	0	10	3.628e-3	5	NC	1	NC	1
84			min	0	3	-.006	3	-.048	4	-3.834e-4	1	NC	1	400.238	4
85		5	max	.001	1	.007	2	0	10	3.628e-3	5	NC	1	NC	1
86			min	0	3	-.006	3	-.043	4	-3.834e-4	1	NC	1	447.505	4
87		6	max	.001	1	.007	2	0	10	3.628e-3	5	NC	1	NC	1
88			min	0	3	-.006	3	-.038	4	-3.834e-4	1	NC	1	505.735	4
89		7	max	.001	1	.006	2	0	10	3.628e-3	5	NC	1	NC	1
90			min	0	3	-.005	3	-.033	4	-3.834e-4	1	NC	1	578.601	4
91		8	max	.001	1	.006	2	0	10	3.628e-3	5	NC	1	NC	1
92			min	0	3	-.005	3	-.029	4	-3.834e-4	1	NC	1	671.48	4
93		9	max	0	1	.005	2	0	10	3.628e-3	5	NC	1	NC	1
94			min	0	3	-.004	3	-.024	4	-3.834e-4	1	NC	1	792.505	4
95		10	max	0	1	.005	2	0	10	3.628e-3	5	NC	1	NC	1
96			min	0	3	-.004	3	-.02	4	-3.834e-4	1	NC	1	954.462	4
97		11	max	0	1	.004	2	0	10	3.628e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.016	4	-3.834e-4	1	NC	1	1178.405	4
99		12	max	0	1	.004	2	0	10	3.628e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.003	3	-.013	4	-3.834e-4	1	NC	1	1501.062	4
101		13	max	0	1	.003	2	0	10	3.628e-3	5	NC	1	NC	1
102			min	0	3	-.003	3	-.01	4	-3.834e-4	1	NC	1	1991.32	4
103		14	max	0	1	.003	2	0	10	3.628e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.007	4	-3.834e-4	1	NC	1	2791.268	4
105		15	max	0	1	.002	2	0	10	3.628e-3	5	NC	1	NC	1
106			min	0	3	-.002	3	-.005	4	-3.834e-4	1	NC	1	4234.716	4
107		16	max	0	1	.002	2	0	10	3.628e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.003	4	-3.834e-4	1	NC	1	7270.573	4
109		17	max	0	1	.001	2	0	10	3.628e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.001	4	-3.834e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	3.628e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-3.834e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	3.628e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-3.834e-4	1	NC	1	NC	1
115	M6	1	max	.007	1	.027	2	.002	1	1.246e-3	4	NC	3	NC	1
116			min	-.01	3	-.024	3	-.011	5	-7.8e-8	2	1328.056	2	7689.802	3
117		2	max	.007	1	.026	2	.002	1	1.266e-3	4	NC	3	NC	1
118			min	-.01	3	-.023	3	-.011	5	-7.363e-8	2	1419.941	2	8199.557	3
119		3	max	.006	1	.024	2	.002	1	1.286e-3	4	NC	3	NC	1
120			min	-.009	3	-.021	3	-.011	5	-6.926e-8	2	1525.092	2	8800.61	3
121		4	max	.006	1	.022	2	.002	1	1.306e-3	4	NC	3	NC	1
122			min	-.009	3	-.02	3	-.01	5	-1.01e-6	11	1646.172	2	9513.004	3
123		5	max	.006	1	.02	2	.002	1	1.325e-3	4	NC	3	NC	1
124			min	-.008	3	-.019	3	-.01	5	-4.075e-6	1	1786.61	2	NC	1
125		6	max	.005	1	.019	2	.001	1	1.345e-3	4	NC	3	NC	1
126			min	-.008	3	-.018	3	-.01	5	-7.431e-6	1	1950.898	2	NC	1
127		7	max	.005	1	.017	2	.001	1	1.365e-3	4	NC	3	NC	1
128			min	-.007	3	-.016	3	-.009	5	-1.079e-5	1	2145.028	2	NC	1
129		8	max	.004	1	.015	2	.001	1	1.385e-3	4	NC	3	NC	1
130			min	-.006	3	-.015	3	-.009	5	-1.414e-5	1	2377.182	2	NC	1
131		9	max	.004	1	.014	2	0	1	1.405e-3	4	NC	3	NC	1
132			min	-.006	3	-.014	3	-.008	5	-1.75e-5	1	2658.815	2	NC	1
133		10	max	.004	1	.012	2	0	1	1.424e-3	4	NC	3	NC	1
134			min	-.005	3	-.012	3	-.008	5	-2.086e-5	1	3006.479	2	NC	1
135		11	max	.003	1	.011	2	0	1	1.444e-3	4	NC	3	NC	1
136			min	-.005	3	-.011	3	-.007	5	-2.421e-5	1	3445.004	2	NC	1
137		12	max	.003	1	.009	2	0	1	1.464e-3	4	NC	3	NC	1
138			min	-.004	3	-.01	3	-.006	5	-2.757e-5	1	4013.409	2	NC	1
139		13	max	.002	1	.008	2	0	1	1.484e-3	4	NC	3	NC	1
140			min	-.003	3	-.008	3	-.005	5	-3.092e-5	1	4776.722	2	NC	1
141		14	max	.002	1	.006	2	0	1	1.503e-3	4	NC	3	NC	1
142			min	-.003	3	-.007	3	-.005	5	-3.428e-5	1	5851.983	2	NC	1
143		15	max	.002	1	.005	2	0	1	1.523e-3	4	NC	1	NC	1
144			min	-.002	3	-.006	3	-.004	5	-3.764e-5	1	7473.259	2	NC	1
145		16	max	.001	1	.004	2	0	1	1.543e-3	4	NC	1	NC	1
146			min	-.002	3	-.004	3	-.003	5	-4.099e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.563e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.002	5	-4.435e-5	1	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.583e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	0	5	-4.77e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.603e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.106e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.358e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-7.455e-4	5	NC	1	NC	1
155		2	max	0	3	.001	2	.004	5	2.036e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-7.386e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.003	2	.008	4	1.715e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-7.318e-4	4	NC	1	NC	1
159		4	max	0	3	.004	2	.012	4	1.393e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-7.25e-4	4	NC	1	NC	1
161		5	max	0	3	.005	2	.016	4	1.071e-5	1	NC	1	NC	1
162			min	-.001	2	-.007	3	0	1	-7.182e-4	4	8784.882	2	NC	1
163		6	max	.001	3	.007	2	.019	4	1.901e-5	3	NC	1	NC	1
164			min	-.002	2	-.009	3	0	1	-7.114e-4	4	7042.987	2	NC	1
165		7	max	.001	3	.008	2	.023	4	3.897e-5	3	NC	3	NC	1
166			min	-.002	2	-.01	3	0	1	-7.046e-4	4	5851.236	2	NC	1
167		8	max	.002	3	.009	2	.027	4	5.893e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-6.978e-4	4	4977.139	2	NC	1
169		9	max	.002	3	.011	2	.03	4	7.89e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	0	1	-6.91e-4	4	4304.886	2	NC	1
171		10	max	.002	3	.012	2	.034	4	9.886e-5	3	NC	3	NC	1
172			min	-.003	2	-.015	3	0	1	-6.842e-4	4	3770.299	2	NC	1
173		11	max	.002	3	.014	2	.037	4	1.188e-4	3	NC	3	NC	1
174			min	-.003	2	-.016	3	0	1	-6.774e-4	4	3334.841	2	NC	1
175		12	max	.003	3	.015	2	.041	4	1.388e-4	3	NC	3	NC	1
176			min	-.003	2	-.017	3	0	1	-6.706e-4	4	2973.845	2	NC	1
177		13	max	.003	3	.017	2	.044	4	1.588e-4	3	NC	3	NC	1
178			min	-.004	2	-.019	3	-.001	1	-6.638e-4	4	2670.666	2	NC	1
179		14	max	.003	3	.019	2	.047	4	1.787e-4	3	NC	3	NC	1
180			min	-.004	2	-.02	3	-.001	1	-6.569e-4	4	2413.562	2	NC	1
181		15	max	.003	3	.021	2	.05	4	1.987e-4	3	NC	3	NC	1
182			min	-.004	2	-.021	3	-.001	1	-6.501e-4	4	2193.937	2	NC	1
183		16	max	.004	3	.023	2	.053	4	2.186e-4	3	NC	3	NC	1
184			min	-.005	2	-.021	3	-.001	1	-6.433e-4	4	2005.302	2	NC	1
185		17	max	.004	3	.025	2	.056	4	2.386e-4	3	NC	3	NC	1
186			min	-.005	2	-.022	3	-.001	1	-6.365e-4	4	1842.637	2	NC	1
187		18	max	.004	3	.027	2	.059	4	2.586e-4	3	NC	3	NC	1
188			min	-.005	2	-.023	3	-.001	1	-6.297e-4	4	1701.983	2	NC	1
189		19	max	.004	3	.029	2	.062	4	2.785e-4	3	NC	3	NC	1
190			min	-.005	2	-.024	3	-.001	1	-6.229e-4	4	1580.171	2	NC	1
191	M8	1	max	.005	1	.031	2	.001	1	3.448e-3	4	NC	1	NC	1
192			min	0	3	-.024	3	-.065	4	-2.118e-4	3	NC	1	297.726	4
193		2	max	.004	1	.029	2	.001	1	3.448e-3	4	NC	1	NC	1
194			min	0	3	-.023	3	-.06	4	-2.118e-4	3	NC	1	324.542	4
195		3	max	.004	1	.027	2	0	1	3.448e-3	4	NC	1	NC	1
196			min	0	3	-.021	3	-.054	4	-2.118e-4	3	NC	1	356.456	4
197		4	max	.004	1	.026	2	0	1	3.448e-3	4	NC	1	NC	1
198			min	0	3	-.02	3	-.049	4	-2.118e-4	3	NC	1	394.812	4
199		5	max	.004	1	.024	2	0	1	3.448e-3	4	NC	1	NC	1
200			min	0	3	-.019	3	-.044	4	-2.118e-4	3	NC	1	441.439	4
201		6	max	.003	1	.022	2	0	1	3.448e-3	4	NC	1	NC	1
202			min	0	3	-.017	3	-.039	4	-2.118e-4	3	NC	1	498.881	4
203		7	max	.003	1	.021	2	0	1	3.448e-3	4	NC	1	NC	1
204			min	0	3	-.016	3	-.034	4	-2.118e-4	3	NC	1	570.76	4
205		8	max	.003	1	.019	2	0	1	3.448e-3	4	NC	1	NC	1
206			min	0	3	-.015	3	-.029	4	-2.118e-4	3	NC	1	662.382	4
207		9	max	.003	1	.017	2	0	1	3.448e-3	4	NC	1	NC	1
208			min	0	3	-.013	3	-.025	4	-2.118e-4	3	NC	1	781.769	4
209		10	max	.002	1	.015	2	0	1	3.448e-3	4	NC	1	NC	1
210			min	0	3	-.012	3	-.021	4	-2.118e-4	3	NC	1	941.535	4
211		11	max	.002	1	.014	2	0	1	3.448e-3	4	NC	1	NC	1
212			min	0	3	-.011	3	-.017	4	-2.118e-4	3	NC	1	1162.449	4
213		12	max	.002	1	.012	2	0	1	3.448e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.009	3	-.013	4	-2.118e-4	3	NC	1	1480.742	4
215		13	max	.002	1	.01	2	0	1	3.448e-3	4	NC	1	NC	1
216			min	0	3	-.008	3	-.01	4	-2.118e-4	3	NC	1	1964.371	4
217		14	max	.001	1	.009	2	0	1	3.448e-3	4	NC	1	NC	1
218			min	0	3	-.007	3	-.007	4	-2.118e-4	3	NC	1	2753.504	4
219		15	max	.001	1	.007	2	0	1	3.448e-3	4	NC	1	NC	1
220			min	0	3	-.005	3	-.005	4	-2.118e-4	3	NC	1	4177.439	4
221		16	max	0	1	.005	2	0	1	3.448e-3	4	NC	1	NC	1
222			min	0	3	-.004	3	-.003	4	-2.118e-4	3	NC	1	7172.265	4
223		17	max	0	1	.003	2	0	1	3.448e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	-.001	4	-2.118e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	3.448e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-2.118e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	3.448e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.118e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.008	2	0	3	4.809e-4	1	NC	3	NC	1
230			min	-.003	3	-.008	3	-.005	4	-4.329e-4	3	4542.168	2	NC	1
231		2	max	.002	1	.007	2	0	3	4.565e-4	1	NC	3	NC	1
232			min	-.003	3	-.007	3	-.005	4	-4.19e-4	3	4948.061	2	NC	1
233		3	max	.002	1	.007	2	0	3	4.321e-4	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.005	4	-4.051e-4	3	5429.212	2	NC	1
235		4	max	.002	1	.006	2	0	3	4.255e-4	4	NC	1	NC	1
236			min	-.002	3	-.007	3	-.005	4	-3.912e-4	3	6003.586	2	NC	1
237		5	max	.002	1	.005	2	0	3	4.796e-4	4	NC	1	NC	1
238			min	-.002	3	-.007	3	-.005	4	-3.773e-4	3	6695.07	2	NC	1
239		6	max	.002	1	.005	2	0	3	5.338e-4	4	NC	1	NC	1
240			min	-.002	3	-.006	3	-.005	4	-3.634e-4	3	7535.956	2	NC	1
241		7	max	.002	1	.004	2	0	3	5.88e-4	4	NC	1	NC	1
242			min	-.002	3	-.006	3	-.005	4	-3.496e-4	3	8570.734	2	NC	1
243		8	max	.001	1	.004	2	0	3	6.422e-4	4	NC	1	NC	1
244			min	-.002	3	-.006	3	-.005	4	-3.357e-4	3	9862.079	2	NC	1
245		9	max	.001	1	.003	2	0	3	6.963e-4	4	NC	1	NC	1
246			min	-.002	3	-.005	3	-.005	4	-3.218e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	7.505e-4	4	NC	1	NC	1
248			min	-.001	3	-.005	3	-.005	4	-3.079e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	8.047e-4	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.004	4	-2.94e-4	3	NC	1	NC	1
251		12	max	0	1	.002	2	0	3	8.589e-4	4	NC	1	NC	1
252			min	-.001	3	-.004	3	-.004	4	-2.801e-4	3	NC	1	NC	1
253		13	max	0	1	.001	2	0	3	9.13e-4	4	NC	1	NC	1
254			min	0	3	-.003	3	-.004	4	-2.662e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	9.672e-4	4	NC	1	NC	1
256			min	0	3	-.003	3	-.003	4	-2.524e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.021e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.003	4	-2.385e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.076e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.002	4	-2.246e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.13e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.001	4	-2.107e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.184e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-1.968e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.238e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.829e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	8.523e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-5.766e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.003	4	6.523e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-6.353e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.006	4	4.523e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-6.941e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.009	4	2.523e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	-.001	3	-7.528e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.012	4	5.234e-6	3	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-8.115e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.015	4	-6.214e-6	10	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-8.702e-4	4	NC	1	NC	1
279		7	max	0	3	0	2	.018	5	-7.079e-6	10	NC	1	NC	1
280			min	0	2	-.005	3	-.002	3	-9.29e-4	4	NC	1	NC	1
281		8	max	0	3	0	2	.022	5	-7.945e-6	10	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-9.877e-4	4	NC	1	NC	1
283		9	max	0	3	.001	2	.025	5	-8.81e-6	10	NC	1	NC	1
284			min	0	2	-.006	3	-.002	3	-1.046e-3	4	NC	1	NC	1
285		10	max	0	3	.002	2	.028	5	-9.676e-6	10	NC	1	NC	1
286			min	0	2	-.006	3	-.002	3	-1.105e-3	4	NC	1	NC	1
287		11	max	0	3	.002	2	.031	5	-1.054e-5	10	NC	1	NC	1
288			min	0	2	-.007	3	-.003	3	-1.164e-3	4	NC	1	NC	1
289		12	max	0	3	.003	2	.034	5	-1.141e-5	10	NC	1	NC	1
290			min	0	2	-.007	3	-.003	1	-1.223e-3	4	NC	1	NC	1
291		13	max	0	3	.003	2	.037	5	-1.227e-5	10	NC	1	NC	1
292			min	0	2	-.007	3	-.003	1	-1.281e-3	4	NC	1	NC	1
293		14	max	.001	3	.004	2	.039	5	-1.314e-5	10	NC	1	NC	1
294			min	-.001	2	-.008	3	-.003	1	-1.34e-3	4	NC	1	NC	1
295		15	max	.001	3	.005	2	.042	5	-1.4e-5	10	NC	1	NC	1
296			min	-.001	2	-.008	3	-.004	1	-1.399e-3	4	9604.06	2	NC	1
297		16	max	.001	3	.006	2	.045	5	-1.487e-5	10	NC	1	NC	1
298			min	-.001	2	-.008	3	-.004	1	-1.457e-3	4	8100.785	2	NC	1
299		17	max	.001	3	.007	2	.048	5	-1.573e-5	10	NC	1	NC	2
300			min	-.001	2	-.008	3	-.005	1	-1.516e-3	4	6945.008	2	9474.821	1
301		18	max	.001	3	.008	2	.051	5	-1.66e-5	10	NC	3	NC	2
302			min	-.001	2	-.008	3	-.005	1	-1.575e-3	4	6045.617	2	8703.332	1
303		19	max	.001	3	.009	2	.054	5	-1.746e-5	10	NC	3	NC	2
304			min	-.001	2	-.008	3	-.006	1	-1.634e-3	4	5339.078	2	8079.678	1
305	M12	1	max	.002	1	.009	2	.005	1	4.327e-3	4	NC	1	NC	2
306			min	0	3	-.008	3	-.06	5	1.838e-5	10	NC	1	324.295	5
307		2	max	.002	1	.009	2	.004	1	4.327e-3	4	NC	1	NC	2
308			min	0	3	-.007	3	-.055	5	1.838e-5	10	NC	1	353.496	5
309		3	max	.001	1	.008	2	.004	1	4.327e-3	4	NC	1	NC	2
310			min	0	3	-.007	3	-.05	5	1.838e-5	10	NC	1	388.248	5
311		4	max	.001	1	.008	2	.004	1	4.327e-3	4	NC	1	NC	2
312			min	0	3	-.006	3	-.045	5	1.838e-5	10	NC	1	430.014	5
313		5	max	.001	1	.007	2	.003	1	4.327e-3	4	NC	1	NC	2
314			min	0	3	-.006	3	-.04	5	1.838e-5	10	NC	1	480.785	5
315		6	max	.001	1	.007	2	.003	1	4.327e-3	4	NC	1	NC	2
316			min	0	3	-.006	3	-.036	5	1.838e-5	10	NC	1	543.331	5
317		7	max	.001	1	.006	2	.002	1	4.327e-3	4	NC	1	NC	2
318			min	0	3	-.005	3	-.031	5	1.838e-5	10	NC	1	621.596	5
319		8	max	.001	1	.006	2	.002	1	4.327e-3	4	NC	1	NC	2
320			min	0	3	-.005	3	-.027	5	1.838e-5	10	NC	1	721.355	5
321		9	max	0	1	.005	2	.002	1	4.327e-3	4	NC	1	NC	1
322			min	0	3	-.004	3	-.023	5	1.838e-5	10	NC	1	851.343	5
323		10	max	0	1	.005	2	.002	1	4.327e-3	4	NC	1	NC	1
324			min	0	3	-.004	3	-.019	5	1.838e-5	10	NC	1	1025.292	5
325		11	max	0	1	.004	2	.001	1	4.327e-3	4	NC	1	NC	1
326			min	0	3	-.003	3	-.015	5	1.838e-5	10	NC	1	1265.813	5
327		12	max	0	1	.004	2	0	1	4.327e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.012	5	1.838e-5	10	NC	1	1612.349	5
329		13	max	0	1	.003	2	0	1	4.327e-3	4	NC	1	NC	1
330			min	0	3	-.003	3	-.009	5	1.838e-5	10	NC	1	2138.882	5
331		14	max	0	1	.003	2	0	1	4.327e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.006	5	1.838e-5	10	NC	1	2998.005	5
333		15	max	0	1	.002	2	0	1	4.327e-3	4	NC	1	NC	1
334			min	0	3	-.002	3	-.004	5	1.838e-5	10	NC	1	4548.2	5
335		16	max	0	1	.002	2	0	1	4.327e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.002	5	1.838e-5	10	NC	1	7808.508	5
337		17	max	0	1	.001	2	0	1	4.327e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.001	5	1.838e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	4.327e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	1.838e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	4.327e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	1.838e-5	10	NC	1	NC	1
343	M1	1	max	.007	3	.023	3	.006	5	9.257e-3	1	NC	1	NC	1
344			min	-.008	2	-.02	2	-.002	1	-1.253e-2	3	NC	1	NC	1
345		2	max	.007	3	.013	3	.009	5	4.446e-3	1	NC	4	NC	1
346			min	-.008	2	-.011	2	-.004	1	-6.183e-3	3	4844.04	3	NC	1
347		3	max	.007	3	.004	3	.011	5	3.351e-4	5	NC	4	NC	1
348			min	-.008	2	-.003	2	-.006	1	-2.755e-4	1	2512.698	3	8958.468	5
349		4	max	.007	3	.004	2	.014	5	3.363e-4	5	NC	4	NC	1
350			min	-.008	2	-.004	3	-.007	1	-2.329e-4	1	1795.486	3	5639.536	5
351		5	max	.007	3	.011	2	.018	5	3.375e-4	5	NC	4	NC	2
352			min	-.008	2	-.01	3	-.007	1	-1.902e-4	1	1437.746	2	4027.182	5
353		6	max	.007	3	.016	2	.021	5	3.387e-4	5	NC	4	NC	1
354			min	-.008	2	-.015	3	-.006	1	-1.476e-4	1	1223.5	2	3088.92	5
355		7	max	.007	3	.021	2	.025	5	3.399e-4	5	NC	4	NC	1
356			min	-.008	2	-.019	3	-.006	1	-1.05e-4	1	1091.598	2	2483.03	5
357		8	max	.007	3	.024	2	.029	5	3.411e-4	5	NC	5	NC	1
358			min	-.008	2	-.022	3	-.004	1	-6.237e-5	1	1009.132	2	2064.141	5
359		9	max	.007	3	.026	2	.033	5	3.423e-4	5	NC	5	NC	1
360			min	-.008	2	-.023	3	-.003	1	-2.203e-5	9	960.579	2	1758.777	4
361		10	max	.007	3	.027	2	.037	5	3.491e-4	4	NC	5	NC	1
362			min	-.008	2	-.023	3	-.002	1	4.894e-6	10	938.557	2	1513.674	4
363		11	max	.007	3	.026	2	.041	4	3.599e-4	4	NC	5	NC	1
364			min	-.008	2	-.023	3	0	9	6.849e-6	10	940.439	2	1327.943	4
365		12	max	.007	3	.024	2	.045	4	3.707e-4	4	NC	4	NC	1
366			min	-.008	2	-.021	3	0	10	8.804e-6	10	967.367	2	1184.092	4
367		13	max	.007	3	.021	2	.049	4	3.816e-4	4	NC	4	NC	1
368			min	-.008	2	-.018	3	0	10	1.076e-5	10	1024.855	2	1070.818	4
369		14	max	.007	3	.017	2	.053	4	3.924e-4	4	NC	4	NC	1
370			min	-.008	2	-.014	3	0	10	1.271e-5	10	1125.562	2	980.545	4
371		15	max	.007	3	.011	2	.057	4	4.032e-4	4	NC	4	NC	2
372			min	-.008	2	-.009	3	0	10	1.467e-5	10	1297.208	2	908.053	4
373		16	max	.007	3	.004	2	.061	4	6.249e-4	4	NC	4	NC	1
374			min	-.008	2	-.003	3	0	10	1.614e-5	10	1607.407	2	849.655	4
375		17	max	.007	3	.003	3	.064	4	5.864e-3	4	NC	4	NC	1
376			min	-.008	2	-.005	2	0	10	-3.188e-6	9	2270.923	2	802.756	4
377		18	max	.007	3	.011	3	.067	4	6.198e-3	2	NC	4	NC	1
378			min	-.008	2	-.015	2	0	10	-2.919e-3	3	4396.628	2	765.338	4
379		19	max	.007	3	.018	3	.069	4	1.248e-2	2	NC	1	NC	1
380			min	-.008	2	-.026	2	-.001	1	-5.939e-3	3	NC	1	736.836	4
381	M5	1	max	.022	3	.075	3	.006	5	1.094e-5	4	NC	1	NC	1
382			min	-.026	2	-.067	2	-.002	1	5.974e-8	11	NC	1	NC	1
383		2	max	.022	3	.043	3	.008	5	1.663e-4	5	NC	4	NC	1
384			min	-.026	2	-.038	2	-.002	1	-4.17e-5	1	1506.659	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
385		3	max	.022	3	.013	3	.011	5	3.191e-4	5	NC	5	NC	1
386			min	-.026	2	-.01	2	-.002	1	-8.265e-5	1	781.811	3	NC	1
387		4	max	.022	3	.015	2	.015	5	3.318e-4	5	NC	5	NC	1
388			min	-.026	2	-.012	3	-.002	1	-7.845e-5	1	552.928	2	NC	1
389		5	max	.022	3	.036	2	.018	5	3.445e-4	5	NC	5	NC	1
390			min	-.026	2	-.032	3	-.002	1	-7.424e-5	1	438.149	2	NC	1
391		6	max	.022	3	.053	2	.022	5	3.573e-4	5	NC	5	NC	1
392			min	-.026	2	-.049	3	-.002	1	-7.003e-5	1	372.619	2	NC	1
393		7	max	.022	3	.068	2	.026	5	3.7e-4	5	NC	5	NC	1
394			min	-.026	2	-.061	3	-.002	1	-6.582e-5	1	332.255	2	NC	1
395		8	max	.022	3	.078	2	.03	5	3.827e-4	5	NC	5	NC	1
396			min	-.026	2	-.069	3	-.002	1	-6.161e-5	1	306.995	2	NC	1
397		9	max	.022	3	.085	2	.035	5	3.955e-4	5	NC	5	NC	1
398			min	-.026	2	-.074	3	-.002	1	-5.741e-5	1	292.092	2	NC	1
399		10	max	.022	3	.088	2	.039	5	4.082e-4	5	NC	5	NC	1
400			min	-.026	2	-.075	3	-.002	1	-5.32e-5	1	285.286	2	NC	1
401		11	max	.022	3	.086	2	.043	5	4.21e-4	5	NC	5	NC	1
402			min	-.026	2	-.072	3	-.002	1	-4.899e-5	1	285.768	2	NC	1
403		12	max	.022	3	.081	2	.047	5	4.337e-4	5	NC	5	NC	1
404			min	-.026	2	-.066	3	-.002	1	-4.478e-5	1	293.88	2	NC	1
405		13	max	.022	3	.071	2	.051	4	4.464e-4	5	NC	5	NC	1
406			min	-.026	2	-.057	3	-.001	1	-4.058e-5	1	311.297	2	NC	1
407		14	max	.022	3	.056	2	.055	4	4.592e-4	5	NC	5	NC	1
408			min	-.026	2	-.044	3	-.001	1	-3.637e-5	1	341.869	2	NC	1
409		15	max	.022	3	.037	2	.059	4	4.719e-4	5	NC	5	NC	1
410			min	-.026	2	-.029	3	-.001	1	-3.216e-5	1	394.041	2	NC	1
411		16	max	.021	3	.013	2	.062	4	6.922e-4	5	NC	5	NC	1
412			min	-.026	2	-.011	3	-.001	1	-3.058e-5	1	488.439	2	NC	1
413		17	max	.022	3	.01	3	.065	4	5.873e-3	4	NC	5	NC	1
414			min	-.026	2	-.016	2	-.001	1	-9.144e-5	1	690.88	2	NC	1
415		18	max	.022	3	.033	3	.067	4	3.014e-3	4	NC	4	NC	1
416			min	-.026	2	-.05	2	-.001	1	-4.674e-5	1	1338.386	2	NC	1
417		19	max	.022	3	.058	3	.069	4	3.768e-6	5	NC	1	NC	1
418			min	-.026	2	-.086	2	-.001	1	-5.529e-7	3	NC	1	NC	1
419	M9	1	max	.007	3	.023	3	.005	5	1.253e-2	3	NC	1	NC	1
420			min	-.008	2	-.02	2	-.003	1	-9.256e-3	1	NC	1	NC	1
421		2	max	.007	3	.013	3	.005	5	6.196e-3	3	NC	4	NC	1
422			min	-.008	2	-.011	2	0	9	-4.536e-3	1	4845.615	3	NC	1
423		3	max	.007	3	.004	3	.005	4	9.739e-5	1	NC	4	NC	1
424			min	-.008	2	-.003	2	0	3	-3.237e-5	5	2513.532	3	NC	1
425		4	max	.007	3	.004	2	.006	4	6.216e-5	1	NC	4	NC	1
426			min	-.008	2	-.004	3	-.001	3	-3.184e-5	5	1796.065	3	NC	1
427		5	max	.007	3	.011	2	.008	4	3.591e-5	2	NC	4	NC	1
428			min	-.008	2	-.01	3	-.002	3	-3.9e-5	3	1438.098	2	NC	1
429		6	max	.007	3	.016	2	.01	4	2.317e-5	2	NC	4	NC	1
430			min	-.008	2	-.015	3	-.003	3	-4.624e-5	3	1223.814	2	8572.538	4
431		7	max	.007	3	.021	2	.013	4	1.042e-5	2	NC	4	NC	1
432			min	-.008	2	-.019	3	-.003	3	-5.349e-5	3	1091.89	2	5630.776	4
433		8	max	.007	3	.024	2	.016	4	-8.572e-7	10	NC	5	NC	1
434			min	-.008	2	-.022	3	-.004	3	-7.875e-5	1	1009.413	2	4019.323	4
435		9	max	.007	3	.026	2	.02	4	-2.819e-6	10	NC	5	NC	1
436			min	-.008	2	-.023	3	-.004	3	-1.14e-4	1	960.856	2	3038.931	4
437		10	max	.007	3	.027	2	.024	5	-4.781e-6	10	NC	5	NC	1
438			min	-.008	2	-.024	3	-.004	3	-1.492e-4	1	938.837	2	2396.869	4
439		11	max	.007	3	.026	2	.029	5	-6.743e-6	10	NC	5	NC	1
440			min	-.008	2	-.023	3	-.004	3	-1.844e-4	1	940.728	2	1952.821	4
441		12	max	.007	3	.024	2	.034	5	-8.706e-6	10	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.008	2	-.021	3	-.004	1	-2.197e-4	1	967.673	2	1632.588	4
443		13	max	.007	3	.021	2	.039	5	-1.067e-5	10	NC	5	NC	1
444			min	-.008	2	-.018	3	-.005	1	-2.549e-4	1	1025.186	2	1387.151	5
445		14	max	.007	3	.017	2	.044	5	-1.263e-5	10	NC	4	NC	2
446			min	-.008	2	-.014	3	-.006	1	-2.901e-4	1	1125.932	2	1202.926	5
447		15	max	.007	3	.011	2	.049	5	-1.459e-5	10	NC	4	NC	2
448			min	-.008	2	-.009	3	-.006	1	-3.254e-4	1	1297.638	2	1061.421	5
449		16	max	.007	3	.004	2	.054	5	2.012e-4	5	NC	4	NC	2
450			min	-.008	2	-.003	3	-.006	1	-3.527e-4	1	1607.934	2	950.697	5
451		17	max	.007	3	.003	3	.06	5	5.822e-3	5	NC	4	NC	1
452			min	-.008	2	-.005	2	-.005	1	-1.934e-4	1	2271.613	2	862.267	4
453		18	max	.007	3	.011	3	.064	5	2.956e-3	3	NC	4	NC	1
454			min	-.008	2	-.015	2	-.003	1	-6.198e-3	2	4397.92	2	786.549	4
455		19	max	.007	3	.018	3	.069	4	5.938e-3	3	NC	1	NC	1
456			min	-.008	2	-.026	2	0	1	-1.248e-2	2	NC	1	724.415	4
457	M13	1	max	.003	1	.023	3	.007	3	3.76e-3	3	NC	1	NC	1
458			min	-.005	5	-.02	2	-.008	2	-3.406e-3	2	NC	1	NC	1
459		2	max	.002	1	.104	3	.007	9	4.69e-3	3	NC	4	NC	1
460			min	-.005	5	-.079	1	-.004	10	-4.266e-3	2	1486.498	3	NC	1
461		3	max	.002	1	.171	3	.021	1	5.62e-3	3	NC	5	NC	2
462			min	-.005	5	-.128	1	-.004	10	-5.126e-3	2	813.422	3	4732.989	1
463		4	max	.002	1	.214	3	.032	1	6.55e-3	3	NC	5	NC	2
464			min	-.005	5	-.161	1	-.004	5	-5.986e-3	2	628.383	3	3299.936	1
465		5	max	.002	1	.23	3	.036	1	7.48e-3	3	NC	5	NC	2
466			min	-.006	5	-.173	1	-.005	5	-6.846e-3	2	581.023	3	2958.565	1
467		6	max	.002	1	.218	3	.032	1	8.41e-3	3	NC	5	NC	2
468			min	-.006	5	-.165	1	-.007	10	-7.706e-3	2	616.6	3	3290.533	1
469		7	max	.002	1	.184	3	.021	1	9.34e-3	3	NC	5	NC	2
470			min	-.006	5	-.141	1	-.009	10	-8.566e-3	2	747.577	3	4827.315	1
471		8	max	.002	1	.138	3	.017	3	1.027e-2	3	NC	5	NC	1
472			min	-.006	5	-.11	2	-.016	2	-9.426e-3	2	1048.448	3	NC	1
473		9	max	.002	1	.095	3	.02	3	1.12e-2	3	NC	4	NC	1
474			min	-.006	5	-.08	2	-.023	2	-1.029e-2	2	1677.192	3	7849.974	2
475		10	max	.002	1	.075	3	.022	3	1.213e-2	3	NC	4	NC	4
476			min	-.006	5	-.067	2	-.026	2	-1.115e-2	2	2315.144	3	6477.493	2
477		11	max	.002	1	.095	3	.024	3	1.12e-2	3	NC	4	NC	1
478			min	-.006	5	-.08	2	-.023	2	-1.029e-2	2	1677.191	3	7045.442	3
479		12	max	.002	1	.138	3	.025	3	1.027e-2	3	NC	5	NC	1
480			min	-.006	5	-.11	2	-.016	2	-9.426e-3	2	1048.447	3	6722.774	3
481		13	max	.002	1	.184	3	.025	3	9.344e-3	3	NC	5	NC	2
482			min	-.006	5	-.141	1	-.009	10	-8.566e-3	2	747.576	3	4804.167	1
483		14	max	.002	1	.218	3	.032	1	8.415e-3	3	NC	5	NC	2
484			min	-.006	5	-.165	1	-.007	10	-7.706e-3	2	616.6	3	3287.022	1
485		15	max	.002	1	.23	3	.036	1	7.486e-3	3	NC	5	NC	2
486			min	-.006	5	-.173	1	-.005	10	-6.846e-3	2	581.022	3	2962.595	1
487		16	max	.002	1	.214	3	.032	1	6.557e-3	3	NC	5	NC	2
488			min	-.006	5	-.161	1	-.004	10	-5.986e-3	2	628.383	3	3312.176	1
489		17	max	.002	1	.171	3	.021	1	5.628e-3	3	NC	5	NC	2
490			min	-.006	5	-.128	1	-.004	10	-5.126e-3	2	813.421	3	4765.015	1
491		18	max	.002	1	.104	3	.01	3	4.7e-3	3	NC	4	NC	1
492			min	-.006	5	-.079	1	-.004	10	-4.266e-3	2	1486.497	3	NC	1
493		19	max	.002	1	.023	3	.007	3	3.771e-3	3	NC	1	NC	1
494			min	-.006	5	-.02	2	-.008	2	-3.406e-3	2	NC	1	NC	1
495	M16	1	max	0	1	.018	3	.007	3	4.159e-3	2	NC	1	NC	1
496			min	-.069	4	-.026	2	-.008	2	-2.898e-3	3	NC	1	NC	1
497		2	max	0	1	.057	3	.011	4	5.217e-3	2	NC	4	NC	1
498			min	-.069	4	-.107	2	-.004	10	-3.595e-3	3	1491.611	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	1	.089	3	.021	1	6.274e-3	2	NC	5	NC	2
500			min	-.069	4	-.173	2	-.004	10	-4.292e-3	3	814.937	2	4742.285	1
501		4	max	0	1	.11	3	.032	1	7.332e-3	2	NC	5	NC	2
502			min	-.069	4	-.217	2	-.004	10	-4.989e-3	3	627.779	2	3306.709	1
503		5	max	0	1	.12	3	.036	1	8.389e-3	2	NC	5	NC	2
504			min	-.069	4	-.234	2	-.005	10	-5.686e-3	3	577.772	2	2965.807	1
505		6	max	.001	1	.116	3	.032	1	9.447e-3	2	NC	5	NC	2
506			min	-.069	4	-.223	2	-.007	10	-6.383e-3	3	608.433	2	3301.699	1
507		7	max	.001	1	.103	3	.023	3	1.05e-2	2	NC	5	NC	2
508			min	-.069	4	-.191	2	-.009	10	-7.08e-3	3	727.74	2	4856.072	1
509		8	max	.001	1	.084	3	.023	3	1.156e-2	2	NC	5	NC	1
510			min	-.069	4	-.147	2	-.016	2	-7.777e-3	3	994.748	2	7405.98	3
511		9	max	.001	1	.066	3	.023	3	1.262e-2	2	NC	4	NC	1
512			min	-.069	4	-.105	2	-.023	2	-8.474e-3	3	1515.411	2	7641.114	3
513		10	max	.001	1	.058	3	.022	3	1.368e-2	2	NC	4	NC	4
514			min	-.069	4	-.086	2	-.026	2	-9.171e-3	3	1996.983	2	6476.937	2
515		11	max	.001	1	.066	3	.02	3	1.262e-2	2	NC	4	NC	1
516			min	-.069	4	-.105	2	-.023	2	-8.473e-3	3	1515.411	2	7848.044	2
517		12	max	.001	1	.084	3	.019	3	1.156e-2	2	NC	5	NC	1
518			min	-.069	4	-.147	2	-.016	2	-7.775e-3	3	994.748	2	9745.06	3
519		13	max	.001	1	.103	3	.02	1	1.051e-2	2	NC	5	NC	2
520			min	-.069	4	-.191	2	-.009	10	-7.077e-3	3	727.74	2	4849.178	1
521		14	max	.001	1	.116	3	.032	1	9.448e-3	2	NC	5	NC	2
522			min	-.069	4	-.223	2	-.007	10	-6.378e-3	3	608.433	2	3306.647	1
523		15	max	.001	1	.12	3	.036	1	8.39e-3	2	NC	5	NC	2
524			min	-.069	4	-.234	2	-.005	10	-5.68e-3	3	577.772	2	2976.68	1
525		16	max	.001	1	.11	3	.032	1	7.333e-3	2	NC	5	NC	2
526			min	-.069	4	-.217	2	-.004	5	-4.982e-3	3	627.779	2	3326.609	1
527		17	max	.001	1	.089	3	.021	1	6.276e-3	2	NC	5	NC	2
528			min	-.069	4	-.173	2	-.005	5	-4.284e-3	3	814.937	2	4786.594	1
529		18	max	.001	1	.056	3	.008	3	5.218e-3	2	NC	4	NC	1
530			min	-.069	4	-.107	2	-.004	5	-3.585e-3	3	1491.611	2	NC	1
531		19	max	.001	1	.018	3	.007	3	4.161e-3	2	NC	1	NC	1
532			min	-.069	4	-.026	2	-.008	2	-2.887e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.687e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-5.694e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.005	4	8.337e-4	3	NC	1	NC	1
536			min	0	4	-.004	1	0	3	-5.876e-4	5	NC	1	NC	1
537		3	max	0	3	0	5	.011	4	1.299e-3	3	NC	3	NC	1
538			min	-.001	4	-.008	1	-.003	3	-1.e-3	2	9310.199	1	6105.133	4
539		4	max	0	3	.001	5	.018	4	1.764e-3	3	NC	5	NC	9
540			min	-.002	4	-.011	1	-.007	3	-1.471e-3	2	6387.341	1	3957.06	4
541		5	max	0	3	.001	5	.024	4	2.229e-3	3	NC	5	NC	9
542			min	-.002	4	-.014	1	-.011	3	-1.941e-3	2	4984.107	1	2978.728	4
543		6	max	0	3	.002	5	.028	4	2.694e-3	3	NC	5	8752.539	9
544			min	-.003	4	-.017	1	-.016	3	-2.411e-3	2	4194.653	2	2459.262	4
545		7	max	0	3	.002	5	.032	4	3.159e-3	3	NC	5	6889.551	9
546			min	-.003	4	-.019	1	-.022	3	-2.881e-3	2	3719.9	1	2170.638	4
547		8	max	0	3	.003	5	.035	4	3.624e-3	3	NC	5	5710.739	9
548			min	-.004	4	-.021	1	-.027	3	-3.351e-3	2	3434.977	1	1910.618	3
549		9	max	0	3	.003	5	.035	4	4.089e-3	3	NC	5	4936.142	9
550			min	-.004	4	-.022	1	-.031	3	-3.822e-3	2	3281.615	1	1644.972	3
551		10	max	0	3	.003	5	.035	4	4.554e-3	3	NC	5	4424.109	9
552			min	-.005	4	-.022	1	-.035	3	-4.292e-3	2	3233.098	1	1469.628	3
553		11	max	0	3	.003	5	.032	1	5.019e-3	3	NC	5	4100.042	9
554			min	-.006	4	-.022	1	-.037	3	-4.762e-3	2	3281.615	1	1358.375	3
555		12	max	0	3	.004	5	.033	1	5.484e-3	3	NC	5	4553.619	15

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.006	4	-.021	1	-.038	3	-5.232e-3	2	3434.977	1	1298.207	3
557		13	max	0	3	.004	5	.033	1	5.949e-3	3	NC	5	5733.972	15
558			min	-.007	4	-.019	1	-.037	3	-5.702e-3	2	3719.9	1	1285.361	3
559		14	max	0	3	.004	5	.03	1	6.414e-3	3	NC	5	8042.66	15
560			min	-.007	4	-.017	1	-.034	3	-6.173e-3	2	4194.653	1	1325.453	3
561		15	max	.001	3	.005	5	.025	1	6.879e-3	3	NC	5	NC	15
562			min	-.008	4	-.014	1	-.028	3	-6.643e-3	2	4984.107	1	1439.083	3
563		16	max	.001	3	.005	5	.018	1	7.344e-3	3	NC	5	NC	5
564			min	-.008	4	-.011	1	-.02	3	-7.113e-3	2	6387.341	1	1682.186	3
565		17	max	.001	3	.005	5	.008	1	7.809e-3	3	NC	3	NC	4
566			min	-.009	4	-.008	9	-.008	3	-7.583e-3	2	9310.199	2	2230.238	3
567		18	max	.001	3	.005	5	.007	3	8.274e-3	3	NC	1	NC	4
568			min	-.009	4	-.005	9	-.01	2	-8.054e-3	2	NC	1	3970.918	3
569		19	max	.001	3	.005	5	.026	3	8.739e-3	3	NC	1	NC	1
570			min	-.01	4	-.002	9	-.028	2	-8.524e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.008	3	2.545e-3	3	NC	1	NC	1
572			min	-.003	4	-.003	4	-.008	2	-2.519e-3	2	NC	1	NC	1
573		2	max	0	10	-.002	12	.002	9	2.443e-3	3	NC	1	NC	1
574			min	-.003	4	-.01	4	-.003	2	-2.405e-3	2	NC	1	NC	1
575		3	max	0	10	-.004	12	.006	1	2.34e-3	3	NC	3	NC	4
576			min	-.003	4	-.016	4	-.006	5	-2.291e-3	2	5259.249	4	6356.311	3
577		4	max	0	10	-.006	12	.009	1	2.237e-3	3	NC	12	NC	9
578			min	-.003	4	-.022	4	-.011	5	-2.177e-3	2	3608.152	4	4836.102	3
579		5	max	0	10	-.007	12	.012	1	2.135e-3	3	9968.213	12	NC	10
580			min	-.003	4	-.027	4	-.017	5	-2.064e-3	2	2815.478	4	4178.317	3
581		6	max	0	10	-.008	12	.013	1	2.032e-3	3	8389.305	12	NC	14
582			min	-.003	4	-.032	4	-.023	5	-1.95e-3	2	2369.522	4	3249.623	5
583		7	max	0	10	-.009	12	.014	1	1.93e-3	3	7439.8	12	9291.812	14
584			min	-.002	4	-.036	4	-.028	5	-1.836e-3	2	2101.339	4	2565.38	5
585		8	max	0	10	-.01	12	.014	1	1.827e-3	3	6869.954	12	9577.719	10
586			min	-.002	4	-.038	4	-.033	5	-1.722e-3	2	1940.388	4	2173.373	5
587		9	max	0	10	-.011	12	.013	1	1.724e-3	3	6563.23	12	NC	10
588			min	-.002	4	-.04	4	-.037	5	-1.608e-3	2	1853.755	4	1947.374	5
589		10	max	0	10	-.011	12	.012	1	1.622e-3	3	6466.197	12	NC	9
590			min	-.002	4	-.04	4	-.039	5	-1.494e-3	2	1826.349	4	1830.58	5
591		11	max	0	10	-.011	12	.01	1	1.519e-3	3	6563.23	12	NC	9
592			min	-.002	4	-.039	4	-.04	5	-1.38e-3	2	1853.755	4	1798.245	5
593		12	max	0	10	-.01	12	.008	1	1.417e-3	3	6869.954	12	NC	9
594			min	-.001	4	-.037	4	-.039	5	-1.267e-3	2	1940.388	4	1844.705	5
595		13	max	0	10	-.009	12	.006	1	1.314e-3	3	7439.8	12	NC	2
596			min	-.001	4	-.034	4	-.036	5	-1.153e-3	2	2101.339	4	1981.03	5
597		14	max	0	10	-.008	12	.005	1	1.211e-3	3	8389.305	12	NC	1
598			min	0	4	-.031	4	-.032	5	-1.039e-3	2	2369.522	4	2241.487	5
599		15	max	0	10	-.007	12	.003	1	1.109e-3	3	9968.213	12	NC	1
600			min	0	4	-.026	4	-.026	5	-9.25e-4	2	2815.478	4	2706.425	5
601		16	max	0	10	-.006	12	.001	1	1.006e-3	3	NC	12	NC	1
602			min	0	4	-.02	4	-.02	5	-8.111e-4	2	3608.152	4	3575.932	5
603		17	max	0	10	-.004	12	0	9	9.036e-4	3	NC	3	NC	1
604			min	0	4	-.014	4	-.013	5	-6.972e-4	2	5259.249	4	5470.398	5
605		18	max	0	10	-.002	12	0	3	8.791e-4	4	NC	1	NC	1
606			min	0	4	-.007	4	-.006	5	-5.834e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	9.446e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-4.695e-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

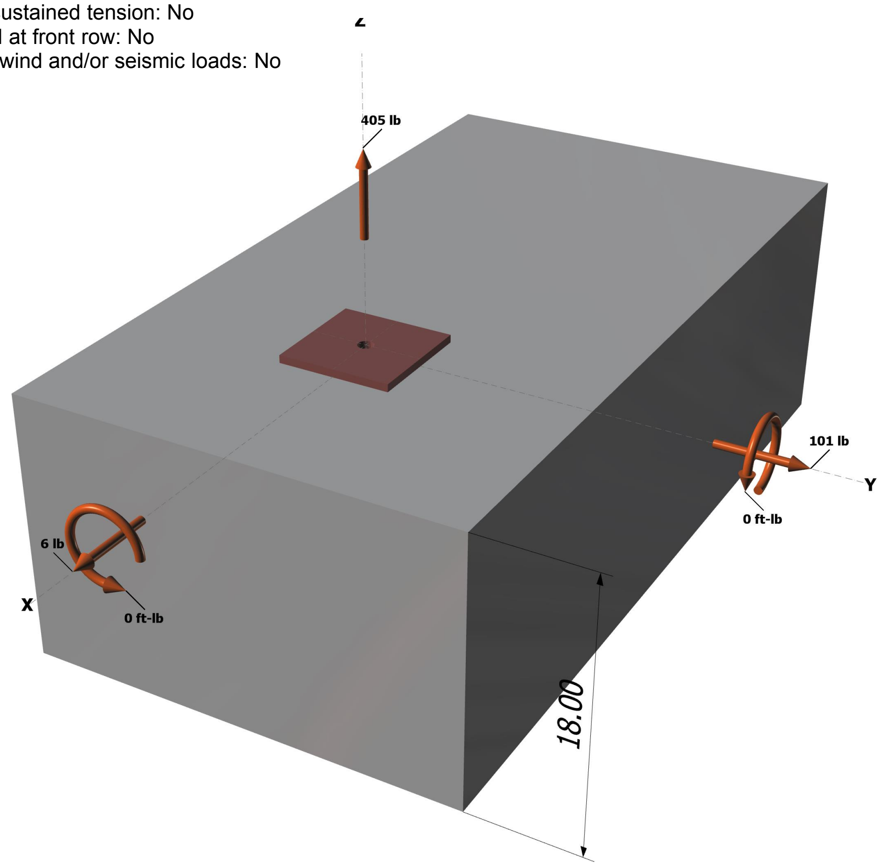
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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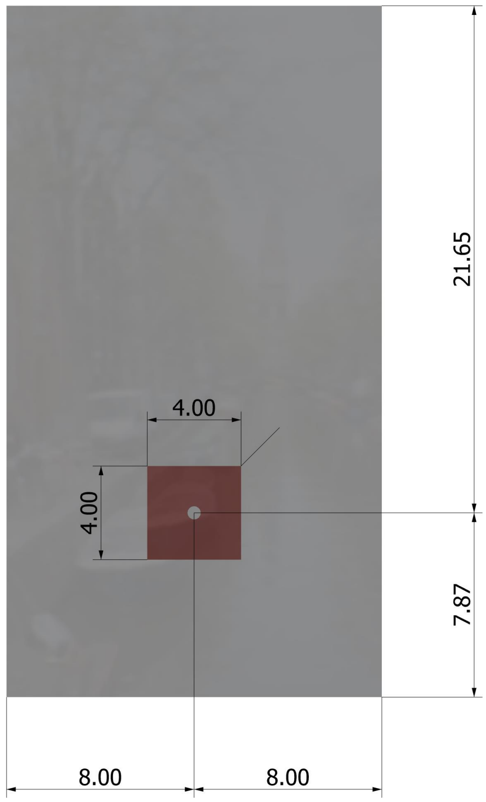


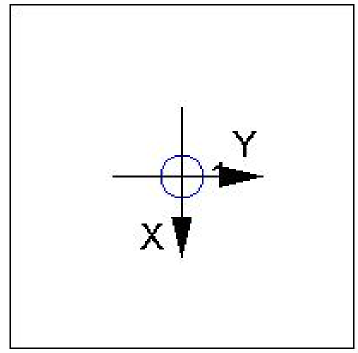
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

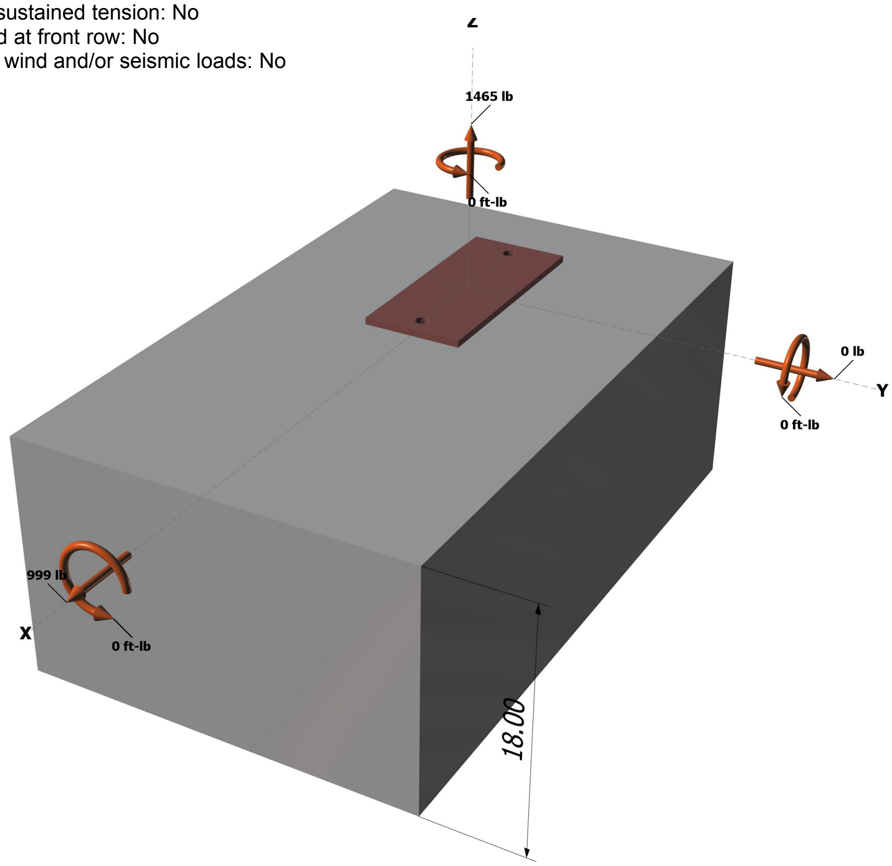
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

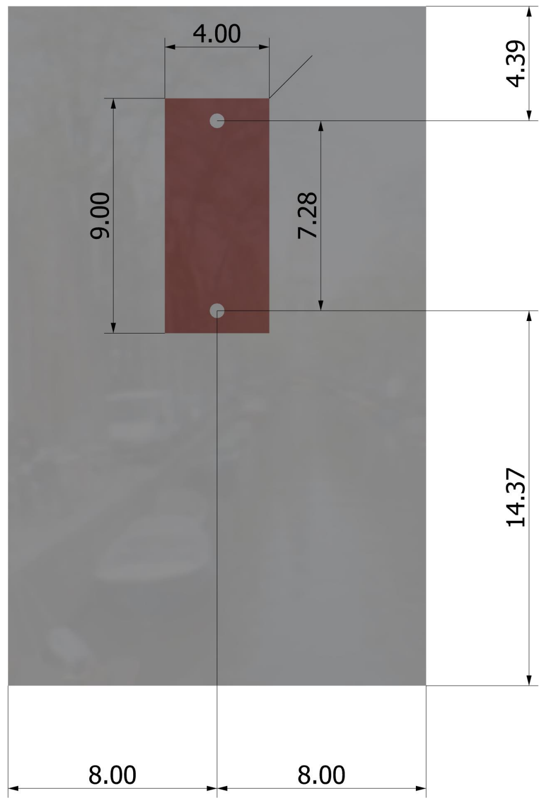
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



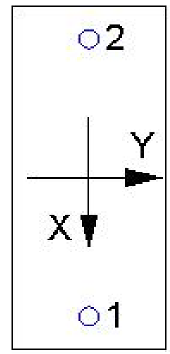
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.