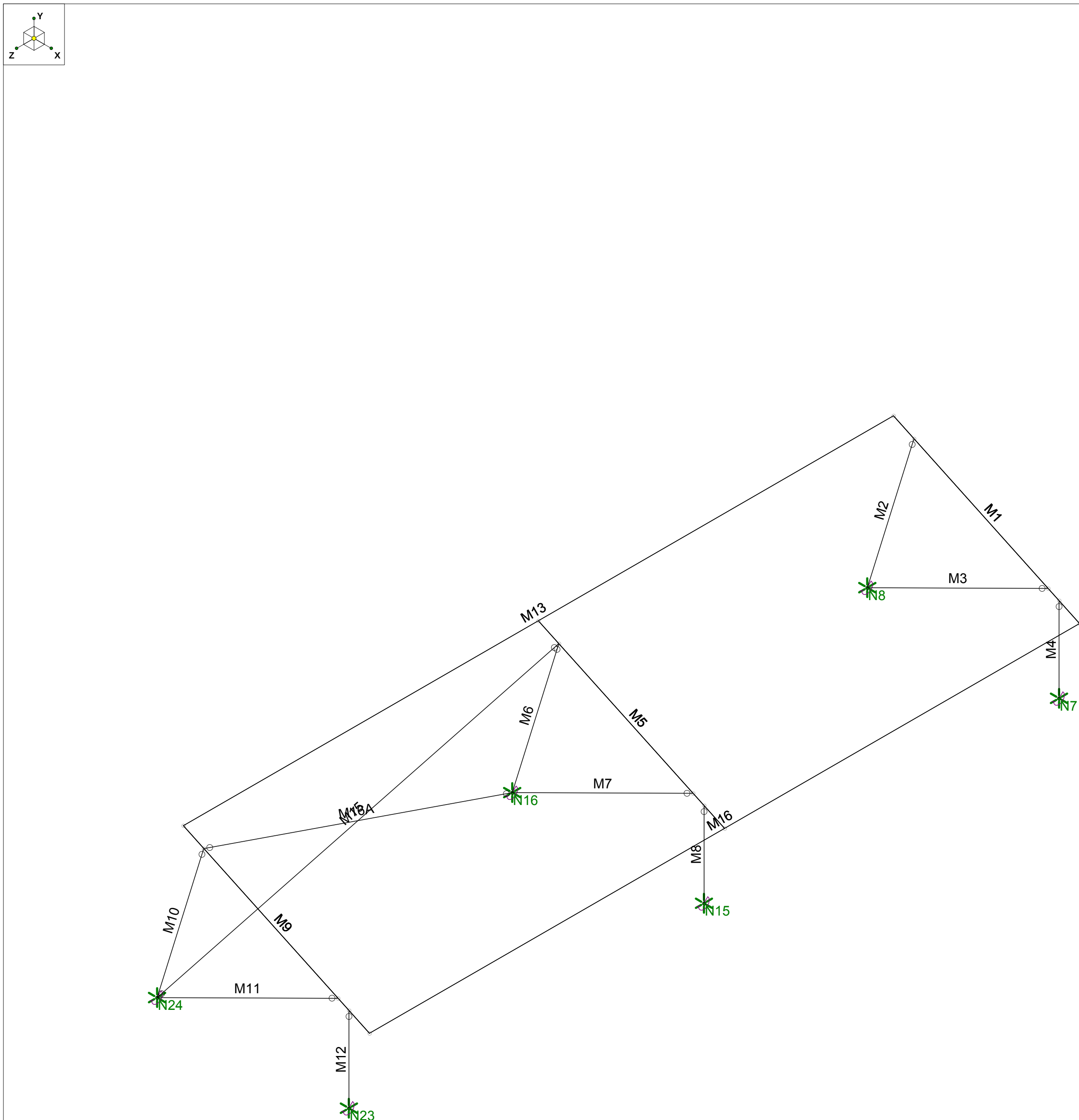


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

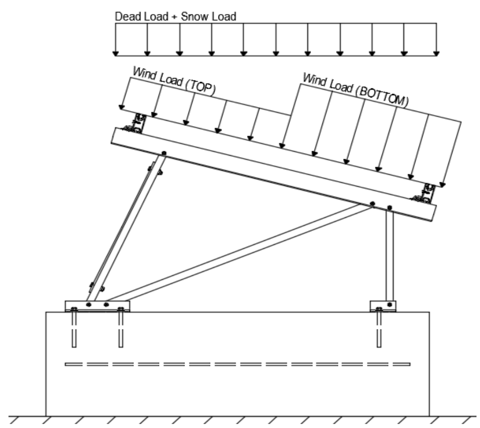
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 25°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 18.56 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 115 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads

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 + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

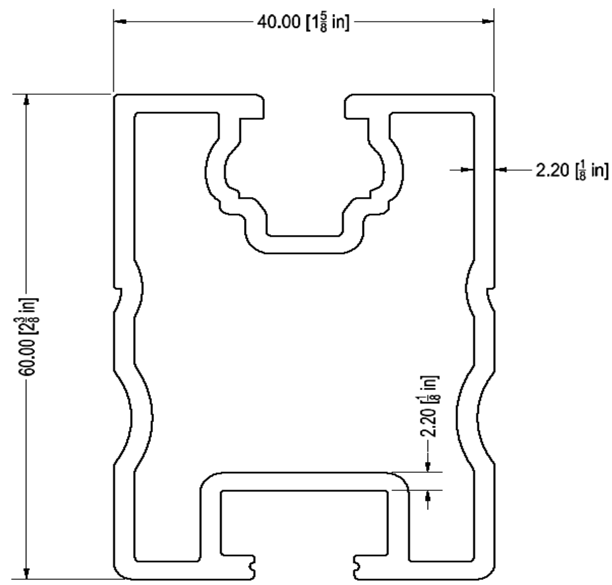
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

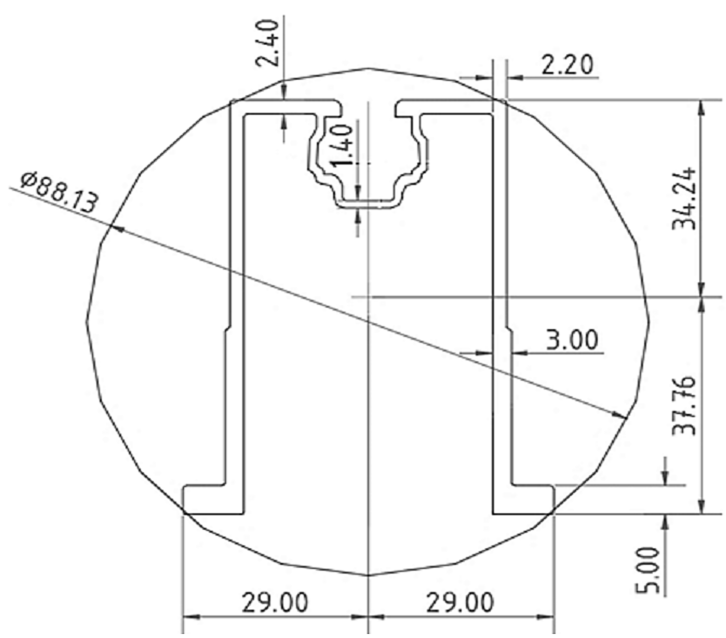
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.45	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.870	k-ft
M_z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



4.2 Girder Design

Loads from purlins are transferred using an inclined girder, which is connected to a set of aluminum struts. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

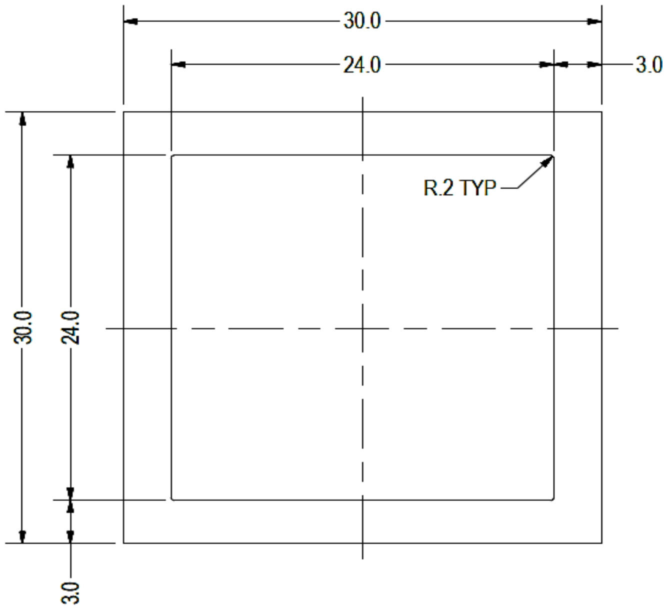
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2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



4.3 Front Strut Design

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

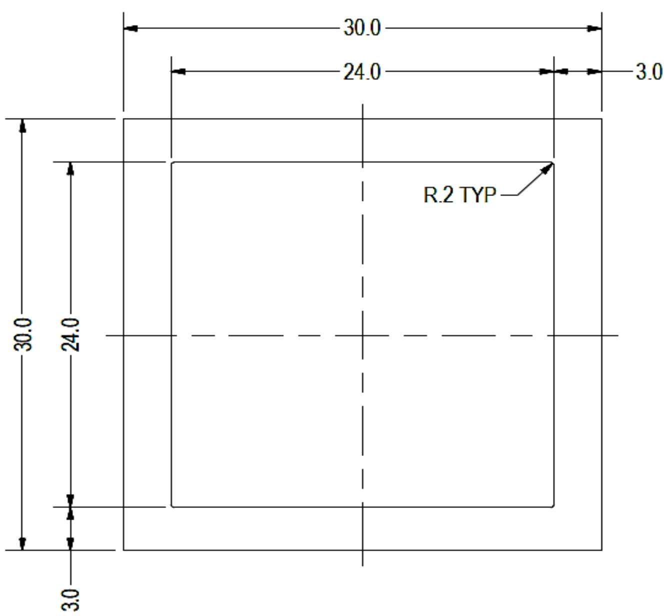
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.051	k-ft
P_n =	0.261	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	14%	



4.4 Diagonal Strut Design

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

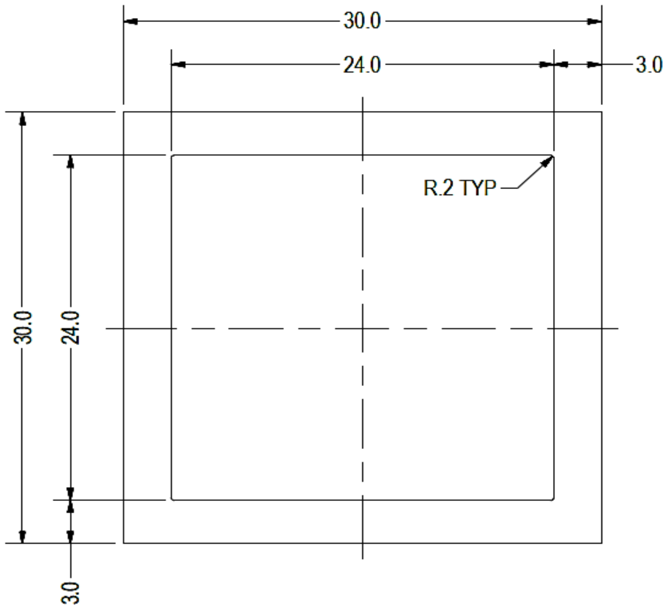
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.469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



4.5 Rear Strut Design

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

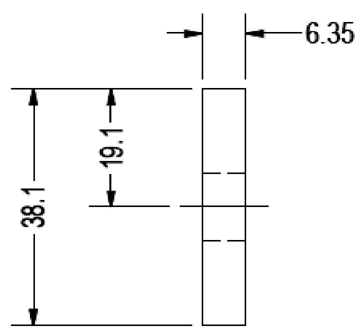
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.055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



4.6 Cross Brace Design

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

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.006	k-ft
P_n =	0.240	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	15%	



A cross brace kit is required every 13 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

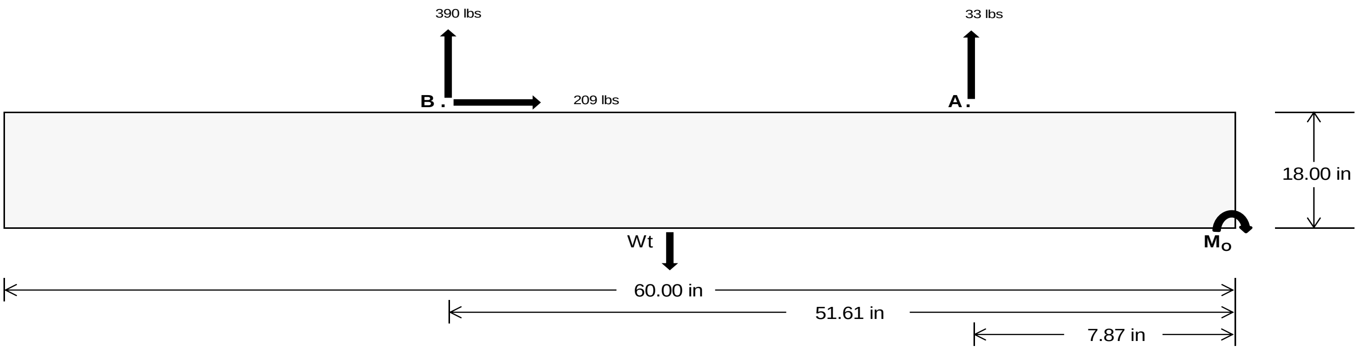
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	151.29	1693.73	k
Compressive Load =	1653.15	1376.09	k
Lateral Load =	41.40	908.28	k
Moment (Weak Axis) =	0.07	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>

M_O = 24133.9 in-lbs
Resisting Force Required = 804.46 lbs
S.F. = 1.67
Weight Required = 1340.77 lbs
Minimum Width = <u>21 in</u> in
Weight Provided = 1903.13 lbs

A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force = 209.44 lbs
Friction = 0.4
Weight Required = 523.59 lbs
Resisting Weight = 1903.13 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force = 209.44 lbs
Cohesion = 130 psf
Area = 8.75 ft^2
Resisting = 951.56 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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.

<u>Bearing Pressure</u>

	Ballast Width			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	630 lbs	630 lbs	630 lbs	630 lbs	469 lbs	469 lbs	469 lbs	469 lbs	773 lbs	773 lbs	773 lbs	773 lbs	-66 lbs	-66 lbs	-66 lbs	-66 lbs
F_B	456 lbs	456 lbs	456 lbs	456 lbs	507 lbs	507 lbs	507 lbs	507 lbs	684 lbs	684 lbs	684 lbs	684 lbs	-779 lbs	-779 lbs	-779 lbs	-779 lbs
F_V	69 lbs	69 lbs	69 lbs	69 lbs	381 lbs	381 lbs	381 lbs	381 lbs	332 lbs	332 lbs	332 lbs	332 lbs	-419 lbs	-419 lbs	-419 lbs	-419 lbs
P_{total}	2989 lbs	3080 lbs	3170 lbs	3261 lbs	2879 lbs	2969 lbs	3060 lbs	3151 lbs	3360 lbs	3451 lbs	3541 lbs	3632 lbs	297 lbs	351 lbs	406 lbs	460 lbs
M	443 lbs-ft	443 lbs-ft	443 lbs-ft	443 lbs-ft	523 lbs-ft	523 lbs-ft	523 lbs-ft	523 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	691 lbs-ft	653 lbs-ft	653 lbs-ft	653 lbs-ft	653 lbs-ft
e	0.15 ft	0.14 ft	0.14 ft	0.14 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.20 ft	1.86 ft	1.61 ft	1.42 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	280.9 psf	278.0 psf	275.4 psf	273.0 psf	257.2 psf	255.4 psf	253.8 psf	252.2 psf	289.2 psf	285.9 psf	282.9 psf	280.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	402.3 psf	393.9 psf	386.2 psf	379.2 psf	400.8 psf	392.4 psf	384.8 psf	377.9 psf	478.8 psf	466.9 psf	456.1 psf	446.1 psf	377.4 psf	199.5 psf	158.6 psf	142.0 psf

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

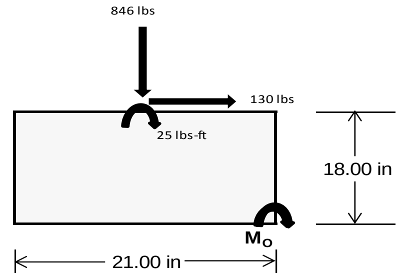
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	520.2 ft-lbs
Resisting Force Required =	594.56 lbs
S.F. =	1.67
Weight Required =	990.94 lbs
Minimum Width =	21 in in
Weight Provided =	1903.13 lbs

A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	138 lbs	161 lbs	83 lbs	344 lbs	846 lbs	300 lbs	80 lbs	5 lbs	27 lbs
F_V	22 lbs	172 lbs	23 lbs	15 lbs	130 lbs	18 lbs	22 lbs	171 lbs	23 lbs
P_{total}	2494 lbs	2517 lbs	2439 lbs	2586 lbs	3089 lbs	2543 lbs	769 lbs	694 lbs	716 lbs
M	63 lbs-ft	292 lbs-ft	68 lbs-ft	41 lbs-ft	220 lbs-ft	53 lbs-ft	64 lbs-ft	291 lbs-ft	68 lbs-ft
e	0.03 ft	0.12 ft	0.03 ft	0.02 ft	0.07 ft	0.02 ft	0.08 ft	0.42 ft	0.09 ft
L/6	0.29 ft	1.52 ft	1.69 ft	1.72 ft	1.61 ft	1.71 ft	1.58 ft	0.91 ft	1.56 ft
f_{min}	260.5 sqft	173.5 sqft	252.1 sqft	279.6 sqft	266.8 sqft	269.7 sqft	62.6 sqft	-34.7 sqft	55.3 sqft
f_{max}	309.7 psf	401.9 psf	305.3 psf	311.6 psf	439.2 psf	311.5 psf	113.1 psf	193.4 psf	108.4 psf

Maximum Bearing Pressure =	439 psf
Allowable Bearing Pressure =	1500 psf

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

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

5.3 Foundation Anchors

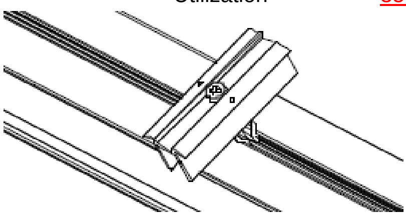
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

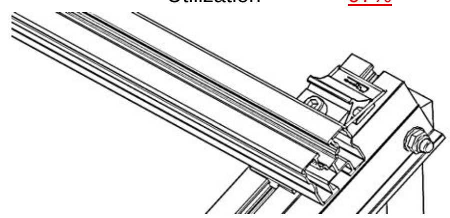
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

Fastening of Modules to Purlins			Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.424 k		Maximum Uplifting Force =	1.082 k
Allowable Uplift =	1.214 k		Allowable Uplift =	1.116 k
Utilization =	35%		Utilization =	97%



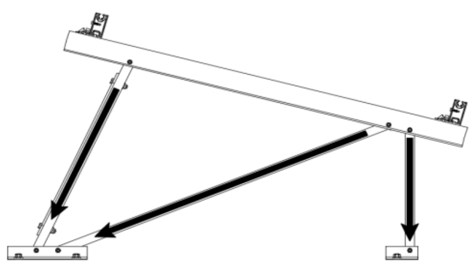


6.2 Bolted Connections

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

Front Strut			Rear Strut	
Maximum Axial Load =	1.272 k		Maximum Axial Load =	1.168 k
M8 Bolt Capacity =	5.692 k		M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k		Strut Bearing Capacity =	7.952 k
Utilization =	22%		Utilization =	21%

Diagonal Strut			Bracing	
Maximum Axial Load =	0.469 k		Maximum Axial Load =	0.240 k
M8 Bolt Shear Capacity =	5.692 k		M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k		Strut Bearing Capacity =	7.952 k
Utilization =	8%		Utilization =	3%



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.

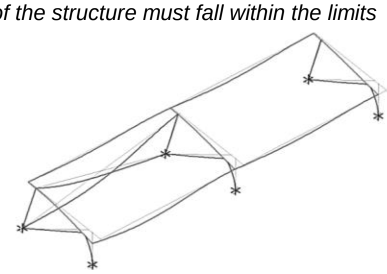
7. SEISMIC DESIGN

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} =	0.108 in	
$0.108 \leq 0.617$, 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 = 87.00 in

J = 0.255

226.543

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

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 = 87.00 in

J = 0.255

235.251

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

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

φF_LSt= 28.5 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

M_{max}St = 1.211 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in^3

M_{max}Wk = 0.871 k-ft

Compression

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.22
22.2924

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

S1 = 1.37733

$$S2 = 1.2C_c$$

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

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.22
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

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

3.4.15

b/t = 24.46

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

S1 = 3.8

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

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

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.6 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.453 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:
3.4.14
L_b = 18.00 in
J = 0.16
47.2194

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 31.2 ksi

3.4.16
b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Not Used
Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0
φF_L= 1.17φyFcy
φF_L= 38.9 ksi

3.4.18
h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 31.2 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
M_{max}St = 0.423 k-ft

Weak Axis:
3.4.14
L_b = 18.00 in
J = 0.16
47.2194

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 31.2

3.4.16
b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1
N/A for Weak Direction

3.4.18
h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 31.2 ksi
Iy = 39958.2 mm^4
0.096 in^4
x = 15 mm
Sy = 0.163 in^3
M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:
3.4.14
L_b = 36.18 in
J = 0.16
94.9139

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2 ksi

3.4.16
b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Not Used
Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0
φF_L= 1.17φyFcy
φF_L= 38.9 ksi

3.4.18
h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 30.2 ksi
Ix = 39958.2 mm^4
0.096 in^4
y = 15 mm
Sx = 0.163 in^3
M_{max}St = 0.410 k-ft

Weak Axis:
3.4.14
L_b = 36.18 in
J = 0.16
94.9139

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2

3.4.16
b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1
N/A for Weak Direction

3.4.18
h/t = 7.75

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.7

$\lambda =$ 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

$\varphi cc =$ 0.7972

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

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L =$ 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	-63.697	-63.697	0	0
2	M16	y	-98.441	-98.441	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	127.394	127.394	0	0
2	M16	y	57.906	57.906	0	0

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 + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

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...
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	167.931	2	290.867	2	-.006	10	0	4	0	1	0	1
2		min	-218.283	3	-395.081	3	-2.137	4	0	3	0	1	0	1
3	N7	max	0	5	465.415	1	-.163	12	0	12	0	1	0	1
4		min	-.157	2	-26.49	3	-31.573	4	-.051	4	0	1	0	1
5	N15	max	0	15	1271.653	1	.591	1	.001	1	0	1	0	1
6		min	-1.78	1	-116.38	3	-31.848	5	-.051	4	0	1	0	1
7	N16	max	659.255	2	1058.532	1	-.157	10	0	1	0	1	0	1
8		min	-698.676	3	-1302.87	3	-224.38	4	0	3	0	1	0	1
9	N23	max	0	15	465.11	1	3.387	1	.006	1	0	1	0	1
10		min	-.157	2	-26.013	3	-29.538	5	-.047	5	0	1	0	1
11	N24	max	168.393	2	295.168	2	40.309	3	.002	4	0	1	0	1
12		min	-218.388	3	-392.541	3	-3.518	5	0	3	0	1	0	1
13	Totals:	max	993.576	2	3837.069	1	0	1						
14		min	-1135.512	3	-2259.373	3	-321.191	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	322.546	1	.639	6	1.282	4	0	12	0	3	0	1
2			min	-356.585	3	.15	15	-.048	3	-.001	1	0	1	0	1
3		2	max	322.662	1	.593	6	1.176	4	0	12	0	5	0	15
4			min	-356.497	3	.139	15	-.048	3	-.001	1	0	1	0	6
5		3	max	322.779	1	.547	6	1.071	4	0	12	0	4	0	15
6			min	-356.41	3	.128	15	-.048	3	-.001	1	0	10	0	6
7		4	max	322.895	1	.502	6	.965	4	0	12	0	4	0	15
8			min	-356.323	3	.117	15	-.048	3	-.001	1	0	3	0	6
9		5	max	323.011	1	.456	6	.86	4	0	12	0	4	0	15
10			min	-356.235	3	.107	15	-.048	3	-.001	1	0	3	0	6
11		6	max	323.128	1	.41	6	.754	4	0	12	0	4	0	15
12			min	-356.148	3	.096	15	-.048	3	-.001	1	0	3	0	6
13		7	max	323.244	1	.365	6	.649	4	0	12	0	4	0	15
14			min	-356.061	3	.085	15	-.048	3	-.001	1	0	3	0	6
15		8	max	323.361	1	.319	6	.617	1	0	12	0	4	0	15
16			min	-355.973	3	.074	15	-.048	3	-.001	1	0	3	0	6
17		9	max	323.477	1	.273	6	.617	1	0	12	.001	4	0	15
18			min	-355.886	3	.064	15	-.048	3	-.001	1	0	3	0	6
19		10	max	323.593	1	.228	6	.617	1	0	12	.001	4	0	15
20			min	-355.799	3	.053	15	-.048	3	-.001	1	0	3	0	6
21		11	max	323.71	1	.182	6	.617	1	0	12	.001	4	0	15
22			min	-355.711	3	.042	15	-.048	3	-.001	1	0	3	0	6
23		12	max	323.826	1	.136	6	.617	1	0	12	.001	4	0	15
24			min	-355.624	3	.031	15	-.048	3	-.001	1	0	3	0	6
25		13	max	323.943	1	.099	2	.617	1	0	12	.001	4	0	15
26			min	-355.537	3	.019	12	-.137	5	-.001	1	0	3	0	6
27		14	max	324.059	1	.063	2	.617	1	0	12	.001	4	0	15
28			min	-355.45	3	-.002	3	-.243	5	-.001	1	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	324.175	1	.028	2	.617	1	0	12	.001	1	0	15
30			min	-355.362	3	-.029	3	-.348	5	-.001	1	0	3	0	6
31		16	max	324.292	1	-.008	2	.617	1	0	12	.001	1	0	15
32			min	-355.275	3	-.055	3	-.454	5	-.001	1	0	3	0	6
33		17	max	324.408	1	-.022	15	.617	1	0	12	.001	1	0	15
34			min	-355.188	3	-.092	4	-.559	5	-.001	1	0	3	0	6
35		18	max	324.525	1	-.033	15	.617	1	0	12	.002	1	0	15
36			min	-355.1	3	-.138	4	-.665	5	-.001	1	0	3	0	6
37		19	max	324.641	1	-.044	15	.617	1	0	12	.002	1	0	15
38			min	-355.013	3	-.183	4	-.77	5	-.001	1	0	3	0	6
39	M3	1	max	105.616	2	1.775	6	-.033	12	0	5	.002	1	0	6
40			min	-127.12	3	.417	15	-1.438	4	0	1	0	12	0	15
41		2	max	105.548	2	1.597	6	-.033	12	0	5	.002	1	0	2
42			min	-127.171	3	.375	15	-1.305	4	0	1	0	12	0	15
43		3	max	105.479	2	1.42	6	-.033	12	0	5	.002	1	0	2
44			min	-127.223	3	.333	15	-1.171	4	0	1	0	15	0	3
45		4	max	105.41	2	1.243	6	-.033	12	0	5	.002	1	0	15
46			min	-127.274	3	.292	15	-1.037	4	0	1	0	5	0	4
47		5	max	105.342	2	1.066	6	-.033	12	0	5	.001	1	0	15
48			min	-127.326	3	.25	15	-.904	4	0	1	0	5	0	4
49		6	max	105.273	2	.889	6	-.033	12	0	5	.001	1	0	15
50			min	-127.377	3	.208	15	-.77	4	0	1	0	5	0	4
51		7	max	105.205	2	.711	6	-.033	12	0	5	.001	1	0	15
52			min	-127.429	3	.167	15	-.637	4	0	1	0	5	0	4
53		8	max	105.136	2	.534	6	-.033	12	0	5	.001	1	0	15
54			min	-127.48	3	.125	15	-.621	1	0	1	0	5	-.001	4
55		9	max	105.067	2	.357	6	-.033	12	0	5	0	1	0	15
56			min	-127.532	3	.083	15	-.621	1	0	1	0	5	-.001	4
57		10	max	104.999	2	.18	6	-.033	12	0	5	0	1	0	15
58			min	-127.583	3	.042	15	-.621	1	0	1	0	5	-.001	4
59		11	max	104.93	2	.024	2	.027	5	0	5	0	1	0	15
60			min	-127.634	3	-.021	3	-.621	1	0	1	0	5	-.001	4
61		12	max	104.862	2	-.042	15	.16	5	0	5	0	1	0	15
62			min	-127.686	3	-.175	4	-.621	1	0	1	0	5	-.001	4
63		13	max	104.793	2	-.083	15	.294	5	0	5	0	1	0	15
64			min	-127.737	3	-.352	4	-.621	1	0	1	0	5	-.001	4
65		14	max	104.724	2	-.125	15	.427	5	0	5	0	1	0	15
66			min	-127.789	3	-.529	4	-.621	1	0	1	0	5	-.001	4
67		15	max	104.656	2	-.166	15	.561	5	0	5	0	1	0	15
68			min	-127.84	3	-.706	4	-.621	1	0	1	0	5	0	4
69		16	max	104.587	2	-.208	15	.695	5	0	5	0	12	0	15
70			min	-127.892	3	-.883	4	-.621	1	0	1	0	4	0	4
71		17	max	104.519	2	-.25	15	.828	5	0	5	0	12	0	15
72			min	-127.943	3	-1.061	4	-.621	1	0	1	0	4	0	4
73		18	max	104.45	2	-.291	15	.962	5	0	5	0	15	0	15
74			min	-127.995	3	-1.238	4	-.621	1	0	1	0	1	0	4
75		19	max	104.381	2	-.333	15	1.096	5	0	5	0	5	0	1
76			min	-128.046	3	-1.415	4	-.621	1	0	1	0	1	0	1
77	M4	1	max	464.25	1	0	1	-.162	12	0	1	0	5	0	1
78			min	-27.363	3	0	1	-31.16	4	0	1	0	1	0	1
79		2	max	464.315	1	0	1	-.162	12	0	1	0	12	0	1
80			min	-27.315	3	0	1	-31.216	4	0	1	-.003	4	0	1
81		3	max	464.379	1	0	1	-.162	12	0	1	0	12	0	1
82			min	-27.266	3	0	1	-31.272	4	0	1	-.006	4	0	1
83		4	max	464.444	1	0	1	-.162	12	0	1	0	12	0	1
84			min	-27.218	3	0	1	-31.328	4	0	1	-.008	4	0	1
85		5	max	464.509	1	0	1	-.162	12	0	1	0	12	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	-27.169	3	0	1	-31.384	4	0	1	-.011	4	0	1
87		6	max	464.573	1	0	1	-.162	12	0	1	0	12	0	1
88			min	-27.121	3	0	1	-31.44	4	0	1	-.014	4	0	1
89		7	max	464.638	1	0	1	-.162	12	0	1	0	12	0	1
90			min	-27.072	3	0	1	-31.496	4	0	1	-.017	4	0	1
91		8	max	464.703	1	0	1	-.162	12	0	1	0	12	0	1
92			min	-27.024	3	0	1	-31.552	4	0	1	-.02	4	0	1
93		9	max	464.768	1	0	1	-.162	12	0	1	0	12	0	1
94			min	-26.975	3	0	1	-31.608	4	0	1	-.022	4	0	1
95		10	max	464.832	1	0	1	-.162	12	0	1	0	12	0	1
96			min	-26.927	3	0	1	-31.665	4	0	1	-.025	4	0	1
97		11	max	464.897	1	0	1	-.162	12	0	1	0	12	0	1
98			min	-26.878	3	0	1	-31.721	4	0	1	-.028	4	0	1
99		12	max	464.962	1	0	1	-.162	12	0	1	0	12	0	1
100			min	-26.83	3	0	1	-31.777	4	0	1	-.031	4	0	1
101		13	max	465.026	1	0	1	-.162	12	0	1	0	12	0	1
102			min	-26.781	3	0	1	-31.833	4	0	1	-.034	4	0	1
103		14	max	465.091	1	0	1	-.162	12	0	1	0	12	0	1
104			min	-26.732	3	0	1	-31.889	4	0	1	-.037	4	0	1
105		15	max	465.156	1	0	1	-.162	12	0	1	0	12	0	1
106			min	-26.684	3	0	1	-31.945	4	0	1	-.039	4	0	1
107		16	max	465.221	1	0	1	-.162	12	0	1	0	12	0	1
108			min	-26.635	3	0	1	-32.001	4	0	1	-.042	4	0	1
109		17	max	465.285	1	0	1	-.162	12	0	1	0	12	0	1
110			min	-26.587	3	0	1	-32.057	4	0	1	-.045	4	0	1
111		18	max	465.35	1	0	1	-.162	12	0	1	0	12	0	1
112			min	-26.538	3	0	1	-32.113	4	0	1	-.048	4	0	1
113		19	max	465.415	1	0	1	-.162	12	0	1	0	12	0	1
114			min	-26.49	3	0	1	-32.169	4	0	1	-.051	4	0	1
115	M6	1	max	1053.003	1	.629	6	1.179	4	0	1	0	3	0	1
116			min	-1167.764	3	.142	15	-.139	3	0	5	0	1	0	1
117		2	max	1053.119	1	.584	6	1.073	4	0	1	0	4	0	15
118			min	-1167.677	3	.132	15	-.139	3	0	5	0	11	0	6
119		3	max	1053.236	1	.538	6	.968	4	0	1	0	4	0	15
120			min	-1167.589	3	.121	15	-.139	3	0	5	0	10	0	6
121		4	max	1053.352	1	.492	6	.862	4	0	1	0	4	0	15
122			min	-1167.502	3	.11	15	-.139	3	0	5	0	10	0	6
123		5	max	1053.468	1	.449	2	.757	4	0	1	0	4	0	15
124			min	-1167.415	3	.099	15	-.139	3	0	5	0	12	0	6
125		6	max	1053.585	1	.414	2	.651	4	0	1	0	4	0	15
126			min	-1167.328	3	.089	15	-.139	3	0	5	0	3	0	6
127		7	max	1053.701	1	.378	2	.546	4	0	1	0	4	0	15
128			min	-1167.24	3	.078	15	-.139	3	0	5	0	3	0	6
129		8	max	1053.818	1	.342	2	.44	4	0	1	.001	4	0	15
130			min	-1167.153	3	.067	15	-.139	3	0	5	0	3	0	6
131		9	max	1053.934	1	.307	2	.335	4	0	1	.001	4	0	15
132			min	-1167.066	3	.05	12	-.139	3	0	5	0	3	0	2
133		10	max	1054.05	1	.271	2	.233	14	0	1	.001	4	0	15
134			min	-1166.978	3	.032	12	-.139	3	0	5	0	3	0	2
135		11	max	1054.167	1	.236	2	.211	1	0	1	.001	4	0	15
136			min	-1166.891	3	.012	3	-.139	3	0	5	0	3	0	2
137		12	max	1054.283	1	.2	2	.211	1	0	1	.001	4	0	15
138			min	-1166.804	3	-.015	3	-.139	3	0	5	0	3	0	2
139		13	max	1054.4	1	.165	2	.211	1	0	1	.001	4	0	15
140			min	-1166.716	3	-.041	3	-.154	5	0	5	0	3	0	2
141		14	max	1054.516	1	.129	2	.211	1	0	1	.001	4	0	15
142			min	-1166.629	3	-.068	3	-.26	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	1054.632	1	.093	2	.211	1	0	1	.001	4	0	15
144			min	-1166.542	3	-.095	3	-.365	5	0	5	0	3	0	2
145		16	max	1054.749	1	.058	2	.211	1	0	1	.001	4	0	12
146			min	-1166.455	3	-.122	3	-.471	5	0	5	0	3	0	2
147		17	max	1054.865	1	.022	2	.211	1	0	1	0	4	0	12
148			min	-1166.367	3	-.148	3	-.576	5	0	5	0	3	0	2
149		18	max	1054.982	1	-.013	2	.211	1	0	1	0	4	0	12
150			min	-1166.28	3	-.175	3	-.682	5	0	5	0	3	0	2
151		19	max	1055.098	1	-.049	2	.211	1	0	1	0	4	0	12
152			min	-1166.193	3	-.202	3	-.787	5	0	5	0	3	0	2
153	M7	1	max	469.475	2	1.788	4	.012	1	0	2	0	4	0	2
154			min	-392.473	3	.425	15	-1.364	5	0	3	0	3	0	12
155		2	max	469.406	2	1.611	4	.012	1	0	2	0	4	0	2
156			min	-392.525	3	.383	15	-1.231	5	0	3	0	3	0	3
157		3	max	469.338	2	1.434	4	.012	1	0	2	0	4	0	2
158			min	-392.576	3	.341	15	-1.097	5	0	3	0	3	0	3
159		4	max	469.269	2	1.257	4	.012	1	0	2	0	2	0	2
160			min	-392.628	3	.3	15	-.963	5	0	3	0	3	0	3
161		5	max	469.2	2	1.079	4	.012	1	0	2	0	2	0	15
162			min	-392.679	3	.258	15	-.83	5	0	3	0	5	0	3
163		6	max	469.132	2	.902	4	.012	1	0	2	0	2	0	15
164			min	-392.731	3	.216	15	-.696	5	0	3	0	5	0	6
165		7	max	469.063	2	.725	4	.012	1	0	2	0	2	0	15
166			min	-392.782	3	.175	15	-.562	5	0	3	0	5	0	6
167		8	max	468.995	2	.548	4	.012	1	0	2	0	2	0	15
168			min	-392.834	3	.133	15	-.429	5	0	3	0	5	-.001	6
169		9	max	468.926	2	.371	4	.012	1	0	2	0	2	0	15
170			min	-392.885	3	.09	12	-.295	5	0	3	0	5	-.001	6
171		10	max	468.857	2	.222	2	.012	1	0	2	0	2	0	15
172			min	-392.937	3	.021	12	-.162	5	0	3	0	5	-.001	6
173		11	max	468.789	2	.084	2	.012	1	0	2	0	2	0	15
174			min	-392.988	3	-.081	3	-.028	5	0	3	0	5	-.001	6
175		12	max	468.72	2	-.033	15	.109	4	0	2	0	2	0	15
176			min	-393.039	3	-.185	3	-.004	10	0	3	0	5	-.001	6
177		13	max	468.651	2	-.075	15	.242	4	0	2	0	2	0	15
178			min	-393.091	3	-.338	6	-.004	10	0	3	0	5	-.001	6
179		14	max	468.583	2	-.117	15	.376	4	0	2	0	2	0	15
180			min	-393.142	3	-.516	6	-.004	10	0	3	0	5	-.001	6
181		15	max	468.514	2	-.158	15	.51	4	0	2	0	2	0	15
182			min	-393.194	3	-.693	6	-.004	10	0	3	0	5	0	6
183		16	max	468.446	2	-.2	15	.643	4	0	2	0	2	0	15
184			min	-393.245	3	-.87	6	-.004	10	0	3	0	5	0	6
185		17	max	468.377	2	-.242	15	.777	4	0	2	0	2	0	15
186			min	-393.297	3	-1.047	6	-.004	10	0	3	0	5	0	6
187		18	max	468.308	2	-.283	15	.911	4	0	2	0	2	0	15
188			min	-393.348	3	-1.225	6	-.004	10	0	3	0	5	0	6
189		19	max	468.24	2	-.325	15	1.044	4	0	2	0	14	0	1
190			min	-393.4	3	-1.402	6	-.004	10	0	3	0	3	0	1
191	M8	1	max	1270.488	1	0	1	.746	1	0	1	0	4	0	1
192			min	-117.253	3	0	1	-31.271	4	0	1	0	1	0	1
193		2	max	1270.553	1	0	1	.746	1	0	1	0	1	0	1
194			min	-117.205	3	0	1	-31.327	4	0	1	-.003	4	0	1
195		3	max	1270.618	1	0	1	.746	1	0	1	0	1	0	1
196			min	-117.156	3	0	1	-31.383	4	0	1	-.006	4	0	1
197		4	max	1270.682	1	0	1	.746	1	0	1	0	1	0	1
198			min	-117.108	3	0	1	-31.439	4	0	1	-.008	4	0	1
199		5	max	1270.747	1	0	1	.746	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	-117.059	3	0	1	-31.495	4	0	1	-.011	4	0	1
201		6	max	1270.812	1	0	1	.746	1	0	1	0	1	0	1
202			min	-117.01	3	0	1	-31.551	4	0	1	-.014	4	0	1
203		7	max	1270.876	1	0	1	.746	1	0	1	0	1	0	1
204			min	-116.962	3	0	1	-31.607	4	0	1	-.017	4	0	1
205		8	max	1270.941	1	0	1	.746	1	0	1	0	1	0	1
206			min	-116.913	3	0	1	-31.663	4	0	1	-.02	4	0	1
207		9	max	1271.006	1	0	1	.746	1	0	1	0	1	0	1
208			min	-116.865	3	0	1	-31.719	4	0	1	-.023	4	0	1
209		10	max	1271.071	1	0	1	.746	1	0	1	0	1	0	1
210			min	-116.816	3	0	1	-31.776	4	0	1	-.025	4	0	1
211		11	max	1271.135	1	0	1	.746	1	0	1	0	1	0	1
212			min	-116.768	3	0	1	-31.832	4	0	1	-.028	4	0	1
213		12	max	1271.2	1	0	1	.746	1	0	1	0	1	0	1
214			min	-116.719	3	0	1	-31.888	4	0	1	-.031	4	0	1
215		13	max	1271.265	1	0	1	.746	1	0	1	0	1	0	1
216			min	-116.671	3	0	1	-31.944	4	0	1	-.034	4	0	1
217		14	max	1271.329	1	0	1	.746	1	0	1	0	1	0	1
218			min	-116.622	3	0	1	-32	4	0	1	-.037	4	0	1
219		15	max	1271.394	1	0	1	.746	1	0	1	0	1	0	1
220			min	-116.574	3	0	1	-32.056	4	0	1	-.04	4	0	1
221		16	max	1271.459	1	0	1	.746	1	0	1	.001	1	0	1
222			min	-116.525	3	0	1	-32.112	4	0	1	-.042	4	0	1
223		17	max	1271.524	1	0	1	.746	1	0	1	.001	1	0	1
224			min	-116.477	3	0	1	-32.168	4	0	1	-.045	4	0	1
225		18	max	1271.588	1	0	1	.746	1	0	1	.001	1	0	1
226			min	-116.428	3	0	1	-32.224	4	0	1	-.048	4	0	1
227		19	max	1271.653	1	0	1	.746	1	0	1	.001	1	0	1
228			min	-116.38	3	0	1	-32.28	4	0	1	-.051	4	0	1
229	M10	1	max	334.059	1	.666	4	1.364	5	.001	1	0	1	0	1
230			min	-338.432	3	.168	15	-.173	1	-.002	5	0	3	0	1
231		2	max	334.176	1	.62	4	1.258	5	.001	1	0	1	0	15
232			min	-338.345	3	.157	15	-.173	1	-.002	5	0	3	0	4
233		3	max	334.292	1	.574	4	1.153	5	.001	1	0	4	0	15
234			min	-338.258	3	.146	15	-.173	1	-.002	5	0	3	0	4
235		4	max	334.408	1	.529	4	1.047	5	.001	1	0	4	0	15
236			min	-338.171	3	.135	15	-.173	1	-.002	5	0	3	0	4
237		5	max	334.525	1	.483	4	.942	5	.001	1	0	4	0	15
238			min	-338.083	3	.125	15	-.173	1	-.002	5	0	3	0	4
239		6	max	334.641	1	.437	4	.836	5	.001	1	0	4	0	15
240			min	-337.996	3	.114	15	-.173	1	-.002	5	0	3	0	4
241		7	max	334.758	1	.392	4	.731	5	.001	1	.001	4	0	15
242			min	-337.909	3	.103	15	-.173	1	-.002	5	0	3	0	4
243		8	max	334.874	1	.346	4	.625	5	.001	1	.001	4	0	15
244			min	-337.821	3	.093	15	-.173	1	-.002	5	0	3	0	4
245		9	max	334.99	1	.3	4	.52	5	.001	1	.001	4	0	15
246			min	-337.734	3	.082	15	-.173	1	-.002	5	0	3	0	4
247		10	max	335.107	1	.255	4	.414	5	.001	1	.001	4	0	15
248			min	-337.647	3	.071	15	-.173	1	-.002	5	0	3	0	4
249		11	max	335.223	1	.209	4	.309	5	.001	1	.001	4	0	15
250			min	-337.559	3	.06	15	-.173	1	-.002	5	0	3	0	4
251		12	max	335.34	1	.163	4	.203	5	.001	1	.001	4	0	15
252			min	-337.472	3	.05	15	-.173	1	-.002	5	0	3	0	4
253		13	max	335.456	1	.118	4	.098	5	.001	1	.001	4	0	15
254			min	-337.385	3	.033	1	-.173	1	-.002	5	0	3	0	4
255		14	max	335.572	1	.072	4	-.006	15	.001	1	.001	4	0	15
256			min	-337.298	3	-.003	1	-.173	1	-.002	5	0	1	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	335.689	1	.028	2	-.01	12	.001	1	.001	4	0	15
258			min	-337.21	3	-.038	1	-.173	1	-.002	5	0	1	0	4
259		16	max	335.805	1	.009	5	-.01	12	.001	1	.001	4	0	15
260			min	-337.123	3	-.074	1	-.238	4	-.002	5	0	1	0	4
261		17	max	335.922	1	-.004	15	-.01	12	.001	1	.001	4	0	15
262			min	-337.036	3	-.11	1	-.344	4	-.002	5	0	1	0	4
263		18	max	336.038	1	-.015	15	-.01	12	.001	1	.001	5	0	15
264			min	-336.948	3	-.145	1	-.449	4	-.002	5	0	1	0	4
265		19	max	336.154	1	-.026	15	-.01	12	.001	1	.001	5	0	15
266			min	-336.861	3	-.181	1	-.555	4	-.002	5	0	1	0	4
267	M11	1	max	105.348	2	1.768	6	.722	1	.002	4	.001	5	0	6
268			min	-127.738	3	.412	15	-1.172	5	0	10	-.002	1	0	15
269		2	max	105.279	2	1.591	6	.722	1	.002	4	0	5	0	1
270			min	-127.789	3	.371	15	-1.038	5	0	10	-.002	1	0	12
271		3	max	105.211	2	1.414	6	.722	1	.002	4	0	5	0	1
272			min	-127.841	3	.329	15	-.904	5	0	10	-.002	1	0	3
273		4	max	105.142	2	1.237	6	.722	1	.002	4	0	5	0	15
274			min	-127.892	3	.287	15	-.771	5	0	10	-.002	1	0	4
275		5	max	105.074	2	1.06	6	.722	1	.002	4	0	5	0	15
276			min	-127.944	3	.246	15	-.637	5	0	10	-.001	1	0	4
277		6	max	105.005	2	.882	6	.722	1	.002	4	0	5	0	15
278			min	-127.995	3	.204	15	-.503	5	0	10	-.001	1	0	4
279		7	max	104.936	2	.705	6	.722	1	.002	4	0	3	0	15
280			min	-128.047	3	.162	15	-.37	5	0	10	-.001	1	0	4
281		8	max	104.868	2	.528	6	.722	1	.002	4	0	3	0	15
282			min	-128.098	3	.121	15	-.236	5	0	10	0	1	-.001	4
283		9	max	104.799	2	.351	6	.722	1	.002	4	0	3	0	15
284			min	-128.149	3	.079	15	-.103	5	0	10	0	1	-.001	4
285		10	max	104.731	2	.174	6	.722	1	.002	4	0	3	0	15
286			min	-128.201	3	.037	15	.008	12	0	10	0	1	-.001	4
287		11	max	104.662	2	.025	1	.722	1	.002	4	0	3	0	15
288			min	-128.252	3	-.039	3	.008	12	0	10	0	1	-.001	4
289		12	max	104.593	2	-.046	15	.722	1	.002	4	0	3	0	15
290			min	-128.304	3	-.181	4	.008	12	0	10	0	1	-.001	4
291		13	max	104.525	2	-.088	15	.722	1	.002	4	0	3	0	15
292			min	-128.355	3	-.358	4	.008	12	0	10	0	1	-.001	4
293		14	max	104.456	2	-.129	15	.722	1	.002	4	0	4	0	15
294			min	-128.407	3	-.536	4	.008	12	0	10	0	2	-.001	4
295		15	max	104.388	2	-.171	15	.845	4	.002	4	0	4	0	15
296			min	-128.458	3	-.713	4	.008	12	0	10	0	10	0	4
297		16	max	104.319	2	-.213	15	.979	4	.002	4	0	4	0	15
298			min	-128.51	3	-.89	4	.008	12	0	10	0	10	0	4
299		17	max	104.25	2	-.254	15	1.113	4	.002	4	0	4	0	15
300			min	-128.561	3	-1.067	4	.008	12	0	10	0	10	0	4
301		18	max	104.182	2	-.296	15	1.246	4	.002	4	.001	4	0	15
302			min	-128.613	3	-1.244	4	.008	12	0	10	0	10	0	4
303		19	max	104.113	2	-.338	15	1.38	4	.002	4	.001	4	0	1
304			min	-128.664	3	-1.422	4	.008	12	0	10	0	10	0	1
305	M12	1	max	463.945	1	0	1	3.669	1	0	1	0	4	0	1
306			min	-26.886	3	0	1	-28.592	5	0	1	0	3	0	1
307		2	max	464.01	1	0	1	3.669	1	0	1	0	1	0	1
308			min	-26.838	3	0	1	-28.649	5	0	1	-.003	5	0	1
309		3	max	464.075	1	0	1	3.669	1	0	1	0	1	0	1
310			min	-26.789	3	0	1	-28.705	5	0	1	-.005	5	0	1
311		4	max	464.139	1	0	1	3.669	1	0	1	.001	1	0	1
312			min	-26.741	3	0	1	-28.761	5	0	1	-.008	5	0	1
313		5	max	464.204	1	0	1	3.669	1	0	1	.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-26.692	3	0	1	-28.817	5	0	1	-.01	5	0	1
315		6	max	464.269	1	0	1	3.669	1	0	1	.002	1	0	1
316			min	-26.644	3	0	1	-28.873	5	0	1	-.013	5	0	1
317		7	max	464.333	1	0	1	3.669	1	0	1	.002	1	0	1
318			min	-26.595	3	0	1	-28.929	5	0	1	-.015	5	0	1
319		8	max	464.398	1	0	1	3.669	1	0	1	.002	1	0	1
320			min	-26.547	3	0	1	-28.985	5	0	1	-.018	5	0	1
321		9	max	464.463	1	0	1	3.669	1	0	1	.003	1	0	1
322			min	-26.498	3	0	1	-29.041	5	0	1	-.021	5	0	1
323		10	max	464.527	1	0	1	3.669	1	0	1	.003	1	0	1
324			min	-26.45	3	0	1	-29.097	5	0	1	-.023	5	0	1
325		11	max	464.592	1	0	1	3.669	1	0	1	.003	1	0	1
326			min	-26.401	3	0	1	-29.153	5	0	1	-.026	5	0	1
327		12	max	464.657	1	0	1	3.669	1	0	1	.004	1	0	1
328			min	-26.353	3	0	1	-29.209	5	0	1	-.028	5	0	1
329		13	max	464.722	1	0	1	3.669	1	0	1	.004	1	0	1
330			min	-26.304	3	0	1	-29.265	5	0	1	-.031	5	0	1
331		14	max	464.786	1	0	1	3.669	1	0	1	.004	1	0	1
332			min	-26.255	3	0	1	-29.321	5	0	1	-.034	5	0	1
333		15	max	464.851	1	0	1	3.669	1	0	1	.005	1	0	1
334			min	-26.207	3	0	1	-29.378	5	0	1	-.036	5	0	1
335		16	max	464.916	1	0	1	3.669	1	0	1	.005	1	0	1
336			min	-26.158	3	0	1	-29.434	5	0	1	-.039	5	0	1
337		17	max	464.98	1	0	1	3.669	1	0	1	.005	1	0	1
338			min	-26.11	3	0	1	-29.49	5	0	1	-.042	5	0	1
339		18	max	465.045	1	0	1	3.669	1	0	1	.006	1	0	1
340			min	-26.061	3	0	1	-29.546	5	0	1	-.044	5	0	1
341		19	max	465.11	1	0	1	3.669	1	0	1	.006	1	0	1
342			min	-26.013	3	0	1	-29.602	5	0	1	-.047	5	0	1
343	M1	1	max	137.879	1	335.641	3	-3.27	12	0	1	.144	1	0	1
344			min	5.586	12	-320.684	1	-72.802	1	0	3	.007	12	0	3
345		2	max	137.997	1	335.451	3	-3.27	12	0	1	.128	1	.07	1
346			min	5.645	12	-320.937	1	-72.802	1	0	3	.006	12	-.073	3
347		3	max	93.663	1	6.969	9	-3.3	12	0	12	.111	1	.138	1
348			min	-2.461	10	-17.83	3	-72.61	1	0	1	.006	12	-.144	3
349		4	max	93.781	1	6.758	9	-3.3	12	0	12	.095	1	.138	1
350			min	-2.362	10	-18.02	3	-72.61	1	0	1	.005	12	-.14	3
351		5	max	93.899	1	6.547	9	-3.3	12	0	12	.079	1	.139	1
352			min	-2.264	10	-18.214	2	-72.61	1	0	1	.004	12	-.136	3
353		6	max	94.017	1	6.336	9	-3.3	12	0	12	.064	1	.139	1
354			min	-2.166	10	-18.467	2	-72.61	1	0	1	.003	12	-.132	3
355		7	max	94.135	1	6.125	9	-3.3	12	0	12	.048	1	.14	1
356			min	-2.067	10	-18.72	2	-72.61	1	0	1	.003	12	-.128	3
357		8	max	94.253	1	5.914	9	-3.3	12	0	12	.032	1	.14	1
358			min	-1.969	10	-18.974	2	-72.61	1	0	1	.002	12	-.124	3
359		9	max	94.371	1	5.704	9	-3.3	12	0	12	.016	1	.141	1
360			min	-1.871	10	-19.227	2	-72.61	1	0	1	.001	12	-.12	3
361		10	max	94.489	1	5.493	9	-3.3	12	0	12	.003	4	.143	2
362			min	-1.772	10	-19.48	2	-72.61	1	0	1	0	10	-.116	3
363		11	max	94.607	1	5.282	9	-3.3	12	0	12	0	12	.147	2
364			min	-1.674	10	-19.733	2	-72.61	1	0	1	-.015	1	-.112	3
365		12	max	94.725	1	5.071	9	-3.3	12	0	12	0	12	.152	2
366			min	-1.576	10	-19.986	2	-72.61	1	0	1	-.031	1	-.108	3
367		13	max	94.843	1	4.86	9	-3.3	12	0	12	-.002	12	.156	2
368			min	-1.477	10	-20.239	2	-72.61	1	0	1	-.047	1	-.104	3
369		14	max	94.961	1	4.649	9	-3.3	12	0	12	-.002	12	.16	2
370			min	-1.379	10	-20.492	2	-72.61	1	0	1	-.062	1	-.099	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	95.079	1	4.438	9	-3.3	12	0	12	-.003	12	.165	2
372			min	-1.281	10	-20.745	2	-72.61	1	0	1	-.078	1	-.095	3
373		16	max	86.912	2	60.253	2	-3.334	12	0	1	-.004	12	.169	2
374			min	-19.465	3	-120.88	3	-73.143	1	0	5	-.095	1	-.09	3
375		17	max	87.03	2	60	2	-3.334	12	0	1	-.005	12	.158	1
376			min	-19.376	3	-121.07	3	-73.143	1	0	5	-.11	1	-.063	3
377		18	max	-5.131	12	367.414	1	-3.497	12	0	3	-.005	12	.08	1
378			min	-137.553	1	-146.09	3	-74.969	1	0	1	-.127	1	-.032	3
379		19	max	-5.072	12	367.161	1	-3.497	12	0	3	-.006	12	0	1
380			min	-137.435	1	-146.28	3	-74.969	1	0	1	-.143	1	0	3
381	M5	1	max	301.68	1	1110.799	3	-.057	10	0	1	.042	4	0	3
382			min	8.163	15	-1062.505	1	-35.931	3	0	5	0	10	0	1
383		2	max	301.798	1	1110.609	3	-.057	10	0	1	.036	4	.23	1
384			min	8.199	15	-1062.758	1	-35.931	3	0	5	-.004	3	-.241	3
385		3	max	179.047	3	7.21	9	4.149	3	0	3	.03	4	.456	1
386			min	-21.263	10	-69.922	2	-22.693	4	0	4	-.011	3	-.476	3
387		4	max	179.135	3	6.999	9	4.149	3	0	3	.025	4	.462	1
388			min	-21.165	10	-70.176	2	-22.451	4	0	4	-.01	3	-.462	3
389		5	max	179.224	3	6.789	9	4.149	3	0	3	.021	4	.468	1
390			min	-21.066	10	-70.429	2	-22.209	4	0	4	-.01	3	-.449	3
391		6	max	179.313	3	6.578	9	4.149	3	0	3	.016	4	.474	1
392			min	-20.968	10	-70.682	2	-21.967	4	0	4	-.009	3	-.434	3
393		7	max	179.401	3	6.367	9	4.149	3	0	3	.011	4	.48	1
394			min	-20.87	10	-70.935	2	-21.725	4	0	4	-.008	3	-.42	3
395		8	max	179.49	3	6.156	9	4.149	3	0	3	.006	4	.486	1
396			min	-20.771	10	-71.188	2	-21.483	4	0	4	-.007	3	-.406	3
397		9	max	179.578	3	5.945	9	4.149	3	0	3	.002	5	.492	1
398			min	-20.673	10	-71.441	2	-21.241	4	0	4	-.006	3	-.392	3
399		10	max	179.667	3	5.734	9	4.149	3	0	3	0	10	.498	1
400			min	-20.574	10	-71.694	2	-20.999	4	0	4	-.005	3	-.378	3
401		11	max	179.755	3	5.523	9	4.149	3	0	3	0	10	.504	1
402			min	-20.476	10	-71.947	2	-20.757	4	0	4	-.007	4	-.364	3
403		12	max	179.844	3	5.312	9	4.149	3	0	3	0	10	.518	2
404			min	-20.378	10	-72.2	2	-20.515	4	0	4	-.012	4	-.349	3
405		13	max	179.932	3	5.101	9	4.149	3	0	3	0	10	.533	2
406			min	-20.279	10	-72.453	2	-20.273	4	0	4	-.016	4	-.335	3
407		14	max	180.021	3	4.891	9	4.149	3	0	3	0	10	.549	2
408			min	-20.181	10	-72.706	2	-20.031	4	0	4	-.021	4	-.321	3
409		15	max	180.109	3	4.68	9	4.149	3	0	3	0	10	.565	2
410			min	-20.083	10	-72.959	2	-19.789	4	0	4	-.025	4	-.306	3
411		16	max	301.568	2	296.048	2	4.121	3	0	1	0	3	.577	2
412			min	-64.572	3	-374.248	3	-18.515	4	0	4	-.029	4	-.289	3
413		17	max	301.686	2	295.795	2	4.121	3	0	1	0	3	.52	1
414			min	-64.484	3	-374.437	3	-18.273	4	0	4	-.033	4	-.208	3
415		18	max	-10.052	12	1211.161	1	3.773	3	0	4	.002	3	.262	1
416			min	-302.388	1	-481.336	3	-48.184	5	0	1	-.043	4	-.104	3
417		19	max	-9.993	12	1210.908	1	3.773	3	0	4	.003	3	0	3
418			min	-302.27	1	-481.526	3	-47.942	5	0	1	-.054	4	0	1
419	M9	1	max	137.26	1	335.619	3	201.852	4	0	3	-.001	15	0	1
420			min	3.05	15	-320.67	1	6.616	10	0	1	-.143	1	0	3
421		2	max	137.378	1	335.429	3	202.094	4	0	3	.038	5	.07	1
422			min	3.086	15	-320.923	1	6.616	10	0	1	-.123	1	-.073	3
423		3	max	93.62	1	6.945	9	68.99	1	0	1	.076	5	.138	1
424			min	-1.971	10	-17.766	3	-29.573	5	0	5	-.102	1	-.144	3
425		4	max	93.738	1	6.734	9	68.99	1	0	1	.07	5	.138	1
426			min	-1.873	10	-17.972	2	-29.331	5	0	5	-.087	1	-.14	3
427		5	max	93.856	1	6.523	9	68.99	1	0	1	.063	5	.139	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
428			min	-1.774	10	-18.225	2	-29.089	5	0	5	-.072	1	-.136	3
429		6	max	93.974	1	6.312	9	68.99	1	0	1	.057	5	.139	1
430			min	-1.676	10	-18.478	2	-28.847	5	0	5	-.057	1	-.132	3
431		7	max	94.092	1	6.101	9	68.99	1	0	1	.051	5	.14	1
432			min	-1.578	10	-18.731	2	-28.605	5	0	5	-.042	1	-.128	3
433		8	max	94.21	1	5.89	9	68.99	1	0	1	.045	5	.14	1
434			min	-1.479	10	-18.984	2	-28.363	5	0	5	-.027	1	-.124	3
435		9	max	94.328	1	5.68	9	68.99	1	0	1	.038	5	.141	1
436			min	-1.381	10	-19.238	2	-28.121	5	0	5	-.012	1	-.12	3
437		10	max	94.446	1	5.469	9	68.99	1	0	1	.032	4	.143	2
438			min	-1.283	10	-19.491	2	-27.879	5	0	5	0	2	-.116	3
439		11	max	94.564	1	5.258	9	68.99	1	0	1	.03	4	.147	2
440			min	-1.184	10	-19.744	2	-27.637	5	0	5	.001	10	-.112	3
441		12	max	94.682	1	5.047	9	68.99	1	0	1	.033	1	.152	2
442			min	-1.086	10	-19.997	2	-27.395	5	0	5	.003	10	-.108	3
443		13	max	94.8	1	4.836	9	68.99	1	0	1	.048	1	.156	2
444			min	-.988	10	-20.25	2	-27.153	5	0	5	.004	10	-.104	3
445		14	max	94.918	1	4.625	9	68.99	1	0	1	.063	1	.16	2
446			min	-.889	10	-20.503	2	-26.911	5	0	5	.005	12	-.099	3
447		15	max	95.036	1	4.414	9	68.99	1	0	1	.078	1	.165	2
448			min	-.791	10	-20.756	2	-26.669	5	0	5	.002	15	-.095	3
449		16	max	87.184	2	60.034	2	69.633	1	0	10	.094	1	.169	2
450			min	-19.576	3	-121.31	3	-25.199	5	0	4	0	5	-.09	3
451		17	max	87.302	2	59.78	2	69.633	1	0	10	.109	1	.158	1
452			min	-19.488	3	-121.5	3	-24.957	5	0	4	-.006	5	-.063	3
453		18	max	1.359	5	367.414	1	73.336	1	0	1	.125	1	.08	1
454			min	-137.232	1	-146.087	3	-53.227	5	0	3	-.018	5	-.032	3
455		19	max	1.414	5	367.161	1	73.336	1	0	1	.141	1	0	1
456			min	-137.114	1	-146.277	3	-52.985	5	0	3	-.029	5	0	3
457	M13	1	max	201.866	4	320.199	1	-3.05	15	0	1	.143	1	0	1
458			min	6.618	10	-335.613	3	-137.242	1	0	3	.001	15	0	3
459		2	max	193.954	4	225.822	1	-1.886	15	0	1	.045	1	.23	3
460			min	6.618	10	-236.622	3	-105.197	1	0	3	0	5	-.22	1
461		3	max	186.042	4	131.444	1	-.723	15	0	1	.002	3	.381	3
462			min	6.618	10	-137.631	3	-73.151	1	0	3	-.027	1	-.364	1
463		4	max	178.13	4	37.066	1	.572	5	0	1	0	12	.452	3
464			min	6.618	10	-38.641	3	-41.106	1	0	3	-.073	1	-.432	1
465		5	max	170.218	4	60.35	3	2.372	5	0	1	0	15	.443	3
466			min	6.618	10	-57.311	1	-9.06	1	0	3	-.093	1	-.424	1
467		6	max	162.306	4	159.341	3	22.986	1	0	1	.001	5	.355	3
468			min	6.618	10	-151.689	1	.204	12	0	3	-.087	1	-.339	1
469		7	max	154.394	4	258.332	3	55.031	1	0	1	.005	5	.187	3
470			min	6.618	10	-246.067	1	1.333	12	0	3	-.056	1	-.179	1
471		8	max	146.482	4	357.323	3	87.077	1	0	1	.011	4	.057	1
472			min	6.618	10	-340.444	1	2.462	12	0	3	0	3	-.061	3
473		9	max	138.57	4	456.314	3	119.122	1	0	1	.084	1	.369	1
474			min	6.618	10	-434.822	1	3.591	12	0	3	.002	12	-.389	3
475		10	max	130.659	4	555.305	3	151.168	1	0	2	.193	1	.758	1
476			min	6.618	10	-529.2	1	4.72	12	0	1	.006	12	-.796	3
477		11	max	96.574	4	434.822	1	.425	15	0	3	.081	1	.369	1
478			min	3.271	12	-456.314	3	-118.499	1	0	1	-.015	5	-.389	3
479		12	max	88.662	4	340.444	1	2.178	5	0	3	.001	2	.057	1
480			min	3.271	12	-357.323	3	-86.454	1	0	1	-.015	4	-.061	3
481		13	max	80.75	4	246.067	1	3.978	5	0	3	-.004	12	.187	3
482			min	3.271	12	-258.332	3	-54.408	1	0	1	-.058	1	-.179	1
483		14	max	73.043	1	151.689	1	5.779	5	0	3	-.004	12	.355	3
484			min	3.271	12	-159.341	3	-22.362	1	0	1	-.089	1	-.339	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	73.043	1	57.311	1	9.736	4	0	3	-.001	15	.443	3
486			min	3.271	12	-60.35	3	.509	10	0	1	-.094	1	-.424	1
487		16	max	73.043	1	38.641	3	41.729	1	0	3	.005	5	.452	3
488			min	3.271	12	-37.066	1	2.199	12	0	1	-.073	1	-.432	1
489		17	max	73.043	1	137.631	3	73.774	1	0	3	.013	5	.381	3
490			min	3.271	12	-131.444	1	3.328	12	0	1	-.027	1	-.364	1
491		18	max	73.043	1	236.622	3	105.82	1	0	3	.045	1	.23	3
492			min	3.271	12	-225.822	1	4.458	12	0	1	.003	12	-.22	1
493		19	max	73.043	1	335.613	3	137.865	1	0	3	.144	1	0	1
494			min	3.271	12	-320.2	1	5.587	12	0	1	.007	12	0	3
495	M16	1	max	52.981	5	367.665	1	1.414	5	0	3	.141	1	0	1
496			min	-73.073	1	-146.299	3	-137.129	1	0	1	-.029	5	0	3
497		2	max	45.069	5	259.294	1	3.215	5	0	3	.043	1	.101	3
498			min	-73.073	1	-103.284	3	-105.083	1	0	1	-.027	5	-.252	1
499		3	max	37.157	5	150.922	1	5.015	5	0	3	0	12	.166	3
500			min	-73.073	1	-60.27	3	-73.038	1	0	1	-.03	4	-.418	1
501		4	max	29.245	5	42.55	1	6.816	5	0	3	-.003	12	.198	3
502			min	-73.073	1	-17.255	3	-40.992	1	0	1	-.074	1	-.496	1
503		5	max	21.333	5	25.759	3	8.616	5	0	3	-.004	12	.194	3
504			min	-73.073	1	-65.822	1	-8.947	1	0	1	-.094	1	-.486	1
505		6	max	13.421	5	68.774	3	23.099	1	0	3	-.004	15	.156	3
506			min	-73.073	1	-174.194	1	.387	12	0	1	-.089	1	-.39	1
507		7	max	5.509	5	111.788	3	55.144	1	0	3	.004	5	.083	3
508			min	-73.073	1	-282.565	1	1.516	12	0	1	-.057	1	-.206	1
509		8	max	-1.219	12	154.802	3	87.19	1	0	3	.014	4	.066	1
510			min	-73.073	1	-390.937	1	2.645	12	0	1	-.002	3	-.024	3
511		9	max	-1.219	12	197.817	3	119.236	1	0	3	.083	1	.424	1
512			min	-73.073	1	-499.309	1	3.774	12	0	1	.001	12	-.166	3
513		10	max	29.745	5	-13.992	15	151.281	1	0	14	.192	1	.87	1
514			min	-74.737	1	-607.681	1	-7.6	3	0	1	.006	12	-.343	3
515		11	max	21.833	5	499.309	1	.457	15	0	1	.083	1	.424	1
516			min	-74.737	1	-197.817	3	-118.914	1	0	3	-.014	5	-.166	3
517		12	max	13.921	5	390.937	1	2.223	5	0	1	.001	2	.066	1
518			min	-74.737	1	-154.802	3	-86.869	1	0	3	-.013	4	-.024	3
519		13	max	6.009	5	282.565	1	4.023	5	0	1	-.002	12	.083	3
520			min	-74.737	1	-111.788	3	-54.823	1	0	3	-.057	1	-.206	1
521		14	max	-1.168	15	174.194	1	5.824	5	0	1	-.003	12	.156	3
522			min	-74.737	1	-68.774	3	-22.777	1	0	3	-.088	1	-.39	1
523		15	max	-3.496	12	65.822	1	9.756	4	0	1	0	15	.194	3
524			min	-74.737	1	-25.759	3	.514	10	0	3	-.093	1	-.486	1
525		16	max	-3.496	12	17.255	3	41.314	1	0	1	.006	5	.198	3
526			min	-74.737	1	-42.55	1	1.685	12	0	3	-.073	1	-.496	1
527		17	max	-3.496	12	60.27	3	73.359	1	0	1	.015	5	.166	3
528			min	-74.737	1	-150.922	1	2.814	12	0	3	-.027	1	-.418	1
529		18	max	-3.496	12	103.284	3	105.405	1	0	1	.045	1	.101	3
530			min	-74.737	1	-259.294	1	3.943	12	0	3	.002	12	-.252	1
531		19	max	-3.496	12	146.299	3	137.45	1	0	1	.143	1	0	1
532			min	-74.737	1	-367.665	1	5.072	12	0	3	.006	12	0	3
533	M15	1	max	0	2	1.972	1	.037	3	0	1	0	1	0	1
534			min	-43.098	3	0	2	-.039	1	0	3	0	3	0	1
535		2	max	0	2	1.753	1	.037	3	0	1	0	1	0	2
536			min	-43.163	3	0	2	-.039	1	0	3	0	3	0	1
537		3	max	0	2	1.534	1	.037	3	0	1	0	1	0	2
538			min	-43.228	3	0	2	-.039	1	0	3	0	3	-.002	1
539		4	max	0	2	1.315	1	.037	3	0	1	0	1	0	2
540			min	-43.293	3	0	2	-.039	1	0	3	0	3	-.002	1
541		5	max	0	2	1.096	1	.037	3	0	1	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-43.358	3	0	2	-.039	1	0	3	0	3	-.003	1
543		6	max	0	2	.876	1	.037	3	0	1	0	1	0	2
544			min	-43.423	3	0	2	-.039	1	0	3	0	3	-.003	1
545		7	max	0	2	.657	1	.037	3	0	1	0	3	0	2
546			min	-43.489	3	0	2	-.039	1	0	3	0	1	-.003	1
547		8	max	0	2	.438	1	.037	3	0	1	0	3	0	2
548			min	-43.554	3	0	2	-.039	1	0	3	0	1	-.004	1
549		9	max	0	2	.219	1	.037	3	0	1	0	3	0	2
550			min	-43.619	3	0	2	-.039	1	0	3	0	1	-.004	1
551		10	max	0	2	0	1	.037	3	0	1	0	3	0	2
552			min	-43.684	3	0	1	-.039	1	0	3	0	1	-.004	1
553		11	max	0	2	0	2	.037	3	0	1	0	3	0	2
554			min	-43.749	3	-.219	1	-.039	1	0	3	0	1	-.004	1
555		12	max	0	2	0	2	.037	3	0	1	0	3	0	2
556			min	-43.815	3	-.438	1	-.039	1	0	3	0	1	-.004	1
557		13	max	0	2	0	2	.037	3	0	1	0	3	0	2
558			min	-43.88	3	-.657	1	-.039	1	0	3	0	1	-.003	1
559		14	max	0	2	0	2	.037	3	0	1	0	3	0	2
560			min	-43.945	3	-.876	1	-.039	1	0	3	0	1	-.003	1
561		15	max	0	2	0	2	.037	3	0	1	0	3	0	2
562			min	-44.01	3	-1.096	1	-.039	1	0	3	0	1	-.003	1
563		16	max	0	2	0	2	.037	3	0	1	0	3	0	2
564			min	-44.075	3	-1.315	1	-.039	1	0	3	0	1	-.002	1
565		17	max	0	2	0	2	.037	3	0	1	0	3	0	2
566			min	-44.141	3	-1.534	1	-.039	1	0	3	0	1	-.002	1
567		18	max	0	2	0	2	.037	3	0	1	0	3	0	2
568			min	-44.206	3	-1.753	1	-.039	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.037	3	0	1	0	3	0	1
570			min	-44.271	3	-1.972	1	-.039	1	0	3	0	1	0	1
571	M16A	1	max	-.823	10	3.204	4	.254	4	0	3	0	3	0	1
572			min	-238.26	4	.986	12	-.014	3	0	1	0	4	0	1
573		2	max	-.75	10	2.848	4	.23	4	0	3	0	3	0	12
574			min	-238.337	4	.876	12	-.014	3	0	1	0	4	-.001	4
575		3	max	-.678	10	2.492	4	.205	4	0	3	0	3	0	12
576			min	-238.413	4	.767	12	-.014	3	0	1	0	4	-.002	4
577		4	max	-.605	10	2.136	4	.18	4	0	3	0	3	-.001	12
578			min	-238.49	4	.657	12	-.014	3	0	1	0	4	-.003	4
579		5	max	-.533	10	1.78	4	.155	4	0	3	0	3	-.001	12
580			min	-238.567	4	.548	12	-.014	3	0	1	0	1	-.004	4
581		6	max	-.461	10	1.424	4	.131	4	0	3	0	3	-.002	12
582			min	-238.644	4	.438	12	-.014	3	0	1	0	1	-.005	4
583		7	max	-.388	10	1.068	4	.106	4	0	3	0	5	-.002	12
584			min	-238.721	4	.329	12	-.014	3	0	1	0	1	-.006	4
585		8	max	-.316	10	.712	4	.081	4	0	3	0	5	-.002	12
586			min	-238.798	4	.219	12	-.014	3	0	1	0	1	-.006	4
587		9	max	-.243	10	.356	4	.056	4	0	3	0	5	-.002	12
588			min	-238.875	4	.11	12	-.014	3	0	1	0	1	-.006	4
589		10	max	-.171	10	0	1	.031	4	0	3	0	5	-.002	12
590			min	-238.952	4	0	1	-.014	3	0	1	0	1	-.006	4
591		11	max	-.098	10	-.11	12	.023	1	0	3	0	5	-.002	12
592			min	-239.029	4	-.356	4	-.014	3	0	1	0	1	-.006	4
593		12	max	-.026	10	-.219	12	.023	1	0	3	0	5	-.002	12
594			min	-239.106	4	-.712	4	-.022	5	0	1	0	1	-.006	4
595		13	max	.047	10	-.329	12	.023	1	0	3	0	5	-.002	12
596			min	-239.183	4	-1.068	4	-.047	5	0	1	0	3	-.006	4
597		14	max	.119	10	-.438	12	.023	1	0	3	0	4	-.002	12
598			min	-239.26	4	-1.424	4	-.072	5	0	1	0	3	-.005	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.191	10	-.548	12	.023	1	0	3	0	4	-.001	12
600			min	-239.337	4	-1.78	4	-.096	5	0	1	0	3	-.004	4
601		16	max	.264	10	-.657	12	.023	1	0	3	0	4	-.001	12
602			min	-239.414	4	-2.136	4	-.121	5	0	1	0	3	-.003	4
603		17	max	.336	10	-.767	12	.023	1	0	3	0	1	0	12
604			min	-239.491	4	-2.492	4	-.146	5	0	1	0	3	-.002	4
605		18	max	.409	10	-.876	12	.023	1	0	3	0	1	0	12
606			min	-239.568	4	-2.848	4	-.171	5	0	1	0	5	-.001	4
607		19	max	.481	10	-.986	12	.023	1	0	3	0	1	0	1
608			min	-239.645	4	-3.204	4	-.195	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	.003	1	.008	2	.014	1	1.828e-3	5	NC	3	NC	3
2			min	-.003	3	-.007	3	-.017	5	-1.132e-3	1	4630.139	2	2607.892	1
3		2	max	.003	1	.007	2	.013	1	1.851e-3	5	NC	3	NC	3
4			min	-.003	3	-.007	3	-.016	5	-1.084e-3	1	5044.982	2	2815.76	1
5		3	max	.003	1	.007	2	.012	1	1.874e-3	5	NC	3	NC	3
6			min	-.003	3	-.007	3	-.016	5	-1.037e-3	1	5536.936	2	3060.944	1
7		4	max	.002	1	.006	2	.011	1	1.897e-3	5	NC	1	NC	3
8			min	-.003	3	-.007	3	-.015	5	-9.888e-4	1	6124.441	2	3352.438	1
9		5	max	.002	1	.005	2	.01	1	1.92e-3	5	NC	1	NC	3
10			min	-.002	3	-.006	3	-.014	5	-9.411e-4	1	6832.024	2	3702.252	1
11		6	max	.002	1	.005	2	.009	1	1.943e-3	5	NC	1	NC	2
12			min	-.002	3	-.006	3	-.014	5	-8.934e-4	1	7692.853	2	4126.711	1
13		7	max	.002	1	.004	2	.008	1	1.966e-3	5	NC	1	NC	2
14			min	-.002	3	-.006	3	-.013	5	-8.457e-4	1	8752.646	2	4648.466	1
15		8	max	.002	1	.004	2	.007	1	1.989e-3	5	NC	1	NC	2
16			min	-.002	3	-.005	3	-.012	5	-7.979e-4	1	NC	1	5299.71	1
17		9	max	.002	1	.003	2	.006	1	2.012e-3	5	NC	1	NC	2
18			min	-.002	3	-.005	3	-.011	5	-7.502e-4	1	NC	1	6127.489	1
19		10	max	.001	1	.003	2	.005	1	2.035e-3	5	NC	1	NC	2
20			min	-.002	3	-.005	3	-.011	5	-7.025e-4	1	NC	1	7202.865	1
21		11	max	.001	1	.002	2	.004	1	2.058e-3	5	NC	1	NC	2
22			min	-.001	3	-.004	3	-.01	5	-6.548e-4	1	NC	1	8637.497	1
23		12	max	.001	1	.002	2	.003	1	2.081e-3	5	NC	1	NC	1
24			min	-.001	3	-.004	3	-.009	5	-6.071e-4	1	NC	1	NC	1
25		13	max	0	1	.001	2	.003	1	2.104e-3	5	NC	1	NC	1
26			min	-.001	3	-.003	3	-.008	5	-5.593e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.127e-3	5	NC	1	NC	1
28			min	0	3	-.003	3	-.006	5	-5.116e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.15e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-4.639e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.173e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.004	5	-4.162e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.196e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-3.685e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.219e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.207e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.242e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.73e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.271e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.044e-3	5	NC	1	NC	1
41		2	max	0	3	0	2	.005	5	1.58e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.055e-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
43		3	max	0	3	0	2	.011	5	1.89e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	-1.066e-3	5	NC	1	9059.783	14
45		4	max	0	3	0	2	.016	5	2.2e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.001	1	-1.078e-3	5	NC	1	5925.459	14
47		5	max	0	3	0	2	.022	5	2.51e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	-1.089e-3	5	NC	1	4371.273	14
49		6	max	0	3	0	2	.027	4	2.819e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.1e-3	5	NC	1	3447.78	14
51		7	max	0	3	0	2	.033	4	3.129e-4	1	NC	1	NC	1
52			min	0	2	-.004	3	0	1	-1.112e-3	5	NC	1	2838.685	14
53		8	max	0	3	0	2	.038	4	3.439e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	-1.123e-3	5	NC	1	2408.555	14
55		9	max	0	3	.001	2	.043	4	3.748e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	-1.134e-3	5	NC	1	2089.759	14
57		10	max	0	3	.002	2	.049	4	4.058e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-1.146e-3	5	NC	1	1844.782	14
59		11	max	0	3	.002	2	.054	4	4.368e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.157e-3	5	NC	1	1651.156	14
61		12	max	0	3	.003	2	.059	4	4.678e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	12	-1.169e-3	5	NC	1	1494.615	14
63		13	max	0	3	.003	2	.064	4	4.987e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	12	-1.18e-3	5	NC	1	1365.665	14
65		14	max	.001	3	.004	2	.069	4	5.297e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	12	-1.191e-3	5	NC	1	1257.751	14
67		15	max	.001	3	.005	2	.074	4	5.607e-4	1	NC	1	NC	1
68			min	0	2	-.007	3	0	12	-1.203e-3	5	9535.159	2	1166.199	14
69		16	max	.001	3	.006	2	.079	4	5.916e-4	1	NC	1	NC	2
70			min	0	2	-.007	3	0	12	-1.214e-3	5	8041.757	2	1087.588	14
71		17	max	.001	3	.007	2	.084	4	6.226e-4	1	NC	1	NC	2
72			min	-.001	2	-.007	3	0	12	-1.225e-3	5	6894.035	2	1019.357	14
73		18	max	.001	3	.008	2	.089	4	6.536e-4	1	NC	3	NC	2
74			min	-.001	2	-.007	3	0	12	-1.237e-3	5	6001.125	2	959.549	14
75		19	max	.001	3	.009	2	.094	4	6.845e-4	1	NC	3	NC	2
76			min	-.001	2	-.007	3	0	12	-1.248e-3	5	5299.757	2	906.644	14
77	M4	1	max	.002	1	.009	2	0	12	5.709e-3	5	NC	1	NC	3
78			min	0	3	-.007	3	-.1	4	-9.049e-4	1	NC	1	194.176	4
79		2	max	.002	1	.009	2	0	12	5.709e-3	5	NC	1	NC	2
80			min	0	3	-.007	3	-.091	4	-9.049e-4	1	NC	1	211.68	4
81		3	max	.002	1	.008	2	0	12	5.709e-3	5	NC	1	NC	2
82			min	0	3	-.007	3	-.083	4	-9.049e-4	1	NC	1	232.514	4
83		4	max	.002	1	.008	2	0	12	5.709e-3	5	NC	1	NC	2
84			min	0	3	-.006	3	-.075	4	-9.049e-4	1	NC	1	257.556	4
85		5	max	.002	1	.007	2	0	12	5.709e-3	5	NC	1	NC	2
86			min	0	3	-.006	3	-.067	4	-9.049e-4	1	NC	1	288	4
87		6	max	.002	1	.007	2	0	12	5.709e-3	5	NC	1	NC	2
88			min	0	3	-.005	3	-.059	4	-9.049e-4	1	NC	1	325.508	4
89		7	max	.001	1	.006	2	0	12	5.709e-3	5	NC	1	NC	2
90			min	0	3	-.005	3	-.052	4	-9.049e-4	1	NC	1	372.448	4
91		8	max	.001	1	.006	2	0	12	5.709e-3	5	NC	1	NC	2
92			min	0	3	-.005	3	-.045	4	-9.049e-4	1	NC	1	432.284	4
93		9	max	.001	1	.005	2	0	12	5.709e-3	5	NC	1	NC	2
94			min	0	3	-.004	3	-.038	4	-9.049e-4	1	NC	1	510.26	4
95		10	max	.001	1	.005	2	0	12	5.709e-3	5	NC	1	NC	1
96			min	0	3	-.004	3	-.031	4	-9.049e-4	1	NC	1	614.614	4
97		11	max	0	1	.004	2	0	12	5.709e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.025	4	-9.049e-4	1	NC	1	758.92	4
99		12	max	0	1	.004	2	0	12	5.709e-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	-.02	4	-9.049e-4	1	NC	1	966.85	4
101		13	max	0	1	.003	2	0	12	5.709e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.015	4	-9.049e-4	1	NC	1	1282.811	4
103		14	max	0	1	.003	2	0	12	5.709e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.011	4	-9.049e-4	1	NC	1	1798.4	4
105		15	max	0	1	.002	2	0	12	5.709e-3	5	NC	1	NC	1
106			min	0	3	-.002	3	-.007	4	-9.049e-4	1	NC	1	2728.812	4
107		16	max	0	1	.002	2	0	12	5.709e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.004	4	-9.049e-4	1	NC	1	4685.806	4
109		17	max	0	1	.001	2	0	12	5.709e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-9.049e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	12	5.709e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-9.049e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	5.709e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-9.049e-4	1	NC	1	NC	1
115	M6	1	max	.009	1	.029	2	.005	1	2.003e-3	4	NC	3	NC	2
116			min	-.01	3	-.024	3	-.017	5	1.724e-6	10	1260.053	2	8018.894	1
117		2	max	.009	1	.027	2	.004	1	2.022e-3	4	NC	3	NC	2
118			min	-.01	3	-.023	3	-.017	5	1.069e-6	10	1346.382	2	8691.794	1
119		3	max	.008	1	.025	2	.004	1	2.041e-3	4	NC	3	NC	2
120			min	-.009	3	-.021	3	-.016	5	4.144e-7	10	1445.06	2	9488.819	1
121		4	max	.008	1	.023	2	.003	1	2.06e-3	4	NC	3	NC	1
122			min	-.009	3	-.02	3	-.015	5	-2.401e-7	10	1558.558	2	NC	1
123		5	max	.007	1	.022	2	.003	1	2.078e-3	4	NC	3	NC	1
124			min	-.008	3	-.019	3	-.015	5	-8.947e-7	10	1690.054	2	NC	1
125		6	max	.007	1	.02	2	.003	1	2.097e-3	4	NC	3	NC	1
126			min	-.008	3	-.018	3	-.014	5	-2.949e-6	2	1843.712	2	NC	1
127		7	max	.006	1	.018	2	.002	1	2.116e-3	4	NC	3	NC	1
128			min	-.007	3	-.016	3	-.013	5	-6.116e-6	2	2025.085	2	NC	1
129		8	max	.006	1	.016	2	.002	1	2.135e-3	4	NC	3	NC	1
130			min	-.006	3	-.015	3	-.013	5	-9.283e-6	2	2241.75	2	NC	1
131		9	max	.005	1	.015	2	.002	1	2.154e-3	4	NC	3	NC	1
132			min	-.006	3	-.014	3	-.012	5	-1.245e-5	2	2504.317	2	NC	1
133		10	max	.005	1	.013	2	.002	1	2.173e-3	4	NC	3	NC	1
134			min	-.005	3	-.012	3	-.011	5	-1.562e-5	2	2828.112	2	NC	1
135		11	max	.004	1	.011	2	.001	1	2.192e-3	4	NC	3	NC	1
136			min	-.005	3	-.011	3	-.01	5	-1.878e-5	2	3236.125	2	NC	1
137		12	max	.004	1	.01	2	.001	1	2.211e-3	4	NC	3	NC	1
138			min	-.004	3	-.01	3	-.009	5	-2.195e-5	2	3764.477	2	NC	1
139		13	max	.003	1	.008	2	0	1	2.23e-3	4	NC	3	NC	1
140			min	-.003	3	-.008	3	-.008	5	-2.512e-5	2	4473.365	2	NC	1
141		14	max	.003	1	.007	2	0	1	2.249e-3	4	NC	3	NC	1
142			min	-.003	3	-.007	3	-.007	5	-2.828e-5	2	5471.127	2	NC	1
143		15	max	.002	1	.005	2	0	1	2.267e-3	4	NC	3	NC	1
144			min	-.002	3	-.006	3	-.005	5	-3.145e-5	2	6974.422	2	NC	1
145		16	max	.002	1	.004	2	0	1	2.286e-3	4	NC	1	NC	1
146			min	-.002	3	-.004	3	-.004	5	-3.462e-5	2	9488.743	2	NC	1
147		17	max	.001	1	.003	2	0	1	2.305e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.003	5	-3.778e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.324e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	-.001	5	-4.095e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.343e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.922e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.243e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.09e-3	4	NC	1	NC	1
155		2	max	0	3	.001	2	.006	4	2.072e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-1.087e-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
157		3	max	0	3	.003	2	.011	4	1.901e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-1.083e-3	4	NC	1	NC	1
159		4	max	0	3	.004	2	.017	4	1.73e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-1.08e-3	4	NC	1	NC	1
161		5	max	0	3	.006	2	.023	4	1.559e-5	1	NC	1	NC	1
162			min	-.001	2	-.007	3	0	1	-1.076e-3	4	8101.877	2	NC	1
163		6	max	.001	3	.007	2	.028	4	1.651e-5	3	NC	3	NC	1
164			min	-.001	2	-.009	3	0	1	-1.072e-3	4	6496.892	2	NC	1
165		7	max	.001	3	.009	2	.034	4	3.088e-5	3	NC	3	NC	1
166			min	-.002	2	-.01	3	0	1	-1.069e-3	4	5400.857	2	NC	1
167		8	max	.002	3	.01	2	.039	4	4.525e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-1.065e-3	4	4598.375	2	NC	1
169		9	max	.002	3	.012	2	.045	4	5.962e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	-.001	1	-1.062e-3	4	3982.104	2	NC	1
171		10	max	.002	3	.013	2	.05	4	7.399e-5	3	NC	3	NC	1
172			min	-.003	2	-.015	3	-.001	1	-1.058e-3	4	3492.547	2	NC	1
173		11	max	.002	3	.015	2	.055	4	8.836e-5	3	NC	3	NC	1
174			min	-.003	2	-.016	3	-.001	1	-1.054e-3	4	3093.997	2	NC	1
175		12	max	.003	3	.017	2	.061	4	1.027e-4	3	NC	3	NC	1
176			min	-.003	2	-.017	3	-.001	1	-1.051e-3	4	2763.627	2	NC	1
177		13	max	.003	3	.019	2	.066	4	1.171e-4	3	NC	3	NC	1
178			min	-.004	2	-.018	3	-.002	1	-1.047e-3	4	2486.068	2	NC	1
179		14	max	.003	3	.02	2	.071	4	1.315e-4	3	NC	3	NC	1
180			min	-.004	2	-.019	3	-.002	1	-1.044e-3	4	2250.511	2	NC	1
181		15	max	.003	3	.022	2	.076	4	1.458e-4	3	NC	3	NC	1
182			min	-.004	2	-.02	3	-.002	1	-1.04e-3	4	2049.068	2	NC	1
183		16	max	.004	3	.025	2	.08	4	1.602e-4	3	NC	3	NC	1
184			min	-.004	2	-.021	3	-.002	1	-1.037e-3	4	1875.808	2	NC	1
185		17	max	.004	3	.027	2	.085	4	1.746e-4	3	NC	3	NC	1
186			min	-.005	2	-.022	3	-.002	1	-1.033e-3	4	1726.157	2	NC	1
187		18	max	.004	3	.029	2	.09	4	1.889e-4	3	NC	3	NC	1
188			min	-.005	2	-.023	3	-.002	1	-1.029e-3	4	1596.517	2	NC	1
189		19	max	.004	3	.031	2	.095	4	2.033e-4	3	NC	3	NC	1
190			min	-.005	2	-.024	3	-.002	1	-1.026e-3	4	1484.016	2	NC	1
191	M8	1	max	.006	1	.033	2	.002	1	5.514e-3	4	NC	1	NC	2
192			min	0	3	-.024	3	-.1	4	-1.596e-4	3	NC	1	193.535	4
193		2	max	.006	1	.031	2	.002	1	5.514e-3	4	NC	1	NC	2
194			min	0	3	-.023	3	-.092	4	-1.596e-4	3	NC	1	210.98	4
195		3	max	.005	1	.029	2	.002	1	5.514e-3	4	NC	1	NC	2
196			min	0	3	-.021	3	-.083	4	-1.596e-4	3	NC	1	231.744	4
197		4	max	.005	1	.027	2	.002	1	5.514e-3	4	NC	1	NC	1
198			min	0	3	-.02	3	-.075	4	-1.596e-4	3	NC	1	256.701	4
199		5	max	.005	1	.025	2	.002	1	5.514e-3	4	NC	1	NC	1
200			min	0	3	-.019	3	-.067	4	-1.596e-4	3	NC	1	287.043	4
201		6	max	.004	1	.024	2	.001	1	5.514e-3	4	NC	1	NC	1
202			min	0	3	-.017	3	-.06	4	-1.596e-4	3	NC	1	324.426	4
203		7	max	.004	1	.022	2	.001	1	5.514e-3	4	NC	1	NC	1
204			min	0	3	-.016	3	-.052	4	-1.596e-4	3	NC	1	371.208	4
205		8	max	.004	1	.02	2	.001	1	5.514e-3	4	NC	1	NC	1
206			min	0	3	-.015	3	-.045	4	-1.596e-4	3	NC	1	430.843	4
207		9	max	.003	1	.018	2	0	1	5.514e-3	4	NC	1	NC	1
208			min	0	3	-.013	3	-.038	4	-1.596e-4	3	NC	1	508.557	4
209		10	max	.003	1	.016	2	0	1	5.514e-3	4	NC	1	NC	1
210			min	0	3	-.012	3	-.032	4	-1.596e-4	3	NC	1	612.561	4
211		11	max	.003	1	.015	2	0	1	5.514e-3	4	NC	1	NC	1
212			min	0	3	-.011	3	-.026	4	-1.596e-4	3	NC	1	756.383	4
213		12	max	.002	1	.013	2	0	1	5.514e-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	-.02	4	-1.596e-4	3	NC	1	963.615	4
215		13	max	.002	1	.011	2	0	1	5.514e-3	4	NC	1	NC	1
216			min	0	3	-.008	3	-.015	4	-1.596e-4	3	NC	1	1278.516	4
217		14	max	.002	1	.009	2	0	1	5.514e-3	4	NC	1	NC	1
218			min	0	3	-.007	3	-.011	4	-1.596e-4	3	NC	1	1792.374	4
219		15	max	.001	1	.007	2	0	1	5.514e-3	4	NC	1	NC	1
220			min	0	3	-.005	3	-.007	4	-1.596e-4	3	NC	1	2719.662	4
221		16	max	.001	1	.005	2	0	1	5.514e-3	4	NC	1	NC	1
222			min	0	3	-.004	3	-.004	4	-1.596e-4	3	NC	1	4670.081	4
223		17	max	0	1	.004	2	0	1	5.514e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	-.002	4	-1.596e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	5.514e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-1.596e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	5.514e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.596e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.008	2	0	3	9.934e-4	1	NC	3	NC	1
230			min	-.003	3	-.007	3	-.007	4	-2.648e-4	3	4634.417	2	NC	1
231		2	max	.003	1	.007	2	0	3	9.426e-4	1	NC	3	NC	1
232			min	-.003	3	-.007	3	-.007	4	-2.568e-4	3	5049.774	2	NC	1
233		3	max	.003	1	.007	2	0	3	8.917e-4	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.007	4	-2.488e-4	3	5542.363	2	NC	1
235		4	max	.003	1	.006	2	0	3	8.409e-4	1	NC	1	NC	1
236			min	-.003	3	-.007	3	-.007	4	-2.408e-4	3	6130.658	2	NC	1
237		5	max	.002	1	.005	2	0	3	8.796e-4	4	NC	1	NC	1
238			min	-.002	3	-.006	3	-.007	4	-2.328e-4	3	6839.236	2	NC	1
239		6	max	.002	1	.005	2	0	3	9.45e-4	4	NC	1	NC	1
240			min	-.002	3	-.006	3	-.007	4	-2.248e-4	3	7701.332	2	NC	1
241		7	max	.002	1	.004	2	0	3	1.01e-3	4	NC	1	NC	1
242			min	-.002	3	-.006	3	-.007	4	-2.168e-4	3	8762.763	2	NC	1
243		8	max	.002	1	.004	2	0	3	1.076e-3	4	NC	1	NC	1
244			min	-.002	3	-.005	3	-.007	4	-2.088e-4	3	NC	1	NC	1
245		9	max	.002	1	.003	2	0	3	1.141e-3	4	NC	1	NC	1
246			min	-.002	3	-.005	3	-.007	4	-2.008e-4	3	NC	1	NC	1
247		10	max	.002	1	.003	2	0	3	1.207e-3	4	NC	1	NC	1
248			min	-.002	3	-.005	3	-.007	4	-1.928e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	1.272e-3	4	NC	1	NC	1
250			min	-.001	3	-.004	3	-.006	4	-1.848e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.338e-3	4	NC	1	NC	1
252			min	-.001	3	-.004	3	-.006	4	-1.768e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	1.403e-3	4	NC	1	NC	1
254			min	-.001	3	-.003	3	-.005	4	-1.688e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.469e-3	4	NC	1	NC	1
256			min	0	3	-.003	3	-.005	4	-1.608e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.534e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.004	4	-1.528e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.599e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.003	4	-1.447e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.665e-3	4	NC	1	NC	1
262			min	0	3	-.001	3	-.002	4	-1.367e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.73e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.287e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.796e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.207e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.62e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-8.368e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.004	4	4.035e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-9.373e-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	.009	4	2.451e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.038e-3	4	NC	1	5279.535	4
273		4	max	0	3	0	2	.013	4	8.659e-6	3	NC	1	NC	1
274			min	0	2	-.002	3	0	3	-1.138e-3	4	NC	1	3501.945	4
275		5	max	0	3	0	2	.018	4	-5.271e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-1.239e-3	4	NC	1	2616.389	4
277		6	max	0	3	0	2	.022	5	-1.499e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.001	1	-1.339e-3	4	NC	1	2087.011	5
279		7	max	0	3	0	2	.027	5	-2.47e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.002	1	-1.439e-3	4	NC	1	1730.1	5
281		8	max	0	3	0	2	.031	5	-3.442e-5	12	NC	1	NC	1
282			min	0	2	-.005	3	-.003	1	-1.54e-3	4	NC	1	1476.607	5
283		9	max	0	3	.001	2	.036	5	-3.877e-5	10	NC	1	NC	1
284			min	0	2	-.006	3	-.004	1	-1.64e-3	4	NC	1	1287.51	5
285		10	max	0	3	.002	2	.04	5	-4.288e-5	10	NC	1	NC	2
286			min	0	2	-.006	3	-.005	1	-1.741e-3	4	NC	1	1141.141	5
287		11	max	0	3	.002	2	.045	5	-4.699e-5	10	NC	1	NC	2
288			min	0	2	-.007	3	-.006	1	-1.841e-3	4	NC	1	1024.507	5
289		12	max	0	3	.003	2	.05	5	-5.11e-5	10	NC	1	NC	2
290			min	0	2	-.007	3	-.007	1	-1.942e-3	4	NC	1	929.342	5
291		13	max	0	3	.003	2	.054	5	-5.521e-5	10	NC	1	NC	2
292			min	0	2	-.007	3	-.008	1	-2.042e-3	4	NC	1	850.14	5
293		14	max	.001	3	.004	2	.059	5	-5.933e-5	10	NC	1	NC	2
294			min	0	2	-.007	3	-.009	1	-2.143e-3	4	NC	1	783.091	5
295		15	max	.001	3	.005	2	.063	5	-6.344e-5	10	NC	1	NC	2
296			min	0	2	-.007	3	-.01	1	-2.243e-3	4	9548.282	2	725.475	5
297		16	max	.001	3	.006	2	.068	5	-6.755e-5	10	NC	1	NC	2
298			min	0	2	-.008	3	-.011	1	-2.343e-3	4	8051.738	2	675.301	5
299		17	max	.001	3	.007	2	.073	5	-7.166e-5	10	NC	3	NC	2
300			min	-.001	2	-.008	3	-.012	1	-2.444e-3	4	6901.846	2	631.076	5
301		18	max	.001	3	.008	2	.078	5	-7.577e-5	10	NC	3	NC	3
302			min	-.001	2	-.007	3	-.013	1	-2.544e-3	4	6007.404	2	591.662	5
303		19	max	.001	3	.009	2	.083	5	-7.989e-5	10	NC	3	NC	3
304			min	-.001	2	-.007	3	-.014	1	-2.645e-3	4	5304.934	2	556.181	5
305	M12	1	max	.002	1	.009	2	.012	1	6.938e-3	4	NC	1	NC	3
306			min	0	3	-.007	3	-.091	5	7.731e-5	10	NC	1	211.472	5
307		2	max	.002	1	.009	2	.011	1	6.938e-3	4	NC	1	NC	3
308			min	0	3	-.007	3	-.084	5	7.731e-5	10	NC	1	230.53	5
309		3	max	.002	1	.008	2	.01	1	6.938e-3	4	NC	1	NC	3
310			min	0	3	-.007	3	-.076	5	7.731e-5	10	NC	1	253.214	5
311		4	max	.002	1	.008	2	.009	1	6.938e-3	4	NC	1	NC	3
312			min	0	3	-.006	3	-.069	5	7.731e-5	10	NC	1	280.478	5
313		5	max	.002	1	.007	2	.008	1	6.938e-3	4	NC	1	NC	3
314			min	0	3	-.006	3	-.062	5	7.731e-5	10	NC	1	313.624	5
315		6	max	.002	1	.007	2	.007	1	6.938e-3	4	NC	1	NC	3
316			min	0	3	-.005	3	-.055	5	7.731e-5	10	NC	1	354.46	5
317		7	max	.001	1	.006	2	.006	1	6.938e-3	4	NC	1	NC	3
318			min	0	3	-.005	3	-.048	5	7.731e-5	10	NC	1	405.564	5
319		8	max	.001	1	.006	2	.005	1	6.938e-3	4	NC	1	NC	2
320			min	0	3	-.005	3	-.041	5	7.731e-5	10	NC	1	470.708	5
321		9	max	.001	1	.005	2	.004	1	6.938e-3	4	NC	1	NC	2
322			min	0	3	-.004	3	-.035	5	7.731e-5	10	NC	1	555.599	5
323		10	max	.001	1	.005	2	.004	1	6.938e-3	4	NC	1	NC	2
324			min	0	3	-.004	3	-.029	5	7.731e-5	10	NC	1	669.207	5
325		11	max	0	1	.004	2	.003	1	6.938e-3	4	NC	1	NC	2
326			min	0	3	-.003	3	-.023	5	7.731e-5	10	NC	1	826.307	5
327		12	max	0	1	.004	2	.002	1	6.938e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.003	3	-.018	5	7.731e-5	10	NC	1	1052.67	5
329		13	max	0	1	.003	2	.002	1	6.938e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.014	5	7.731e-5	10	NC	1	1396.635	5
331		14	max	0	1	.003	2	.001	1	6.938e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.01	5	7.731e-5	10	NC	1	1957.914	5
333		15	max	0	1	.002	2	0	1	6.938e-3	4	NC	1	NC	1
334			min	0	3	-.002	3	-.007	5	7.731e-5	10	NC	1	2970.76	5
335		16	max	0	1	.002	2	0	1	6.938e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.004	5	7.731e-5	10	NC	1	5101.106	5
337		17	max	0	1	.001	2	0	1	6.938e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	7.731e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	6.938e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	7.731e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	6.938e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	7.731e-5	10	NC	1	NC	1
343	M1	1	max	.007	3	.023	3	.009	5	2.299e-2	1	NC	1	NC	1
344			min	-.007	2	-.023	1	-.005	1	-2.396e-2	3	NC	1	NC	1
345		2	max	.007	3	.013	3	.013	5	1.105e-2	1	NC	4	NC	2
346			min	-.007	2	-.013	1	-.01	1	-1.187e-2	3	4467.927	1	8347.069	1
347		3	max	.007	3	.004	3	.017	5	5.543e-4	5	NC	4	NC	2
348			min	-.007	2	-.003	1	-.014	1	-6.573e-4	1	2305.103	1	5062.989	1
349		4	max	.007	3	.005	1	.022	5	5.62e-4	5	NC	4	NC	2
350			min	-.007	2	-.003	3	-.016	1	-5.565e-4	1	1629.22	1	3556.927	5
351		5	max	.007	3	.012	1	.027	5	5.696e-4	5	NC	5	NC	2
352			min	-.007	2	-.01	3	-.016	1	-4.556e-4	1	1304.442	1	2556.76	5
353		6	max	.007	3	.018	1	.033	5	5.773e-4	5	NC	5	NC	2
354			min	-.007	2	-.015	3	-.015	1	-3.548e-4	1	1120.85	1	1971.233	5
355		7	max	.007	3	.022	1	.038	5	5.85e-4	5	NC	5	NC	2
356			min	-.007	2	-.018	3	-.013	1	-2.539e-4	1	1009.639	1	1590.95	5
357		8	max	.007	3	.025	1	.044	5	5.927e-4	5	NC	5	NC	2
358			min	-.007	2	-.021	3	-.011	1	-1.53e-4	1	942.203	1	1326.599	5
359		9	max	.007	3	.027	1	.05	5	6.003e-4	5	NC	5	NC	1
360			min	-.007	2	-.022	3	-.008	1	-5.219e-5	1	905.184	1	1129.339	4
361		10	max	.007	3	.028	2	.056	5	6.155e-4	4	NC	5	NC	1
362			min	-.008	2	-.023	3	-.004	1	1.085e-5	10	886.881	2	968.435	4
363		11	max	.007	3	.028	2	.063	4	6.457e-4	4	NC	5	NC	1
364			min	-.008	2	-.022	3	-.001	1	1.957e-5	10	889.832	2	847.057	4
365		12	max	.007	3	.026	2	.069	4	6.758e-4	4	NC	5	NC	2
366			min	-.008	2	-.02	3	0	10	2.818e-5	12	916.454	2	753.441	4
367		13	max	.007	3	.023	2	.076	4	7.059e-4	4	NC	5	NC	2
368			min	-.008	2	-.017	3	0	12	3.089e-5	12	972.041	2	680.021	4
369		14	max	.007	3	.018	2	.083	4	7.36e-4	4	NC	5	NC	2
370			min	-.008	2	-.013	3	0	12	3.36e-5	12	1068.654	2	621.749	4
371		15	max	.007	3	.012	2	.089	4	7.662e-4	4	NC	5	NC	2
372			min	-.008	2	-.009	3	0	12	3.631e-5	12	1232.625	2	575.161	4
373		16	max	.007	3	.004	1	.094	4	1.118e-3	4	NC	4	NC	2
374			min	-.008	2	-.003	3	0	12	3.811e-5	12	1527.972	2	537.825	4
375		17	max	.007	3	.003	3	.099	4	9.136e-3	4	NC	4	NC	2
376			min	-.008	2	-.005	2	0	12	5.038e-6	2	2156.442	2	508.034	4
377		18	max	.007	3	.01	3	.104	4	1.307e-2	1	NC	4	NC	2
378			min	-.008	2	-.016	2	0	10	-5.286e-3	3	4173.404	2	484.496	4
379		19	max	.007	3	.017	3	.108	4	2.639e-2	1	NC	1	NC	1
380			min	-.008	2	-.027	2	-.003	1	-1.07e-2	3	NC	1	466.848	4
381	M5	1	max	.022	3	.074	3	.008	5	7.007e-6	4	NC	1	NC	1
382			min	-.027	2	-.081	1	-.006	1	5.088e-8	10	NC	1	NC	1
383		2	max	.022	3	.043	3	.012	5	2.772e-4	5	NC	5	NC	1
384			min	-.028	2	-.045	1	-.005	1	-7.407e-5	1	1299.179	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
385		3	max	.022	3	.013	3	.017	5	5.429e-4	5	NC	5	NC	1
386			min	-.028	2	-.012	1	-.005	1	-1.473e-4	1	669.389	1	NC	1
387		4	max	.022	3	.017	1	.022	5	5.638e-4	5	NC	5	NC	1
388			min	-.028	2	-.011	3	-.004	1	-1.391e-4	1	471.918	1	NC	1
389		5	max	.022	3	.041	1	.028	5	5.847e-4	5	NC	5	NC	1
390			min	-.028	2	-.032	3	-.004	1	-1.31e-4	1	376.856	1	NC	1
391		6	max	.022	3	.061	1	.034	5	6.057e-4	5	NC	15	NC	1
392			min	-.028	2	-.048	3	-.003	1	-1.229e-4	1	322.978	1	NC	1
393		7	max	.022	3	.077	1	.04	5	6.266e-4	5	NC	15	NC	1
394			min	-.028	2	-.06	3	-.003	1	-1.147e-4	1	290.196	1	NC	1
395		8	max	.022	3	.089	1	.046	5	6.476e-4	5	NC	15	NC	1
396			min	-.028	2	-.068	3	-.003	1	-1.066e-4	1	270.152	1	NC	1
397		9	max	.022	3	.096	1	.053	5	6.685e-4	5	NC	15	NC	1
398			min	-.028	2	-.073	3	-.003	1	-9.845e-5	1	258.93	1	NC	1
399		10	max	.022	3	.098	1	.059	5	6.894e-4	5	NC	15	NC	1
400			min	-.028	2	-.073	3	-.002	1	-9.032e-5	1	254.711	1	NC	1
401		11	max	.022	3	.096	1	.066	5	7.104e-4	5	NC	15	NC	1
402			min	-.028	2	-.071	3	-.002	1	-8.218e-5	1	256.915	1	NC	1
403		12	max	.022	3	.089	1	.072	5	7.313e-4	5	NC	15	NC	1
404			min	-.028	2	-.065	3	-.002	1	-7.404e-5	1	265.972	1	NC	1
405		13	max	.022	3	.078	1	.078	4	7.523e-4	5	NC	15	NC	1
406			min	-.028	2	-.056	3	-.002	1	-6.591e-5	1	283.515	1	NC	1
407		14	max	.021	3	.061	1	.084	4	7.732e-4	5	NC	15	NC	1
408			min	-.028	2	-.044	3	-.002	1	-5.777e-5	1	313.169	1	NC	1
409		15	max	.021	3	.04	1	.09	4	7.941e-4	5	NC	5	NC	1
410			min	-.028	2	-.029	3	-.002	1	-4.964e-5	1	362.764	1	NC	1
411		16	max	.021	3	.015	1	.095	4	1.134e-3	5	NC	5	NC	1
412			min	-.028	2	-.011	3	-.002	1	-4.837e-5	1	450.596	2	NC	1
413		17	max	.021	3	.01	3	.1	4	9.129e-3	4	NC	5	NC	1
414			min	-.028	2	-.018	2	-.002	1	-2.107e-4	1	636.919	1	NC	1
415		18	max	.021	3	.033	3	.104	4	4.683e-3	4	NC	5	NC	1
416			min	-.028	2	-.054	2	-.002	1	-1.079e-4	1	1233.176	1	NC	1
417		19	max	.021	3	.057	3	.108	4	2.15e-6	5	NC	1	NC	1
418			min	-.028	2	-.093	2	-.003	1	-2.091e-7	3	NC	1	NC	1
419	M9	1	max	.007	3	.022	3	.007	5	2.397e-2	3	NC	1	NC	1
420			min	-.007	2	-.024	1	-.007	1	-2.299e-2	1	NC	1	NC	1
421		2	max	.007	3	.013	3	.007	5	1.187e-2	3	NC	4	NC	2
422			min	-.007	2	-.013	1	-.001	1	-1.13e-2	1	4468.938	1	9508.211	1
423		3	max	.007	3	.004	3	.007	4	1.705e-4	1	NC	4	NC	2
424			min	-.007	2	-.003	1	0	3	-1.036e-5	3	2305.638	1	5886.371	1
425		4	max	.007	3	.005	1	.009	4	8.539e-5	1	NC	4	NC	2
426			min	-.007	2	-.004	3	0	3	-1.86e-5	3	1629.589	1	4973.35	1
427		5	max	.007	3	.012	1	.012	4	1.428e-5	2	NC	5	NC	2
428			min	-.007	2	-.01	3	-.001	3	-2.683e-5	3	1304.715	1	4909.642	1
429		6	max	.007	3	.018	1	.016	4	1.08e-5	5	NC	5	NC	2
430			min	-.007	2	-.015	3	-.002	3	-8.477e-5	1	1121.06	1	4444.318	4
431		7	max	.007	3	.022	1	.02	4	1.229e-5	5	NC	5	NC	2
432			min	-.007	2	-.018	3	-.002	3	-1.699e-4	1	1009.803	1	3169.167	4
433		8	max	.007	3	.025	1	.025	4	1.378e-5	5	NC	5	NC	1
434			min	-.007	2	-.021	3	-.003	3	-2.549e-4	1	942.333	1	2382.768	4
435		9	max	.007	3	.027	2	.03	5	1.526e-5	5	NC	5	NC	1
436			min	-.007	2	-.022	3	-.003	1	-3.4e-4	1	905.286	1	1864.16	4
437		10	max	.007	3	.028	2	.037	5	1.675e-5	5	NC	5	NC	1
438			min	-.007	2	-.023	3	-.006	1	-4.251e-4	1	887.259	2	1504.142	4
439		11	max	.007	3	.028	2	.044	5	1.824e-5	5	NC	5	NC	2
440			min	-.007	2	-.022	3	-.009	1	-5.102e-4	1	890.203	2	1243.916	4
441		12	max	.007	3	.026	2	.051	5	1.972e-5	5	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.008	2	-.02	3	-.011	1	-5.953e-4	1	916.828	2	1049.603	4
443		13	max	.007	3	.023	2	.059	5	2.121e-5	5	NC	5	NC	2
444			min	-.008	2	-.017	3	-.013	1	-6.803e-4	1	972.427	2	898.834	5
445		14	max	.007	3	.018	2	.067	5	2.27e-5	5	NC	5	NC	2
446			min	-.008	2	-.013	3	-.015	1	-7.654e-4	1	1069.067	2	779.651	5
447		15	max	.007	3	.012	2	.075	5	2.418e-5	5	NC	5	NC	2
448			min	-.008	2	-.009	3	-.015	1	-8.505e-4	1	1233.086	2	687.035	5
449		16	max	.007	3	.004	1	.083	5	3.743e-4	5	NC	4	NC	2
450			min	-.008	2	-.003	3	-.014	1	-9.127e-4	1	1528.521	2	613.741	5
451		17	max	.007	3	.003	3	.091	5	9.028e-3	4	NC	4	NC	2
452			min	-.008	2	-.005	2	-.012	1	-4.312e-4	1	2157.165	2	551.94	4
453		18	max	.007	3	.01	3	.099	5	5.304e-3	3	NC	4	NC	2
454			min	-.008	2	-.016	2	-.008	1	-1.329e-2	1	4174.757	2	499.574	4
455		19	max	.007	3	.017	3	.108	4	1.07e-2	3	NC	1	NC	1
456			min	-.008	2	-.027	2	-.002	1	-2.639e-2	1	NC	1	455.726	4
457	M13	1	max	.007	1	.022	3	.007	3	3.644e-3	3	NC	1	NC	1
458			min	-.007	5	-.024	1	-.007	2	-3.93e-3	1	NC	1	NC	1
459		2	max	.006	1	.246	3	.04	1	4.568e-3	3	NC	5	NC	2
460			min	-.007	5	-.238	1	0	5	-4.989e-3	1	777.881	3	3939.584	1
461		3	max	.006	1	.429	3	.102	1	5.491e-3	3	NC	5	NC	3
462			min	-.007	5	-.414	1	-.002	5	-6.048e-3	1	428.328	3	1633.773	1
463		4	max	.006	1	.542	3	.155	1	6.414e-3	3	NC	15	NC	3
464			min	-.007	5	-.523	1	-.004	5	-7.106e-3	1	334.66	3	1091.536	1
465		5	max	.006	1	.574	3	.181	1	7.338e-3	3	NC	15	NC	3
466			min	-.007	5	-.555	1	-.006	5	-8.165e-3	1	315.369	3	939.488	1
467		6	max	.006	1	.526	3	.172	1	8.261e-3	3	NC	15	NC	3
468			min	-.008	5	-.509	1	-.01	5	-9.224e-3	1	345.753	3	987.872	1
469		7	max	.006	1	.413	3	.13	1	9.184e-3	3	NC	5	NC	3
470			min	-.008	5	-.403	1	-.013	5	-1.028e-2	1	445.309	3	1295.124	1
471		8	max	.006	1	.268	3	.068	1	1.011e-2	3	NC	5	NC	3
472			min	-.008	5	-.265	1	-.014	5	-1.134e-2	1	709.832	3	2419.337	1
473		9	max	.006	1	.135	3	.021	3	1.103e-2	3	NC	5	NC	1
474			min	-.008	5	-.138	1	-.016	2	-1.24e-2	1	1515.893	1	NC	1
475		10	max	.006	1	.074	3	.022	3	1.195e-2	3	NC	4	NC	1
476			min	-.008	5	-.081	1	-.027	2	-1.346e-2	1	3035.052	1	8676.921	2
477		11	max	.006	1	.135	3	.025	3	1.103e-2	3	NC	5	NC	1
478			min	-.008	5	-.138	1	-.015	2	-1.24e-2	1	1515.894	1	9430.755	3
479		12	max	.005	1	.268	3	.073	1	1.011e-2	3	NC	5	NC	5
480			min	-.008	5	-.265	1	-.005	10	-1.134e-2	1	709.831	3	2259.409	1
481		13	max	.005	1	.413	3	.136	1	9.186e-3	3	NC	5	NC	5
482			min	-.008	5	-.403	1	.003	10	-1.028e-2	1	445.309	3	1240.051	1
483		14	max	.005	1	.526	3	.178	1	8.263e-3	3	NC	15	NC	5
484			min	-.008	5	-.509	1	.008	10	-9.223e-3	1	345.753	3	955.398	1
485		15	max	.005	1	.574	3	.186	1	7.34e-3	3	NC	15	NC	5
486			min	-.009	5	-.555	1	.004	15	-8.164e-3	1	315.369	3	913.14	1
487		16	max	.005	1	.543	3	.16	1	6.418e-3	3	NC	15	NC	3
488			min	-.009	5	-.523	1	0	5	-7.105e-3	1	334.659	3	1063.312	1
489		17	max	.005	1	.429	3	.105	1	5.495e-3	3	NC	5	NC	3
490			min	-.009	5	-.413	1	-.007	5	-6.046e-3	1	428.328	3	1591.323	1
491		18	max	.005	1	.246	3	.041	1	4.572e-3	3	NC	5	NC	2
492			min	-.009	5	-.238	1	-.008	5	-4.988e-3	1	777.881	3	3821.367	1
493		19	max	.005	1	.023	3	.007	3	3.649e-3	3	NC	1	NC	1
494			min	-.009	5	-.023	1	-.007	2	-3.929e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.017	3	.007	3	4.369e-3	2	NC	1	NC	1
496			min	-.108	4	-.027	2	-.008	2	-2.781e-3	3	NC	1	NC	1
497		2	max	.002	1	.117	3	.042	1	5.527e-3	2	NC	5	NC	2
498			min	-.108	4	-.272	1	0	10	-3.474e-3	3	706.278	1	3740.179	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	.002	1	.199	3	.106	1	6.686e-3	2	NC	5	NC	3
500			min	-.108	4	-.473	1	.005	10	-4.166e-3	3	388.696	1	1574.193	1
501		4	max	.002	1	.251	3	.16	1	7.844e-3	2	NC	15	NC	3
502			min	-.108	4	-.599	1	.009	10	-4.859e-3	3	303.402	1	1057.931	1
503		5	max	.002	1	.268	3	.186	1	9.003e-3	2	NC	15	NC	10
504			min	-.108	4	-.635	1	.01	10	-5.552e-3	3	285.446	1	912.452	1
505		6	max	.002	1	.249	3	.177	1	1.016e-2	2	NC	15	NC	10
506			min	-.108	4	-.583	1	.008	10	-6.245e-3	3	312.048	1	958.812	1
507		7	max	.002	1	.201	3	.134	1	1.132e-2	2	NC	5	NC	5
508			min	-.108	4	-.461	1	.003	10	-6.938e-3	3	399.666	1	1251.79	1
509		8	max	.002	1	.14	3	.071	1	1.248e-2	2	NC	5	NC	4
510			min	-.108	4	-.302	1	-.005	10	-7.63e-3	3	628.924	1	2308.291	1
511		9	max	.002	1	.083	3	.024	3	1.364e-2	2	NC	5	NC	1
512			min	-.108	4	-.158	2	-.016	2	-8.323e-3	3	1324.533	1	NC	1
513		10	max	.003	1	.057	3	.021	3	1.48e-2	2	NC	4	NC	1
514			min	-.108	4	-.093	2	-.028	2	-9.016e-3	3	2645.721	2	8668.323	2
515		11	max	.003	1	.083	3	.021	3	1.364e-2	2	NC	5	NC	1
516			min	-.108	4	-.158	2	-.015	2	-8.323e-3	3	1324.533	1	NC	1
517		12	max	.003	1	.14	3	.069	1	1.248e-2	2	NC	5	NC	3
518			min	-.108	4	-.302	1	-.005	10	-7.629e-3	3	628.925	1	2358.944	1
519		13	max	.003	1	.201	3	.132	1	1.132e-2	2	NC	5	NC	3
520			min	-.108	4	-.461	1	.003	10	-6.936e-3	3	399.666	1	1273.592	1
521		14	max	.003	1	.249	3	.174	1	1.016e-2	2	NC	15	NC	3
522			min	-.108	4	-.583	1	.005	15	-6.242e-3	3	312.049	1	974.794	1
523		15	max	.003	1	.268	3	.183	1	9.004e-3	2	NC	15	NC	3
524			min	-.108	4	-.635	1	0	15	-5.549e-3	3	285.446	1	928.554	1
525		16	max	.003	1	.251	3	.157	1	7.846e-3	2	NC	15	NC	3
526			min	-.108	4	-.599	1	-.006	5	-4.856e-3	3	303.403	1	1079.422	1
527		17	max	.003	1	.199	3	.103	1	6.687e-3	2	NC	5	NC	3
528			min	-.108	4	-.473	1	-.011	5	-4.162e-3	3	388.696	1	1614.79	1
529		18	max	.003	1	.117	3	.04	1	5.529e-3	2	NC	5	NC	2
530			min	-.108	4	-.272	1	-.01	5	-3.469e-3	3	706.278	1	3883.817	1
531		19	max	.003	1	.017	3	.007	3	4.371e-3	2	NC	1	NC	1
532			min	-.108	4	-.027	2	-.008	2	-2.775e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.382e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.095e-4	5	NC	1	NC	1
535		2	max	0	3	0	15	.011	4	8.412e-4	3	NC	5	NC	1
536			min	0	5	-.014	1	0	3	-6.435e-4	1	7041.409	1	8600.44	4
537		3	max	0	3	-.001	15	.024	4	1.344e-3	3	NC	5	NC	1
538			min	-.002	5	-.027	1	-.003	3	-1.253e-3	1	3583.133	1	3986.925	4
539		4	max	0	3	-.002	15	.036	4	1.847e-3	3	NC	5	NC	9
540			min	-.003	5	-.039	1	-.007	3	-1.863e-3	1	2458.238	1	2572.845	4
541		5	max	0	3	-.003	15	.049	4	2.35e-3	3	NC	5	NC	9
542			min	-.004	5	-.05	1	-.011	3	-2.473e-3	1	1918.188	1	1933.244	4
543		6	max	0	3	-.003	15	.059	4	2.853e-3	3	NC	5	8556.375	9
544			min	-.004	5	-.059	1	-.016	3	-3.083e-3	1	1614.358	1	1596.392	4
545		7	max	0	3	-.003	15	.066	4	3.356e-3	3	NC	5	6727.298	9
546			min	-.005	5	-.067	1	-.021	3	-3.693e-3	1	1431.645	1	1411.771	4
547		8	max	0	3	-.004	15	.071	4	3.859e-3	3	NC	5	5571.234	9
548			min	-.006	5	-.072	1	-.026	3	-4.303e-3	1	1321.989	1	1319.914	4
549		9	max	0	3	-.004	15	.072	4	4.362e-3	3	NC	5	4812.114	9
550			min	-.007	5	-.076	1	-.031	3	-4.913e-3	1	1262.966	1	1296.515	4
551		10	max	0	3	-.003	15	.07	4	4.865e-3	3	NC	15	4310.434	9
552			min	-.008	5	-.077	1	-.034	3	-5.523e-3	1	1244.294	1	1335.572	4
553		11	max	0	3	-.003	15	.065	4	5.368e-3	3	NC	5	3992.761	9
554			min	-.009	5	-.076	1	-.037	3	-6.133e-3	1	1262.966	1	1445.618	4
555		12	max	0	3	-.003	15	.056	4	5.871e-3	3	NC	5	3822.866	9

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	-.01	5	-.073	1	-.038	3	-6.743e-3	1	1321.989	1	1640.605	1
557		13	max	0	3	-.002	15	.046	4	6.374e-3	3	NC	5	3790.926	9
558			min	-.011	5	-.068	1	-.037	3	-7.353e-3	1	1431.645	1	1626.262	1
559		14	max	0	3	-.001	15	.038	1	6.877e-3	3	NC	5	5302.487	15
560			min	-.012	5	-.06	1	-.034	3	-7.963e-3	1	1614.358	1	1678.671	1
561		15	max	0	3	0	15	.032	1	7.38e-3	3	NC	5	9347.075	15
562			min	-.012	5	-.051	1	-.028	3	-8.573e-3	1	1918.188	1	1824.178	1
563		16	max	0	3	0	15	.023	1	7.883e-3	3	NC	5	NC	5
564			min	-.013	5	-.041	1	-.02	3	-9.183e-3	1	2458.238	1	2133.976	1
565		17	max	0	3	.002	5	.011	1	8.386e-3	3	NC	5	NC	4
566			min	-.014	5	-.029	1	-.008	3	-9.793e-3	1	3583.133	1	2831.151	1
567		18	max	.001	3	.004	5	.007	3	8.889e-3	3	NC	5	NC	4
568			min	-.015	5	-.016	1	-.011	2	-1.04e-2	1	7041.409	1	5043.906	1
569		19	max	.001	3	.006	5	.026	3	9.392e-3	3	NC	1	NC	1
570			min	-.016	5	-.003	9	-.03	2	-1.101e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.008	3	2.794e-3	3	NC	1	NC	1
572			min	-.006	4	-.004	4	-.008	2	-2.832e-3	2	NC	1	NC	1
573		2	max	0	10	-.007	12	.004	1	2.678e-3	3	NC	12	NC	2
574			min	-.006	4	-.025	4	-.003	5	-2.706e-3	2	4334.287	4	9702.6	1
575		3	max	0	10	-.013	12	.012	1	2.561e-3	3	7166.266	12	NC	4
576			min	-.005	4	-.046	4	-.01	5	-2.58e-3	2	2205.571	4	5487.448	1
577		4	max	0	10	-.019	12	.018	1	2.445e-3	3	4916.477	12	NC	10
578			min	-.005	4	-.065	4	-.021	5	-2.454e-3	2	1513.15	4	4171.642	1
579		5	max	0	10	-.024	12	.022	1	2.329e-3	3	3836.377	12	NC	10
580			min	-.005	4	-.083	4	-.034	5	-2.328e-3	2	1180.726	4	2827.389	5
581		6	max	0	10	-.029	12	.024	1	2.212e-3	3	3228.717	12	NC	10
582			min	-.004	4	-.098	4	-.048	5	-2.202e-3	2	993.706	4	2009.527	5
583		7	max	0	10	-.033	12	.025	1	2.096e-3	3	2863.289	12	NC	10
584			min	-.004	4	-.109	4	-.061	5	-2.076e-3	2	881.238	4	1578.915	5
585		8	max	0	10	-.036	12	.025	1	1.98e-3	3	2643.978	12	NC	10
586			min	-.004	4	-.118	4	-.072	5	-1.95e-3	2	813.74	4	1333.687	5
587		9	max	0	10	-.037	12	.023	1	1.864e-3	3	2525.931	12	NC	10
588			min	-.003	4	-.123	4	-.08	5	-1.824e-3	2	777.409	4	1192.81	5
589		10	max	0	10	-.038	12	.021	1	1.747e-3	3	2488.587	12	NC	10
590			min	-.003	4	-.125	4	-.085	5	-1.698e-3	2	765.916	4	1120.115	5
591		11	max	0	10	-.037	12	.018	1	1.631e-3	3	2525.931	12	NC	10
592			min	-.003	4	-.123	4	-.086	5	-1.572e-3	2	777.409	4	1099.896	5
593		12	max	0	10	-.036	12	.015	1	1.515e-3	3	2643.978	12	NC	9
594			min	-.002	4	-.117	4	-.084	5	-1.446e-3	2	813.74	4	1128.501	5
595		13	max	0	10	-.033	12	.012	1	1.398e-3	3	2863.289	12	NC	2
596			min	-.002	4	-.108	4	-.078	5	-1.32e-3	2	881.238	4	1212.766	5
597		14	max	0	10	-.029	12	.009	1	1.282e-3	3	3228.717	12	NC	2
598			min	-.002	4	-.096	4	-.069	5	-1.194e-3	2	993.706	4	1374.011	5
599		15	max	0	10	-.025	12	.006	1	1.166e-3	3	3836.377	12	NC	1
600			min	-.001	4	-.081	4	-.057	5	-1.068e-3	2	1180.726	4	1662.358	5
601		16	max	0	10	-.019	12	.003	1	1.05e-3	3	4916.477	12	NC	1
602			min	0	4	-.063	4	-.043	5	-9.423e-4	2	1513.15	4	2202.878	5
603		17	max	0	10	-.013	12	.001	1	9.332e-4	3	7166.266	12	NC	1
604			min	0	4	-.043	4	-.028	5	-8.163e-4	2	2205.571	4	3384.18	5
605		18	max	0	10	-.007	12	0	3	9.297e-4	4	NC	12	NC	1
606			min	0	4	-.022	4	-.013	5	-6.903e-4	2	4334.287	4	7190.228	5
607		19	max	0	1	0	1	0	1	1.004e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.643e-4	2	NC	1	NC	1

SIMPSON Strong-Tie®

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

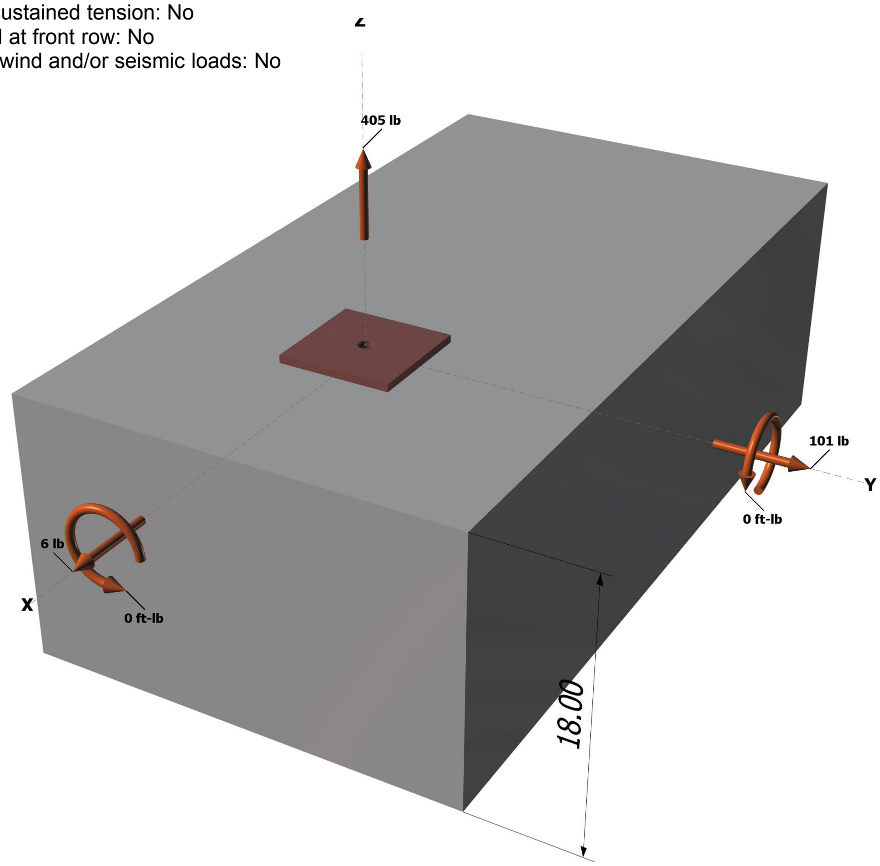
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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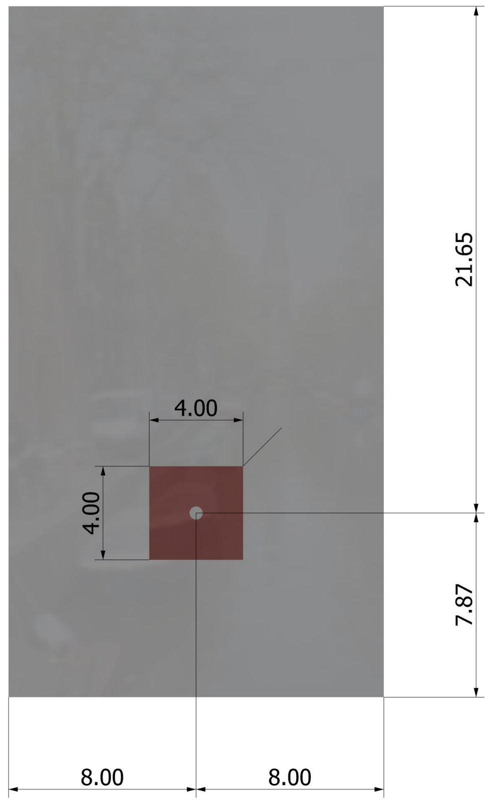


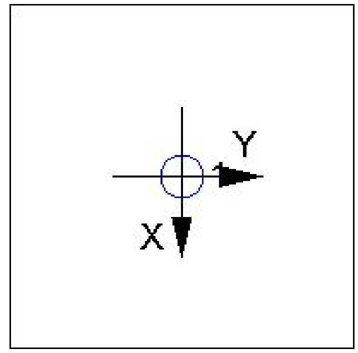
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

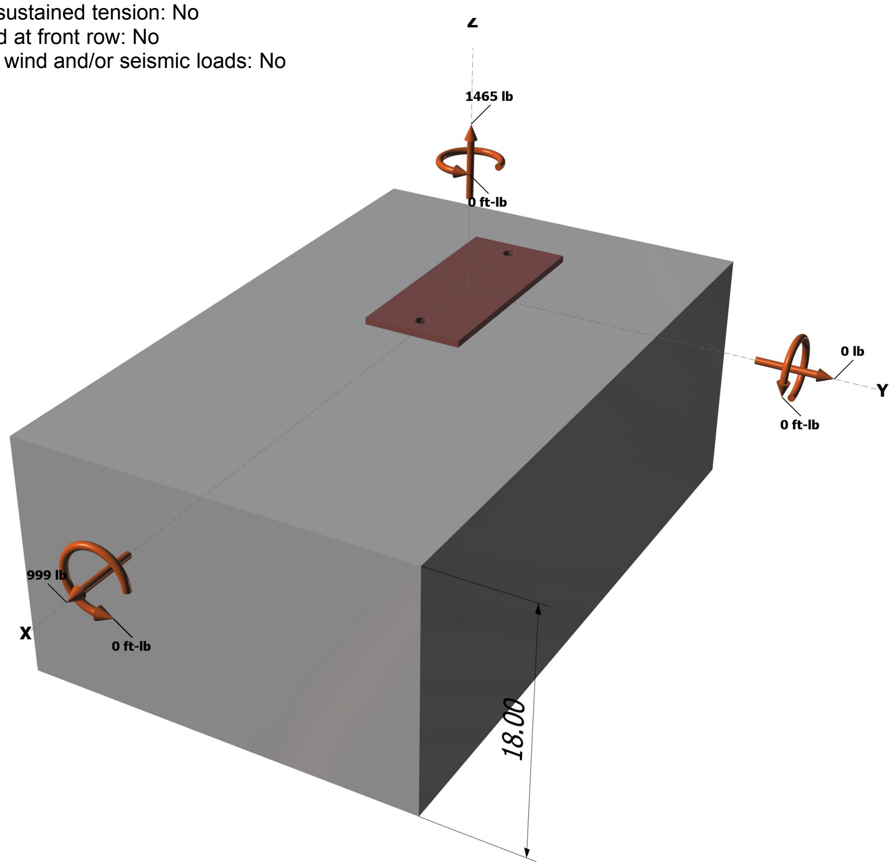
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

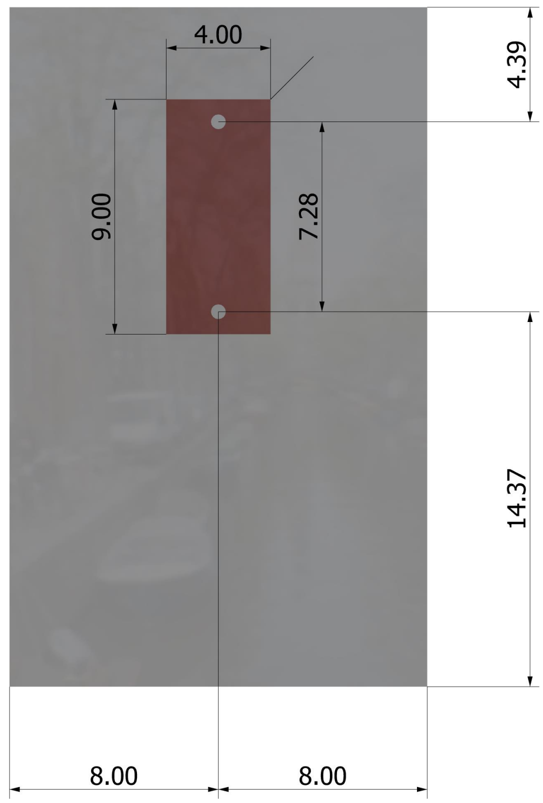
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



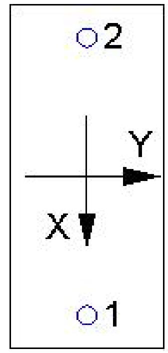
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.