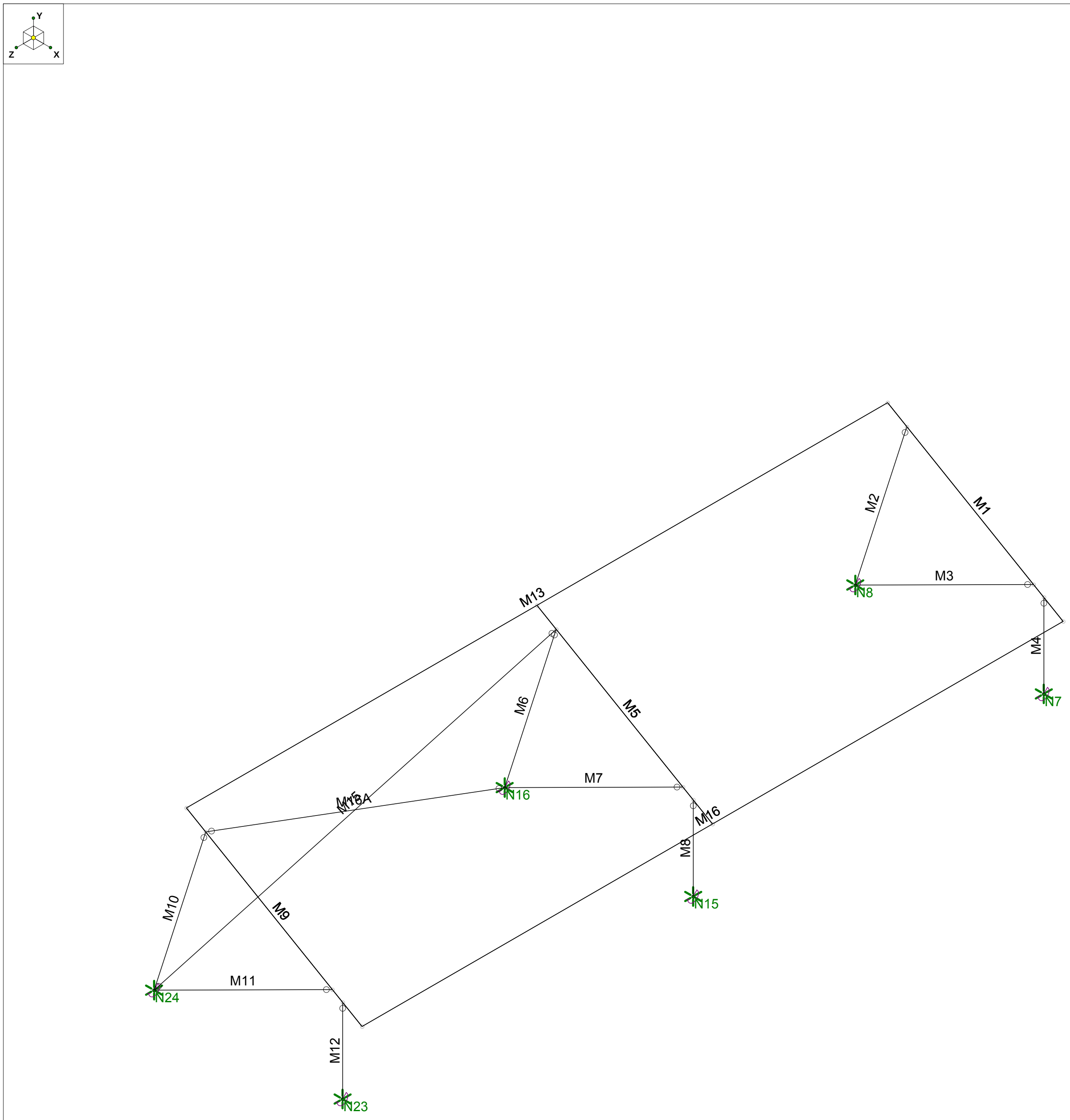


Schletter, Inc.		30° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

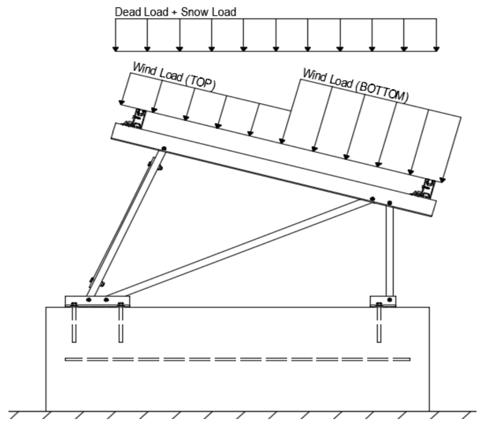
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

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



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf

g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

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

2.3 Wind Loads

Design Wind Speed, V =	85 mph	Exposure Category = C
Height ≤	15 ft	Importance Category = II

Peak Velocity Pressure, q_z = 11.34 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

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

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

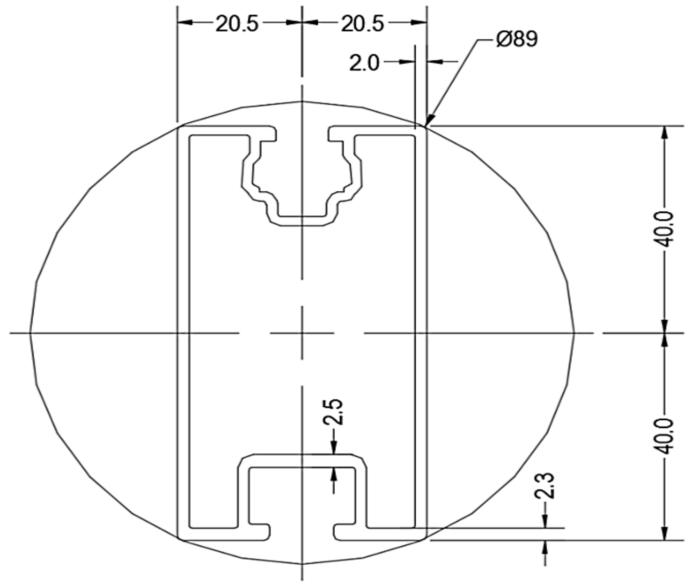
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

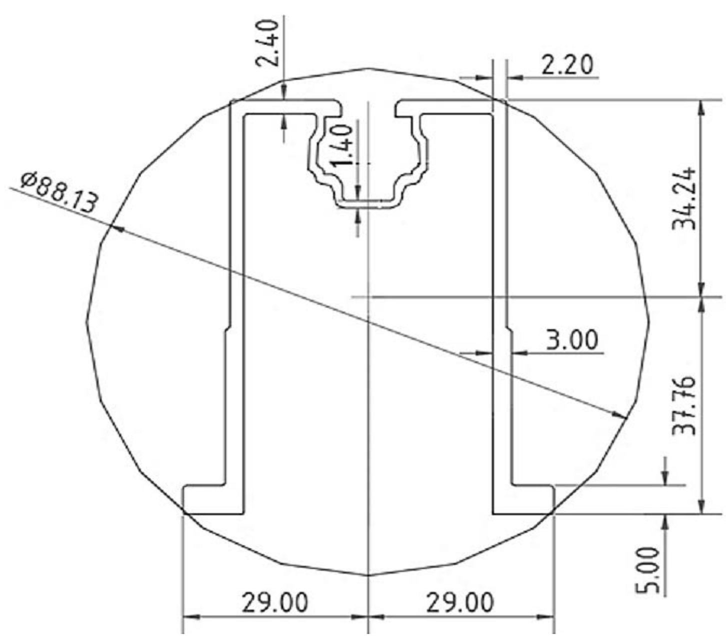
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	0.942	k-ft
M_z =	0.251	k-ft
$M_{y\ allowable}$ =	1.787	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	83%	



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).

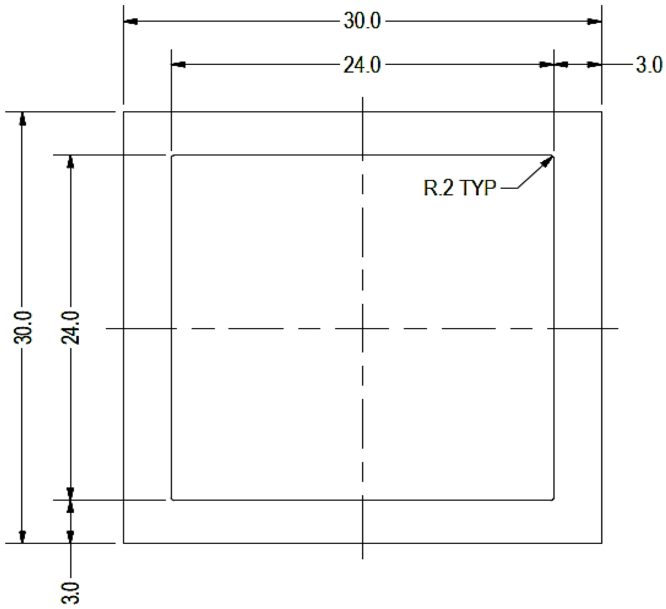
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.84	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.596	k-ft
M_z =	0.000	k-ft
P_n =	0.316	k
$M_{y\ allowable}$ =	1.464	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



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).

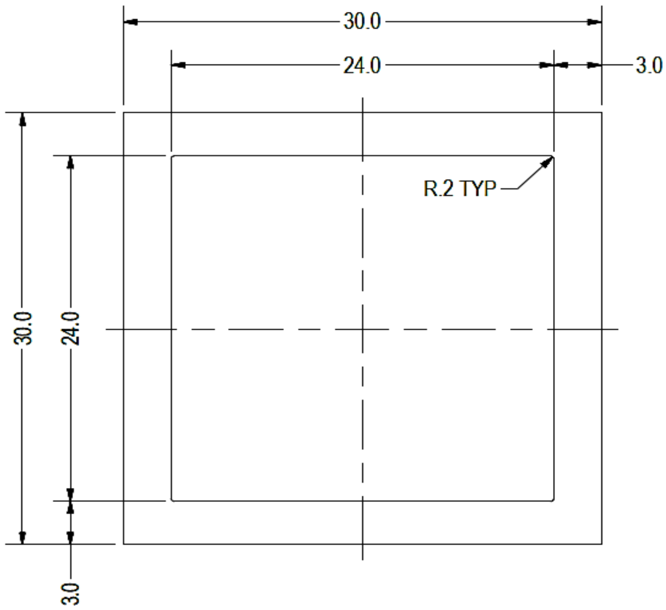
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.055	k-ft
P_n =	0.276	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	15%	



4.4 Diagonal Strut Design

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

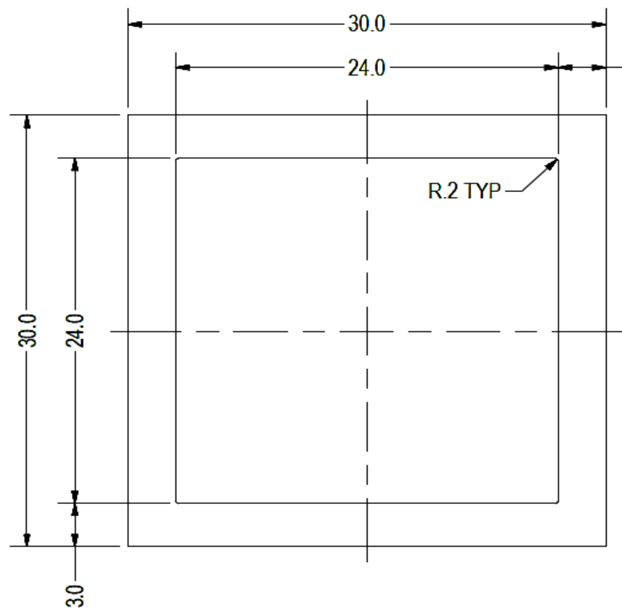
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.624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



4.5 Rear Strut Design

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

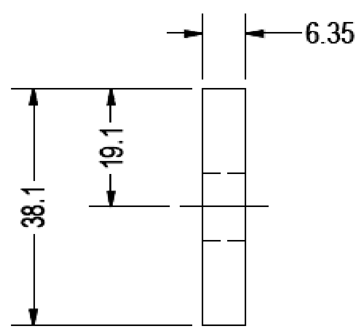
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.031	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	20%	



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 =	0.008	k-ft
P_n =	0.267	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	20%	



A cross brace kit is required every 10 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

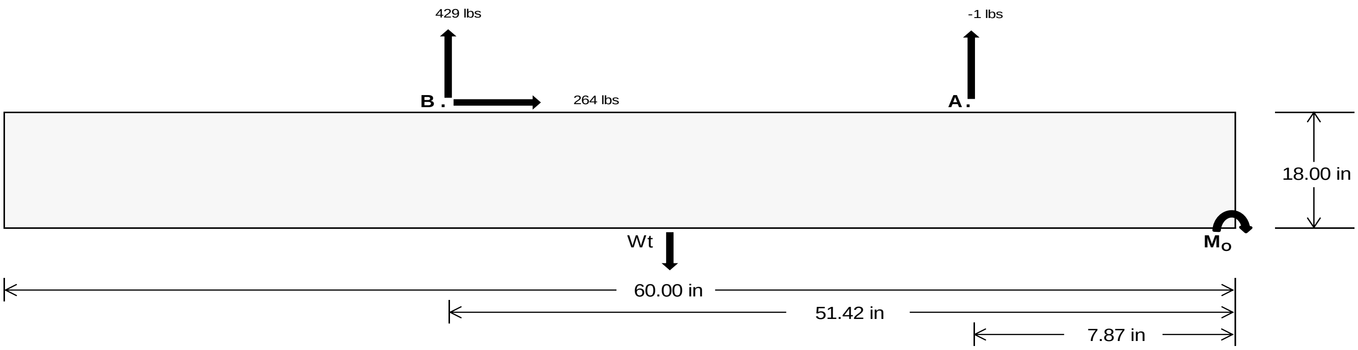
5.1 Helical Pile Foundations

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 =	2.11	1787.02	k
Compressive Load =	1597.09	1387.51	k
Lateral Load =	44.57	1100.66	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 tables 1804.2 (2003, 2006) & 1806.2 (2009).



<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 = 26796.0 in-lbs
Resisting Force Required = 893.20 lbs
S.F. = 1.67
Weight Required = 1488.67 lbs
Minimum Width = <u>22 in</u> in
Weight Provided = 1993.75 lbs

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

<u>Sliding</u>

Force = 264.44 lbs
Friction = 0.4
Weight Required = 661.10 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

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

<u>Cohesion</u>

Sliding Force = 264.44 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

<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			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.83 ft) =	1994 lbs	2084 lbs	2175 lbs	2266 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	631 lbs	631 lbs	631 lbs	631 lbs	444 lbs	444 lbs	444 lbs	444 lbs	750 lbs	750 lbs	750 lbs	750 lbs	2 lbs	2 lbs	2 lbs	2 lbs
F_B	443 lbs	443 lbs	443 lbs	443 lbs	570 lbs	570 lbs	570 lbs	570 lbs	719 lbs	719 lbs	719 lbs	719 lbs	-857 lbs	-857 lbs	-857 lbs	-857 lbs
F_V	76 lbs	76 lbs	76 lbs	76 lbs	484 lbs	484 lbs	484 lbs	484 lbs	414 lbs	414 lbs	414 lbs	414 lbs	-529 lbs	-529 lbs	-529 lbs	-529 lbs
P_{total}	3068 lbs	3159 lbs	3249 lbs	3340 lbs	3008 lbs	3098 lbs	3189 lbs	3280 lbs	3462 lbs	3553 lbs	3644 lbs	3734 lbs	341 lbs	395 lbs	449 lbs	504 lbs
M	488 lbs-ft	488 lbs-ft	488 lbs-ft	488 lbs-ft	527 lbs-ft	527 lbs-ft	527 lbs-ft	527 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	720 lbs-ft	740 lbs-ft	740 lbs-ft	740 lbs-ft	740 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.21 ft	0.20 ft	0.20 ft	0.19 ft	2.17 ft	1.87 ft	1.65 ft	1.47 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}	270.9 psf	268.5 psf	266.4 psf	264.5 psf	259.2 psf	257.4 psf	255.7 psf	254.2 psf	283.5 psf	280.6 psf	278.0 psf	275.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	398.5 psf	390.7 psf	383.4 psf	376.8 psf	397.1 psf	389.3 psf	382.1 psf	375.5 psf	472.0 psf	460.9 psf	450.8 psf	441.4 psf	379.1 psf	219.5 psf	175.7 psf	156.4 psf

Maximum Bearing Pressure = 472 psf
Allowable Bearing Pressure = 1500 psf

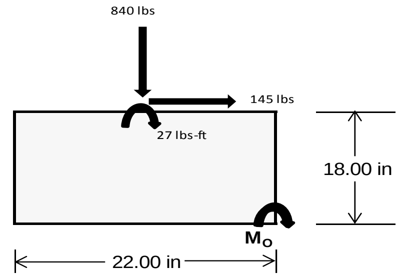
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 526.2 ft-lbs
Resisting Force Required = 573.99 lbs
S.F. = 1.67
Weight Required = 956.64 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	153 lbs	177 lbs	93 lbs	356 lbs	840 lbs	309 lbs	87 lbs	6 lbs	31 lbs
F_V	23 lbs	191 lbs	24 lbs	15 lbs	145 lbs	19 lbs	24 lbs	190 lbs	24 lbs
P_{total}	2621 lbs	2645 lbs	2561 lbs	2706 lbs	3190 lbs	2659 lbs	809 lbs	727 lbs	752 lbs
M	67 lbs-ft	323 lbs-ft	74 lbs-ft	43 lbs-ft	244 lbs-ft	58 lbs-ft	69 lbs-ft	323 lbs-ft	72 lbs-ft
e	0.03 ft	0.12 ft	0.03 ft	0.02 ft	0.08 ft	0.02 ft	0.09 ft	0.44 ft	0.10 ft
L/6	0.31 ft	1.59 ft	1.78 ft	1.80 ft	1.68 ft	1.79 ft	1.66 ft	0.95 ft	1.64 ft
f_{min}	262.0 sqft	173.1 sqft	253.1 sqft	279.9 sqft	260.9 sqft	269.5 sqft	63.7 sqft	-35.9 sqft	56.3 sqft
f_{max}	309.9 psf	403.9 psf	305.6 psf	310.5 psf	435.1 psf	310.6 psf	112.8 psf	194.6 psf	107.9 psf

Maximum Bearing Pressure = 435 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

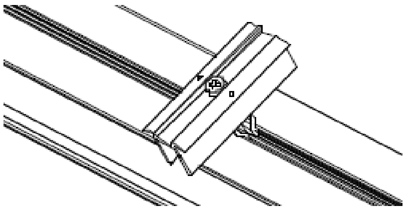
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

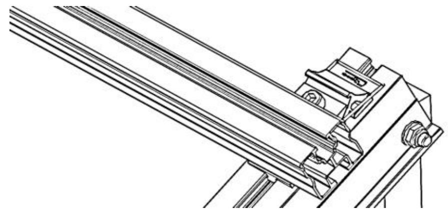
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins	
Maximum Uplifting Force =	0.386 k
Allowable Uplift =	1.214 k
Utilization =	32%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	1.088 k
Allowable Uplift =	1.116 k
Utilization =	97%



6.2 Bolted Connections

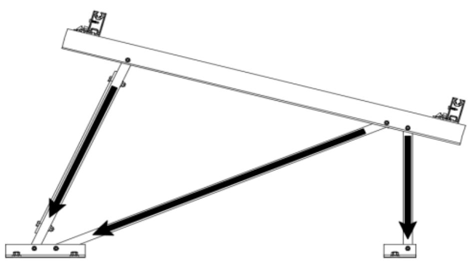
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut	
Maximum Axial Load =	1.229 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	22%

Rear Strut	
Maximum Axial Load =	1.173 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	21%

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

Bracing	
Maximum Axial Load =	0.267 k
M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k
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

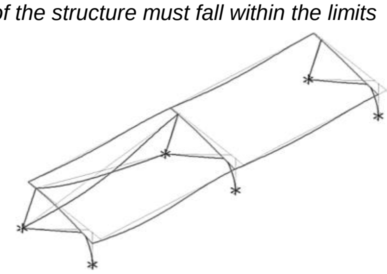
7.1 Seismic Drift

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} =	32.32 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.646 in
Max Drift, Δ_{MAX} =	0.116 in

$0.116 \leq 0.646$, 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 = **<u>ProfiPlus XT</u>**

Strong Axis:

3.4.14

L_b = 96.00 in

J = 0.427

200.222

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

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= 28.8 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 96.00 in

J = 0.427

217.57

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 28.8 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
M_{max}St = 1.787 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

<u>Compression</u>

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.38

20.9468

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.8 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 = 1.38

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= 29.8 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

3.4.16.2

N/A for Strong Direction

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= 29.8 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.464 k-ft

3.4.16.1

N/A for Weak 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 = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

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

$\varphi F_L =$ 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

λ = 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

φcc = 0.85841

φF_L= $(\varphi ccFcy)/(\lambda^2)$

φF_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)

φF_L= $\varphi yFcy$

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= $\varphi yFcy$

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= $\varphi yFcy$

φF_L= 33.25 ksi

φF_L= 7.60 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.1

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.68476

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.81587

φF_L= (φccFcy)/(λ²)

φF_L= 10.0603 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 10.06 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.05 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.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	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-36.38	-36.38	0	0
2	M16	y	-58.525	-58.525	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	72.761	72.761	0	0
2	M16	y	34.799	34.799	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	207.464	2	307.48	2	-.011	10	0	4	0	1	0	1
2		min	-265.01	3	-419.758	3	-2.234	4	0	1	0	1	0	1
3	N7	max	.005	3	472.786	1	-.202	12	0	12	0	1	0	1
4		min	-.194	2	7.949	12	-34.041	4	-.055	4	0	1	0	1
5	N15	max	.001	12	1228.532	1	.733	1	.001	1	0	1	0	1
6		min	-1.842	1	-1.62	3	-34.284	5	-.055	4	0	1	0	1
7	N16	max	801.424	2	1067.319	1	-.303	10	0	14	0	1	0	1
8		min	-846.665	3	-1374.63	3	-250.644	4	0	3	0	1	0	1
9	N23	max	.006	3	472.413	1	4.399	1	.008	1	0	1	0	1
10		min	-.194	2	8.319	12	-31.725	5	-.05	5	0	1	0	1
11	N24	max	208.073	2	312.284	2	43.266	3	.002	1	0	1	0	1
12		min	-265.1	3	-416.951	3	-3.806	5	0	3	0	1	0	1
13	Totals:	max	1214.784	2	3816.143	1	0	10						
14		min	-1376.768	3	-2190.692	3	-354.441	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	314.869	1	.651	6	1.405	4	0	12	0	12	0	1
2			min	-360.782	3	.153	15	-.02	3	-.001	1	0	1	0	1
3		2	max	314.995	1	.6	6	1.291	4	0	12	0	5	0	15
4			min	-360.688	3	.141	15	-.02	3	-.001	1	0	1	0	6
5		3	max	315.12	1	.549	6	1.176	4	0	12	0	5	0	15
6			min	-360.594	3	.129	15	-.02	3	-.001	1	0	1	0	6
7		4	max	315.246	1	.498	6	1.062	4	0	12	0	4	0	15
8			min	-360.499	3	.117	15	-.02	3	-.001	1	0	3	0	6
9		5	max	315.372	1	.447	6	.947	4	0	12	0	4	0	15
10			min	-360.405	3	.104	15	-.02	3	-.001	1	0	3	0	6
11		6	max	315.498	1	.396	6	.833	4	0	12	0	4	0	15
12			min	-360.31	3	.092	15	-.02	3	-.001	1	0	3	0	6
13		7	max	315.624	1	.344	6	.718	4	0	12	0	4	0	15
14			min	-360.216	3	.08	15	-.02	3	-.001	1	0	3	0	6
15		8	max	315.75	1	.293	6	.649	1	0	12	.001	4	0	15
16			min	-360.122	3	.068	15	-.02	3	-.001	1	0	3	0	6
17		9	max	315.876	1	.242	6	.649	1	0	12	.001	4	0	15
18			min	-360.027	3	.056	15	-.02	3	-.001	1	0	3	0	6
19		10	max	316.002	1	.191	6	.649	1	0	12	.001	4	0	15
20			min	-359.933	3	.044	15	-.02	3	-.001	1	0	3	0	6
21		11	max	316.127	1	.14	6	.649	1	0	12	.001	4	0	15
22			min	-359.838	3	.032	15	-.02	3	-.001	1	0	3	0	6
23		12	max	316.253	1	.099	2	.649	1	0	12	.001	4	0	15
24			min	-359.744	3	.013	12	-.024	5	-.001	1	0	3	0	6
25		13	max	316.379	1	.059	2	.649	1	0	12	.001	4	0	15
26			min	-359.65	3	-.013	3	-.138	5	-.001	1	0	3	0	6
27		14	max	316.505	1	.019	2	.649	1	0	12	.001	4	0	15
28			min	-359.555	3	-.043	3	-.253	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	316.631	1	-.016	15	.649	1	0	12	.001	4	0	15
30			min	-359.461	3	-.073	3	-.367	5	-.001	1	0	3	0	6
31		16	max	316.757	1	-.028	15	.649	1	0	12	.001	1	0	15
32			min	-359.366	3	-.116	4	-.481	5	-.001	1	0	3	0	6
33		17	max	316.883	1	-.04	15	.649	1	0	12	.002	1	0	15
34			min	-359.272	3	-.167	4	-.596	5	-.001	1	0	3	0	6
35		18	max	317.008	1	-.052	15	.649	1	0	12	.002	1	0	15
36			min	-359.178	3	-.218	4	-.71	5	-.001	1	0	3	0	6
37		19	max	317.134	1	-.064	15	.649	1	0	12	.002	1	0	15
38			min	-359.083	3	-.269	4	-.825	5	-.001	1	0	3	0	6
39	M3	1	max	148.345	2	1.755	6	-.04	12	0	5	.002	1	0	6
40			min	-174.51	3	.412	15	-1.48	4	0	1	0	12	0	15
41		2	max	148.276	2	1.578	6	-.04	12	0	5	.002	1	0	2
42			min	-174.562	3	.371	15	-1.346	4	0	1	0	12	0	12
43		3	max	148.206	2	1.401	6	-.04	12	0	5	.002	1	0	2
44			min	-174.614	3	.329	15	-1.212	4	0	1	0	15	0	3
45		4	max	148.137	2	1.225	6	-.04	12	0	5	.002	1	0	15
46			min	-174.666	3	.287	15	-1.079	4	0	1	0	5	0	4
47		5	max	148.068	2	1.048	6	-.04	12	0	5	.002	1	0	15
48			min	-174.718	3	.246	15	-.945	4	0	1	0	5	0	4
49		6	max	147.998	2	.871	6	-.04	12	0	5	.002	1	0	15
50			min	-174.77	3	.204	15	-.811	4	0	1	0	5	0	4
51		7	max	147.929	2	.694	6	-.04	12	0	5	.001	1	0	15
52			min	-174.822	3	.163	15	-.726	1	0	1	0	5	0	4
53		8	max	147.86	2	.517	6	-.04	12	0	5	.001	1	0	15
54			min	-174.874	3	.121	15	-.726	1	0	1	0	5	-.001	4
55		9	max	147.79	2	.34	6	-.04	12	0	5	.001	1	0	15
56			min	-174.926	3	.08	15	-.726	1	0	1	0	5	-.001	4
57		10	max	147.721	2	.164	6	-.04	12	0	5	0	1	0	15
58			min	-174.978	3	.038	15	-.726	1	0	1	0	5	-.001	4
59		11	max	147.652	2	.015	2	.014	5	0	5	0	1	0	15
60			min	-175.03	3	-.038	3	-.726	1	0	1	0	5	-.001	4
61		12	max	147.582	2	-.045	15	.148	5	0	5	0	1	0	15
62			min	-175.082	3	-.19	4	-.726	1	0	1	0	5	-.001	4
63		13	max	147.513	2	-.087	15	.281	5	0	5	0	1	0	15
64			min	-175.134	3	-.367	4	-.726	1	0	1	0	5	-.001	4
65		14	max	147.444	2	-.128	15	.415	5	0	5	0	1	0	15
66			min	-175.186	3	-.544	4	-.726	1	0	1	0	5	-.001	4
67		15	max	147.374	2	-.17	15	.549	5	0	5	0	1	0	15
68			min	-175.238	3	-.721	4	-.726	1	0	1	0	5	0	4
69		16	max	147.305	2	-.211	15	.682	5	0	5	0	1	0	15
70			min	-175.29	3	-.898	4	-.726	1	0	1	0	5	0	4
71		17	max	147.236	2	-.253	15	.816	5	0	5	0	12	0	15
72			min	-175.342	3	-1.074	4	-.726	1	0	1	0	4	0	4
73		18	max	147.167	2	-.295	15	.95	5	0	5	0	12	0	15
74			min	-175.394	3	-1.251	4	-.726	1	0	1	0	1	0	4
75		19	max	147.097	2	-.336	15	1.083	5	0	5	0	5	0	1
76			min	-175.446	3	-1.428	4	-.726	1	0	1	0	1	0	1
77	M4	1	max	471.621	1	0	1	-.202	12	0	1	0	5	0	1
78			min	7.366	12	0	1	-33.748	4	0	1	0	1	0	1
79		2	max	471.686	1	0	1	-.202	12	0	1	0	12	0	1
80			min	7.399	12	0	1	-33.805	4	0	1	-.003	4	0	1
81		3	max	471.75	1	0	1	-.202	12	0	1	0	12	0	1
82			min	7.431	12	0	1	-33.861	4	0	1	-.006	4	0	1
83		4	max	471.815	1	0	1	-.202	12	0	1	0	12	0	1
84			min	7.463	12	0	1	-33.917	4	0	1	-.009	4	0	1
85		5	max	471.88	1	0	1	-.202	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	7.496	12	0	1	-33.973	4	0	1	-.012	4	0	1
87		6	max	471.944	1	0	1	-.202	12	0	1	0	12	0	1
88			min	7.528	12	0	1	-34.029	4	0	1	-.015	4	0	1
89		7	max	472.009	1	0	1	-.202	12	0	1	0	12	0	1
90			min	7.56	12	0	1	-34.085	4	0	1	-.018	4	0	1
91		8	max	472.074	1	0	1	-.202	12	0	1	0	12	0	1
92			min	7.593	12	0	1	-34.141	4	0	1	-.021	4	0	1
93		9	max	472.139	1	0	1	-.202	12	0	1	0	12	0	1
94			min	7.625	12	0	1	-34.197	4	0	1	-.024	4	0	1
95		10	max	472.203	1	0	1	-.202	12	0	1	0	12	0	1
96			min	7.657	12	0	1	-34.253	4	0	1	-.027	4	0	1
97		11	max	472.268	1	0	1	-.202	12	0	1	0	12	0	1
98			min	7.69	12	0	1	-34.309	4	0	1	-.03	4	0	1
99		12	max	472.333	1	0	1	-.202	12	0	1	0	12	0	1
100			min	7.722	12	0	1	-34.365	4	0	1	-.033	4	0	1
101		13	max	472.397	1	0	1	-.202	12	0	1	0	12	0	1
102			min	7.754	12	0	1	-34.421	4	0	1	-.037	4	0	1
103		14	max	472.462	1	0	1	-.202	12	0	1	0	12	0	1
104			min	7.787	12	0	1	-34.478	4	0	1	-.04	4	0	1
105		15	max	472.527	1	0	1	-.202	12	0	1	0	12	0	1
106			min	7.819	12	0	1	-34.534	4	0	1	-.043	4	0	1
107		16	max	472.592	1	0	1	-.202	12	0	1	0	12	0	1
108			min	7.852	12	0	1	-34.59	4	0	1	-.046	4	0	1
109		17	max	472.656	1	0	1	-.202	12	0	1	0	12	0	1
110			min	7.884	12	0	1	-34.646	4	0	1	-.049	4	0	1
111		18	max	472.721	1	0	1	-.202	12	0	1	0	12	0	1
112			min	7.916	12	0	1	-34.702	4	0	1	-.052	4	0	1
113		19	max	472.786	1	0	1	-.202	12	0	1	0	12	0	1
114			min	7.949	12	0	1	-34.758	4	0	1	-.055	4	0	1
115	M6	1	max	1028.311	1	.642	6	1.261	4	0	1	0	3	0	1
116			min	-1172.728	3	.144	15	-.122	3	0	5	0	11	0	1
117		2	max	1028.437	1	.59	6	1.147	4	0	1	0	4	0	15
118			min	-1172.633	3	.132	15	-.122	3	0	5	0	11	0	6
119		3	max	1028.562	1	.539	6	1.033	4	0	1	0	4	0	15
120			min	-1172.539	3	.12	15	-.122	3	0	5	0	10	0	6
121		4	max	1028.688	1	.489	2	.918	4	0	1	0	4	0	15
122			min	-1172.445	3	.108	15	-.122	3	0	5	0	10	0	6
123		5	max	1028.814	1	.449	2	.804	4	0	1	0	4	0	15
124			min	-1172.35	3	.096	15	-.122	3	0	5	0	10	0	6
125		6	max	1028.94	1	.409	2	.689	4	0	1	0	4	0	15
126			min	-1172.256	3	.083	12	-.122	3	0	5	0	12	0	6
127		7	max	1029.066	1	.369	2	.575	4	0	1	.001	4	0	15
128			min	-1172.161	3	.063	12	-.122	3	0	5	0	3	0	2
129		8	max	1029.192	1	.329	2	.46	4	0	1	.001	4	0	15
130			min	-1172.067	3	.043	12	-.122	3	0	5	0	3	0	2
131		9	max	1029.318	1	.29	2	.346	4	0	1	.001	4	0	15
132			min	-1171.973	3	.023	12	-.122	3	0	5	0	3	0	2
133		10	max	1029.443	1	.25	2	.232	4	0	1	.001	4	0	15
134			min	-1171.878	3	-.002	3	-.122	3	0	5	0	3	0	2
135		11	max	1029.569	1	.21	2	.174	14	0	1	.001	4	0	12
136			min	-1171.784	3	-.032	3	-.122	3	0	5	0	3	0	2
137		12	max	1029.695	1	.17	2	.173	1	0	1	.001	4	0	12
138			min	-1171.689	3	-.062	3	-.122	3	0	5	0	3	0	2
139		13	max	1029.821	1	.13	2	.173	1	0	1	.001	4	0	12
140			min	-1171.595	3	-.092	3	-.181	5	0	5	0	3	0	2
141		14	max	1029.947	1	.09	2	.173	1	0	1	.001	4	0	12
142			min	-1171.501	3	-.122	3	-.295	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	1030.073	1	.051	2	.173	1	0	1	.001	4	0	12
144			min	-1171.406	3	-.151	3	-.41	5	0	5	0	3	0	2
145		16	max	1030.199	1	.011	2	.173	1	0	1	.001	4	0	12
146			min	-1171.312	3	-.181	3	-.524	5	0	5	0	3	0	2
147		17	max	1030.325	1	-.029	2	.173	1	0	1	.001	4	0	12
148			min	-1171.217	3	-.211	3	-.638	5	0	5	0	3	0	2
149		18	max	1030.45	1	-.061	15	.173	1	0	1	0	4	0	3
150			min	-1171.123	3	-.241	3	-.753	5	0	5	0	3	0	2
151		19	max	1030.576	1	-.073	15	.173	1	0	1	0	4	0	3
152			min	-1171.029	3	-.28	4	-.867	5	0	5	0	3	0	2
153	M7	1	max	623.952	2	1.774	4	.016	1	0	2	0	4	0	2
154			min	-544.359	3	.422	15	-1.348	5	0	3	0	3	0	3
155		2	max	623.883	2	1.597	4	.016	1	0	2	0	4	0	2
156			min	-544.411	3	.381	15	-1.214	5	0	3	0	3	0	3
157		3	max	623.814	2	1.42	4	.016	1	0	2	0	2	0	2
158			min	-544.463	3	.339	15	-1.08	5	0	3	0	3	0	3
159		4	max	623.744	2	1.243	4	.016	1	0	2	0	2	0	2
160			min	-544.515	3	.298	15	-.947	5	0	3	0	3	0	3
161		5	max	623.675	2	1.066	4	.016	1	0	2	0	2	0	15
162			min	-544.567	3	.256	15	-.813	5	0	3	0	5	0	3
163		6	max	623.606	2	.89	4	.016	1	0	2	0	2	0	15
164			min	-544.619	3	.215	15	-.679	5	0	3	0	5	0	3
165		7	max	623.536	2	.713	4	.016	1	0	2	0	2	0	15
166			min	-544.671	3	.173	15	-.546	5	0	3	0	5	0	6
167		8	max	623.467	2	.536	4	.016	1	0	2	0	2	0	15
168			min	-544.723	3	.131	15	-.412	5	0	3	0	5	-.001	6
169		9	max	623.398	2	.36	2	.016	1	0	2	0	2	0	15
170			min	-544.775	3	.066	12	-.278	5	0	3	0	5	-.001	6
171		10	max	623.328	2	.223	2	.016	1	0	2	0	2	0	15
172			min	-544.827	3	-.01	3	-.145	5	0	3	0	5	-.001	6
173		11	max	623.259	2	.085	2	.016	1	0	2	0	2	0	15
174			min	-544.879	3	-.114	3	-.011	5	0	3	0	5	-.001	6
175		12	max	623.19	2	-.035	15	.126	4	0	2	0	2	0	15
176			min	-544.931	3	-.217	3	-.004	10	0	3	0	5	-.001	6
177		13	max	623.121	2	-.076	15	.26	4	0	2	0	2	0	15
178			min	-544.983	3	-.349	6	-.004	10	0	3	0	5	-.001	6
179		14	max	623.051	2	-.118	15	.393	4	0	2	0	2	0	15
180			min	-545.035	3	-.525	6	-.004	10	0	3	0	5	-.001	6
181		15	max	622.982	2	-.16	15	.527	4	0	2	0	2	0	15
182			min	-545.087	3	-.702	6	-.004	10	0	3	0	5	0	6
183		16	max	622.913	2	-.201	15	.661	4	0	2	0	2	0	15
184			min	-545.139	3	-.879	6	-.004	10	0	3	0	5	0	6
185		17	max	622.843	2	-.243	15	.794	4	0	2	0	2	0	15
186			min	-545.191	3	-1.056	6	-.004	10	0	3	0	5	0	6
187		18	max	622.774	2	-.284	15	.928	4	0	2	0	2	0	15
188			min	-545.243	3	-1.233	6	-.004	10	0	3	0	5	0	6
189		19	max	622.705	2	-.326	15	1.062	4	0	2	0	14	0	1
190			min	-545.295	3	-1.41	6	-.004	10	0	3	0	3	0	1
191	M8	1	max	1227.368	1	0	1	.917	1	0	1	0	4	0	1
192			min	-2.494	3	0	1	-33.716	4	0	1	0	1	0	1
193		2	max	1227.432	1	0	1	.917	1	0	1	0	1	0	1
194			min	-2.445	3	0	1	-33.772	4	0	1	-.003	4	0	1
195		3	max	1227.497	1	0	1	.917	1	0	1	0	1	0	1
196			min	-2.397	3	0	1	-33.828	4	0	1	-.006	4	0	1
197		4	max	1227.562	1	0	1	.917	1	0	1	0	1	0	1
198			min	-2.348	3	0	1	-33.884	4	0	1	-.009	4	0	1
199		5	max	1227.626	1	0	1	.917	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	-2.3	3	0	1	-33.94	4	0	1	-.012	4	0	1
201		6	max	1227.691	1	0	1	.917	1	0	1	0	1	0	1
202			min	-2.251	3	0	1	-33.997	4	0	1	-.015	4	0	1
203		7	max	1227.756	1	0	1	.917	1	0	1	0	1	0	1
204			min	-2.203	3	0	1	-34.053	4	0	1	-.018	4	0	1
205		8	max	1227.821	1	0	1	.917	1	0	1	0	1	0	1
206			min	-2.154	3	0	1	-34.109	4	0	1	-.021	4	0	1
207		9	max	1227.885	1	0	1	.917	1	0	1	0	1	0	1
208			min	-2.106	3	0	1	-34.165	4	0	1	-.024	4	0	1
209		10	max	1227.95	1	0	1	.917	1	0	1	0	1	0	1
210			min	-2.057	3	0	1	-34.221	4	0	1	-.027	4	0	1
211		11	max	1228.015	1	0	1	.917	1	0	1	0	1	0	1
212			min	-2.009	3	0	1	-34.277	4	0	1	-.03	4	0	1
213		12	max	1228.079	1	0	1	.917	1	0	1	0	1	0	1
214			min	-1.96	3	0	1	-34.333	4	0	1	-.033	4	0	1
215		13	max	1228.144	1	0	1	.917	1	0	1	0	1	0	1
216			min	-1.911	3	0	1	-34.389	4	0	1	-.037	4	0	1
217		14	max	1228.209	1	0	1	.917	1	0	1	.001	1	0	1
218			min	-1.863	3	0	1	-34.445	4	0	1	-.04	4	0	1
219		15	max	1228.273	1	0	1	.917	1	0	1	.001	1	0	1
220			min	-1.814	3	0	1	-34.501	4	0	1	-.043	4	0	1
221		16	max	1228.338	1	0	1	.917	1	0	1	.001	1	0	1
222			min	-1.766	3	0	1	-34.557	4	0	1	-.046	4	0	1
223		17	max	1228.403	1	0	1	.917	1	0	1	.001	1	0	1
224			min	-1.717	3	0	1	-34.613	4	0	1	-.049	4	0	1
225		18	max	1228.468	1	0	1	.917	1	0	1	.001	1	0	1
226			min	-1.669	3	0	1	-34.669	4	0	1	-.052	4	0	1
227		19	max	1228.532	1	0	1	.917	1	0	1	.001	1	0	1
228			min	-1.62	3	0	1	-34.726	4	0	1	-.055	4	0	1
229	M10	1	max	331.785	1	.68	4	1.447	5	.001	1	0	1	0	1
230			min	-341.578	3	.172	15	-.235	1	-.002	5	0	5	0	1
231		2	max	331.911	1	.629	4	1.333	5	.001	1	0	1	0	15
232			min	-341.484	3	.16	15	-.235	1	-.002	5	0	3	0	4
233		3	max	332.037	1	.578	4	1.219	5	.001	1	0	4	0	15
234			min	-341.39	3	.148	15	-.235	1	-.002	5	0	3	0	4
235		4	max	332.163	1	.526	4	1.104	5	.001	1	0	4	0	15
236			min	-341.295	3	.136	15	-.235	1	-.002	5	0	3	0	4
237		5	max	332.289	1	.475	4	.99	5	.001	1	0	4	0	15
238			min	-341.201	3	.124	15	-.235	1	-.002	5	0	3	0	4
239		6	max	332.415	1	.424	4	.875	5	.001	1	0	4	0	15
240			min	-341.106	3	.112	15	-.235	1	-.002	5	0	3	0	4
241		7	max	332.54	1	.373	4	.761	5	.001	1	.001	4	0	15
242			min	-341.012	3	.1	15	-.235	1	-.002	5	0	3	0	4
243		8	max	332.666	1	.322	4	.646	5	.001	1	.001	4	0	15
244			min	-340.918	3	.088	15	-.235	1	-.002	5	0	3	0	4
245		9	max	332.792	1	.271	4	.532	5	.001	1	.001	4	0	15
246			min	-340.823	3	.076	15	-.235	1	-.002	5	0	3	0	4
247		10	max	332.918	1	.22	4	.418	5	.001	1	.001	4	0	15
248			min	-340.729	3	.064	15	-.235	1	-.002	5	0	3	0	4
249		11	max	333.044	1	.168	4	.303	5	.001	1	.001	4	0	15
250			min	-340.634	3	.048	12	-.235	1	-.002	5	0	3	0	4
251		12	max	333.17	1	.117	4	.189	5	.001	1	.001	4	0	15
252			min	-340.54	3	.028	12	-.235	1	-.002	5	0	3	0	4
253		13	max	333.296	1	.066	4	.074	5	.001	1	.002	4	0	15
254			min	-340.446	3	.007	1	-.235	1	-.002	5	0	1	0	4
255		14	max	333.421	1	.023	5	-.008	12	.001	1	.002	4	0	15
256			min	-340.351	3	-.033	1	-.235	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	333.547	1	.004	5	-.008	12	.001	1	.001	4	0	15
258			min	-340.257	3	-.073	1	-.235	1	-.002	5	0	1	0	4
259		16	max	333.673	1	-.009	15	-.008	12	.001	1	.001	5	0	15
260			min	-340.162	3	-.113	1	-.303	4	-.002	5	0	1	0	4
261		17	max	333.799	1	-.021	15	-.008	12	.001	1	.001	5	0	15
262			min	-340.068	3	-.153	1	-.417	4	-.002	5	0	1	0	4
263		18	max	333.925	1	-.033	15	-.008	12	.001	1	.001	5	0	15
264			min	-339.974	3	-.193	1	-.532	4	-.002	5	0	1	0	4
265		19	max	334.051	1	-.045	15	-.008	12	.001	1	.001	5	0	15
266			min	-339.879	3	-.242	6	-.646	4	-.002	5	0	1	0	4
267	M11	1	max	148.115	2	1.746	6	.809	1	.002	4	.001	5	0	6
268			min	-175.154	3	.406	15	-1.199	5	0	10	-.002	1	0	15
269		2	max	148.046	2	1.569	6	.809	1	.002	4	0	5	0	1
270			min	-175.206	3	.364	15	-1.065	5	0	10	-.002	1	0	3
271		3	max	147.976	2	1.393	6	.809	1	.002	4	0	5	0	1
272			min	-175.258	3	.323	15	-.931	5	0	10	-.002	1	0	3
273		4	max	147.907	2	1.216	6	.809	1	.002	4	0	5	0	15
274			min	-175.31	3	.281	15	-.798	5	0	10	-.002	1	0	4
275		5	max	147.838	2	1.039	6	.809	1	.002	4	0	5	0	15
276			min	-175.362	3	.24	15	-.664	5	0	10	-.002	1	0	4
277		6	max	147.768	2	.862	6	.809	1	.002	4	0	5	0	15
278			min	-175.414	3	.198	15	-.53	5	0	10	-.001	1	0	4
279		7	max	147.699	2	.685	6	.809	1	.002	4	0	3	0	15
280			min	-175.466	3	.156	15	-.397	5	0	10	-.001	1	0	4
281		8	max	147.63	2	.508	6	.809	1	.002	4	0	3	0	15
282			min	-175.518	3	.115	15	-.263	5	0	10	-.001	1	-.001	4
283		9	max	147.561	2	.332	6	.809	1	.002	4	0	3	0	15
284			min	-175.57	3	.073	15	-.129	5	0	10	0	1	-.001	4
285		10	max	147.491	2	.155	6	.809	1	.002	4	0	3	0	15
286			min	-175.622	3	.032	15	.002	15	0	10	0	1	-.001	4
287		11	max	147.422	2	.016	1	.809	1	.002	4	0	3	0	15
288			min	-175.674	3	-.055	3	.011	12	0	10	0	1	-.001	4
289		12	max	147.353	2	-.051	15	.809	1	.002	4	0	3	0	15
290			min	-175.726	3	-.199	4	.011	12	0	10	0	1	-.001	4
291		13	max	147.283	2	-.093	15	.809	1	.002	4	0	3	0	15
292			min	-175.778	3	-.376	4	.011	12	0	10	0	1	-.001	4
293		14	max	147.214	2	-.135	15	.809	1	.002	4	0	5	0	15
294			min	-175.83	3	-.553	4	.011	12	0	10	0	1	-.001	4
295		15	max	147.145	2	-.176	15	.848	4	.002	4	0	4	0	15
296			min	-175.882	3	-.73	4	.011	12	0	10	0	10	0	4
297		16	max	147.075	2	-.218	15	.981	4	.002	4	0	4	0	15
298			min	-175.934	3	-.907	4	.011	12	0	10	0	10	0	4
299		17	max	147.006	2	-.259	15	1.115	4	.002	4	0	4	0	15
300			min	-175.986	3	-1.084	4	.011	12	0	10	0	10	0	4
301		18	max	146.937	2	-.301	15	1.249	4	.002	4	.001	4	0	15
302			min	-176.038	3	-1.26	4	.011	12	0	10	0	10	0	4
303		19	max	146.867	2	-.342	15	1.382	4	.002	4	.001	4	0	1
304			min	-176.09	3	-1.437	4	.011	12	0	10	0	10	0	1
305	M12	1	max	471.248	1	0	1	4.768	1	0	1	0	4	0	1
306			min	7.737	12	0	1	-30.797	5	0	1	0	3	0	1
307		2	max	471.313	1	0	1	4.768	1	0	1	0	1	0	1
308			min	7.769	12	0	1	-30.854	5	0	1	-.003	5	0	1
309		3	max	471.378	1	0	1	4.768	1	0	1	0	1	0	1
310			min	7.801	12	0	1	-30.91	5	0	1	-.005	5	0	1
311		4	max	471.442	1	0	1	4.768	1	0	1	.001	1	0	1
312			min	7.834	12	0	1	-30.966	5	0	1	-.008	5	0	1
313		5	max	471.507	1	0	1	4.768	1	0	1	.002	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	7.866	12	0	1	-31.022	5	0	1	-.011	5	0	1
315		6	max	471.572	1	0	1	4.768	1	0	1	.002	1	0	1
316			min	7.898	12	0	1	-31.078	5	0	1	-.014	5	0	1
317		7	max	471.637	1	0	1	4.768	1	0	1	.003	1	0	1
318			min	7.931	12	0	1	-31.134	5	0	1	-.017	5	0	1
319		8	max	471.701	1	0	1	4.768	1	0	1	.003	1	0	1
320			min	7.963	12	0	1	-31.19	5	0	1	-.019	5	0	1
321		9	max	471.766	1	0	1	4.768	1	0	1	.003	1	0	1
322			min	7.995	12	0	1	-31.246	5	0	1	-.022	5	0	1
323		10	max	471.831	1	0	1	4.768	1	0	1	.004	1	0	1
324			min	8.028	12	0	1	-31.302	5	0	1	-.025	5	0	1
325		11	max	471.895	1	0	1	4.768	1	0	1	.004	1	0	1
326			min	8.06	12	0	1	-31.358	5	0	1	-.028	5	0	1
327		12	max	471.96	1	0	1	4.768	1	0	1	.005	1	0	1
328			min	8.092	12	0	1	-31.414	5	0	1	-.031	5	0	1
329		13	max	472.025	1	0	1	4.768	1	0	1	.005	1	0	1
330			min	8.125	12	0	1	-31.47	5	0	1	-.033	5	0	1
331		14	max	472.089	1	0	1	4.768	1	0	1	.006	1	0	1
332			min	8.157	12	0	1	-31.526	5	0	1	-.036	5	0	1
333		15	max	472.154	1	0	1	4.768	1	0	1	.006	1	0	1
334			min	8.189	12	0	1	-31.583	5	0	1	-.039	5	0	1
335		16	max	472.219	1	0	1	4.768	1	0	1	.006	1	0	1
336			min	8.222	12	0	1	-31.639	5	0	1	-.042	5	0	1
337		17	max	472.284	1	0	1	4.768	1	0	1	.007	1	0	1
338			min	8.254	12	0	1	-31.695	5	0	1	-.045	5	0	1
339		18	max	472.348	1	0	1	4.768	1	0	1	.007	1	0	1
340			min	8.287	12	0	1	-31.751	5	0	1	-.048	5	0	1
341		19	max	472.413	1	0	1	4.768	1	0	1	.008	1	0	1
342			min	8.319	12	0	1	-31.807	5	0	1	-.05	5	0	1
343	M1	1	max	162.228	1	338.41	3	-4.508	12	0	1	.184	1	.012	1
344			min	7.177	12	-311.124	1	-93.198	1	0	3	.01	12	-.011	3
345		2	max	162.367	1	338.229	3	-4.508	12	0	1	.164	1	.079	1
346			min	7.247	12	-311.366	1	-93.198	1	0	3	.009	12	-.084	3
347		3	max	95.178	1	7.576	9	-4.523	12	0	12	.142	1	.145	1
348			min	-8.058	10	-23.512	2	-93.133	1	0	1	.007	12	-.156	3
349		4	max	95.317	1	7.374	9	-4.523	12	0	12	.122	1	.146	1
350			min	-7.942	10	-23.754	2	-93.133	1	0	1	.006	12	-.153	3
351		5	max	95.457	1	7.173	9	-4.523	12	0	12	.102	1	.147	1
352			min	-7.825	10	-23.996	2	-93.133	1	0	1	.005	12	-.15	3
353		6	max	95.596	1	6.971	9	-4.523	12	0	12	.082	1	.148	1
354			min	-7.709	10	-24.238	2	-93.133	1	0	1	.005	12	-.147	3
355		7	max	95.736	1	6.77	9	-4.523	12	0	12	.062	1	.149	1
356			min	-7.593	10	-24.479	2	-93.133	1	0	1	.004	12	-.143	3
357		8	max	95.876	1	6.568	9	-4.523	12	0	12	.041	1	.152	2
358			min	-7.476	10	-24.721	2	-93.133	1	0	1	.003	12	-.14	3
359		9	max	96.015	1	6.367	9	-4.523	12	0	12	.021	1	.157	2
360			min	-7.36	10	-24.963	2	-93.133	1	0	1	.002	12	-.137	3
361		10	max	96.155	1	6.165	9	-4.523	12	0	12	.003	4	.163	2
362			min	-7.244	10	-25.205	2	-93.133	1	0	1	0	10	-.133	3
363		11	max	96.295	1	5.964	9	-4.523	12	0	12	0	12	.168	2
364			min	-7.127	10	-25.447	2	-93.133	1	0	1	-.019	1	-.13	3
365		12	max	96.434	1	5.762	9	-4.523	12	0	12	-.001	12	.174	2
366			min	-7.011	10	-25.689	2	-93.133	1	0	1	-.039	1	-.127	3
367		13	max	96.574	1	5.561	9	-4.523	12	0	12	-.002	12	.179	2
368			min	-6.894	10	-25.93	2	-93.133	1	0	1	-.06	1	-.123	3
369		14	max	96.713	1	5.359	9	-4.523	12	0	12	-.003	12	.185	2
370			min	-6.778	10	-26.172	2	-93.133	1	0	1	-.08	1	-.12	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	96.853	1	5.157	9	-4.523	12	0	12	-.004	12	.191	2
372			min	-6.662	10	-26.414	2	-93.133	1	0	1	-.1	1	-.116	3
373		16	max	95.522	2	96.111	2	-4.564	12	0	1	-.005	12	.195	2
374			min	-5.286	3	-163.712	3	-93.729	1	0	5	-.121	1	-.111	3
375		17	max	95.662	2	95.869	2	-4.564	12	0	1	-.006	12	.174	2
376			min	-5.181	3	-163.893	3	-93.729	1	0	5	-.141	1	-.076	3
377		18	max	-6.693	12	373.14	2	-4.767	12	0	5	-.007	12	.095	2
378			min	-161.689	1	-155.413	3	-96.153	1	0	2	-.162	1	-.042	3
379		19	max	-6.623	12	372.898	2	-4.767	12	0	5	-.008	12	.014	2
380			min	-161.55	1	-155.594	3	-96.153	1	0	2	-.183	1	-.008	3
381	M5	1	max	356.5	1	1116.298	3	-.113	10	0	1	.048	4	.021	3
382			min	11.407	15	-1027.292	1	-38.658	3	0	5	0	10	-.023	1
383		2	max	356.64	1	1116.116	3	-.113	10	0	1	.041	4	.2	1
384			min	11.449	15	-1027.534	1	-38.658	3	0	5	-.004	3	-.221	3
385		3	max	275.741	3	7.087	9	4.395	3	0	3	.035	4	.418	1
386			min	-44.044	10	-85.264	2	-25.973	4	0	4	-.012	3	-.458	3
387		4	max	275.845	3	6.885	9	4.395	3	0	3	.029	4	.426	1
388			min	-43.928	10	-85.506	2	-25.731	4	0	4	-.011	3	-.447	3
389		5	max	275.95	3	6.684	9	4.395	3	0	3	.024	4	.433	1
390			min	-43.812	10	-85.748	2	-25.489	4	0	4	-.01	3	-.437	3
391		6	max	276.055	3	6.482	9	4.395	3	0	3	.018	4	.441	1
392			min	-43.695	10	-85.99	2	-25.247	4	0	4	-.009	3	-.426	3
393		7	max	276.159	3	6.281	9	4.395	3	0	3	.013	4	.449	1
394			min	-43.579	10	-86.232	2	-25.005	4	0	4	-.008	3	-.416	3
395		8	max	276.264	3	6.079	9	4.395	3	0	3	.007	4	.456	1
396			min	-43.463	10	-86.473	2	-24.763	4	0	4	-.007	3	-.405	3
397		9	max	276.369	3	5.878	9	4.395	3	0	3	.002	4	.468	2
398			min	-43.346	10	-86.715	2	-24.521	4	0	4	-.006	3	-.394	3
399		10	max	276.474	3	5.676	9	4.395	3	0	3	0	10	.487	2
400			min	-43.23	10	-86.957	2	-24.279	4	0	4	-.005	3	-.383	3
401		11	max	276.578	3	5.475	9	4.395	3	0	3	0	10	.505	2
402			min	-43.114	10	-87.199	2	-24.037	4	0	4	-.008	4	-.373	3
403		12	max	276.683	3	5.273	9	4.395	3	0	3	0	10	.524	2
404			min	-42.997	10	-87.441	2	-23.795	4	0	4	-.014	4	-.362	3
405		13	max	276.788	3	5.072	9	4.395	3	0	3	0	10	.543	2
406			min	-42.881	10	-87.683	2	-23.553	4	0	4	-.019	4	-.351	3
407		14	max	276.892	3	4.87	9	4.395	3	0	3	0	10	.562	2
408			min	-42.765	10	-87.924	2	-23.311	4	0	4	-.024	4	-.34	3
409		15	max	276.997	3	4.669	9	4.395	3	0	3	0	10	.581	2
410			min	-42.648	10	-88.166	2	-23.069	4	0	4	-.029	4	-.329	3
411		16	max	316.453	2	435.635	2	4.373	3	0	1	0	3	.596	2
412			min	-21.694	3	-506.825	3	-21.781	4	0	4	-.034	4	-.314	3
413		17	max	316.593	2	435.393	2	4.373	3	0	1	.001	3	.502	2
414			min	-21.589	3	-507.007	3	-21.539	4	0	4	-.039	4	-.204	3
415		18	max	-13.536	12	1226.902	2	4.018	3	0	4	.002	3	.239	2
416			min	-357.556	1	-509.343	3	-53.693	5	0	1	-.05	4	-.094	3
417		19	max	-13.466	12	1226.661	2	4.018	3	0	4	.003	3	.017	3
418			min	-357.416	1	-509.524	3	-53.451	5	0	1	-.062	4	-.027	2
419	M9	1	max	161.456	1	338.388	3	230.327	4	0	3	-.004	15	.012	1
420			min	4.657	15	-311.105	1	9.748	10	0	1	-.184	1	-.011	3
421		2	max	161.595	1	338.207	3	230.569	4	0	3	.039	5	.079	1
422			min	4.699	15	-311.347	1	9.748	10	0	1	-.157	1	-.084	3
423		3	max	95.096	1	7.547	9	87.862	1	0	1	.082	5	.145	1
424			min	-7.512	10	-23.526	2	-31.857	5	0	5	-.129	1	-.156	3
425		4	max	95.235	1	7.345	9	87.862	1	0	1	.075	5	.146	1
426			min	-7.396	10	-23.767	2	-31.615	5	0	5	-.11	1	-.153	3
427		5	max	95.375	1	7.144	9	87.862	1	0	1	.068	5	.147	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	-7.279	10	-24.009	2	-31.373	5	0	5	-.09	1	-.15	3
429		6	max	95.515	1	6.942	9	87.862	1	0	1	.062	5	.148	1
430			min	-7.163	10	-24.251	2	-31.131	5	0	5	-.071	1	-.147	3
431		7	max	95.654	1	6.741	9	87.862	1	0	1	.055	5	.149	1
432			min	-7.047	10	-24.493	2	-30.889	5	0	5	-.052	1	-.143	3
433		8	max	95.794	1	6.539	9	87.862	1	0	1	.048	5	.152	2
434			min	-6.93	10	-24.735	2	-30.647	5	0	5	-.033	1	-.14	3
435		9	max	95.934	1	6.338	9	87.862	1	0	1	.042	5	.157	2
436			min	-6.814	10	-24.977	2	-30.405	5	0	5	-.014	1	-.137	3
437		10	max	96.073	1	6.136	9	87.862	1	0	1	.035	4	.163	2
438			min	-6.698	10	-25.218	2	-30.163	5	0	5	0	2	-.133	3
439		11	max	96.213	1	5.935	9	87.862	1	0	1	.033	4	.168	2
440			min	-6.581	10	-25.46	2	-29.921	5	0	5	.002	10	-.13	3
441		12	max	96.352	1	5.733	9	87.862	1	0	1	.043	1	.174	2
442			min	-6.465	10	-25.702	2	-29.679	5	0	5	.004	10	-.127	3
443		13	max	96.492	1	5.532	9	87.862	1	0	1	.062	1	.179	2
444			min	-6.348	10	-25.944	2	-29.437	5	0	5	.005	12	-.123	3
445		14	max	96.632	1	5.33	9	87.862	1	0	1	.081	1	.185	2
446			min	-6.232	10	-26.186	2	-29.195	5	0	5	.006	12	-.12	3
447		15	max	96.771	1	5.129	9	87.862	1	0	1	.1	1	.191	2
448			min	-6.116	10	-26.428	2	-28.953	5	0	5	.002	15	-.116	3
449		16	max	95.871	2	95.906	2	88.543	1	0	10	.121	1	.195	2
450			min	-5.31	3	-164.197	3	-27.51	5	0	4	-.001	5	-.111	3
451		17	max	96.01	2	95.664	2	88.543	1	0	10	.14	1	.174	2
452			min	-5.205	3	-164.378	3	-27.268	5	0	4	-.007	5	-.076	3
453		18	max	-.161	15	373.141	2	93.428	1	0	2	.16	1	.095	2
454			min	-161.357	1	-155.41	3	-57.715	5	0	3	-.019	5	-.042	3
455		19	max	-.119	15	372.899	2	93.428	1	0	2	.18	1	.014	2
456			min	-161.217	1	-155.591	3	-57.473	5	0	3	-.032	5	-.008	3
457	M13	1	max	230.348	4	310.508	1	-4.657	15	.012	1	.184	1	0	1
458			min	9.752	10	-338.37	3	-161.435	1	-.011	3	.004	15	0	3
459		2	max	221.547	4	219.187	1	-3.125	15	.012	1	.057	1	.256	3
460			min	9.752	10	-238.77	3	-123.647	1	-.011	3	0	15	-.235	1
461		3	max	212.745	4	127.866	1	-1.594	15	.012	1	.002	3	.424	3
462			min	9.752	10	-139.171	3	-85.858	1	-.011	3	-.036	1	-.39	1
463		4	max	203.944	4	36.545	1	-.062	15	.012	1	-.002	12	.504	3
464			min	9.752	10	-39.572	3	-48.07	1	-.011	3	-.096	1	-.463	1
465		5	max	195.142	4	60.028	3	2.167	5	.012	1	-.002	15	.495	3
466			min	9.752	10	-54.776	1	-10.282	1	-.011	3	-.122	1	-.455	1
467		6	max	186.341	4	159.627	3	27.506	1	.012	1	0	15	.397	3
468			min	9.752	10	-146.097	1	.448	12	-.011	3	-.114	1	-.365	1
469		7	max	177.539	4	259.226	3	65.294	1	.012	1	.005	5	.211	3
470			min	9.752	10	-237.418	1	1.942	12	-.011	3	-.073	1	-.195	1
471		8	max	168.738	4	358.826	3	103.082	1	.012	1	.012	4	.057	1
472			min	9.752	10	-328.739	1	3.437	12	-.011	3	0	3	-.064	3
473		9	max	159.936	4	458.425	3	140.87	1	.012	1	.111	1	.39	1
474			min	9.752	10	-420.06	1	4.931	12	-.011	3	.004	12	-.427	3
475		10	max	151.135	4	558.025	3	178.658	1	.011	2	.253	1	.804	1
476			min	9.752	10	-511.381	1	6.426	12	-.012	1	.009	12	-.879	3
477		11	max	112.625	4	420.059	1	-.747	15	.011	3	.106	1	.39	1
478			min	4.51	12	-458.425	3	-140.092	1	-.012	1	-.016	5	-.427	3
479		12	max	103.823	4	328.738	1	.924	5	.011	3	.001	2	.057	1
480			min	4.51	12	-358.826	3	-102.304	1	-.012	1	-.017	4	-.064	3
481		13	max	95.022	4	237.417	1	3.294	5	.011	3	-.005	12	.211	3
482			min	4.51	12	-259.226	3	-64.516	1	-.012	1	-.076	1	-.195	1
483		14	max	93.565	1	146.096	1	5.663	5	.011	3	-.006	12	.397	3
484			min	4.51	12	-159.627	3	-26.728	1	-.012	1	-.117	1	-.365	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	93.565	1	54.775	1	11.06	1	.011	3	-.003	15	.495	3
486			min	4.51	12	-60.028	3	.754	10	-.012	1	-.124	1	-.455	1
487		16	max	93.565	1	39.572	3	48.848	1	.011	3	.004	5	.504	3
488			min	4.51	12	-36.546	1	2.694	12	-.012	1	-.097	1	-.463	1
489		17	max	93.565	1	139.171	3	86.636	1	.011	3	.014	5	.424	3
490			min	4.51	12	-127.867	1	4.189	12	-.012	1	-.037	1	-.39	1
491		18	max	93.565	1	238.771	3	124.424	1	.011	3	.057	1	.256	3
492			min	4.51	12	-219.188	1	5.683	12	-.012	1	.004	12	-.235	1
493		19	max	93.565	1	338.37	3	162.212	1	.011	3	.184	1	0	1
494			min	4.51	12	-310.509	1	7.178	12	-.012	1	.01	12	0	3
495	M16	1	max	57.475	5	373.192	2	-.119	15	.008	3	.18	1	0	2
496			min	-93.028	1	-155.624	3	-161.234	1	-.014	2	-.032	5	0	3
497		2	max	48.674	5	263.456	2	1.802	5	.008	3	.054	1	.118	3
498			min	-93.028	1	-110.015	3	-123.446	1	-.014	2	-.031	5	-.283	2
499		3	max	39.873	5	153.721	2	4.171	5	.008	3	-.001	12	.196	3
500			min	-93.028	1	-64.406	3	-85.658	1	-.014	2	-.039	1	-.468	2
501		4	max	31.071	5	43.986	2	6.541	5	.008	3	-.004	12	.233	3
502			min	-93.028	1	-18.797	3	-47.87	1	-.014	2	-.098	1	-.556	2
503		5	max	22.27	5	26.812	3	8.91	5	.008	3	-.005	12	.229	3
504			min	-93.028	1	-65.75	2	-10.082	1	-.014	2	-.124	1	-.547	2
505		6	max	13.468	5	72.421	3	27.706	1	.008	3	-.005	15	.185	3
506			min	-93.028	1	-175.485	2	.66	12	-.014	2	-.116	1	-.439	2
507		7	max	4.667	5	118.03	3	65.494	1	.008	3	.003	5	.1	3
508			min	-93.028	1	-285.22	2	2.155	12	-.014	2	-.075	1	-.235	2
509		8	max	-2.241	12	163.639	3	103.282	1	.008	3	.016	4	.068	2
510			min	-93.028	1	-394.955	2	3.649	12	-.014	2	-.003	3	-.025	3
511		9	max	-2.241	12	209.248	3	141.07	1	.008	3	.109	1	.468	2
512			min	-93.028	1	-504.691	2	5.144	12	-.014	2	.002	12	-.191	3
513		10	max	31.752	5	-14.854	15	178.858	1	.004	14	.251	1	.965	2
514			min	-95.802	1	-614.426	2	-10.221	3	-.014	2	.009	12	-.397	3
515		11	max	22.951	5	504.691	2	-.745	15	.014	2	.109	1	.468	2
516			min	-95.802	1	-209.248	3	-140.738	1	-.008	3	-.014	5	-.191	3
517		12	max	14.149	5	394.955	2	.923	5	.014	2	.001	2	.068	2
518			min	-95.802	1	-163.639	3	-102.95	1	-.008	3	-.015	4	-.025	3
519		13	max	5.348	5	285.22	2	3.293	5	.014	2	-.003	12	.1	3
520			min	-95.802	1	-118.03	3	-65.162	1	-.008	3	-.074	1	-.235	2
521		14	max	-2.165	15	175.485	2	5.662	5	.014	2	-.004	12	.185	3
522			min	-95.802	1	-72.421	3	-27.374	1	-.008	3	-.115	1	-.439	2
523		15	max	-4.766	12	65.749	2	10.538	4	.014	2	-.001	15	.229	3
524			min	-95.802	1	-26.812	3	.644	12	-.008	3	-.123	1	-.547	2
525		16	max	-4.766	12	18.797	3	48.202	1	.014	2	.006	5	.233	3
526			min	-95.802	1	-43.986	2	2.139	12	-.008	3	-.097	1	-.556	2
527		17	max	-4.766	12	64.406	3	85.99	1	.014	2	.016	5	.196	3
528			min	-95.802	1	-153.721	2	3.633	12	-.008	3	-.037	1	-.468	2
529		18	max	-4.766	12	110.015	3	123.778	1	.014	2	.056	1	.118	3
530			min	-95.802	1	-263.456	2	5.128	12	-.008	3	.003	12	-.283	2
531		19	max	-4.766	12	155.624	3	161.566	1	.014	2	.183	1	0	2
532			min	-95.802	1	-373.192	2	6.622	12	-.008	3	.008	12	0	5
533	M15	1	max	0	2	2.177	1	.03	3	0	1	0	1	0	1
534			min	-46.125	3	0	2	-.029	1	0	3	0	3	0	1
535		2	max	0	2	1.935	1	.03	3	0	1	0	1	0	2
536			min	-46.195	3	0	2	-.029	1	0	3	0	3	0	1
537		3	max	0	2	1.693	1	.03	3	0	1	0	1	0	2
538			min	-46.266	3	0	2	-.029	1	0	3	0	3	-.002	1
539		4	max	0	2	1.451	1	.03	3	0	1	0	1	0	2
540			min	-46.336	3	0	2	-.029	1	0	3	0	3	-.003	1
541		5	max	0	2	1.209	1	.03	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	-46.407	3	0	2	-.029	1	0	3	0	3	-.003	1
543		6	max	0	2	.967	1	.03	3	0	1	0	1	0	2
544			min	-46.477	3	0	2	-.029	1	0	3	0	3	-.004	1
545		7	max	0	2	.726	1	.03	3	0	1	0	3	0	2
546			min	-46.548	3	0	2	-.029	1	0	3	0	1	-.004	1
547		8	max	0	2	.484	1	.03	3	0	1	0	3	0	2
548			min	-46.618	3	0	2	-.029	1	0	3	0	1	-.004	1
549		9	max	0	2	.242	1	.03	3	0	1	0	3	0	2
550			min	-46.689	3	0	2	-.029	1	0	3	0	1	-.005	1
551		10	max	0	2	0	1	.03	3	0	1	0	3	0	2
552			min	-46.759	3	0	1	-.029	1	0	3	0	1	-.005	1
553		11	max	0	2	0	2	.03	3	0	1	0	3	0	2
554			min	-46.83	3	-.242	1	-.029	1	0	3	0	1	-.005	1
555		12	max	0	2	0	2	.03	3	0	1	0	3	0	2
556			min	-46.9	3	-.484	1	-.029	1	0	3	0	1	-.004	1
557		13	max	0	2	0	2	.03	3	0	1	0	3	0	2
558			min	-46.971	3	-.726	1	-.029	1	0	3	0	1	-.004	1
559		14	max	0	2	0	2	.03	3	0	1	0	3	0	2
560			min	-47.041	3	-.967	1	-.029	1	0	3	0	1	-.004	1
561		15	max	0	2	0	2	.03	3	0	1	0	3	0	2
562			min	-47.112	3	-1.209	1	-.029	1	0	3	0	1	-.003	1
563		16	max	0	2	0	2	.03	3	0	1	0	3	0	2
564			min	-47.182	3	-1.451	1	-.029	1	0	3	0	1	-.003	1
565		17	max	0	2	0	2	.03	3	0	1	0	3	0	2
566			min	-47.253	3	-1.693	1	-.029	1	0	3	0	1	-.002	1
567		18	max	0	2	0	2	.03	3	0	1	0	3	0	2
568			min	-47.323	3	-1.935	1	-.029	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.03	3	0	1	0	3	0	1
570			min	-47.394	3	-2.177	1	-.029	1	0	3	0	1	0	1
571	M16A	1	max	-1.035	10	3.521	4	.277	4	0	3	0	3	0	1
572			min	-265.693	4	1.088	12	-.013	3	0	2	0	4	0	1
573		2	max	-.957	10	3.13	4	.25	4	0	3	0	3	0	12
574			min	-265.781	4	.967	12	-.013	3	0	2	0	4	-.002	4
575		3	max	-.878	10	2.738	4	.222	4	0	3	0	3	0	12
576			min	-265.868	4	.846	12	-.013	3	0	2	0	4	-.003	4
577		4	max	-.8	10	2.347	4	.194	4	0	3	0	3	-.001	12
578			min	-265.955	4	.726	12	-.013	3	0	2	0	4	-.004	4
579		5	max	-.722	10	1.956	4	.167	4	0	3	0	3	-.002	12
580			min	-266.043	4	.605	12	-.013	3	0	2	0	1	-.005	4
581		6	max	-.643	10	1.565	4	.139	4	0	3	0	5	-.002	12
582			min	-266.13	4	.484	12	-.013	3	0	2	0	1	-.006	4
583		7	max	-.565	10	1.174	4	.111	4	0	3	0	5	-.002	12
584			min	-266.218	4	.363	12	-.013	3	0	2	0	1	-.007	4
585		8	max	-.487	10	.782	4	.083	4	0	3	0	5	-.002	12
586			min	-266.305	4	.242	12	-.013	3	0	2	0	1	-.007	4
587		9	max	-.408	10	.391	4	.056	4	0	3	0	5	-.002	12
588			min	-266.392	4	.121	12	-.013	3	0	2	0	1	-.008	4
589		10	max	-.33	10	0	1	.028	4	0	3	0	5	-.002	12
590			min	-266.48	4	0	1	-.013	3	0	2	0	1	-.008	4
591		11	max	-.252	10	-.121	12	.021	1	0	3	0	5	-.002	12
592			min	-266.567	4	-.391	4	-.013	3	0	2	0	1	-.008	4
593		12	max	-.173	10	-.242	12	.021	1	0	3	0	5	-.002	12
594			min	-266.654	4	-.782	4	-.031	5	0	2	0	1	-.007	4
595		13	max	-.095	10	-.363	12	.021	1	0	3	0	5	-.002	12
596			min	-266.742	4	-1.174	4	-.059	5	0	2	0	3	-.007	4
597		14	max	-.017	10	-.484	12	.021	1	0	3	0	4	-.002	12
598			min	-266.829	4	-1.565	4	-.086	5	0	2	0	3	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.062	10	-.605	12	.021	1	0	3	0	4	-.002	12
600			min	-266.917	4	-1.956	4	-.114	5	0	2	0	3	-.005	4
601		16	max	.14	10	-.726	12	.021	1	0	3	0	4	-.001	12
602			min	-267.004	4	-2.347	4	-.142	5	0	2	0	3	-.004	4
603		17	max	.218	10	-.846	12	.021	1	0	3	0	1	0	12
604			min	-267.091	4	-2.738	4	-.169	5	0	2	0	5	-.003	4
605		18	max	.297	10	-.967	12	.021	1	0	3	0	1	0	12
606			min	-267.179	4	-3.13	4	-.197	5	0	2	0	5	-.002	4
607		19	max	.375	10	-1.088	12	.021	1	0	3	0	1	0	1
608			min	-267.266	4	-3.521	4	-.225	5	0	2	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	.01	2	.017	1	1.936e-3	5	NC	3	NC	3
2			min	-.003	3	-.01	3	-.019	5	-1.52e-3	1	3952.211	2	2256.571	1
3		2	max	.003	1	.009	2	.016	1	1.962e-3	5	NC	3	NC	3
4			min	-.003	3	-.009	3	-.019	5	-1.454e-3	1	4304.16	2	2429.417	1
5		3	max	.003	1	.008	2	.015	1	1.988e-3	5	NC	3	NC	3
6			min	-.003	3	-.009	3	-.018	5	-1.388e-3	1	4720.966	2	2633.566	1
7		4	max	.003	1	.008	2	.014	1	2.014e-3	5	NC	3	NC	3
8			min	-.003	3	-.009	3	-.017	5	-1.322e-3	1	5217.831	2	2876.462	1
9		5	max	.002	1	.007	2	.012	1	2.04e-3	5	NC	1	NC	3
10			min	-.003	3	-.008	3	-.017	5	-1.256e-3	1	5814.88	2	3168.035	1
11		6	max	.002	1	.006	2	.011	1	2.066e-3	5	NC	1	NC	3
12			min	-.003	3	-.008	3	-.016	5	-1.191e-3	1	6539.177	2	3521.769	1
13		7	max	.002	1	.005	2	.01	1	2.092e-3	5	NC	1	NC	3
14			min	-.002	3	-.007	3	-.015	5	-1.125e-3	1	7427.796	2	3956.352	1
15		8	max	.002	1	.005	2	.009	1	2.118e-3	5	NC	1	NC	2
16			min	-.002	3	-.007	3	-.014	5	-1.059e-3	1	8532.625	2	4498.296	1
17		9	max	.002	1	.004	2	.008	1	2.144e-3	5	NC	1	NC	2
18			min	-.002	3	-.006	3	-.013	5	-9.93e-4	1	9928.147	2	5186.276	1
19		10	max	.002	1	.003	2	.006	1	2.169e-3	5	NC	1	NC	2
20			min	-.002	3	-.006	3	-.012	5	-9.271e-4	1	NC	1	6078.578	1
21		11	max	.001	1	.003	2	.005	1	2.195e-3	5	NC	1	NC	2
22			min	-.002	3	-.005	3	-.011	5	-8.613e-4	1	NC	1	7266.558	1
23		12	max	.001	1	.002	2	.004	1	2.221e-3	5	NC	1	NC	2
24			min	-.001	3	-.005	3	-.01	5	-7.954e-4	1	NC	1	8900.456	1
25		13	max	.001	1	.002	2	.004	1	2.247e-3	5	NC	1	NC	1
26			min	-.001	3	-.004	3	-.009	5	-7.295e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.003	1	2.273e-3	5	NC	1	NC	1
28			min	0	3	-.003	3	-.008	5	-6.637e-4	1	NC	1	NC	1
29		15	max	0	1	.001	2	.002	1	2.299e-3	5	NC	1	NC	1
30			min	0	3	-.003	3	-.006	5	-5.978e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	2.325e-3	5	NC	1	NC	1
32			min	0	3	-.002	3	-.005	5	-5.32e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.351e-3	5	NC	1	NC	1
34			min	0	3	-.001	3	-.003	5	-4.661e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.377e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.002	5	-4.003e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.403e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.344e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.578e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-1.133e-3	5	NC	1	NC	1
41		2	max	0	3	0	2	.006	5	1.941e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-1.146e-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	.012	5	2.303e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	-1.159e-3	5	NC	1	8599.187	14
45		4	max	0	3	0	2	.017	5	2.665e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	-1.172e-3	5	NC	1	5606.982	14
47		5	max	0	3	0	2	.023	5	3.027e-4	1	NC	1	NC	1
48			min	0	2	-.004	3	-.001	1	-1.185e-3	5	NC	1	4124.296	14
49		6	max	0	3	0	2	.029	5	3.389e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	-1.198e-3	5	NC	1	3243.955	14
51		7	max	0	3	0	2	.035	4	3.752e-4	1	NC	1	NC	1
52			min	0	2	-.005	3	-.001	1	-1.211e-3	5	NC	1	2663.778	14
53		8	max	0	3	.001	2	.041	4	4.114e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	-1.224e-3	5	NC	1	2254.395	14
55		9	max	0	3	.002	2	.047	4	4.476e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	-1.237e-3	5	NC	1	1951.217	14
57		10	max	0	3	.002	2	.052	4	4.838e-4	1	NC	1	NC	1
58			min	0	2	-.007	3	0	10	-1.25e-3	5	NC	1	1718.426	14
59		11	max	.001	3	.003	2	.058	4	5.2e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	-1.263e-3	5	NC	1	1534.582	14
61		12	max	.001	3	.003	2	.064	4	5.563e-4	1	NC	1	NC	1
62			min	-.001	2	-.008	3	0	12	-1.276e-3	5	NC	1	1386.07	14
63		13	max	.001	3	.004	2	.069	4	5.925e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	12	-1.289e-3	5	NC	1	1263.843	14
65		14	max	.001	3	.005	2	.075	4	6.287e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	12	-1.302e-3	5	9415.819	2	1161.65	14
67		15	max	.002	3	.006	2	.08	4	6.649e-4	1	NC	1	NC	2
68			min	-.001	2	-.009	3	0	12	-1.315e-3	5	7942.04	2	1075.044	14
69		16	max	.002	3	.007	2	.086	4	7.011e-4	1	NC	1	NC	2
70			min	-.001	2	-.009	3	0	12	-1.328e-3	5	6796.151	2	1000.768	14
71		17	max	.002	3	.008	2	.091	4	7.374e-4	1	NC	3	NC	2
72			min	-.001	2	-.009	3	0	12	-1.341e-3	5	5895.903	2	936.388	14
73		18	max	.002	3	.009	2	.097	4	7.736e-4	1	NC	3	NC	2
74			min	-.002	2	-.009	3	0	12	-1.354e-3	5	5182.303	2	880.047	14
75		19	max	.002	3	.01	2	.102	4	8.098e-4	1	NC	3	NC	2
76			min	-.002	2	-.009	3	0	12	-1.366e-3	5	4612.692	2	830.303	14
77	M4	1	max	.002	1	.012	2	0	12	7.088e-3	5	NC	1	NC	3
78			min	0	12	-.01	3	-.108	4	-1.176e-3	1	NC	1	179.483	4
79		2	max	.002	1	.011	2	0	12	7.088e-3	5	NC	1	NC	3
80			min	0	12	-.009	3	-.099	4	-1.176e-3	1	NC	1	195.663	4
81		3	max	.002	1	.01	2	0	12	7.088e-3	5	NC	1	NC	3
82			min	0	12	-.009	3	-.09	4	-1.176e-3	1	NC	1	214.922	4
83		4	max	.002	1	.01	2	0	12	7.088e-3	5	NC	1	NC	3
84			min	0	12	-.008	3	-.081	4	-1.176e-3	1	NC	1	238.07	4
85		5	max	.002	1	.009	2	0	12	7.088e-3	5	NC	1	NC	2
86			min	0	12	-.008	3	-.073	4	-1.176e-3	1	NC	1	266.213	4
87		6	max	.002	1	.008	2	0	12	7.088e-3	5	NC	1	NC	2
88			min	0	12	-.007	3	-.064	4	-1.176e-3	1	NC	1	300.887	4
89		7	max	.001	1	.008	2	0	12	7.088e-3	5	NC	1	NC	2
90			min	0	12	-.006	3	-.056	4	-1.176e-3	1	NC	1	344.279	4
91		8	max	.001	1	.007	2	0	12	7.088e-3	5	NC	1	NC	2
92			min	0	12	-.006	3	-.048	4	-1.176e-3	1	NC	1	399.595	4
93		9	max	.001	1	.006	2	0	12	7.088e-3	5	NC	1	NC	2
94			min	0	12	-.005	3	-.041	4	-1.176e-3	1	NC	1	471.68	4
95		10	max	.001	1	.006	2	0	12	7.088e-3	5	NC	1	NC	2
96			min	0	12	-.005	3	-.034	4	-1.176e-3	1	NC	1	568.152	4
97		11	max	0	1	.005	2	0	12	7.088e-3	5	NC	1	NC	1
98			min	0	12	-.004	3	-.028	4	-1.176e-3	1	NC	1	701.558	4
99		12	max	0	1	.005	2	0	12	7.088e-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	12	-.004	3	-.022	4	-1.176e-3	1	NC	1	893.786	4
101		13	max	0	1	.004	2	0	12	7.088e-3	5	NC	1	NC	1
102			min	0	12	-.003	3	-.016	4	-1.176e-3	1	NC	1	1185.889	4
103		14	max	0	1	.003	2	0	12	7.088e-3	5	NC	1	NC	1
104			min	0	12	-.003	3	-.012	4	-1.176e-3	1	NC	1	1662.55	4
105		15	max	0	1	.003	2	0	12	7.088e-3	5	NC	1	NC	1
106			min	0	12	-.002	3	-.008	4	-1.176e-3	1	NC	1	2522.722	4
107		16	max	0	1	.002	2	0	12	7.088e-3	5	NC	1	NC	1
108			min	0	12	-.002	3	-.004	4	-1.176e-3	1	NC	1	4331.991	4
109		17	max	0	1	.001	2	0	12	7.088e-3	5	NC	1	NC	1
110			min	0	12	-.001	3	-.002	4	-1.176e-3	1	NC	1	9286.984	4
111		18	max	0	1	0	2	0	12	7.088e-3	5	NC	1	NC	1
112			min	0	12	0	3	0	4	-1.176e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	7.088e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.176e-3	1	NC	1	NC	1
115	M6	1	max	.01	1	.033	2	.005	1	2.151e-3	4	NC	3	NC	2
116			min	-.011	3	-.029	3	-.019	5	1.974e-6	10	1204.578	2	7644.399	1
117		2	max	.009	1	.031	2	.005	1	2.171e-3	4	NC	3	NC	2
118			min	-.011	3	-.027	3	-.019	5	1.054e-6	10	1288.503	2	8310.695	1
119		3	max	.009	1	.028	2	.004	1	2.192e-3	4	NC	3	NC	2
120			min	-.01	3	-.026	3	-.018	5	1.33e-7	10	1384.612	2	9099.158	1
121		4	max	.008	1	.026	2	.004	1	2.212e-3	4	NC	3	NC	1
122			min	-.009	3	-.024	3	-.018	5	-1.471e-6	2	1495.34	2	NC	1
123		5	max	.008	1	.024	2	.004	1	2.233e-3	4	NC	3	NC	1
124			min	-.009	3	-.023	3	-.017	5	-5.213e-6	2	1623.823	2	NC	1
125		6	max	.007	1	.022	2	.003	1	2.254e-3	4	NC	3	NC	1
126			min	-.008	3	-.021	3	-.016	5	-8.954e-6	2	1774.166	2	NC	1
127		7	max	.007	1	.02	2	.003	1	2.274e-3	4	NC	3	NC	1
128			min	-.008	3	-.02	3	-.016	5	-1.27e-5	2	1951.847	2	NC	1
129		8	max	.006	1	.018	2	.002	1	2.295e-3	4	NC	3	NC	1
130			min	-.007	3	-.018	3	-.015	5	-1.644e-5	2	2164.338	2	NC	1
131		9	max	.006	1	.016	2	.002	1	2.315e-3	4	NC	3	NC	1
132			min	-.006	3	-.016	3	-.014	5	-2.018e-5	2	2422.099	2	NC	1
133		10	max	.005	1	.014	2	.002	1	2.336e-3	4	NC	3	NC	1
134			min	-.006	3	-.015	3	-.013	5	-2.392e-5	2	2740.237	2	NC	1
135		11	max	.004	1	.013	2	.001	1	2.357e-3	4	NC	3	NC	1
136			min	-.005	3	-.013	3	-.012	5	-2.766e-5	2	3141.407	2	NC	1
137		12	max	.004	1	.011	2	.001	1	2.377e-3	4	NC	3	NC	1
138			min	-.004	3	-.012	3	-.011	5	-3.14e-5	2	3661.198	2	NC	1
139		13	max	.003	1	.009	2	0	1	2.398e-3	4	NC	3	NC	1
140			min	-.004	3	-.01	3	-.009	5	-3.515e-5	2	4358.911	2	NC	1
141		14	max	.003	1	.007	2	0	1	2.418e-3	4	NC	3	NC	1
142			min	-.003	3	-.008	3	-.008	5	-3.889e-5	2	5341.257	2	NC	1
143		15	max	.002	1	.006	2	0	1	2.439e-3	4	NC	3	NC	1
144			min	-.003	3	-.007	3	-.007	5	-4.263e-5	2	6821.61	2	NC	1
145		16	max	.002	1	.004	2	0	1	2.46e-3	4	NC	1	NC	1
146			min	-.002	3	-.005	3	-.005	5	-4.637e-5	2	9297.773	2	NC	1
147		17	max	.001	1	.003	2	0	1	2.48e-3	4	NC	1	NC	1
148			min	-.001	3	-.003	3	-.003	5	-5.011e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	2.502e-3	5	NC	1	NC	1
150			min	0	3	-.002	3	-.002	5	-5.385e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.525e-3	5	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.759e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.692e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.191e-3	5	NC	1	NC	1
155		2	max	0	3	.002	2	.006	5	2.248e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-1.186e-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	.012	5	2.119e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	2	-1.184e-3	4	NC	1	NC	1
159		4	max	.001	3	.004	2	.018	5	2.161e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	2	-1.182e-3	4	NC	1	NC	1
161		5	max	.001	3	.006	2	.024	5	2.203e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	2	-1.179e-3	4	7970.879	2	NC	1
163		6	max	.002	3	.007	2	.03	5	2.246e-5	1	NC	3	NC	1
164			min	-.002	2	-.009	3	0	2	-1.177e-3	4	6391.958	2	NC	1
165		7	max	.002	3	.009	2	.036	5	3.241e-5	3	NC	3	NC	1
166			min	-.002	2	-.011	3	0	1	-1.174e-3	4	5314.15	2	NC	1
167		8	max	.002	3	.01	2	.042	5	4.693e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-1.172e-3	4	4525.316	2	NC	1
169		9	max	.003	3	.012	2	.048	5	6.145e-5	3	NC	3	NC	1
170			min	-.003	2	-.014	3	-.001	1	-1.169e-3	4	3919.725	2	NC	1
171		10	max	.003	3	.013	2	.054	5	7.598e-5	3	NC	3	NC	1
172			min	-.004	2	-.016	3	-.001	1	-1.167e-3	4	3438.772	2	NC	1
173		11	max	.003	3	.015	2	.06	4	9.05e-5	3	NC	3	NC	1
174			min	-.004	2	-.017	3	-.001	1	-1.164e-3	4	3047.288	2	NC	1
175		12	max	.004	3	.017	2	.065	4	1.05e-4	3	NC	3	NC	1
176			min	-.004	2	-.018	3	-.002	1	-1.162e-3	4	2722.793	2	NC	1
177		13	max	.004	3	.019	2	.071	4	1.195e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	-.002	1	-1.159e-3	4	2450.16	2	NC	1
179		14	max	.004	3	.021	2	.076	4	1.341e-4	3	NC	3	NC	1
180			min	-.005	2	-.021	3	-.002	1	-1.157e-3	4	2218.754	2	NC	1
181		15	max	.005	3	.023	2	.081	4	1.486e-4	3	NC	3	NC	1
182			min	-.006	2	-.022	3	-.002	1	-1.155e-3	4	2020.822	2	NC	1
183		16	max	.005	3	.025	2	.087	4	1.631e-4	3	NC	3	NC	1
184			min	-.006	2	-.023	3	-.002	1	-1.152e-3	4	1850.536	2	NC	1
185		17	max	.005	3	.027	2	.092	4	1.776e-4	3	NC	3	NC	1
186			min	-.006	2	-.023	3	-.002	1	-1.15e-3	4	1703.408	2	NC	1
187		18	max	.006	3	.029	2	.097	4	1.922e-4	3	NC	3	NC	1
188			min	-.007	2	-.024	3	-.003	1	-1.147e-3	4	1575.906	2	NC	1
189		19	max	.006	3	.031	2	.102	4	2.067e-4	3	NC	3	NC	1
190			min	-.007	2	-.025	3	-.003	1	-1.145e-3	4	1465.215	2	NC	1
191	M8	1	max	.006	1	.037	2	.003	1	6.882e-3	4	NC	1	NC	2
192			min	0	3	-.028	3	-.108	4	-2.085e-4	1	NC	1	179.676	4
193		2	max	.006	1	.035	2	.003	1	6.882e-3	4	NC	1	NC	2
194			min	0	3	-.027	3	-.099	4	-2.085e-4	1	NC	1	195.873	4
195		3	max	.005	1	.033	2	.002	1	6.882e-3	4	NC	1	NC	2
196			min	0	3	-.025	3	-.09	4	-2.085e-4	1	NC	1	215.152	4
197		4	max	.005	1	.031	2	.002	1	6.882e-3	4	NC	1	NC	2
198			min	0	3	-.024	3	-.081	4	-2.085e-4	1	NC	1	238.324	4
199		5	max	.005	1	.029	2	.002	1	6.882e-3	4	NC	1	NC	2
200			min	0	3	-.022	3	-.073	4	-2.085e-4	1	NC	1	266.497	4
201		6	max	.004	1	.027	2	.002	1	6.882e-3	4	NC	1	NC	1
202			min	0	3	-.02	3	-.064	4	-2.085e-4	1	NC	1	301.206	4
203		7	max	.004	1	.025	2	.002	1	6.882e-3	4	NC	1	NC	1
204			min	0	3	-.019	3	-.056	4	-2.085e-4	1	NC	1	344.644	4
205		8	max	.004	1	.023	2	.001	1	6.882e-3	4	NC	1	NC	1
206			min	0	3	-.017	3	-.048	4	-2.085e-4	1	NC	1	400.017	4
207		9	max	.003	1	.021	2	.001	1	6.882e-3	4	NC	1	NC	1
208			min	0	3	-.016	3	-.041	4	-2.085e-4	1	NC	1	472.176	4
209		10	max	.003	1	.019	2	0	1	6.882e-3	4	NC	1	NC	1
210			min	0	3	-.014	3	-.034	4	-2.085e-4	1	NC	1	568.749	4
211		11	max	.003	1	.017	2	0	1	6.882e-3	4	NC	1	NC	1
212			min	0	3	-.013	3	-.028	4	-2.085e-4	1	NC	1	702.294	4
213		12	max	.002	1	.015	2	0	1	6.882e-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	-.011	3	-.022	4	-2.085e-4	1	NC	1	894.721	4
215		13	max	.002	1	.012	2	0	1	6.882e-3	4	NC	1	NC	1
216			min	0	3	-.009	3	-.016	4	-2.085e-4	1	NC	1	1187.126	4
217		14	max	.002	1	.01	2	0	1	6.882e-3	4	NC	1	NC	1
218			min	0	3	-.008	3	-.012	4	-2.085e-4	1	NC	1	1664.281	4
219		15	max	.001	1	.008	2	0	1	6.882e-3	4	NC	1	NC	1
220			min	0	3	-.006	3	-.008	4	-2.085e-4	1	NC	1	2525.342	4
221		16	max	0	1	.006	2	0	1	6.882e-3	4	NC	1	NC	1
222			min	0	3	-.005	3	-.004	4	-2.085e-4	1	NC	1	4336.478	4
223		17	max	0	1	.004	2	0	1	6.882e-3	4	NC	1	NC	1
224			min	0	3	-.003	3	-.002	4	-2.085e-4	1	NC	1	9296.575	4
225		18	max	0	1	.002	2	0	1	6.882e-3	4	NC	1	NC	1
226			min	0	3	-.002	3	0	4	-2.085e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	6.882e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.085e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.01	2	0	3	1.231e-3	1	NC	3	NC	1
230			min	-.003	3	-.01	3	-.009	4	-2.538e-4	3	3953.986	2	NC	1
231		2	max	.003	1	.009	2	0	3	1.167e-3	1	NC	3	NC	1
232			min	-.003	3	-.009	3	-.009	4	-2.459e-4	3	4306.163	2	NC	1
233		3	max	.003	1	.008	2	0	3	1.102e-3	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.009	4	-2.381e-4	3	4723.252	2	NC	1
235		4	max	.003	1	.008	2	0	3	1.037e-3	1	NC	3	NC	1
236			min	-.003	3	-.009	3	-.009	4	-2.302e-4	3	5220.473	2	NC	1
237		5	max	.003	1	.007	2	0	3	9.837e-4	14	NC	1	NC	1
238			min	-.003	3	-.008	3	-.009	4	-2.223e-4	3	5817.972	2	NC	1
239		6	max	.002	1	.006	2	0	3	1.048e-3	4	NC	1	NC	1
240			min	-.002	3	-.008	3	-.009	4	-2.144e-4	3	6542.846	2	NC	1
241		7	max	.002	1	.005	2	0	3	1.119e-3	4	NC	1	NC	1
242			min	-.002	3	-.007	3	-.009	4	-2.066e-4	3	7432.214	2	NC	1
243		8	max	.002	1	.005	2	0	3	1.191e-3	4	NC	1	NC	1
244			min	-.002	3	-.007	3	-.009	4	-1.987e-4	3	8538.032	2	NC	1
245		9	max	.002	1	.004	2	0	3	1.262e-3	4	NC	1	NC	1
246			min	-.002	3	-.006	3	-.008	4	-1.908e-4	3	9934.883	2	NC	1
247		10	max	.002	1	.003	2	0	3	1.333e-3	4	NC	1	NC	1
248			min	-.002	3	-.006	3	-.008	4	-1.83e-4	3	NC	1	NC	1
249		11	max	.001	1	.003	2	0	3	1.404e-3	4	NC	1	NC	1
250			min	-.001	3	-.005	3	-.008	4	-1.751e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.475e-3	4	NC	1	NC	1
252			min	-.001	3	-.005	3	-.007	4	-1.672e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	1.547e-3	4	NC	1	NC	1
254			min	-.001	3	-.004	3	-.006	4	-1.594e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.618e-3	4	NC	1	NC	1
256			min	0	3	-.004	3	-.006	4	-1.515e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	1.689e-3	4	NC	1	NC	1
258			min	0	3	-.003	3	-.005	4	-1.436e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.76e-3	4	NC	1	NC	1
260			min	0	3	-.002	3	-.004	4	-1.358e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.831e-3	4	NC	1	NC	1
262			min	0	3	-.002	3	-.003	4	-1.279e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.903e-3	4	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-1.2e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.974e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.122e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	5.286e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-9.319e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.005	4	3.588e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.042e-3	4	NC	1	9840.551	5

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.01	4	1.889e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.152e-3	4	NC	1	4873.791	5
273		4	max	0	3	0	2	.014	4	1.906e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.262e-3	4	NC	1	3223.658	5
275		5	max	0	3	0	2	.019	4	-1.023e-5	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	1	-1.372e-3	4	NC	1	2402.136	5
277		6	max	0	3	0	2	.024	5	-2.103e-5	12	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-1.482e-3	4	NC	1	1911.666	5
279		7	max	0	3	0	2	.029	5	-3.182e-5	12	NC	1	NC	1
280			min	0	2	-.005	3	-.003	1	-1.592e-3	4	NC	1	1586.423	5
281		8	max	0	3	.001	2	.034	5	-4.261e-5	12	NC	1	NC	1
282			min	0	2	-.006	3	-.004	1	-1.701e-3	4	NC	1	1355.357	5
283		9	max	0	3	.002	2	.039	5	-5.328e-5	10	NC	1	NC	2
284			min	0	2	-.007	3	-.005	1	-1.811e-3	4	NC	1	1182.955	5
285		10	max	0	3	.002	2	.044	5	-5.907e-5	10	NC	1	NC	2
286			min	0	2	-.007	3	-.006	1	-1.921e-3	4	NC	1	1049.494	5
287		11	max	.001	3	.003	2	.049	5	-6.485e-5	10	NC	1	NC	2
288			min	0	2	-.008	3	-.007	1	-2.031e-3	4	NC	1	943.145	5
289		12	max	.001	3	.003	2	.054	5	-7.064e-5	10	NC	1	NC	2
290			min	-.001	2	-.008	3	-.009	1	-2.141e-3	4	NC	1	856.385	5
291		13	max	.001	3	.004	2	.059	5	-7.642e-5	10	NC	1	NC	2
292			min	-.001	2	-.008	3	-.01	1	-2.251e-3	4	NC	1	784.197	5
293		14	max	.001	3	.005	2	.064	5	-8.221e-5	10	NC	1	NC	2
294			min	-.001	2	-.008	3	-.011	1	-2.361e-3	4	9426.766	2	723.113	5
295		15	max	.002	3	.006	2	.069	5	-8.799e-5	10	NC	1	NC	3
296			min	-.001	2	-.009	3	-.013	1	-2.471e-3	4	7950.496	2	670.653	5
297		16	max	.002	3	.007	2	.074	5	-9.378e-5	10	NC	1	NC	3
298			min	-.001	2	-.009	3	-.014	1	-2.581e-3	4	6802.835	2	625.001	5
299		17	max	.002	3	.008	2	.079	5	-9.957e-5	10	NC	3	NC	3
300			min	-.001	2	-.009	3	-.016	1	-2.691e-3	4	5901.306	2	584.797	5
301		18	max	.002	3	.009	2	.084	5	-1.054e-4	10	NC	3	NC	3
302			min	-.002	2	-.009	3	-.017	1	-2.801e-3	4	5186.766	2	549	5
303		19	max	.002	3	.01	2	.089	5	-1.111e-4	10	NC	3	NC	3
304			min	-.002	2	-.009	3	-.018	1	-2.911e-3	4	4616.457	2	516.807	5
305	M12	1	max	.002	1	.012	2	.015	1	8.499e-3	4	NC	1	NC	3
306			min	0	12	-.01	3	-.098	5	1.091e-4	10	NC	1	196.542	5
307		2	max	.002	1	.011	2	.014	1	8.499e-3	4	NC	1	NC	3
308			min	0	12	-.009	3	-.09	5	1.091e-4	10	NC	1	214.256	5
309		3	max	.002	1	.01	2	.013	1	8.499e-3	4	NC	1	NC	3
310			min	0	12	-.009	3	-.082	5	1.091e-4	10	NC	1	235.339	5
311		4	max	.002	1	.01	2	.011	1	8.499e-3	4	NC	1	NC	3
312			min	0	12	-.008	3	-.074	5	1.091e-4	10	NC	1	260.681	5
313		5	max	.002	1	.009	2	.01	1	8.499e-3	4	NC	1	NC	3
314			min	0	12	-.008	3	-.066	5	1.091e-4	10	NC	1	291.49	5
315		6	max	.002	1	.008	2	.009	1	8.499e-3	4	NC	1	NC	3
316			min	0	12	-.007	3	-.059	5	1.091e-4	10	NC	1	329.448	5
317		7	max	.001	1	.008	2	.008	1	8.499e-3	4	NC	1	NC	3
318			min	0	12	-.007	3	-.051	5	1.091e-4	10	NC	1	376.951	5
319		8	max	.001	1	.007	2	.007	1	8.499e-3	4	NC	1	NC	3
320			min	0	12	-.006	3	-.044	5	1.091e-4	10	NC	1	437.505	5
321		9	max	.001	1	.006	2	.006	1	8.499e-3	4	NC	1	NC	3
322			min	0	12	-.005	3	-.037	5	1.091e-4	10	NC	1	516.415	5
323		10	max	.001	1	.006	2	.005	1	8.499e-3	4	NC	1	NC	2
324			min	0	12	-.005	3	-.031	5	1.091e-4	10	NC	1	622.02	5
325		11	max	0	1	.005	2	.004	1	8.499e-3	4	NC	1	NC	2
326			min	0	12	-.004	3	-.025	5	1.091e-4	10	NC	1	768.054	5
327		12	max	0	1	.005	2	.003	1	8.499e-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	12	-.004	3	-.02	5	1.091e-4	10	NC	1	978.475	5
329		13	max	0	1	.004	2	.002	1	8.499e-3	4	NC	1	NC	2
330			min	0	12	-.003	3	-.015	5	1.091e-4	10	NC	1	1298.219	5
331		14	max	0	1	.003	2	.002	1	8.499e-3	4	NC	1	NC	1
332			min	0	12	-.003	3	-.011	5	1.091e-4	10	NC	1	1819.978	5
333		15	max	0	1	.003	2	.001	1	8.499e-3	4	NC	1	NC	1
334			min	0	12	-.002	3	-.007	5	1.091e-4	10	NC	1	2761.519	5
335		16	max	0	1	.002	2	0	1	8.499e-3	4	NC	1	NC	1
336			min	0	12	-.002	3	-.004	5	1.091e-4	10	NC	1	4741.907	5
337		17	max	0	1	.001	2	0	1	8.499e-3	4	NC	1	NC	1
338			min	0	12	-.001	3	-.002	5	1.091e-4	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	8.499e-3	4	NC	1	NC	1
340			min	0	12	0	3	0	5	1.091e-4	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	8.499e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	1.091e-4	10	NC	1	NC	1
343	M1	1	max	.009	3	.026	3	.011	5	1.389e-2	1	NC	1	NC	1
344			min	-.009	2	-.025	1	-.006	1	-1.504e-2	3	NC	1	NC	1
345		2	max	.009	3	.015	3	.015	5	6.44e-3	1	NC	4	NC	2
346			min	-.009	2	-.015	2	-.013	1	-7.457e-3	3	4173.375	1	6495.872	1
347		3	max	.009	3	.005	3	.019	5	6.914e-4	5	NC	4	NC	2
348			min	-.009	2	-.004	2	-.018	1	-8.738e-4	1	2153.482	2	3938.948	1
349		4	max	.009	3	.005	1	.024	5	7.088e-4	5	NC	5	NC	3
350			min	-.009	2	-.003	3	-.02	1	-7.473e-4	1	1508.55	2	3259.339	1
351		5	max	.009	3	.012	1	.03	5	7.263e-4	5	NC	5	NC	3
352			min	-.009	2	-.01	3	-.02	1	-6.209e-4	1	1196.507	2	2472.14	5
353		6	max	.009	3	.019	2	.036	5	7.437e-4	5	NC	5	NC	3
354			min	-.009	2	-.016	3	-.019	1	-4.945e-4	1	1018.385	2	1893.416	5
355		7	max	.009	3	.024	2	.042	5	7.611e-4	5	NC	5	NC	2
356			min	-.009	2	-.02	3	-.017	1	-3.681e-4	1	908.728	2	1519.761	5
357		8	max	.009	3	.028	2	.048	5	7.785e-4	5	NC	5	NC	2
358			min	-.009	2	-.023	3	-.014	1	-2.417e-4	1	840.19	2	1261.479	5
359		9	max	.009	3	.03	2	.054	5	7.96e-4	5	NC	5	NC	2
360			min	-.009	2	-.025	3	-.01	1	-1.152e-4	1	799.87	2	1072.005	4
361		10	max	.009	3	.031	2	.061	5	8.134e-4	5	NC	5	NC	1
362			min	-.009	2	-.025	3	-.006	1	-4.657e-6	2	781.633	2	912.551	4
363		11	max	.009	3	.031	2	.068	4	8.584e-4	4	NC	5	NC	1
364			min	-.009	2	-.024	3	-.001	1	1.79e-5	10	783.301	2	793.789	4
365		12	max	.009	3	.028	2	.075	4	9.052e-4	4	NC	5	NC	2
366			min	-.009	2	-.022	3	0	10	2.96e-5	12	805.832	2	703.268	4
367		13	max	.009	3	.025	2	.083	4	9.521e-4	4	NC	5	NC	2
368			min	-.009	2	-.019	3	0	12	3.399e-5	12	853.825	2	633.092	4
369		14	max	.008	3	.019	2	.09	4	9.989e-4	4	NC	5	NC	3
370			min	-.009	2	-.015	3	0	12	3.839e-5	12	937.831	2	578.065	4
371		15	max	.008	3	.012	2	.096	4	1.046e-3	4	NC	5	NC	3
372			min	-.009	2	-.009	3	0	12	4.279e-5	12	1080.945	2	534.67	4
373		16	max	.008	3	.004	1	.102	4	1.453e-3	4	NC	4	NC	3
374			min	-.009	2	-.003	3	0	12	4.588e-5	12	1339.477	2	500.474	4
375		17	max	.008	3	.005	3	.108	4	1.045e-2	4	NC	4	NC	2
376			min	-.009	2	-.007	2	0	12	-1.059e-4	1	1892.241	2	473.809	4
377		18	max	.008	3	.013	3	.112	4	8.252e-3	2	NC	4	NC	2
378			min	-.009	2	-.019	2	0	10	-3.526e-3	3	3655.521	2	453.452	4
379		19	max	.008	3	.022	3	.115	4	1.672e-2	2	NC	1	NC	1
380			min	-.009	2	-.032	2	-.004	1	-7.146e-3	3	NC	1	439.107	4
381	M5	1	max	.025	3	.077	3	.01	5	7.616e-6	4	NC	1	NC	1
382			min	-.03	2	-.079	1	-.007	1	5.612e-8	10	NC	1	NC	1
383		2	max	.025	3	.046	3	.015	5	3.516e-4	5	NC	5	NC	1
384			min	-.03	2	-.046	1	-.006	1	-6.592e-5	1	1389.906	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	.025	3	.017	3	.02	5	6.9e-4	5	NC	5	NC	1
386			min	-.03	2	-.014	1	-.005	1	-1.315e-4	1	714.589	1	NC	1
387		4	max	.025	3	.012	1	.025	5	7.189e-4	5	NC	5	NC	1
388			min	-.03	2	-.008	3	-.004	1	-1.245e-4	1	502.994	1	NC	1
389		5	max	.025	3	.036	1	.031	5	7.478e-4	5	NC	5	NC	1
390			min	-.03	2	-.028	3	-.004	1	-1.176e-4	1	401.076	1	NC	1
391		6	max	.025	3	.055	1	.037	5	7.766e-4	5	NC	15	NC	1
392			min	-.03	2	-.044	3	-.003	1	-1.107e-4	1	343.241	1	NC	1
393		7	max	.025	3	.07	2	.044	5	8.055e-4	5	NC	15	NC	1
394			min	-.03	2	-.057	3	-.003	1	-1.038e-4	1	306.701	2	NC	1
395		8	max	.025	3	.081	2	.051	5	8.344e-4	5	NC	15	NC	1
396			min	-.03	2	-.065	3	-.003	1	-9.687e-5	1	283.053	2	NC	1
397		9	max	.025	3	.089	2	.058	5	8.633e-4	5	NC	15	NC	1
398			min	-.03	2	-.07	3	-.003	1	-8.996e-5	1	269.014	2	NC	1
399		10	max	.025	3	.092	2	.064	5	8.922e-4	5	NC	15	NC	1
400			min	-.03	2	-.071	3	-.002	1	-8.304e-5	1	262.472	2	NC	1
401		11	max	.025	3	.09	2	.071	5	9.211e-4	5	NC	15	NC	1
402			min	-.03	2	-.069	3	-.002	1	-7.612e-5	1	262.663	2	NC	1
403		12	max	.025	3	.084	2	.078	5	9.5e-4	5	NC	15	NC	1
404			min	-.03	2	-.063	3	-.002	1	-6.921e-5	1	269.885	2	NC	1
405		13	max	.025	3	.073	2	.085	5	9.789e-4	5	NC	15	NC	1
406			min	-.03	2	-.054	3	-.002	1	-6.229e-5	1	285.668	2	NC	1
407		14	max	.025	3	.058	2	.091	5	1.008e-3	5	NC	15	NC	1
408			min	-.03	2	-.042	3	-.002	1	-5.538e-5	1	313.547	2	9398.595	4
409		15	max	.025	3	.037	2	.097	4	1.037e-3	5	NC	5	NC	1
410			min	-.03	2	-.026	3	-.003	1	-4.915e-5	2	361.303	2	9280.619	4
411		16	max	.024	3	.011	1	.102	4	1.425e-3	5	NC	5	NC	1
412			min	-.03	2	-.008	3	-.003	1	-5.153e-5	1	448.013	2	NC	1
413		17	max	.024	3	.014	3	.107	4	1.042e-2	4	NC	5	NC	1
414			min	-.03	2	-.022	2	-.003	1	-2.924e-4	1	635.21	2	NC	1
415		18	max	.024	3	.037	3	.112	4	5.346e-3	4	NC	5	NC	1
416			min	-.03	2	-.059	2	-.003	1	-1.499e-4	1	1233.563	2	NC	1
417		19	max	.024	3	.061	3	.116	4	2.078e-6	5	NC	1	NC	1
418			min	-.03	2	-.098	2	-.003	1	-2.297e-7	3	NC	1	NC	1
419	M9	1	max	.009	3	.026	3	.008	5	1.504e-2	3	NC	1	NC	1
420			min	-.009	2	-.026	1	-.008	1	-1.389e-2	1	NC	1	NC	1
421		2	max	.009	3	.015	3	.008	5	7.44e-3	3	NC	4	NC	2
422			min	-.009	2	-.015	1	-.002	1	-6.733e-3	1	4174.218	1	7608.705	1
423		3	max	.009	3	.005	3	.009	4	2.907e-4	1	NC	4	NC	2
424			min	-.009	2	-.004	2	0	3	-2.353e-5	3	2154.327	2	4734.305	1
425		4	max	.009	3	.005	1	.011	4	1.834e-4	1	NC	4	NC	3
426			min	-.009	2	-.003	3	0	3	-3.153e-5	3	1509.154	2	4020.604	1
427		5	max	.009	3	.012	2	.014	4	8.681e-5	4	NC	5	NC	3
428			min	-.009	2	-.01	3	-.001	3	-3.953e-5	3	1196.984	2	3997.459	1
429		6	max	.009	3	.019	2	.018	4	8.42e-5	5	NC	5	NC	3
430			min	-.009	2	-.016	3	-.002	3	-4.753e-5	3	1018.784	2	3869.124	14
431		7	max	.009	3	.024	2	.022	4	1.036e-4	5	NC	5	NC	2
432			min	-.009	2	-.02	3	-.002	3	-1.386e-4	1	909.078	2	2942.615	4
433		8	max	.009	3	.028	2	.027	4	1.231e-4	5	NC	5	NC	2
434			min	-.009	2	-.023	3	-.003	3	-2.459e-4	1	840.506	2	2233.174	4
435		9	max	.009	3	.03	2	.033	5	1.425e-4	5	NC	5	NC	1
436			min	-.009	2	-.025	3	-.005	1	-3.532e-4	1	800.163	2	1757.8	4
437		10	max	.009	3	.031	2	.04	5	1.619e-4	5	NC	5	NC	1
438			min	-.009	2	-.025	3	-.008	1	-4.605e-4	1	781.912	2	1423.784	4
439		11	max	.009	3	.03	2	.047	5	1.814e-4	5	NC	5	NC	2
440			min	-.009	2	-.024	3	-.012	1	-5.679e-4	1	783.573	2	1180.063	4
441		12	max	.009	3	.028	2	.055	5	2.008e-4	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	-.009	2	-.022	3	-.015	1	-6.752e-4	1	806.105	2	996.687	4
443		13	max	.009	3	.025	2	.064	5	2.203e-4	5	NC	5	NC	2
444			min	-.009	2	-.019	3	-.018	1	-7.825e-4	1	854.106	2	850.092	5
445		14	max	.009	3	.019	2	.072	5	2.397e-4	5	NC	5	NC	3
446			min	-.009	2	-.015	3	-.019	1	-8.898e-4	1	938.129	2	736.268	5
447		15	max	.008	3	.012	2	.081	5	2.591e-4	5	NC	5	NC	3
448			min	-.009	2	-.009	3	-.019	1	-9.972e-4	1	1081.276	2	648.028	5
449		16	max	.008	3	.004	1	.089	5	6.718e-4	5	NC	5	NC	3
450			min	-.009	2	-.003	3	-.018	1	-1.074e-3	1	1339.869	2	578.337	5
451		17	max	.008	3	.005	3	.098	5	1.046e-2	4	NC	4	NC	2
452			min	-.009	2	-.007	2	-.015	1	-4.318e-4	1	1892.756	2	520.519	4
453		18	max	.008	3	.013	3	.107	5	5.053e-3	5	NC	4	NC	2
454			min	-.009	2	-.019	2	-.01	1	-8.377e-3	2	3656.478	2	469.728	4
455		19	max	.008	3	.022	3	.116	4	7.145e-3	3	NC	1	NC	1
456			min	-.009	2	-.032	2	-.002	1	-1.672e-2	2	NC	1	427.048	4
457	M13	1	max	.008	1	.026	3	.009	3	4.097e-3	3	NC	1	NC	1
458			min	-.008	5	-.026	1	-.009	2	-4.22e-3	1	NC	1	NC	1
459		2	max	.008	1	.181	3	.054	1	4.947e-3	3	NC	5	NC	3
460			min	-.009	5	-.169	1	0	5	-5.14e-3	1	1239.457	3	3273.687	1
461		3	max	.008	1	.308	3	.135	1	5.798e-3	3	NC	5	NC	3
462			min	-.009	5	-.286	1	0	5	-6.059e-3	1	681.453	3	1372.085	1
463		4	max	.008	1	.388	3	.204	1	6.648e-3	3	NC	5	NC	3
464			min	-.009	5	-.36	1	-.002	5	-6.979e-3	1	530.958	3	920.455	1
465		5	max	.007	1	.411	3	.237	1	7.499e-3	3	NC	5	NC	3
466			min	-.009	5	-.383	1	-.005	5	-7.898e-3	1	498.008	3	793.099	1
467		6	max	.007	1	.381	3	.226	1	8.349e-3	3	NC	5	NC	3
468			min	-.009	5	-.355	1	-.009	5	-8.818e-3	1	541.528	3	832.609	1
469		7	max	.007	1	.306	3	.172	1	9.199e-3	3	NC	5	NC	3
470			min	-.01	5	-.287	1	-.012	5	-9.737e-3	1	686.558	3	1084.581	1
471		8	max	.007	1	.208	3	.092	1	1.005e-2	3	NC	5	NC	3
472			min	-.01	5	-.198	1	-.014	5	-1.066e-2	1	1055.998	3	1979.675	1
473		9	max	.007	1	.118	3	.024	3	1.09e-2	3	NC	4	NC	1
474			min	-.01	5	-.116	1	-.015	2	-1.158e-2	1	2087.325	3	NC	1
475		10	max	.007	1	.077	3	.025	3	1.175e-2	3	NC	4	NC	1
476			min	-.01	5	-.079	1	-.03	2	-1.25e-2	1	3607.5	1	9140.427	2
477		11	max	.007	1	.118	3	.03	3	1.09e-2	3	NC	4	NC	2
478			min	-.01	5	-.116	1	-.014	2	-1.158e-2	1	2087.323	3	8007.204	1
479		12	max	.007	1	.208	3	.1	1	1.005e-2	3	NC	5	NC	10
480			min	-.01	5	-.198	1	-.003	10	-1.066e-2	1	1055.998	3	1821.371	1
481		13	max	.006	1	.306	3	.182	1	9.201e-3	3	NC	5	NC	10
482			min	-.01	5	-.287	1	.007	10	-9.736e-3	1	686.557	3	1026.299	1
483		14	max	.006	1	.381	3	.236	1	8.351e-3	3	NC	5	NC	5
484			min	-.01	5	-.355	1	.012	15	-8.816e-3	1	541.528	3	797.016	1
485		15	max	.006	1	.412	3	.247	1	7.502e-3	3	NC	5	NC	5
486			min	-.01	5	-.383	1	.007	15	-7.896e-3	1	498.008	3	763.375	1
487		16	max	.006	1	.388	3	.211	1	6.652e-3	3	NC	5	NC	5
488			min	-.011	5	-.36	1	0	15	-6.976e-3	1	530.958	3	887.692	1
489		17	max	.006	1	.308	3	.14	1	5.802e-3	3	NC	5	NC	3
490			min	-.011	5	-.286	1	-.006	5	-6.057e-3	1	681.453	3	1321.307	1
491		18	max	.006	1	.181	3	.056	1	4.952e-3	3	NC	5	NC	3
492			min	-.011	5	-.169	1	-.008	5	-5.137e-3	1	1239.457	3	3128.38	1
493		19	max	.006	1	.026	3	.009	3	4.103e-3	3	NC	1	NC	1
494			min	-.011	5	-.025	1	-.009	2	-4.217e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.022	3	.008	3	5.037e-3	2	NC	1	NC	1
496			min	-.116	4	-.032	2	-.009	2	-3.313e-3	3	NC	1	NC	1
497		2	max	.002	1	.095	3	.057	1	6.124e-3	2	NC	5	NC	3
498			min	-.116	4	-.205	2	0	10	-3.969e-3	3	1114.758	2	3057.342	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	.003	1	.156	3	.142	1	7.21e-3	2	NC	5	NC	3
500			min	-.116	4	-.346	2	.009	10	-4.626e-3	3	612.416	2	1305.838	1
501		4	max	.003	1	.195	3	.212	1	8.297e-3	2	NC	5	NC	12
502			min	-.116	4	-.435	2	.015	10	-5.282e-3	3	476.49	2	882.732	1
503		5	max	.003	1	.208	3	.246	1	9.384e-3	2	NC	5	NC	12
504			min	-.116	4	-.463	2	.018	10	-5.938e-3	3	445.849	2	762.658	1
505		6	max	.003	1	.196	3	.235	1	1.047e-2	2	NC	5	NC	12
506			min	-.116	4	-.43	2	.015	10	-6.594e-3	3	482.803	2	799.955	1
507		7	max	.003	1	.164	3	.18	1	1.156e-2	2	NC	5	NC	5
508			min	-.116	4	-.349	2	.007	10	-7.25e-3	3	607.321	2	1036.386	1
509		8	max	.003	1	.12	3	.098	1	1.264e-2	2	NC	5	NC	5
510			min	-.116	4	-.242	2	-.003	10	-7.906e-3	3	918.227	2	1860.942	1
511		9	max	.003	1	.08	3	.028	3	1.373e-2	2	NC	4	NC	2
512			min	-.116	4	-.143	2	-.015	2	-8.562e-3	3	1735.975	2	8664.082	1
513		10	max	.003	1	.061	3	.024	3	1.482e-2	2	NC	4	NC	1
514			min	-.116	4	-.098	2	-.03	2	-9.218e-3	3	2922.754	2	9176.41	2
515		11	max	.003	1	.08	3	.025	3	1.373e-2	2	NC	4	NC	2
516			min	-.116	4	-.143	2	-.014	2	-8.562e-3	3	1735.975	2	9331.17	1
517		12	max	.003	1	.12	3	.095	1	1.265e-2	2	NC	5	NC	3
518			min	-.116	4	-.242	2	-.003	10	-7.905e-3	3	918.227	2	1917.32	1
519		13	max	.004	1	.164	3	.176	1	1.156e-2	2	NC	5	NC	5
520			min	-.116	4	-.349	2	.007	10	-7.248e-3	3	607.321	2	1060.64	1
521		14	max	.004	1	.196	3	.23	1	1.047e-2	2	NC	5	NC	5
522			min	-.116	4	-.43	2	.007	15	-6.591e-3	3	482.803	2	817.254	1
523		15	max	.004	1	.208	3	.241	1	9.385e-3	2	NC	5	NC	5
524			min	-.116	4	-.463	2	.002	15	-5.934e-3	3	445.849	2	779.545	1
525		16	max	.004	1	.195	3	.207	1	8.299e-3	2	NC	5	NC	3
526			min	-.116	4	-.435	2	-.005	5	-5.277e-3	3	476.49	2	904.542	1
527		17	max	.004	1	.156	3	.137	1	7.212e-3	2	NC	5	NC	3
528			min	-.115	4	-.346	2	-.011	5	-4.621e-3	3	612.416	2	1345.556	1
529		18	max	.004	1	.095	3	.055	1	6.125e-3	2	NC	5	NC	3
530			min	-.115	4	-.205	2	-.011	5	-3.964e-3	3	1114.758	2	3190.945	1
531		19	max	.004	1	.022	3	.008	3	5.039e-3	2	NC	1	NC	1
532			min	-.115	4	-.032	2	-.009	2	-3.307e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.76e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.58e-4	5	NC	1	NC	1
535		2	max	0	3	-.001	15	.014	4	8.745e-4	3	NC	5	NC	1
536			min	-.001	5	-.02	1	0	3	-6.89e-4	5	5266.127	1	7393.462	4
537		3	max	0	3	-.002	15	.031	4	1.373e-3	3	NC	5	NC	1
538			min	-.002	5	-.039	1	-.003	3	-1.178e-3	1	2679.753	1	3315.933	4
539		4	max	0	3	-.004	15	.049	4	1.872e-3	3	NC	5	NC	9
540			min	-.003	5	-.057	1	-.007	3	-1.753e-3	1	1838.467	1	2092.018	4
541		5	max	0	3	-.005	15	.067	4	2.37e-3	3	NC	5	NC	9
542			min	-.004	5	-.073	1	-.012	3	-2.328e-3	1	1434.574	1	1545.976	4
543		6	max	0	3	-.005	15	.082	4	2.869e-3	3	NC	15	9775.611	9
544			min	-.005	5	-.087	1	-.017	3	-2.902e-3	1	1207.346	1	1260.083	4
545		7	max	0	3	-.006	15	.094	4	3.367e-3	3	NC	15	7705.91	9
546			min	-.006	5	-.098	1	-.022	3	-3.477e-3	1	1070.698	1	1102.481	4
547		8	max	0	3	-.006	15	.101	4	3.866e-3	3	NC	15	6394.514	9
548			min	-.007	5	-.106	1	-.027	3	-4.052e-3	1	988.689	1	1021.262	4
549		9	max	0	3	-.006	15	.104	4	4.365e-3	3	NC	15	5532.064	9
550			min	-.008	5	-.111	1	-.032	3	-4.626e-3	1	944.546	1	994.783	4
551		10	max	0	3	-.006	15	.102	4	4.863e-3	3	NC	15	4961.795	9
552			min	-.009	5	-.113	1	-.036	3	-5.201e-3	1	930.582	1	1016.554	4
553		11	max	0	3	-.006	15	.095	4	5.362e-3	3	NC	15	4601.101	9
554			min	-.01	5	-.111	1	-.038	3	-5.776e-3	1	944.546	1	1091.335	4
555		12	max	0	3	-.005	15	.083	4	5.86e-3	3	NC	15	4409.352	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	-.011	5	-.107	1	-.039	3	-6.351e-3	1	988.689	1	1237.656	4
557		13	max	0	3	-.004	15	.068	4	6.359e-3	3	NC	15	4375.932	9
558			min	-.012	5	-.099	1	-.038	3	-6.925e-3	1	1070.698	1	1499.433	4
559		14	max	0	3	-.003	15	.052	4	6.857e-3	3	NC	15	4521.536	9
560			min	-.013	5	-.088	1	-.034	3	-7.5e-3	1	1207.346	1	1836.961	3
561		15	max	0	3	-.002	15	.034	4	7.356e-3	3	NC	5	5708.751	15
562			min	-.014	5	-.074	1	-.028	3	-8.075e-3	1	1434.574	1	1994.466	3
563		16	max	.001	3	0	15	.022	1	7.854e-3	3	NC	5	NC	15
564			min	-.015	5	-.059	1	-.019	3	-8.649e-3	1	1838.467	1	2331.413	3
565		17	max	.001	3	.001	15	.009	1	8.353e-3	3	NC	5	NC	4
566			min	-.016	5	-.041	1	-.006	3	-9.224e-3	1	2679.753	1	3091.011	3
567		18	max	.001	3	.004	5	.01	3	8.852e-3	3	NC	5	NC	4
568			min	-.017	5	-.022	1	-.013	2	-9.799e-3	1	5266.127	1	5503.56	3
569		19	max	.001	3	.007	5	.031	3	9.35e-3	3	NC	1	NC	1
570			min	-.018	5	-.003	9	-.034	2	-1.037e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.01	3	3.153e-3	3	NC	1	NC	1
572			min	-.007	4	-.004	4	-.01	2	-3.147e-3	2	NC	1	NC	1
573		2	max	0	10	-.01	12	.006	1	3.02e-3	3	NC	12	NC	2
574			min	-.007	4	-.036	4	-.005	5	-3.004e-3	2	3255.538	4	8629.704	1
575		3	max	0	10	-.02	12	.015	1	2.887e-3	3	5359.505	12	NC	4
576			min	-.006	4	-.067	4	-.016	5	-2.862e-3	2	1656.632	4	4876.88	1
577		4	max	0	10	-.028	12	.022	1	2.754e-3	3	3676.934	12	NC	10
578			min	-.006	4	-.095	4	-.032	5	-2.719e-3	2	1136.546	4	3427.844	5
579		5	max	0	10	-.036	12	.027	1	2.621e-3	3	2869.149	12	NC	14
580			min	-.006	4	-.12	4	-.05	5	-2.576e-3	2	886.859	4	2115.654	5
581		6	max	0	10	-.043	12	.03	1	2.487e-3	3	2414.692	12	9046.021	10
582			min	-.005	4	-.142	4	-.07	5	-2.434e-3	2	746.385	4	1518.979	5
583		7	max	0	10	-.049	12	.031	1	2.354e-3	3	2141.396	12	8896.082	10
584			min	-.005	4	-.16	4	-.087	5	-2.291e-3	2	661.909	4	1202.899	5
585		8	max	0	10	-.053	12	.031	1	2.221e-3	3	1977.377	12	9134.411	10
586			min	-.004	4	-.172	4	-.103	5	-2.148e-3	2	611.211	4	1023.062	5
587		9	max	0	10	-.055	12	.029	1	2.088e-3	3	1889.093	12	9748.114	10
588			min	-.004	4	-.18	4	-.114	5	-2.006e-3	2	583.922	4	920.982	5
589		10	max	0	10	-.056	12	.026	1	1.955e-3	3	1861.164	12	NC	10
590			min	-.004	4	-.183	4	-.12	5	-1.863e-3	2	575.289	4	870.589	5
591		11	max	0	10	-.055	12	.023	1	1.821e-3	3	1889.093	12	NC	10
592			min	-.003	4	-.18	4	-.121	5	-1.72e-3	2	583.922	4	860.92	5
593		12	max	0	10	-.053	12	.019	1	1.688e-3	3	1977.377	12	NC	10
594			min	-.003	4	-.171	4	-.117	5	-1.578e-3	2	611.211	4	890.252	5
595		13	max	0	10	-.049	12	.015	1	1.555e-3	3	2141.396	12	NC	3
596			min	-.002	4	-.158	4	-.108	5	-1.435e-3	2	661.909	4	965.389	5
597		14	max	0	10	-.043	12	.011	1	1.422e-3	3	2414.692	12	NC	2
598			min	-.002	4	-.14	4	-.094	5	-1.292e-3	2	746.385	4	1105.551	5
599		15	max	0	10	-.036	12	.007	1	1.289e-3	3	2869.149	12	NC	1
600			min	-.002	4	-.118	4	-.077	5	-1.15e-3	2	886.859	4	1355.391	5
601		16	max	0	10	-.028	12	.004	1	1.155e-3	3	3676.934	12	NC	1
602			min	-.001	4	-.092	4	-.057	5	-1.007e-3	2	1136.546	4	1826.861	5
603		17	max	0	10	-.019	12	.002	1	1.022e-3	3	5359.505	12	NC	1
604			min	0	4	-.063	4	-.036	5	-8.644e-4	2	1656.632	4	2871.303	5
605		18	max	0	10	-.01	12	0	3	9.983e-4	4	NC	12	NC	1
606			min	0	4	-.032	4	-.017	5	-7.218e-4	2	3255.538	4	6302.671	5
607		19	max	0	1	0	1	0	1	1.078e-3	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.791e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

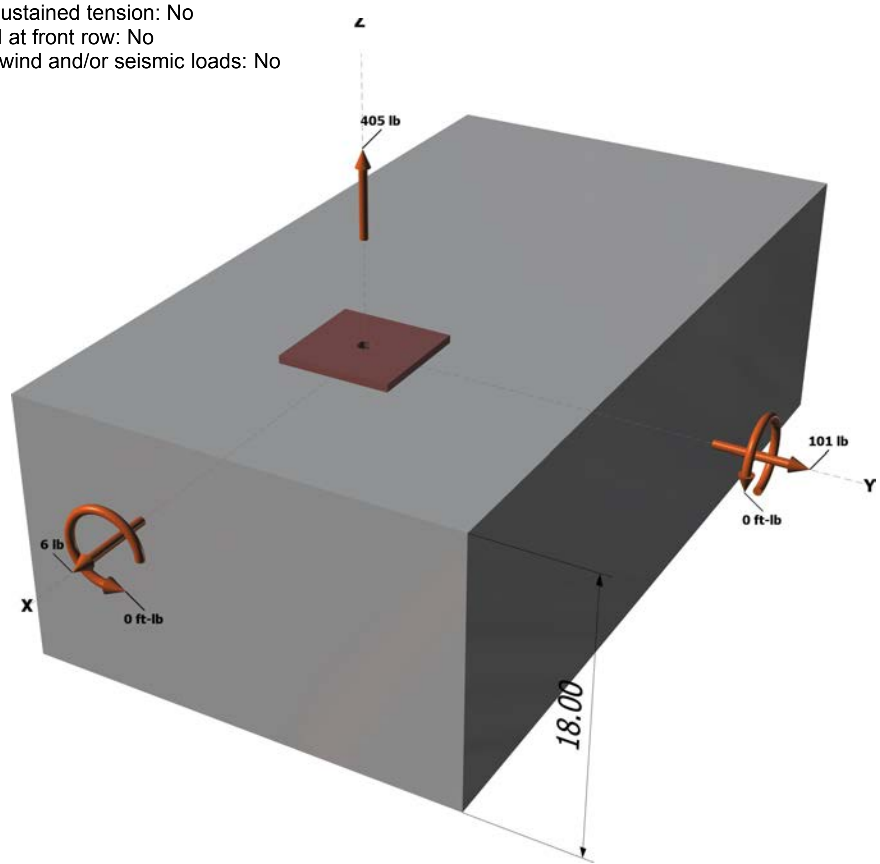
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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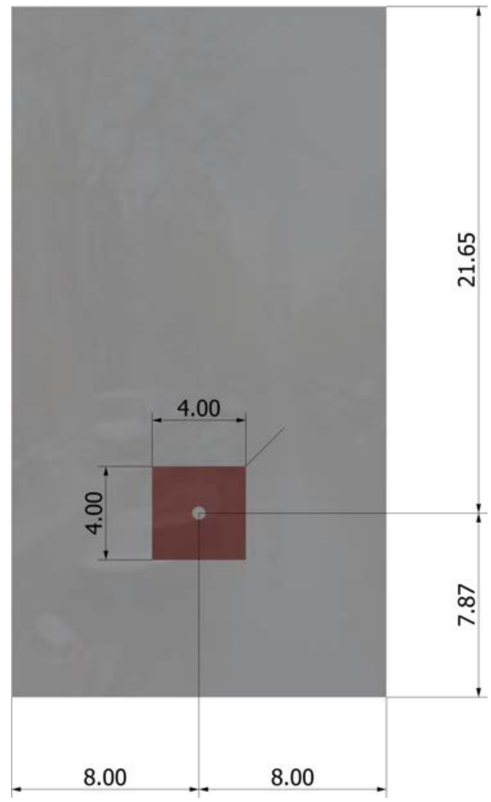


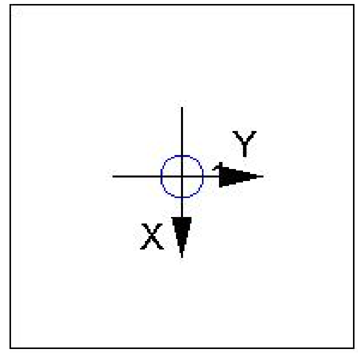
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	109.66	109.66	1.000	1.000	9755	9755

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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.

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

Anchor Designer™ Software
Version 2.4.5673.0

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

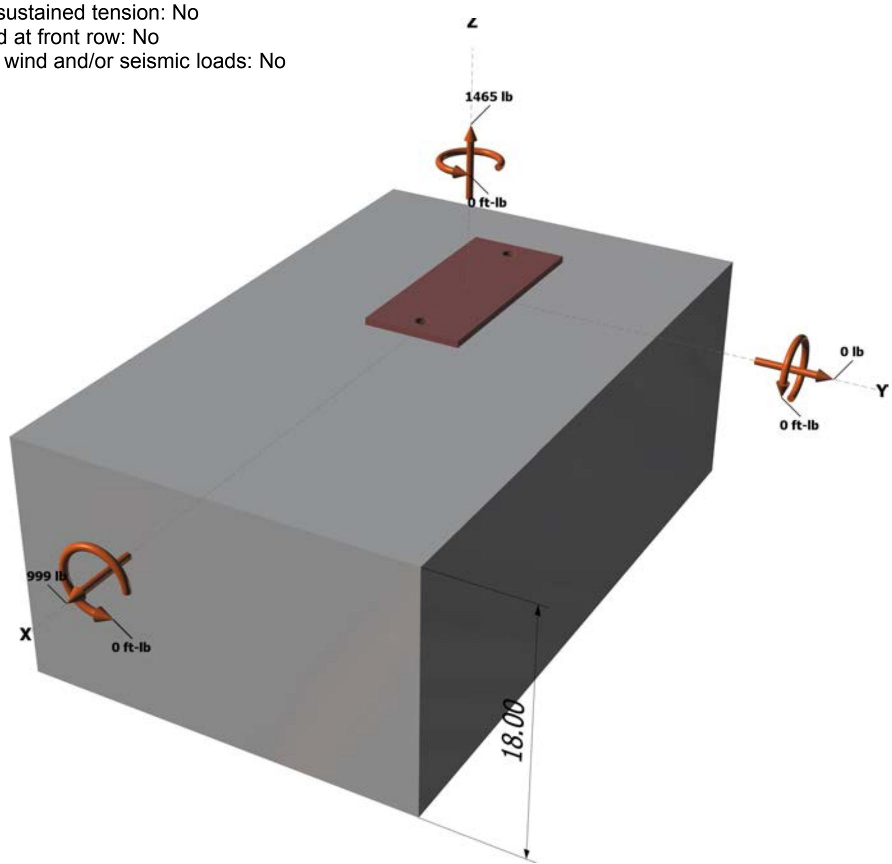
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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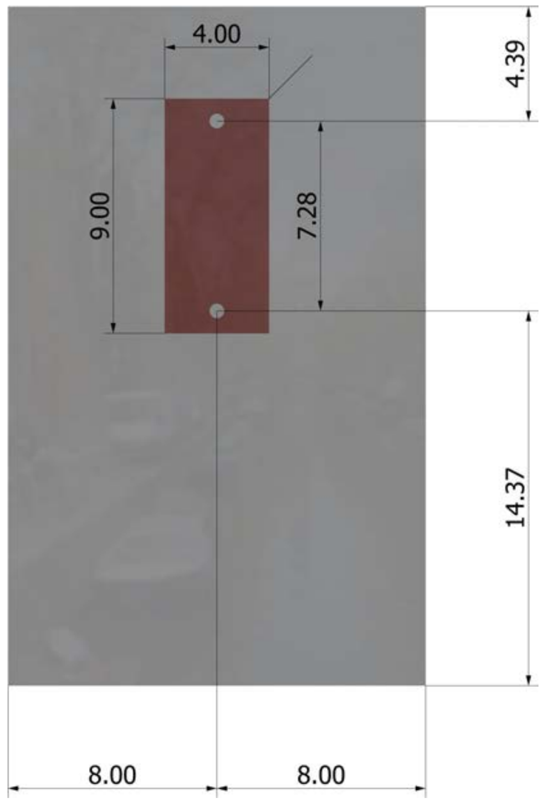


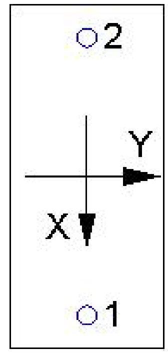
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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