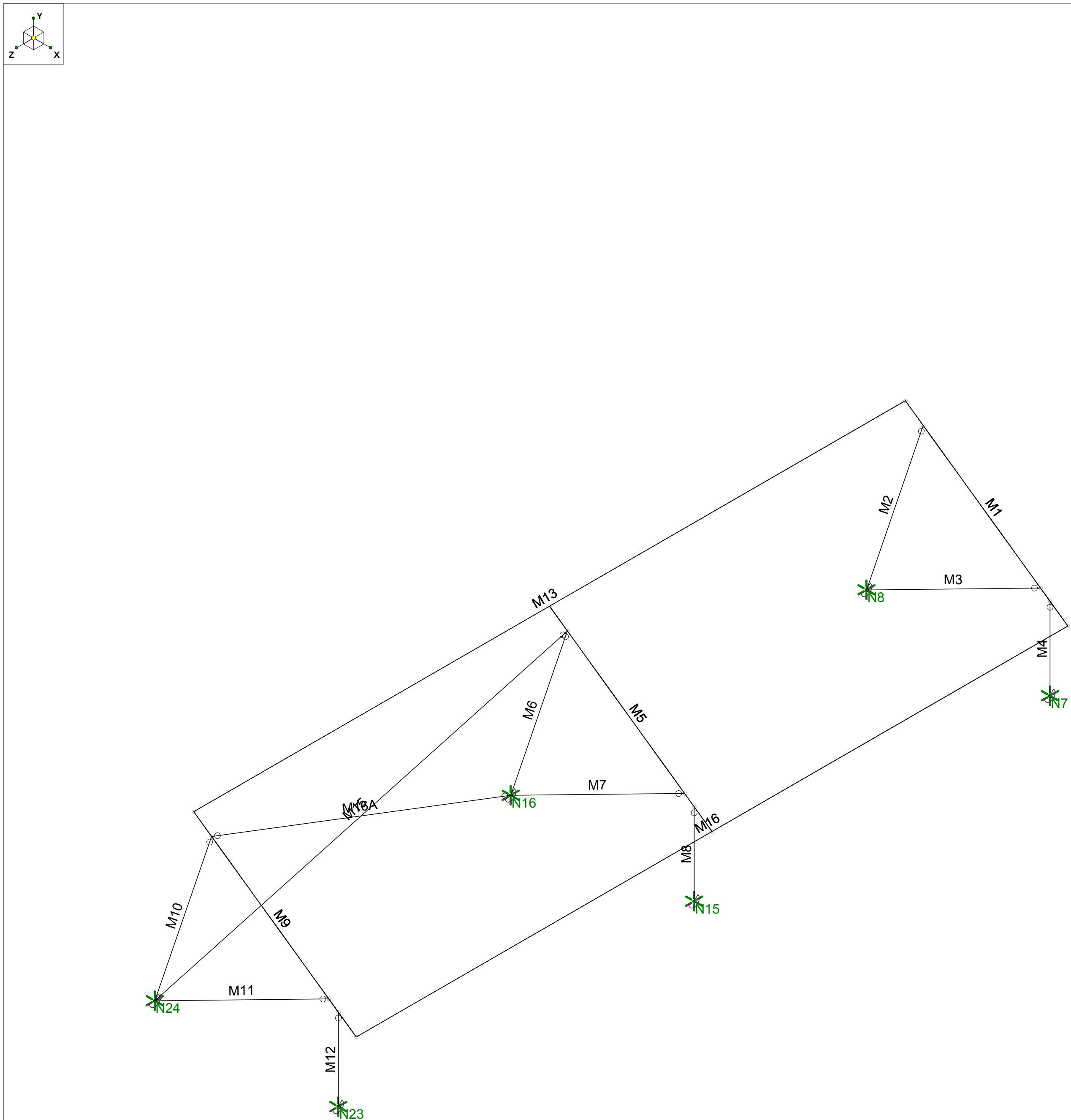


Schletter, Inc.		35° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

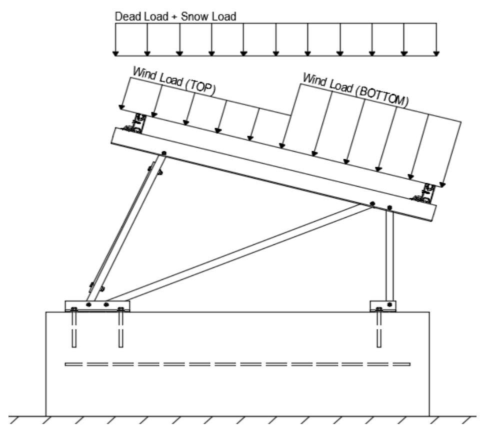
1.2 Construction

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 35°
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 =	14.43	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V = 130 mph — Exposure Category = C
Height ≤ 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 26.53 psf — *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.2	*(Pressure)*
$Cf+_{BOTTOM}$	=	2	
$Cf-_{TOP}$	=	-2.4	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.2	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

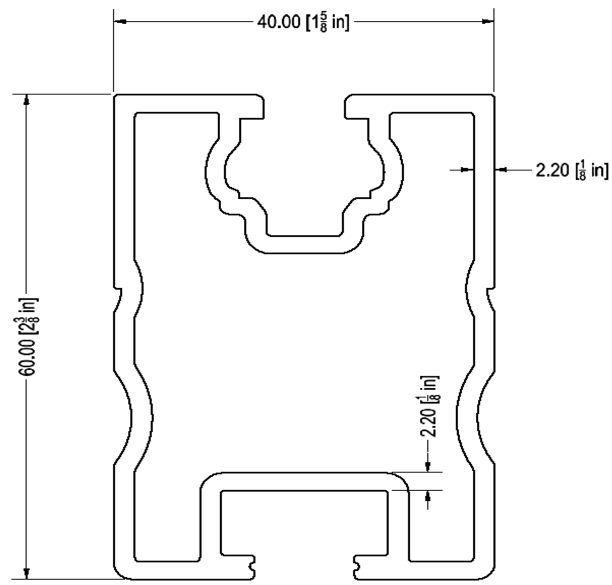
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

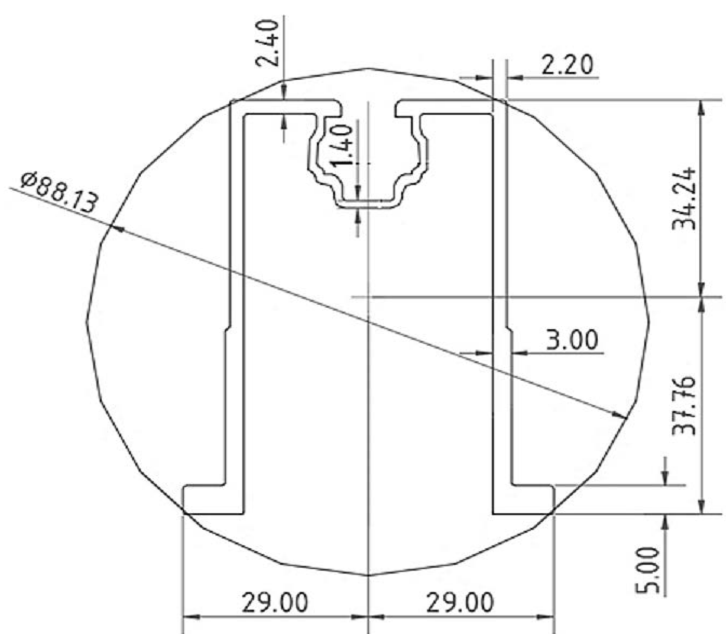
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	30.25	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	-0.255	k-ft
M_z =	-0.025	k-ft
$M_{y\ allowable}$ =	1.287	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	23%	



4.2 Girder Design

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

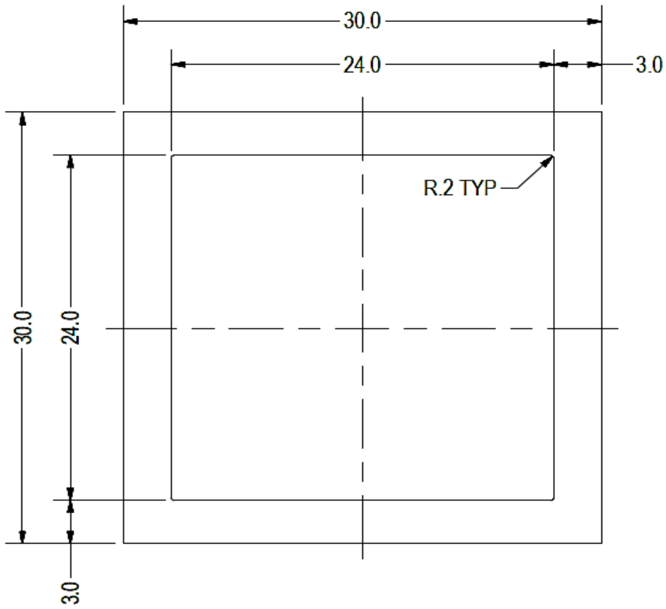
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	-0.433	k-ft
M_z =	-0.026	k-ft
P_n =	0.295	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	37%	



4.3 Front Strut Design

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

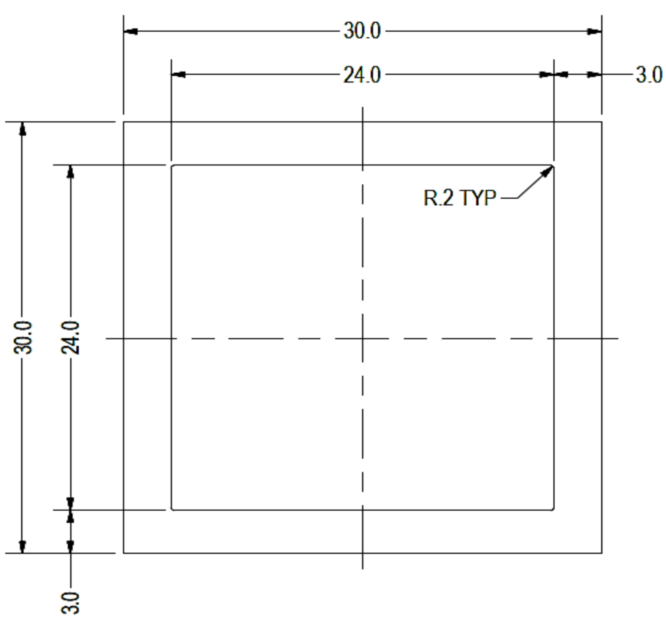
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.555	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	5%	



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).

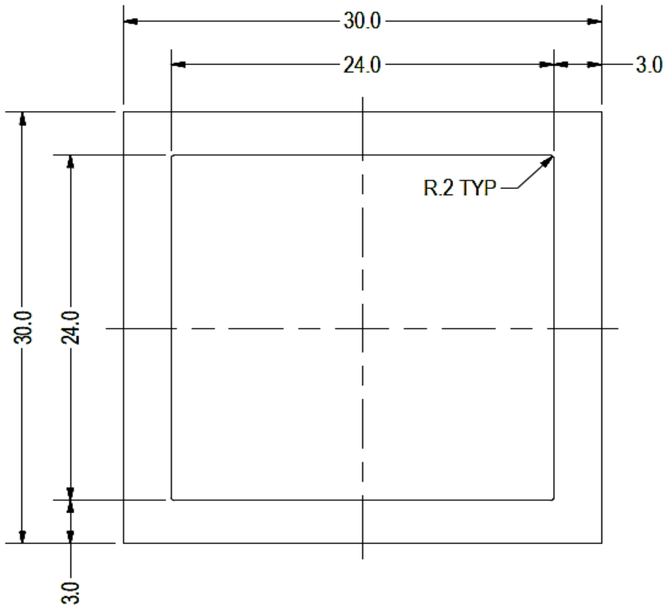
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.660	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	17%	



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).

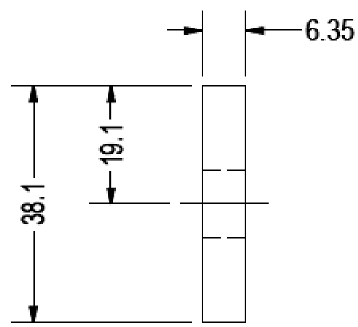
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	42.32	in
$\Phi F_{ty\ AXIAL}$ =	8.86	ksi
$\Phi F_{ty\ BENDING}$ =	29.96	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.533	k
$M_{y\ allowable}$ =	0.406	k-ft
$M_{z\ allowable}$ =	0.406	k-ft
$P_{n\ allowable}$ =	4.450	k
Utilization =	12%	



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 =	0.001	k-ft
P_n =	0.170	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	4%	



A cross brace kit is required every 55 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

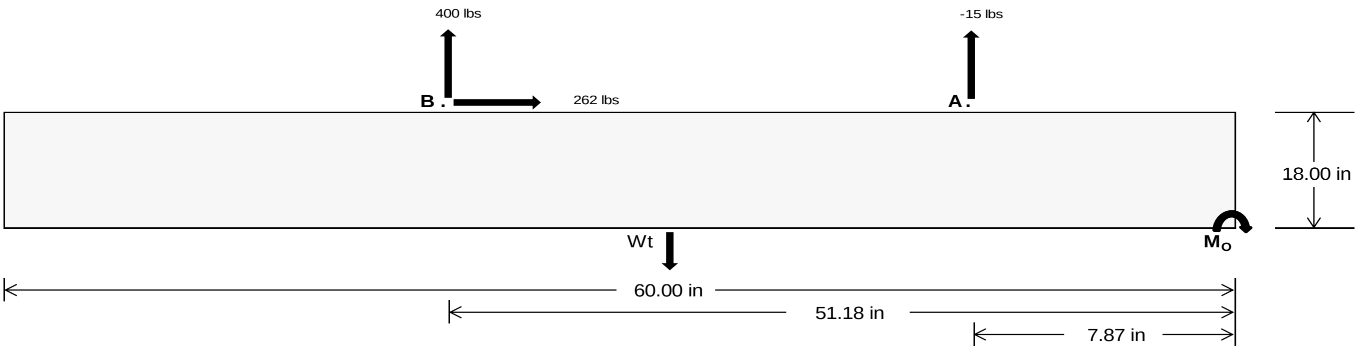
5.1 Helical Pile Foundations

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 =	15.68	1665.73	k
Compressive Load =	721.74	1050.92	k
Lateral Load =	1.31	1090.99	k
Moment (Weak Axis) =	0.00	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O = 25081.1 in-lbs
Resisting Force Required = 836.04 lbs
S.F. = 1.67
Weight Required = 1393.39 lbs
Minimum Width = 20 in in
Weight Provided = 1812.50 lbs

A minimum 60in long x 20in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 262.22 lbs
Friction = 0.4
Weight Required = 655.55 lbs
Resisting Weight = 1812.50 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 20in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 262.22 lbs
Cohesion = 130 psf
Area = 8.33 ft^2
Resisting = 906.25 lbs
Additional Weight Required = 0 lbs

Use a 60in long x 20in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

Additional Force = 0 lbs
Lateral Bearing Pressure = 200 psf/ft
Required Depth = 0.00 ft
f'_c = 2500 psi
Length = 8 in

Shear key is not required.

Bearing Pressure

	Ballast Width			
	20 in	21 in	22 in	23 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.67 ft) =	1813 lbs	1903 lbs	1994 lbs	2084 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in
F_A	223 lbs	223 lbs	223 lbs	223 lbs	304 lbs	304 lbs	304 lbs	304 lbs	372 lbs	372 lbs	372 lbs	372 lbs	30 lbs	30 lbs	30 lbs	30 lbs
F_B	137 lbs	137 lbs	137 lbs	137 lbs	480 lbs	480 lbs	480 lbs	480 lbs	447 lbs	447 lbs	447 lbs	447 lbs	-800 lbs	-800 lbs	-800 lbs	-800 lbs
F_V	15 lbs	15 lbs	15 lbs	15 lbs	468 lbs	468 lbs	468 lbs	468 lbs	361 lbs	361 lbs	361 lbs	361 lbs	-524 lbs	-524 lbs	-524 lbs	-524 lbs
P_{total}	2172 lbs	2263 lbs	2353 lbs	2444 lbs	2596 lbs	2687 lbs	2777 lbs	2868 lbs	2631 lbs	2722 lbs	2812 lbs	2903 lbs	317 lbs	372 lbs	426 lbs	480 lbs
M	192 lbs-ft	192 lbs-ft	192 lbs-ft	192 lbs-ft	416 lbs-ft	416 lbs-ft	416 lbs-ft	416 lbs-ft	438 lbs-ft	438 lbs-ft	438 lbs-ft	438 lbs-ft	681 lbs-ft	681 lbs-ft	681 lbs-ft	681 lbs-ft
e	0.09 ft	0.08 ft	0.08 ft	0.08 ft	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.17 ft	0.16 ft	0.16 ft	0.15 ft	2.15 ft	1.83 ft	1.60 ft	1.42 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	233.0 psf	232.2 psf	231.6 psf	231.0 psf	251.6 psf	250.0 psf	248.5 psf	247.1 psf	252.6 psf	250.9 psf	249.4 psf	248.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	288.3 psf	284.9 psf	281.9 psf	279.1 psf	371.5 psf	364.2 psf	357.5 psf	351.4 psf	378.8 psf	371.1 psf	364.2 psf	357.8 psf	360.0 psf	212.4 psf	172.0 psf	154.5 psf

Maximum Bearing Pressure = 379 psf
Allowable Bearing Pressure = 1500 psf

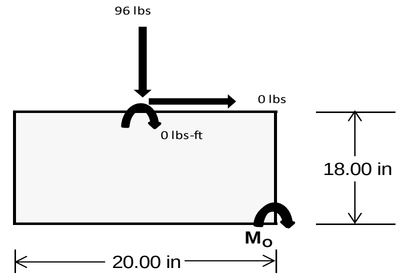
Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 0.0 ft-lbs
Resisting Force Required = 0.00 lbs
S.F. = 1.67
Weight Required = 0.00 lbs
Minimum Width = 20 in in
Weight Provided = 1812.50 lbs

A minimum 60in long x 20in 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	20 in			20 in			20 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	44 lbs	96 lbs	41 lbs	117 lbs	303 lbs	115 lbs	13 lbs	28 lbs	12 lbs
F_V	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs
P_{total}	2288 lbs	1813 lbs	2285 lbs	2253 lbs	2439 lbs	2251 lbs	669 lbs	1813 lbs	668 lbs
M	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.28 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft
f_{min}	274.5 sqft	217.5 sqft	274.2 sqft	270.2 sqft	292.7 sqft	269.9 sqft	80.3 sqft	217.5 sqft	80.2 sqft
f_{max}	274.5 psf	217.5 psf	274.2 psf	270.5 psf	292.7 psf	270.2 psf	80.3 psf	217.5 psf	80.2 psf

Maximum Bearing Pressure = 293 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 20in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

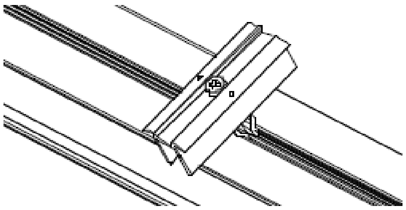
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

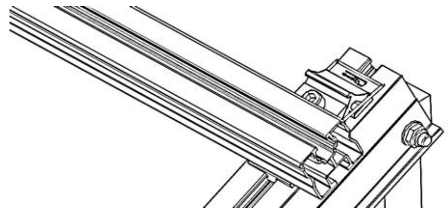
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.964	k
Allowable Uplift =	1.214	k
Utilization =	79%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.039	k
Allowable Uplift =	1.116	k
Utilization =	93%	



6.2 Bolted Connections

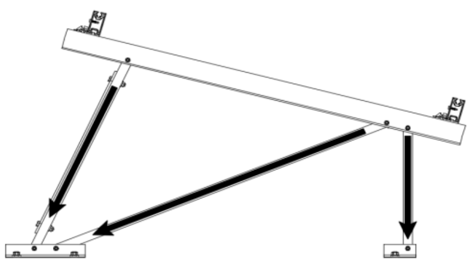
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	0.555	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	10%	

Rear Strut		
Maximum Axial Load =	0.962	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	17%	

Diagonal Strut		
Maximum Axial Load =	0.660	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	12%	

Bracing		
Maximum Axial Load =	0.170	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	2%	



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

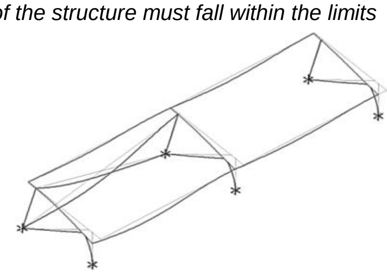
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	33.11	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.662	in
Max Drift, Δ_{MAX} =	0.002	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

$L_b =$ 36.00 in

J = 0.255

93.7419

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

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= 30.3 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

$L_b =$ 36.00 in

J = 0.255

97.3454

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.2

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 30.3 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in³

$M_{max}St$ = 1.287 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in³

$M_{max}Wk$ = 0.871 k-ft

<u>Compression</u>

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

21.9891

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

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

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

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= 30.0 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= 30.0 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.406 k-ft

Weak Axis:

3.4.14

L_b = 42.32 in

J = 0.16

111.025

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

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= 30.0

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.81475

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83406

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

$\varphi F_L =$ 8.86409 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

$\varphi F_L =$ 8.86 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 4.45 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-40.249	-40.249	0	0
2	M16	Y	-40.249	-40.249	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	-88.797	-88.797	0	0
2	M16	y	-147.995	-147.995	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	177.594	177.594	0	0
2	M16	y	88.797	88.797	0	0

Load Combinations

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	275.225	2	287.553	2	.008	10	0	10	0	1	0	1
2		min	-313.183	3	-437.778	3	-.165	3	0	3	0	1	0	1
3	N7	max	.027	3	191.767	1	.107	10	0	10	0	1	0	1
4		min	-.108	2	7.798	15	-.58	3	0	3	0	1	0	1
5	N15	max	.087	3	555.181	2	.025	9	0	9	0	1	0	1
6		min	-1.01	2	16.949	15	-.871	3	-.001	3	0	1	0	1
7	N16	max	754.632	2	808.401	2	0	15	0	9	0	1	0	1
8		min	-839.224	3	-1281.327	3	-108.235	3	0	3	0	1	0	1
9	N23	max	.028	3	192.154	1	.399	3	0	3	0	1	0	1
10		min	-.108	2	7.914	15	-.106	10	0	10	0	1	0	1
11	N24	max	275.225	2	289.671	2	109.453	3	0	9	0	1	0	1
12		min	-314.572	3	-438.382	3	-.008	10	0	3	0	1	0	1
13	Totals:	max	1303.856	2	2279.166	2	0	3						
14		min	-1466.838	3	-2005.474	3	0	2						

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	182.144	2	.679	4	.035	9	0	10	0	10	0	1
2			min	-356.532	3	.16	15	-.066	3	0	3	0	3	0	1
3		2	max	182.279	2	.621	4	.035	9	0	10	0	10	0	15
4			min	-356.431	3	.146	15	-.066	3	0	3	0	3	0	4
5		3	max	182.414	2	.564	4	.035	9	0	10	0	10	0	15
6			min	-356.33	3	.133	15	-.066	3	0	3	0	3	0	4
7		4	max	182.549	2	.506	4	.035	9	0	10	0	10	0	15
8			min	-356.229	3	.119	15	-.066	3	0	3	0	3	0	4
9		5	max	182.684	2	.449	4	.035	9	0	10	0	10	0	15
10			min	-356.128	3	.106	15	-.066	3	0	3	0	3	0	4
11		6	max	182.819	2	.392	4	.035	9	0	10	0	9	0	15
12			min	-356.026	3	.092	15	-.066	3	0	3	0	3	0	4
13		7	max	182.954	2	.334	4	.035	9	0	10	0	9	0	15
14			min	-355.925	3	.079	15	-.066	3	0	3	0	3	0	4
15		8	max	183.089	2	.277	4	.035	9	0	10	0	9	0	15
16			min	-355.824	3	.065	15	-.066	3	0	3	0	3	0	4
17		9	max	183.223	2	.219	4	.035	9	0	10	0	9	0	15
18			min	-355.723	3	.052	15	-.066	3	0	3	0	3	0	4
19		10	max	183.358	2	.162	4	.035	9	0	10	0	9	0	15
20			min	-355.622	3	.037	12	-.066	3	0	3	0	3	0	4
21		11	max	183.493	2	.112	2	.035	9	0	10	0	9	0	15
22			min	-355.521	3	.015	12	-.066	3	0	3	0	3	0	4
23		12	max	183.628	2	.067	2	.035	9	0	10	0	9	0	15
24			min	-355.42	3	-.014	3	-.066	3	0	3	0	3	0	4
25		13	max	183.763	2	.022	2	.035	9	0	10	0	9	0	15
26			min	-355.318	3	-.047	3	-.066	3	0	3	0	3	0	4
27		14	max	183.898	2	-.016	15	.035	9	0	10	0	9	0	15
28			min	-355.217	3	-.081	3	-.066	3	0	3	0	3	0	4
29		15	max	184.033	2	-.03	15	.035	9	0	10	0	9	0	15
30			min	-355.116	3	-.126	4	-.066	3	0	3	0	3	0	4
31		16	max	184.167	2	-.043	15	.035	9	0	10	0	9	0	15
32			min	-355.015	3	-.183	4	-.066	3	0	3	0	3	0	4
33		17	max	184.302	2	-.057	15	.035	9	0	10	0	9	0	15
34			min	-354.914	3	-.241	4	-.066	3	0	3	0	3	0	4
35		18	max	184.437	2	-.07	15	.035	9	0	10	0	9	0	15
36			min	-354.813	3	-.298	4	-.066	3	0	3	0	3	0	4
37		19	max	184.572	2	-.084	15	.035	9	0	10	0	9	0	12

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-354.711	3	-.356	4	-.066	3	0	3	0	3	0	4
39	M3	1	max	244.621	2	1.736	4	.02	10	0	10	0	3	0	4
40			min	-225.109	3	.408	15	-.063	3	0	3	0	10	0	12
41		2	max	244.551	2	1.56	4	.02	10	0	10	0	3	0	2
42			min	-225.162	3	.367	15	-.063	3	0	3	0	10	0	3
43		3	max	244.481	2	1.383	4	.02	10	0	10	0	3	0	2
44			min	-225.214	3	.325	15	-.063	3	0	3	0	10	0	3
45		4	max	244.411	2	1.207	4	.02	10	0	10	0	3	0	15
46			min	-225.267	3	.284	15	-.063	3	0	3	0	10	0	4
47		5	max	244.341	2	1.031	4	.02	10	0	10	0	3	0	15
48			min	-225.319	3	.242	15	-.063	3	0	3	0	10	0	4
49		6	max	244.271	2	.854	4	.02	10	0	10	0	3	0	15
50			min	-225.372	3	.201	15	-.063	3	0	3	0	10	0	4
51		7	max	244.201	2	.678	4	.02	10	0	10	0	3	0	15
52			min	-225.424	3	.159	15	-.063	3	0	3	0	10	0	4
53		8	max	244.131	2	.502	4	.02	10	0	10	0	3	0	15
54			min	-225.477	3	.118	15	-.063	3	0	3	0	10	-.001	4
55		9	max	244.061	2	.325	4	.02	10	0	10	0	3	0	15
56			min	-225.529	3	.076	15	-.063	3	0	3	0	10	-.001	4
57		10	max	243.991	2	.149	4	.02	10	0	10	0	3	0	15
58			min	-225.582	3	.034	12	-.063	3	0	3	0	10	-.001	4
59		11	max	243.921	2	.007	2	.02	10	0	10	0	3	0	15
60			min	-225.634	3	-.054	3	-.063	3	0	3	0	10	-.001	4
61		12	max	243.851	2	-.048	15	.02	10	0	10	0	3	0	15
62			min	-225.687	3	-.204	4	-.063	3	0	3	0	10	-.001	4
63		13	max	243.781	2	-.089	15	.02	10	0	10	0	3	0	15
64			min	-225.739	3	-.38	4	-.063	3	0	3	0	10	-.001	4
65		14	max	243.711	2	-.131	15	.02	10	0	10	0	3	0	15
66			min	-225.792	3	-.557	4	-.063	3	0	3	0	10	-.001	4
67		15	max	243.641	2	-.172	15	.02	10	0	10	0	3	0	15
68			min	-225.844	3	-.733	4	-.063	3	0	3	0	10	0	4
69		16	max	243.571	2	-.214	15	.02	10	0	10	0	9	0	15
70			min	-225.897	3	-.909	4	-.063	3	0	3	0	10	0	4
71		17	max	243.501	2	-.255	15	.02	10	0	10	0	10	0	15
72			min	-225.949	3	-1.086	4	-.063	3	0	3	0	3	0	4
73		18	max	243.431	2	-.297	15	.02	10	0	10	0	10	0	15
74			min	-226.002	3	-1.262	4	-.063	3	0	3	0	3	0	4
75		19	max	243.361	2	-.338	15	.02	10	0	10	0	10	0	1
76			min	-226.054	3	-1.438	4	-.063	3	0	3	0	3	0	1
77	M4	1	max	190.603	1	0	1	.108	10	0	1	0	3	0	1
78			min	7.446	15	0	1	-.585	3	0	1	0	2	0	1
79		2	max	190.667	1	0	1	.108	10	0	1	0	10	0	1
80			min	7.466	15	0	1	-.585	3	0	1	0	3	0	1
81		3	max	190.732	1	0	1	.108	10	0	1	0	10	0	1
82			min	7.485	15	0	1	-.585	3	0	1	0	3	0	1
83		4	max	190.797	1	0	1	.108	10	0	1	0	10	0	1
84			min	7.505	15	0	1	-.585	3	0	1	0	3	0	1
85		5	max	190.861	1	0	1	.108	10	0	1	0	10	0	1
86			min	7.524	15	0	1	-.585	3	0	1	0	3	0	1
87		6	max	190.926	1	0	1	.108	10	0	1	0	10	0	1
88			min	7.544	15	0	1	-.585	3	0	1	0	3	0	1
89		7	max	190.991	1	0	1	.108	10	0	1	0	10	0	1
90			min	7.563	15	0	1	-.585	3	0	1	0	3	0	1
91		8	max	191.056	1	0	1	.108	10	0	1	0	10	0	1
92			min	7.583	15	0	1	-.585	3	0	1	0	3	0	1
93		9	max	191.12	1	0	1	.108	10	0	1	0	10	0	1
94			min	7.602	15	0	1	-.585	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	191.185	1	0	1	.108	10	0	1	0	10	0	1
96			min	7.622	15	0	1	-.585	3	0	1	0	3	0	1
97		11	max	191.25	1	0	1	.108	10	0	1	0	10	0	1
98			min	7.641	15	0	1	-.585	3	0	1	0	3	0	1
99		12	max	191.314	1	0	1	.108	10	0	1	0	10	0	1
100			min	7.661	15	0	1	-.585	3	0	1	0	3	0	1
101		13	max	191.379	1	0	1	.108	10	0	1	0	10	0	1
102			min	7.68	15	0	1	-.585	3	0	1	0	3	0	1
103		14	max	191.444	1	0	1	.108	10	0	1	0	10	0	1
104			min	7.7	15	0	1	-.585	3	0	1	0	3	0	1
105		15	max	191.508	1	0	1	.108	10	0	1	0	10	0	1
106			min	7.72	15	0	1	-.585	3	0	1	0	3	0	1
107		16	max	191.573	1	0	1	.108	10	0	1	0	10	0	1
108			min	7.739	15	0	1	-.585	3	0	1	0	3	0	1
109		17	max	191.638	1	0	1	.108	10	0	1	0	10	0	1
110			min	7.759	15	0	1	-.585	3	0	1	0	3	0	1
111		18	max	191.703	1	0	1	.108	10	0	1	0	10	0	1
112			min	7.778	15	0	1	-.585	3	0	1	0	3	0	1
113		19	max	191.767	1	0	1	.108	10	0	1	0	10	0	1
114			min	7.798	15	0	1	-.585	3	0	1	0	3	0	1
115	M6	1	max	530.618	2	.678	4	.001	9	0	3	0	3	0	1
116			min	-961.677	3	.16	15	-.317	3	0	13	0	13	0	1
117		2	max	530.753	2	.621	4	.001	9	0	3	0	3	0	15
118			min	-961.575	3	.146	15	-.317	3	0	13	0	13	0	4
119		3	max	530.888	2	.564	4	.001	9	0	3	0	3	0	15
120			min	-961.474	3	.133	15	-.317	3	0	13	0	13	0	4
121		4	max	531.023	2	.506	4	.001	9	0	3	0	3	0	15
122			min	-961.373	3	.119	15	-.317	3	0	13	0	13	0	4
123		5	max	531.158	2	.449	4	.001	9	0	3	0	3	0	15
124			min	-961.272	3	.104	12	-.317	3	0	13	0	13	0	4
125		6	max	531.293	2	.391	4	.001	9	0	3	0	3	0	15
126			min	-961.171	3	.081	12	-.317	3	0	13	0	13	0	4
127		7	max	531.428	2	.342	2	.001	9	0	3	0	3	0	15
128			min	-961.07	3	.059	12	-.317	3	0	13	0	13	0	4
129		8	max	531.562	2	.297	2	.001	9	0	3	0	9	0	15
130			min	-960.969	3	.036	12	-.317	3	0	13	0	3	0	4
131		9	max	531.697	2	.253	2	.001	9	0	3	0	9	0	12
132			min	-960.867	3	.014	3	-.317	3	0	13	0	3	0	4
133		10	max	531.832	2	.208	2	.001	9	0	3	0	9	0	12
134			min	-960.766	3	-.02	3	-.317	3	0	13	0	3	0	4
135		11	max	531.967	2	.163	2	.001	9	0	3	0	9	0	12
136			min	-960.665	3	-.053	3	-.317	3	0	13	0	3	0	4
137		12	max	532.102	2	.118	2	.001	9	0	3	0	9	0	12
138			min	-960.564	3	-.087	3	-.317	3	0	13	0	3	0	2
139		13	max	532.237	2	.073	2	.001	9	0	3	0	9	0	12
140			min	-960.463	3	-.12	3	-.317	3	0	13	0	3	0	2
141		14	max	532.372	2	.029	2	.001	9	0	3	0	9	0	12
142			min	-960.362	3	-.154	3	-.317	3	0	13	0	3	0	2
143		15	max	532.507	2	-.016	2	.001	9	0	3	0	9	0	12
144			min	-960.26	3	-.188	3	-.317	3	0	13	0	3	0	2
145		16	max	532.641	2	-.043	15	.001	9	0	3	0	9	0	12
146			min	-960.159	3	-.221	3	-.317	3	0	13	0	3	0	2
147		17	max	532.776	2	-.056	15	.001	9	0	3	0	9	0	3
148			min	-960.058	3	-.255	3	-.317	3	0	13	0	3	0	2
149		18	max	532.911	2	-.07	15	.001	9	0	3	0	9	0	3
150			min	-959.957	3	-.299	4	-.317	3	0	13	0	3	0	2
151		19	max	533.046	2	-.083	15	.001	9	0	3	0	9	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-959.856	3	-.356	4	-.317	3	0	13	0	3	0	2
153	M7	1	max	659.86	2	1.738	4	.058	3	0	9	0	9	0	2
154			min	-555.715	3	.408	15	-.002	9	0	3	0	3	0	3
155		2	max	659.79	2	1.562	4	.058	3	0	9	0	9	0	2
156			min	-555.767	3	.367	15	-.002	9	0	3	0	3	0	3
157		3	max	659.72	2	1.386	4	.058	3	0	9	0	9	0	2
158			min	-555.82	3	.325	15	-.002	9	0	3	0	3	0	3
159		4	max	659.65	2	1.209	4	.058	3	0	9	0	9	0	2
160			min	-555.872	3	.284	15	-.002	9	0	3	0	3	0	3
161		5	max	659.58	2	1.033	4	.058	3	0	9	0	9	0	15
162			min	-555.925	3	.242	15	-.002	9	0	3	0	3	0	3
163		6	max	659.51	2	.857	4	.058	3	0	9	0	9	0	15
164			min	-555.977	3	.201	15	-.002	9	0	3	0	3	0	4
165		7	max	659.44	2	.68	4	.058	3	0	9	0	9	0	15
166			min	-556.03	3	.16	15	-.002	9	0	3	0	3	0	4
167		8	max	659.37	2	.504	4	.058	3	0	9	0	9	0	15
168			min	-556.082	3	.118	15	-.002	9	0	3	0	3	-.001	4
169		9	max	659.3	2	.329	2	.058	3	0	9	0	9	0	15
170			min	-556.135	3	.071	12	-.002	9	0	3	0	3	-.001	4
171		10	max	659.23	2	.191	2	.058	3	0	9	0	9	0	15
172			min	-556.187	3	-.002	3	-.002	9	0	3	0	3	-.001	4
173		11	max	659.16	2	.054	2	.058	3	0	9	0	9	0	15
174			min	-556.24	3	-.105	3	-.002	9	0	3	0	3	-.001	4
175		12	max	659.09	2	-.048	15	.058	3	0	9	0	9	0	15
176			min	-556.292	3	-.208	3	-.002	9	0	3	0	3	-.001	4
177		13	max	659.02	2	-.089	15	.058	3	0	9	0	9	0	15
178			min	-556.345	3	-.378	4	-.002	9	0	3	0	3	-.001	4
179		14	max	658.95	2	-.131	15	.058	3	0	9	0	9	0	15
180			min	-556.397	3	-.554	4	-.002	9	0	3	0	3	-.001	4
181		15	max	658.88	2	-.172	15	.058	3	0	9	0	9	0	15
182			min	-556.45	3	-.731	4	-.002	9	0	3	0	3	0	4
183		16	max	658.81	2	-.214	15	.058	3	0	9	0	9	0	15
184			min	-556.502	3	-.907	4	-.002	9	0	3	0	3	0	4
185		17	max	658.74	2	-.255	15	.058	3	0	9	0	9	0	15
186			min	-556.555	3	-1.084	4	-.002	9	0	3	0	3	0	4
187		18	max	658.67	2	-.296	15	.058	3	0	9	0	9	0	15
188			min	-556.607	3	-1.26	4	-.002	9	0	3	0	3	0	4
189		19	max	658.6	2	-.338	15	.058	3	0	9	0	9	0	1
190			min	-556.66	3	-1.436	4	-.002	9	0	3	0	3	0	1
191	M8	1	max	554.016	2	0	1	.026	9	0	1	0	1	0	1
192			min	16.598	15	0	1	-.879	3	0	1	0	3	0	1
193		2	max	554.081	2	0	1	.026	9	0	1	0	9	0	1
194			min	16.617	15	0	1	-.879	3	0	1	0	3	0	1
195		3	max	554.145	2	0	1	.026	9	0	1	0	9	0	1
196			min	16.637	15	0	1	-.879	3	0	1	0	3	0	1
197		4	max	554.21	2	0	1	.026	9	0	1	0	9	0	1
198			min	16.656	15	0	1	-.879	3	0	1	0	3	0	1
199		5	max	554.275	2	0	1	.026	9	0	1	0	9	0	1
200			min	16.676	15	0	1	-.879	3	0	1	0	3	0	1
201		6	max	554.34	2	0	1	.026	9	0	1	0	9	0	1
202			min	16.695	15	0	1	-.879	3	0	1	0	3	0	1
203		7	max	554.404	2	0	1	.026	9	0	1	0	9	0	1
204			min	16.715	15	0	1	-.879	3	0	1	0	3	0	1
205		8	max	554.469	2	0	1	.026	9	0	1	0	9	0	1
206			min	16.734	15	0	1	-.879	3	0	1	0	3	0	1
207		9	max	554.534	2	0	1	.026	9	0	1	0	9	0	1
208			min	16.754	15	0	1	-.879	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	554.598	2	0	1	.026	9	0	1	0	9	0	1
210			min	16.773	15	0	1	-.879	3	0	1	0	3	0	1
211		11	max	554.663	2	0	1	.026	9	0	1	0	9	0	1
212			min	16.793	15	0	1	-.879	3	0	1	0	3	0	1
213		12	max	554.728	2	0	1	.026	9	0	1	0	9	0	1
214			min	16.812	15	0	1	-.879	3	0	1	0	3	0	1
215		13	max	554.793	2	0	1	.026	9	0	1	0	9	0	1
216			min	16.832	15	0	1	-.879	3	0	1	0	3	0	1
217		14	max	554.857	2	0	1	.026	9	0	1	0	9	0	1
218			min	16.852	15	0	1	-.879	3	0	1	-.001	3	0	1
219		15	max	554.922	2	0	1	.026	9	0	1	0	9	0	1
220			min	16.871	15	0	1	-.879	3	0	1	-.001	3	0	1
221		16	max	554.987	2	0	1	.026	9	0	1	0	9	0	1
222			min	16.891	15	0	1	-.879	3	0	1	-.001	3	0	1
223		17	max	555.051	2	0	1	.026	9	0	1	0	9	0	1
224			min	16.91	15	0	1	-.879	3	0	1	-.001	3	0	1
225		18	max	555.116	2	0	1	.026	9	0	1	0	9	0	1
226			min	16.93	15	0	1	-.879	3	0	1	-.001	3	0	1
227		19	max	555.181	2	0	1	.026	9	0	1	0	9	0	1
228			min	16.949	15	0	1	-.879	3	0	1	-.001	3	0	1
229	M10	1	max	183.242	2	.679	4	.011	10	0	1	0	9	0	1
230			min	-228.435	3	.16	15	-.036	9	0	3	0	3	0	1
231		2	max	183.377	2	.621	4	.011	10	0	1	0	9	0	15
232			min	-228.334	3	.146	15	-.036	9	0	3	0	3	0	4
233		3	max	183.512	2	.564	4	.011	10	0	1	0	9	0	15
234			min	-228.233	3	.133	15	-.036	9	0	3	0	3	0	4
235		4	max	183.647	2	.506	4	.011	10	0	1	0	9	0	15
236			min	-228.132	3	.119	15	-.036	9	0	3	0	3	0	4
237		5	max	183.782	2	.449	4	.011	10	0	1	0	9	0	15
238			min	-228.031	3	.106	15	-.036	9	0	3	0	3	0	4
239		6	max	183.916	2	.392	4	.011	10	0	1	0	9	0	15
240			min	-227.93	3	.092	15	-.036	9	0	3	0	3	0	4
241		7	max	184.051	2	.334	4	.011	10	0	1	0	9	0	15
242			min	-227.829	3	.079	15	-.036	9	0	3	0	3	0	4
243		8	max	184.186	2	.277	4	.011	10	0	1	0	10	0	15
244			min	-227.727	3	.065	15	-.036	9	0	3	0	3	0	4
245		9	max	184.321	2	.219	4	.011	10	0	1	0	10	0	15
246			min	-227.626	3	.052	15	-.036	9	0	3	0	3	0	4
247		10	max	184.456	2	.162	4	.011	10	0	1	0	10	0	15
248			min	-227.525	3	.038	12	-.036	9	0	3	0	3	0	4
249		11	max	184.591	2	.112	2	.011	10	0	1	0	10	0	15
250			min	-227.424	3	.015	12	-.036	9	0	3	0	3	0	4
251		12	max	184.726	2	.067	2	.011	10	0	1	0	10	0	15
252			min	-227.323	3	-.013	3	-.036	9	0	3	0	3	0	4
253		13	max	184.86	2	.022	2	.011	10	0	1	0	10	0	15
254			min	-227.222	3	-.047	3	-.036	9	0	3	0	3	0	4
255		14	max	184.995	2	-.016	15	.011	10	0	1	0	10	0	15
256			min	-227.12	3	-.08	3	-.036	9	0	3	0	3	0	4
257		15	max	185.13	2	-.03	15	.011	10	0	1	0	10	0	15
258			min	-227.019	3	-.126	4	-.036	9	0	3	0	3	0	4
259		16	max	185.265	2	-.043	15	.011	10	0	1	0	10	0	15
260			min	-226.918	3	-.183	4	-.036	9	0	3	0	3	0	4
261		17	max	185.4	2	-.057	15	.011	10	0	1	0	10	0	15
262			min	-226.817	3	-.241	4	-.036	9	0	3	0	3	0	4
263		18	max	185.535	2	-.07	15	.011	10	0	1	0	10	0	15
264			min	-226.716	3	-.298	4	-.036	9	0	3	0	3	0	4
265		19	max	185.67	2	-.084	15	.011	10	0	1	0	10	0	12

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-226.615	3	-.356	4	-.036	9	0	3	0	3	0	4
267	M11	1	max	244.233	2	1.736	4	.054	1	0	3	0	3	0	4
268			min	-226.437	3	.408	15	-.071	3	0	10	0	1	0	15
269		2	max	244.163	2	1.56	4	.054	1	0	3	0	3	0	2
270			min	-226.49	3	.367	15	-.071	3	0	10	0	1	0	12
271		3	max	244.093	2	1.383	4	.054	1	0	3	0	3	0	2
272			min	-226.542	3	.325	15	-.071	3	0	10	0	1	0	3
273		4	max	244.023	2	1.207	4	.054	1	0	3	0	3	0	15
274			min	-226.595	3	.284	15	-.071	3	0	10	0	1	0	4
275		5	max	243.953	2	1.031	4	.054	1	0	3	0	3	0	15
276			min	-226.647	3	.242	15	-.071	3	0	10	0	1	0	4
277		6	max	243.883	2	.854	4	.054	1	0	3	0	3	0	15
278			min	-226.7	3	.201	15	-.071	3	0	10	0	1	0	4
279		7	max	243.813	2	.678	4	.054	1	0	3	0	3	0	15
280			min	-226.752	3	.159	15	-.071	3	0	10	0	1	0	4
281		8	max	243.743	2	.502	4	.054	1	0	3	0	3	0	15
282			min	-226.805	3	.118	15	-.071	3	0	10	0	1	-.001	4
283		9	max	243.673	2	.325	4	.054	1	0	3	0	3	0	15
284			min	-226.857	3	.076	15	-.071	3	0	10	0	1	-.001	4
285		10	max	243.603	2	.149	4	.054	1	0	3	0	3	0	15
286			min	-226.91	3	.035	15	-.071	3	0	10	0	1	-.001	4
287		11	max	243.533	2	.007	2	.054	1	0	3	0	3	0	15
288			min	-226.962	3	-.044	3	-.071	3	0	10	0	1	-.001	4
289		12	max	243.463	2	-.048	15	.054	1	0	3	0	3	0	15
290			min	-227.015	3	-.204	4	-.071	3	0	10	0	1	-.001	4
291		13	max	243.393	2	-.089	15	.054	1	0	3	0	3	0	15
292			min	-227.067	3	-.38	4	-.071	3	0	10	0	1	-.001	4
293		14	max	243.323	2	-.131	15	.054	1	0	3	0	3	0	15
294			min	-227.12	3	-.557	4	-.071	3	0	10	0	1	-.001	4
295		15	max	243.253	2	-.172	15	.054	1	0	3	0	3	0	15
296			min	-227.172	3	-.733	4	-.071	3	0	10	0	1	0	4
297		16	max	243.183	2	-.214	15	.054	1	0	3	0	3	0	15
298			min	-227.225	3	-.909	4	-.071	3	0	10	0	1	0	4
299		17	max	243.113	2	-.255	15	.054	1	0	3	0	3	0	15
300			min	-227.277	3	-1.086	4	-.071	3	0	10	0	10	0	4
301		18	max	243.043	2	-.297	15	.054	1	0	3	0	3	0	15
302			min	-227.33	3	-1.262	4	-.071	3	0	10	0	10	0	4
303		19	max	242.973	2	-.338	15	.054	1	0	3	0	3	0	1
304			min	-227.382	3	-1.438	4	-.071	3	0	10	0	10	0	1
305	M12	1	max	190.989	1	0	1	.402	3	0	1	0	2	0	1
306			min	7.563	15	0	1	-.108	10	0	1	0	3	0	1
307		2	max	191.054	1	0	1	.402	3	0	1	0	1	0	1
308			min	7.582	15	0	1	-.108	10	0	1	0	10	0	1
309		3	max	191.118	1	0	1	.402	3	0	1	0	3	0	1
310			min	7.602	15	0	1	-.108	10	0	1	0	10	0	1
311		4	max	191.183	1	0	1	.402	3	0	1	0	3	0	1
312			min	7.621	15	0	1	-.108	10	0	1	0	10	0	1
313		5	max	191.248	1	0	1	.402	3	0	1	0	3	0	1
314			min	7.641	15	0	1	-.108	10	0	1	0	10	0	1
315		6	max	191.312	1	0	1	.402	3	0	1	0	3	0	1
316			min	7.66	15	0	1	-.108	10	0	1	0	10	0	1
317		7	max	191.377	1	0	1	.402	3	0	1	0	3	0	1
318			min	7.68	15	0	1	-.108	10	0	1	0	10	0	1
319		8	max	191.442	1	0	1	.402	3	0	1	0	3	0	1
320			min	7.699	15	0	1	-.108	10	0	1	0	10	0	1
321		9	max	191.507	1	0	1	.402	3	0	1	0	3	0	1
322			min	7.719	15	0	1	-.108	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	191.571	1	0	1	.402	3	0	1	0	3	0	1
324			min	7.738	15	0	1	-.108	10	0	1	0	10	0	1
325		11	max	191.636	1	0	1	.402	3	0	1	0	3	0	1
326			min	7.758	15	0	1	-.108	10	0	1	0	10	0	1
327		12	max	191.701	1	0	1	.402	3	0	1	0	3	0	1
328			min	7.778	15	0	1	-.108	10	0	1	0	10	0	1
329		13	max	191.765	1	0	1	.402	3	0	1	0	3	0	1
330			min	7.797	15	0	1	-.108	10	0	1	0	10	0	1
331		14	max	191.83	1	0	1	.402	3	0	1	0	3	0	1
332			min	7.817	15	0	1	-.108	10	0	1	0	10	0	1
333		15	max	191.895	1	0	1	.402	3	0	1	0	3	0	1
334			min	7.836	15	0	1	-.108	10	0	1	0	10	0	1
335		16	max	191.96	1	0	1	.402	3	0	1	0	3	0	1
336			min	7.856	15	0	1	-.108	10	0	1	0	10	0	1
337		17	max	192.024	1	0	1	.402	3	0	1	0	3	0	1
338			min	7.875	15	0	1	-.108	10	0	1	0	10	0	1
339		18	max	192.089	1	0	1	.402	3	0	1	0	3	0	1
340			min	7.895	15	0	1	-.108	10	0	1	0	10	0	1
341		19	max	192.154	1	0	1	.402	3	0	1	0	3	0	1
342			min	7.914	15	0	1	-.108	10	0	1	0	10	0	1
343	M1	1	max	54.073	1	335.11	3	2.723	10	0	2	.016	3	0	2
344			min	1.401	10	-204.807	2	-7.22	1	0	3	-.005	10	0	3
345		2	max	54.233	1	334.938	3	2.723	10	0	2	.014	3	.045	2
346			min	1.534	10	-205.036	2	-7.22	1	0	3	-.005	10	-.073	3
347		3	max	120.234	3	3.256	9	2.712	10	0	10	.012	3	.089	2
348			min	-36.38	2	-30.535	2	-7.198	1	0	1	-.004	10	-.144	3
349		4	max	120.354	3	3.066	9	2.712	10	0	10	.011	3	.095	2
350			min	-36.22	2	-30.763	2	-7.198	1	0	1	-.004	10	-.143	3
351		5	max	120.475	3	2.875	9	2.712	10	0	10	.01	3	.102	2
352			min	-36.06	2	-30.992	2	-7.198	1	0	1	-.003	10	-.141	3
353		6	max	120.595	3	2.684	9	2.712	10	0	10	.008	3	.109	2
354			min	-35.9	2	-31.221	2	-7.198	1	0	1	-.002	10	-.14	3
355		7	max	120.715	3	2.494	9	2.712	10	0	10	.007	3	.115	2
356			min	-35.739	2	-31.449	2	-7.198	1	0	1	-.002	10	-.138	3
357		8	max	120.835	3	2.303	9	2.712	10	0	10	.005	3	.122	2
358			min	-35.579	2	-31.678	2	-7.198	1	0	1	-.001	10	-.136	3
359		9	max	120.955	3	2.112	9	2.712	10	0	10	.004	3	.129	2
360			min	-35.419	2	-31.907	2	-7.198	1	0	1	0	10	-.135	3
361		10	max	121.075	3	1.922	9	2.712	10	0	10	.002	3	.136	2
362			min	-35.259	2	-32.136	2	-7.198	1	0	1	0	2	-.133	3
363		11	max	121.195	3	1.731	9	2.712	10	0	10	0	3	.143	2
364			min	-35.099	2	-32.364	2	-7.198	1	0	1	-.002	1	-.131	3
365		12	max	121.315	3	1.541	9	2.712	10	0	10	.001	10	.15	2
366			min	-34.939	2	-32.593	2	-7.198	1	0	1	-.003	1	-.129	3
367		13	max	121.436	3	1.35	9	2.712	10	0	10	.002	10	.157	2
368			min	-34.778	2	-32.822	2	-7.198	1	0	1	-.005	1	-.128	3
369		14	max	121.556	3	1.159	9	2.712	10	0	10	.002	10	.164	2
370			min	-34.618	2	-33.051	2	-7.198	1	0	1	-.006	1	-.126	3
371		15	max	121.676	3	.969	9	2.712	10	0	10	.003	10	.172	2
372			min	-34.458	2	-33.279	2	-7.198	1	0	1	-.008	1	-.124	3
373		16	max	80.907	2	181.139	2	2.73	10	0	9	.004	10	.177	2
374			min	1.472	15	-209.099	3	-7.245	1	0	3	-.009	1	-.12	3
375		17	max	81.068	2	180.911	2	2.73	10	0	9	.004	10	.138	2
376			min	1.52	15	-209.271	3	-7.245	1	0	3	-.011	1	-.075	3
377		18	max	-1.559	10	317.741	2	2.838	10	0	3	.005	10	.069	2
378			min	-54.218	1	-171.4	3	-7.517	1	0	2	-.013	1	-.038	3
379		19	max	-1.425	10	317.512	2	2.838	10	0	3	.005	10	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-54.058	1	-171.572	3	-7.517	1	0	2	-.014	1	0	3
381	M5	1	max	152.478	1	1010.319	3	0	1	0	9	.016	3	0	3
382			min	-17.086	3	-598.261	2	-98.728	3	0	3	0	15	0	2
383		2	max	152.638	1	1010.148	3	0	1	0	9	0	9	.129	2
384			min	-16.966	3	-598.49	2	-98.728	3	0	3	-.005	3	-.218	3
385		3	max	295.493	3	4.136	9	10.322	3	0	3	0	9	.257	2
386			min	-72.172	2	-90.484	2	-.029	9	0	1	-.026	3	-.433	3
387		4	max	295.613	3	3.946	9	10.322	3	0	3	0	9	.277	2
388			min	-72.012	2	-90.713	2	-.029	9	0	1	-.023	3	-.425	3
389		5	max	295.733	3	3.755	9	10.322	3	0	3	0	9	.296	2
390			min	-71.852	2	-90.941	2	-.029	9	0	1	-.021	3	-.417	3
391		6	max	295.854	3	3.564	9	10.322	3	0	3	0	9	.316	2
392			min	-71.692	2	-91.17	2	-.029	9	0	1	-.019	3	-.409	3
393		7	max	295.974	3	3.374	9	10.322	3	0	3	0	9	.336	2
394			min	-71.532	2	-91.399	2	-.029	9	0	1	-.017	3	-.401	3
395		8	max	296.094	3	3.183	9	10.322	3	0	3	0	9	.356	2
396			min	-71.371	2	-91.628	2	-.029	9	0	1	-.014	3	-.394	3
397		9	max	296.214	3	2.993	9	10.322	3	0	3	0	9	.376	2
398			min	-71.211	2	-91.856	2	-.029	9	0	1	-.012	3	-.386	3
399		10	max	296.334	3	2.802	9	10.322	3	0	3	0	13	.396	2
400			min	-71.051	2	-92.085	2	-.029	9	0	1	-.01	3	-.378	3
401		11	max	296.454	3	2.611	9	10.322	3	0	3	0	1	.416	2
402			min	-70.891	2	-92.314	2	-.029	9	0	1	-.008	3	-.37	3
403		12	max	296.574	3	2.421	9	10.322	3	0	3	0	1	.436	2
404			min	-70.731	2	-92.543	2	-.029	9	0	1	-.006	3	-.362	3
405		13	max	296.694	3	2.23	9	10.322	3	0	3	0	1	.456	2
406			min	-70.571	2	-92.771	2	-.029	9	0	1	-.003	3	-.354	3
407		14	max	296.815	3	2.039	9	10.322	3	0	3	0	1	.476	2
408			min	-70.41	2	-93	2	-.029	9	0	1	-.001	3	-.345	3
409		15	max	296.935	3	1.849	9	10.322	3	0	3	.001	3	.496	2
410			min	-70.25	2	-93.229	2	-.029	9	0	1	0	9	-.337	3
411		16	max	239.779	2	490.118	2	10.311	3	0	3	.003	3	.511	2
412			min	2.919	15	-530.116	3	-.031	9	0	1	0	9	-.325	3
413		17	max	239.939	2	489.889	2	10.311	3	0	3	.005	3	.405	2
414			min	2.967	15	-530.287	3	-.031	9	0	1	0	9	-.21	3
415		18	max	4.668	3	939.481	2	9.428	3	0	3	.007	3	.203	2
416			min	-152.668	1	-484.673	3	-.006	9	0	9	0	9	-.105	3
417		19	max	4.788	3	939.252	2	9.428	3	0	3	.009	3	0	3
418			min	-152.508	1	-484.845	3	-.006	9	0	9	0	9	0	2
419	M9	1	max	54.073	1	334.965	3	105.289	3	0	3	.005	10	0	2
420			min	1.4	10	-204.807	2	-2.723	10	0	2	-.028	3	0	3
421		2	max	54.233	1	334.793	3	105.289	3	0	3	.005	10	.045	2
422			min	1.534	10	-205.036	2	-2.723	10	0	2	-.013	1	-.073	3
423		3	max	119.288	3	3.263	9	7.198	1	0	1	.017	3	.089	2
424			min	-35.977	2	-30.509	2	-2.712	10	0	10	-.011	1	-.144	3
425		4	max	119.408	3	3.073	9	7.198	1	0	1	.016	3	.095	2
426			min	-35.816	2	-30.738	2	-2.712	10	0	10	-.009	1	-.143	3
427		5	max	119.528	3	2.882	9	7.198	1	0	1	.015	3	.102	2
428			min	-35.656	2	-30.966	2	-2.712	10	0	10	-.008	1	-.141	3
429		6	max	119.648	3	2.692	9	7.198	1	0	1	.015	3	.109	2
430			min	-35.496	2	-31.195	2	-2.712	10	0	10	-.006	1	-.14	3
431		7	max	119.768	3	2.501	9	7.198	1	0	1	.014	3	.115	2
432			min	-35.336	2	-31.424	2	-2.712	10	0	10	-.005	1	-.138	3
433		8	max	119.889	3	2.31	9	7.198	1	0	1	.014	3	.122	2
434			min	-35.176	2	-31.652	2	-2.712	10	0	10	-.003	1	-.136	3
435		9	max	120.009	3	2.12	9	7.198	1	0	1	.013	3	.129	2
436			min	-35.016	2	-31.881	2	-2.712	10	0	10	-.002	1	-.135	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	120.129	3	1.929	9	7.198	1	0	1	.013	3	.136	2
438			min	-34.855	2	-32.11	2	-2.712	10	0	10	0	1	-.133	3
439		11	max	120.249	3	1.739	9	7.198	1	0	1	.012	3	.143	2
440			min	-34.695	2	-32.339	2	-2.712	10	0	10	0	10	-.131	3
441		12	max	120.369	3	1.548	9	7.198	1	0	1	.012	3	.15	2
442			min	-34.535	2	-32.567	2	-2.712	10	0	10	-.001	10	-.13	3
443		13	max	120.489	3	1.357	9	7.198	1	0	1	.011	3	.157	2
444			min	-34.375	2	-32.796	2	-2.712	10	0	10	-.002	10	-.128	3
445		14	max	120.609	3	1.167	9	7.198	1	0	1	.011	3	.164	2
446			min	-34.215	2	-33.025	2	-2.712	10	0	10	-.002	10	-.126	3
447		15	max	120.729	3	.976	9	7.198	1	0	1	.01	3	.172	2
448			min	-34.055	2	-33.254	2	-2.712	10	0	10	-.003	10	-.124	3
449		16	max	81.129	2	180.824	2	7.245	1	0	10	.01	3	.177	2
450			min	1.539	15	-210.093	3	-2.73	10	0	3	-.004	10	-.12	3
451		17	max	81.289	2	180.595	2	7.245	1	0	10	.011	1	.138	2
452			min	1.587	15	-210.265	3	-2.73	10	0	3	-.004	10	-.075	3
453		18	max	-1.559	10	317.741	2	7.517	1	0	2	.013	1	.069	2
454			min	-54.218	1	-171.381	3	-2.838	10	0	3	-.005	10	-.038	3
455		19	max	-1.425	10	317.512	2	7.517	1	0	2	.014	1	0	2
456			min	-54.058	1	-171.553	3	-2.838	10	0	3	-.005	10	0	3
457	M13	1	max	105.278	3	204.757	2	-1.401	10	0	2	.028	3	0	2
458			min	-2.723	10	-335.05	3	-54.071	1	0	3	-.005	10	0	3
459		2	max	105.278	3	148.809	2	.404	10	0	2	.023	3	.096	3
460			min	-2.723	10	-241.691	3	-39.592	1	0	3	-.008	2	-.059	2
461		3	max	105.278	3	92.862	2	2.21	10	0	2	.018	3	.161	3
462			min	-2.723	10	-148.333	3	-25.113	1	0	3	-.012	1	-.099	2
463		4	max	105.278	3	36.914	2	4.016	10	0	2	.013	3	.195	3
464			min	-2.723	10	-54.975	3	-13.677	3	0	3	-.018	1	-.121	2
465		5	max	105.278	3	38.384	3	9.129	2	0	2	.009	3	.198	3
466			min	-2.723	10	-19.034	2	-12.726	3	0	3	-.019	1	-.124	2
467		6	max	105.278	3	131.742	3	18.325	1	0	2	.005	3	.169	3
468			min	-2.723	10	-74.982	2	-11.775	3	0	3	-.016	1	-.108	2
469		7	max	105.278	3	225.101	3	32.804	1	0	2	.003	10	.11	3
470			min	-2.723	10	-130.929	2	-10.824	3	0	3	-.007	1	-.074	2
471		8	max	105.278	3	318.459	3	47.283	1	0	2	.01	2	.019	3
472			min	-2.723	10	-186.877	2	-9.873	3	0	3	-.003	3	-.021	2
473		9	max	105.278	3	411.817	3	61.762	1	0	2	.024	1	.051	2
474			min	-2.723	10	-242.825	2	-8.922	3	0	3	-.006	3	-.102	3
475		10	max	105.278	3	-5.048	15	76.241	1	0	2	.047	1	.141	2
476			min	-2.723	10	-505.176	3	3.227	15	0	3	-.025	3	-.255	3
477		11	max	7.23	1	242.825	2	10.117	3	0	3	.024	1	.051	2
478			min	-2.723	10	-411.817	3	-61.762	1	0	2	-.022	3	-.102	3
479		12	max	7.23	1	186.877	2	11.068	3	0	3	.01	2	.019	3
480			min	-2.723	10	-318.459	3	-47.283	1	0	2	-.018	3	-.021	2
481		13	max	7.23	1	130.929	2	12.019	3	0	3	.003	10	.11	3
482			min	-2.723	10	-225.1	3	-32.804	1	0	2	-.014	3	-.074	2
483		14	max	7.23	1	74.982	2	12.97	3	0	3	0	10	.169	3
484			min	-2.723	10	-131.742	3	-18.324	1	0	2	-.016	1	-.108	2
485		15	max	7.23	1	19.034	2	13.922	3	0	3	0	15	.198	3
486			min	-2.723	10	-38.384	3	-9.128	2	0	2	-.019	1	-.124	2
487		16	max	7.23	1	54.975	3	14.873	3	0	3	0	12	.195	3
488			min	-2.723	10	-36.914	2	-4.015	10	0	2	-.018	1	-.121	2
489		17	max	7.23	1	148.333	3	25.113	1	0	3	.004	3	.161	3
490			min	-2.723	10	-92.862	2	-2.21	10	0	2	-.012	1	-.099	2
491		18	max	7.23	1	241.692	3	39.592	1	0	3	.01	3	.096	3
492			min	-2.723	10	-148.809	2	-.404	10	0	2	-.008	2	-.059	2
493		19	max	7.23	1	335.05	3	54.071	1	0	3	.016	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
494			min	-2.723	10	-204.757	2	1.401	10	0	2	-.005	10	0	3
495	M16	1	max	2.838	10	317.579	2	-1.424	10	0	3	.014	1	0	2
496			min	-7.508	1	-171.596	3	-54.06	1	0	2	-.005	10	0	3
497		2	max	2.838	10	230.059	2	.381	10	0	3	.005	3	.05	3
498			min	-7.508	1	-125.596	3	-39.581	1	0	2	-.008	2	-.091	2
499		3	max	2.838	10	142.539	2	2.187	10	0	3	.001	3	.084	3
500			min	-7.508	1	-79.596	3	-25.102	1	0	2	-.012	1	-.153	2
501		4	max	2.838	10	55.019	2	3.992	10	0	3	0	15	.103	3
502			min	-7.508	1	-33.596	3	-10.623	1	0	2	-.018	1	-.186	2
503		5	max	2.838	10	12.404	3	9.099	2	0	3	0	15	.106	3
504			min	-7.508	1	-32.501	2	-8.293	3	0	2	-.019	1	-.19	2
505		6	max	2.838	10	58.404	3	18.335	1	0	3	0	10	.094	3
506			min	-7.508	1	-120.021	2	-7.342	3	0	2	-.016	1	-.165	2
507		7	max	2.838	10	104.404	3	32.815	1	0	3	.003	10	.067	3
508			min	-7.508	1	-207.541	2	-6.391	3	0	2	-.01	3	-.11	2
509		8	max	2.838	10	150.404	3	47.294	1	0	3	.01	2	.025	3
510			min	-7.508	1	-295.061	2	-5.44	3	0	2	-.012	3	-.026	2
511		9	max	2.838	10	196.404	3	61.773	1	0	3	.025	1	.087	2
512			min	-7.508	1	-382.581	2	-4.488	3	0	2	-.014	3	-.033	3
513		10	max	2.838	10	242.404	3	76.252	1	0	15	.048	1	.229	2
514			min	-7.508	1	-470.101	2	-3.537	3	0	2	-.015	3	-.106	3
515		11	max	2.838	10	382.581	2	2.2	3	0	2	.025	1	.087	2
516			min	-7.508	1	-196.404	3	-61.773	1	0	3	-.005	3	-.033	3
517		12	max	2.838	10	295.061	2	3.151	3	0	2	.01	2	.025	3
518			min	-7.508	1	-150.404	3	-47.294	1	0	3	-.004	3	-.026	2
519		13	max	2.838	10	207.541	2	4.102	3	0	2	.003	10	.067	3
520			min	-7.508	1	-104.404	3	-32.814	1	0	3	-.007	1	-.11	2
521		14	max	2.838	10	120.021	2	5.053	3	0	2	0	10	.094	3
522			min	-7.508	1	-58.404	3	-18.335	1	0	3	-.016	1	-.165	2
523		15	max	2.838	10	32.501	2	6.004	3	0	2	0	3	.106	3
524			min	-7.508	1	-12.404	3	-9.099	2	0	3	-.019	1	-.19	2
525		16	max	2.838	10	33.596	3	10.623	1	0	2	.003	3	.103	3
526			min	-7.508	1	-55.019	2	-3.992	10	0	3	-.018	1	-.186	2
527		17	max	2.838	10	79.596	3	25.102	1	0	2	.005	3	.084	3
528			min	-7.508	1	-142.539	2	-2.187	10	0	3	-.012	1	-.153	2
529		18	max	2.838	10	125.596	3	39.581	1	0	2	.008	3	.05	3
530			min	-7.508	1	-230.059	2	-.381	10	0	3	-.008	2	-.091	2
531		19	max	2.838	10	171.596	3	54.06	1	0	2	.014	1	0	2
532			min	-7.508	1	-317.579	2	1.425	10	0	3	-.005	10	0	3
533	M15	1	max	0	1	.648	3	.184	3	0	1	0	1	0	1
534			min	-168.589	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.576	3	.184	3	0	1	0	1	0	1
536			min	-168.664	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.504	3	.184	3	0	1	0	1	0	1
538			min	-168.74	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.432	3	.184	3	0	1	0	1	0	1
540			min	-168.815	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.36	3	.184	3	0	1	0	1	0	1
542			min	-168.891	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.288	3	.184	3	0	1	0	1	0	1
544			min	-168.966	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.216	3	.184	3	0	1	0	3	0	1
546			min	-169.042	3	0	1	0	1	0	3	0	1	0	3
547		8	max	0	1	.144	3	.184	3	0	1	0	3	0	1
548			min	-169.117	3	0	1	0	1	0	3	0	1	0	3
549		9	max	0	1	.072	3	.184	3	0	1	0	3	0	1
550			min	-169.193	3	0	1	0	1	0	3	0	1	0	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	1	0	1	.184	3	0	1	0	3	0	1
552			min	-169.268	3	0	1	0	1	0	3	0	1	0	3
553		11	max	0	1	0	1	.184	3	0	1	0	3	0	1
554			min	-169.344	3	-.072	3	0	1	0	3	0	1	0	3
555		12	max	0	1	0	1	.184	3	0	1	0	3	0	1
556			min	-169.42	3	-.144	3	0	1	0	3	0	1	0	3
557		13	max	0	1	0	1	.184	3	0	1	0	3	0	1
558			min	-169.495	3	-.216	3	0	1	0	3	0	1	0	3
559		14	max	0	1	0	1	.184	3	0	1	0	3	0	1
560			min	-169.571	3	-.288	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.184	3	0	1	0	3	0	1
562			min	-169.646	3	-.36	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.184	3	0	1	0	3	0	1
564			min	-169.722	3	-.432	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.184	3	0	1	0	3	0	1
566			min	-169.797	3	-.504	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.184	3	0	1	0	3	0	1
568			min	-169.873	3	-.576	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.184	3	0	1	0	3	0	1
570			min	-169.948	3	-.648	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	1	1.109	4	.009	9	0	3	0	3	0	1
572			min	-167.225	3	0	1	-.078	3	0	9	0	9	0	1
573		2	max	0	1	.986	4	.009	9	0	3	0	3	0	1
574			min	-167.149	3	0	1	-.078	3	0	9	0	9	0	4
575		3	max	0	1	.863	4	.009	9	0	3	0	3	0	1
576			min	-167.074	3	0	1	-.078	3	0	9	0	9	0	4
577		4	max	0	1	.739	4	.009	9	0	3	0	3	0	1
578			min	-166.998	3	0	1	-.078	3	0	9	0	9	0	4
579		5	max	0	1	.616	4	.009	9	0	3	0	3	0	1
580			min	-166.923	3	0	1	-.078	3	0	9	0	9	0	4
581		6	max	0	1	.493	4	.009	9	0	3	0	3	0	1
582			min	-166.847	3	0	1	-.078	3	0	9	0	9	-.001	4
583		7	max	0	1	.37	4	.009	9	0	3	0	3	0	1
584			min	-166.771	3	0	1	-.078	3	0	9	0	9	-.001	4
585		8	max	0	1	.246	4	.009	9	0	3	0	3	0	1
586			min	-166.696	3	0	1	-.078	3	0	9	0	9	-.001	4
587		9	max	0	1	.123	4	.009	9	0	3	0	3	0	1
588			min	-166.62	3	0	1	-.078	3	0	9	0	9	-.001	4
589		10	max	0	1	0	1	.009	9	0	3	0	3	0	1
590			min	-166.545	3	0	1	-.078	3	0	9	0	9	-.001	4
591		11	max	.113	4	0	1	.009	9	0	3	0	3	0	1
592			min	-166.469	3	-.123	4	-.078	3	0	9	0	9	-.001	4
593		12	max	.242	4	0	1	.009	9	0	3	0	3	0	1
594			min	-166.394	3	-.246	4	-.078	3	0	9	0	4	-.001	4
595		13	max	.371	4	0	1	.009	9	0	3	0	1	0	1
596			min	-166.318	3	-.37	4	-.078	3	0	9	0	3	-.001	4
597		14	max	.5	4	0	1	.009	9	0	3	0	1	0	1
598			min	-166.243	3	-.493	4	-.078	3	0	9	0	3	-.001	4
599		15	max	.63	4	0	1	.009	9	0	3	0	9	0	1
600			min	-166.167	3	-.616	4	-.078	3	0	9	0	3	0	4
601		16	max	.759	4	0	1	.009	9	0	3	0	9	0	1
602			min	-166.092	3	-.739	4	-.078	3	0	9	0	3	0	4
603		17	max	.888	4	0	1	.009	9	0	3	0	9	0	1
604			min	-166.016	3	-.863	4	-.078	3	0	9	0	3	0	4
605		18	max	1.017	4	0	1	.009	9	0	3	0	9	0	1
606			min	-165.941	3	-.986	4	-.078	3	0	9	0	3	0	4
607		19	max	1.146	4	0	1	.009	9	0	3	0	9	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-165.865	3	-1.109	4	-.078	3	0	9	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.002	2	.011	2	0	9	4.552e-5	10	NC	3	NC	1
2			min	-.004	3	-.011	3	-.003	3	-2.53e-4	3	3924.883	2	NC	1
3		2	max	.002	2	.01	2	0	9	4.334e-5	10	NC	3	NC	1
4			min	-.004	3	-.011	3	-.003	3	-2.391e-4	3	4292.811	2	NC	1
5		3	max	.002	2	.009	2	0	9	4.116e-5	10	NC	3	NC	1
6			min	-.003	3	-.01	3	-.003	3	-2.252e-4	3	4732.079	2	NC	1
7		4	max	.002	2	.008	2	0	9	3.897e-5	10	NC	1	NC	1
8			min	-.003	3	-.01	3	-.002	3	-2.113e-4	3	5260.135	2	NC	1
9		5	max	.001	2	.007	2	0	9	3.679e-5	10	NC	1	NC	1
10			min	-.003	3	-.009	3	-.002	3	-1.974e-4	3	5900.294	2	NC	1
11		6	max	.001	2	.006	2	0	9	3.46e-5	10	NC	1	NC	1
12			min	-.003	3	-.009	3	-.002	3	-1.835e-4	3	6684.218	2	NC	1
13		7	max	.001	2	.006	2	0	9	3.242e-5	10	NC	1	NC	1
14			min	-.002	3	-.008	3	-.002	3	-1.696e-4	3	7655.721	2	NC	1
15		8	max	.001	2	.005	2	0	9	3.024e-5	10	NC	1	NC	1
16			min	-.002	3	-.008	3	-.001	3	-1.558e-4	3	8876.773	2	NC	1
17		9	max	.001	2	.004	2	0	9	2.805e-5	10	NC	1	NC	1
18			min	-.002	3	-.007	3	-.001	3	-1.419e-4	3	NC	1	NC	1
19		10	max	0	2	.003	2	0	9	2.587e-5	10	NC	1	NC	1
20			min	-.002	3	-.007	3	0	3	-1.28e-4	3	NC	1	NC	1
21		11	max	0	2	.003	2	0	9	2.369e-5	10	NC	1	NC	1
22			min	-.002	3	-.006	3	0	3	-1.141e-4	3	NC	1	NC	1
23		12	max	0	2	.002	2	0	9	2.15e-5	10	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-1.002e-4	3	NC	1	NC	1
25		13	max	0	2	.002	2	0	9	1.932e-5	10	NC	1	NC	1
26			min	-.001	3	-.005	3	0	3	-8.631e-5	3	NC	1	NC	1
27		14	max	0	2	.001	2	0	9	1.713e-5	10	NC	1	NC	1
28			min	-.001	3	-.004	3	0	3	-7.242e-5	3	NC	1	NC	1
29		15	max	0	2	0	2	0	9	1.495e-5	10	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-5.853e-5	3	NC	1	NC	1
31		16	max	0	2	0	2	0	9	1.277e-5	10	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.464e-5	3	NC	1	NC	1
33		17	max	0	2	0	2	0	9	1.058e-5	10	NC	1	NC	1
34			min	0	3	-.002	3	0	3	-3.075e-5	3	NC	1	NC	1
35		18	max	0	2	0	2	0	9	8.4e-6	10	NC	1	NC	1
36			min	0	3	0	3	0	3	-2.311e-5	9	NC	1	NC	1
37		19	max	0	1	0	1	0	1	6.216e-6	10	NC	1	NC	1
38			min	0	1	0	1	0	1	-1.779e-5	9	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	8.548e-6	9	NC	1	NC	1
40			min	0	1	0	1	0	1	-2.994e-6	10	NC	1	NC	1
41		2	max	0	3	0	2	0	10	1.142e-5	9	NC	1	NC	1
42			min	0	2	0	3	0	9	-4.182e-6	10	NC	1	NC	1
43		3	max	0	3	0	2	0	3	1.437e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	9	-5.369e-6	10	NC	1	NC	1
45		4	max	0	3	0	2	0	3	1.761e-5	1	NC	1	NC	1
46			min	0	2	-.003	3	0	9	-6.557e-6	10	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.085e-5	1	NC	1	NC	1
48			min	0	2	-.004	3	0	9	-7.745e-6	10	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.408e-5	1	NC	1	NC	1
50			min	0	2	-.005	3	0	9	-8.933e-6	10	NC	1	NC	1
51		7	max	0	3	0	2	0	3	2.732e-5	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	10	-1.012e-5	10	NC	1	NC	1
53		8	max	0	3	.001	2	0	3	3.056e-5	1	NC	1	NC	1
54			min	-.001	2	-.006	3	0	10	-1.131e-5	10	NC	1	NC	1
55		9	max	.001	3	.001	2	0	3	3.379e-5	1	NC	1	NC	1
56			min	-.001	2	-.007	3	0	10	-1.25e-5	10	NC	1	NC	1
57		10	max	.001	3	.002	2	0	3	3.703e-5	1	NC	1	NC	1
58			min	-.001	2	-.007	3	0	10	-1.368e-5	10	NC	1	NC	1
59		11	max	.001	3	.002	2	0	3	4.027e-5	1	NC	1	NC	1
60			min	-.002	2	-.008	3	0	10	-1.487e-5	10	NC	1	NC	1
61		12	max	.002	3	.003	2	0	3	4.35e-5	1	NC	1	NC	1
62			min	-.002	2	-.008	3	0	10	-1.606e-5	10	NC	1	NC	1
63		13	max	.002	3	.004	2	.001	3	4.724e-5	3	NC	1	NC	1
64			min	-.002	2	-.008	3	0	10	-1.725e-5	10	NC	1	NC	1
65		14	max	.002	3	.004	2	.001	3	5.103e-5	3	NC	1	NC	1
66			min	-.002	2	-.009	3	0	10	-1.844e-5	10	NC	1	NC	1
67		15	max	.002	3	.005	2	.001	3	5.482e-5	3	NC	1	NC	1
68			min	-.002	2	-.009	3	0	10	-1.962e-5	10	8557.174	2	NC	1
69		16	max	.002	3	.006	2	.002	3	5.861e-5	3	NC	1	NC	1
70			min	-.002	2	-.009	3	0	10	-2.081e-5	10	7264.34	2	NC	1
71		17	max	.002	3	.007	2	.002	3	6.24e-5	3	NC	1	NC	1
72			min	-.002	2	-.009	3	0	10	-2.2e-5	10	6261.651	2	NC	1
73		18	max	.002	3	.008	2	.002	3	6.619e-5	3	NC	1	NC	1
74			min	-.003	2	-.009	3	0	10	-2.319e-5	10	5475.275	2	NC	1
75		19	max	.003	3	.009	2	.002	3	6.998e-5	3	NC	3	NC	1
76			min	-.003	2	-.009	3	0	10	-2.437e-5	10	4853.133	2	NC	1
77	M4	1	max	0	1	.012	2	0	10	3.053e-5	10	NC	1	NC	1
78			min	0	15	-.011	3	-.002	3	-8.119e-5	1	NC	1	NC	1
79		2	max	0	1	.012	2	0	10	3.053e-5	10	NC	1	NC	1
80			min	0	15	-.01	3	-.002	3	-8.119e-5	1	NC	1	NC	1
81		3	max	0	1	.011	2	0	10	3.053e-5	10	NC	1	NC	1
82			min	0	15	-.01	3	-.002	3	-8.119e-5	1	NC	1	NC	1
83		4	max	0	1	.01	2	0	10	3.053e-5	10	NC	1	NC	1
84			min	0	15	-.009	3	-.001	3	-8.119e-5	1	NC	1	NC	1
85		5	max	0	1	.01	2	0	10	3.053e-5	10	NC	1	NC	1
86			min	0	15	-.009	3	-.001	3	-8.119e-5	1	NC	1	NC	1
87		6	max	0	1	.009	2	0	10	3.053e-5	10	NC	1	NC	1
88			min	0	15	-.008	3	-.001	3	-8.119e-5	1	NC	1	NC	1
89		7	max	0	1	.008	2	0	10	3.053e-5	10	NC	1	NC	1
90			min	0	15	-.007	3	0	3	-8.119e-5	1	NC	1	NC	1
91		8	max	0	1	.008	2	0	10	3.053e-5	10	NC	1	NC	1
92			min	0	15	-.007	3	0	3	-8.119e-5	1	NC	1	NC	1
93		9	max	0	1	.007	2	0	10	3.053e-5	10	NC	1	NC	1
94			min	0	15	-.006	3	0	3	-8.119e-5	1	NC	1	NC	1
95		10	max	0	1	.006	2	0	10	3.053e-5	10	NC	1	NC	1
96			min	0	15	-.006	3	0	3	-8.119e-5	1	NC	1	NC	1
97		11	max	0	1	.006	2	0	10	3.053e-5	10	NC	1	NC	1
98			min	0	15	-.005	3	0	3	-8.119e-5	1	NC	1	NC	1
99		12	max	0	1	.005	2	0	10	3.053e-5	10	NC	1	NC	1
100			min	0	15	-.004	3	0	3	-8.119e-5	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	10	3.053e-5	10	NC	1	NC	1
102			min	0	15	-.004	3	0	3	-8.119e-5	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	10	3.053e-5	10	NC	1	NC	1
104			min	0	15	-.003	3	0	3	-8.119e-5	1	NC	1	NC	1
105		15	max	0	1	.003	2	0	10	3.053e-5	10	NC	1	NC	1
106			min	0	15	-.002	3	0	3	-8.119e-5	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	10	3.053e-5	10	NC	1	NC	1
108			min	0	15	-.002	3	0	3	-8.119e-5	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	10	3.053e-5	10	NC	1	NC	1
110			min	0	15	-.001	3	0	3	-8.119e-5	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	3.053e-5	10	NC	1	NC	1
112			min	0	15	0	3	0	3	-8.119e-5	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	3.053e-5	10	NC	1	NC	1
114			min	0	1	0	1	0	1	-8.119e-5	1	NC	1	NC	1
115	M6	1	max	.006	2	.03	2	0	9	5.667e-4	3	NC	3	NC	1
116			min	-.01	3	-.03	3	-.008	3	-2.401e-7	9	1398.14	2	5303.046	3
117		2	max	.005	2	.028	2	0	9	5.488e-4	3	NC	3	NC	1
118			min	-.009	3	-.028	3	-.008	3	-5.066e-7	9	1499.896	2	5598.831	3
119		3	max	.005	2	.026	2	0	9	5.309e-4	3	NC	3	NC	1
120			min	-.009	3	-.027	3	-.007	3	-7.731e-7	9	1617.017	2	5955.54	3
121		4	max	.005	2	.024	2	0	9	5.13e-4	3	NC	3	NC	1
122			min	-.008	3	-.025	3	-.007	3	-1.04e-6	9	1752.592	2	6385.534	3
123		5	max	.004	2	.022	2	0	9	4.95e-4	3	NC	3	NC	1
124			min	-.008	3	-.024	3	-.006	3	-1.306e-6	9	1910.605	2	6905.382	3
125		6	max	.004	2	.02	2	0	9	4.771e-4	3	NC	3	NC	1
126			min	-.007	3	-.022	3	-.006	3	-1.572e-6	9	2096.276	2	7537.538	3
127		7	max	.004	2	.018	2	0	9	4.592e-4	3	NC	3	NC	1
128			min	-.007	3	-.021	3	-.005	3	-1.839e-6	9	2316.567	2	8312.913	3
129		8	max	.003	2	.016	2	0	9	4.412e-4	3	NC	3	NC	1
130			min	-.006	3	-.019	3	-.005	3	-2.105e-6	9	2580.976	2	9274.926	3
131		9	max	.003	2	.015	2	0	9	4.233e-4	3	NC	3	NC	1
132			min	-.006	3	-.017	3	-.004	3	-2.372e-6	9	2902.794	2	NC	1
133		10	max	.003	2	.013	2	0	9	4.054e-4	3	NC	3	NC	1
134			min	-.005	3	-.016	3	-.004	3	-2.638e-6	9	3301.214	2	NC	1
135		11	max	.002	2	.011	2	0	9	3.875e-4	3	NC	3	NC	1
136			min	-.004	3	-.014	3	-.003	3	-2.905e-6	9	3805.002	2	NC	1
137		12	max	.002	2	.01	2	0	9	3.695e-4	3	NC	3	NC	1
138			min	-.004	3	-.012	3	-.003	3	-3.171e-6	9	4459.33	2	NC	1
139		13	max	.002	2	.008	2	0	9	3.516e-4	3	NC	1	NC	1
140			min	-.003	3	-.011	3	-.002	3	-3.438e-6	9	5339.43	2	NC	1
141		14	max	.002	2	.006	2	0	9	3.337e-4	3	NC	1	NC	1
142			min	-.003	3	-.009	3	-.002	3	-3.704e-6	9	6580.625	2	NC	1
143		15	max	.001	2	.005	2	0	9	3.158e-4	3	NC	1	NC	1
144			min	-.002	3	-.007	3	-.001	3	-3.971e-6	9	8453.423	2	NC	1
145		16	max	0	2	.004	2	0	9	2.978e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-4.237e-6	9	NC	1	NC	1
147		17	max	0	2	.002	2	0	9	2.799e-4	3	NC	1	NC	1
148			min	-.001	3	-.004	3	0	3	-4.504e-6	9	NC	1	NC	1
149		18	max	0	2	.001	2	0	9	2.62e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-4.77e-6	9	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.441e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.036e-6	9	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.405e-6	9	NC	1	NC	1
154			min	0	1	0	1	0	1	-1.162e-4	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	2.201e-6	9	NC	1	NC	1
156			min	0	2	-.002	3	0	9	-8.783e-5	3	NC	1	NC	1
157		3	max	0	3	.002	2	.001	3	1.996e-6	9	NC	1	NC	1
158			min	0	2	-.004	3	0	9	-5.948e-5	3	NC	1	NC	1
159		4	max	.001	3	.003	2	.002	3	1.792e-6	9	NC	1	NC	1
160			min	-.001	2	-.006	3	0	9	-3.113e-5	3	NC	1	NC	1
161		5	max	.001	3	.005	2	.002	3	1.588e-6	9	NC	1	NC	1
162			min	-.002	2	-.007	3	0	9	-2.782e-6	3	NC	1	NC	1
163		6	max	.002	3	.006	2	.002	3	2.557e-5	3	NC	1	NC	1
164			min	-.002	2	-.009	3	0	9	0	5	8056.551	2	NC	1
165		7	max	.002	3	.007	2	.003	3	5.392e-5	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.011	3	0	9	0	5	6666.518	2	NC	1
167		8	max	.002	3	.008	2	.003	3	8.227e-5	3	NC	1	NC	1
168			min	-.003	2	-.012	3	0	9	0	5	5645.726	2	NC	1
169		9	max	.003	3	.009	2	.003	3	1.106e-4	3	NC	1	NC	1
170			min	-.003	2	-.014	3	0	9	0	5	4860.513	2	NC	1
171		10	max	.003	3	.011	2	.003	3	1.39e-4	3	NC	3	NC	1
172			min	-.004	2	-.015	3	0	9	0	5	4236.682	2	NC	1
173		11	max	.004	3	.012	2	.004	3	1.673e-4	3	NC	3	NC	1
174			min	-.004	2	-.017	3	0	9	0	15	3729.533	2	NC	1
175		12	max	.004	3	.014	2	.004	3	1.957e-4	3	NC	3	NC	1
176			min	-.005	2	-.018	3	0	9	0	15	3310.313	2	NC	1
177		13	max	.004	3	.016	2	.004	3	2.24e-4	3	NC	3	NC	1
178			min	-.005	2	-.019	3	0	9	-4.634e-8	9	2959.496	2	NC	1
179		14	max	.005	3	.017	2	.004	3	2.524e-4	3	NC	3	NC	1
180			min	-.005	2	-.02	3	0	9	-2.506e-7	9	2663.215	2	NC	1
181		15	max	.005	3	.019	2	.004	3	2.807e-4	3	NC	3	NC	1
182			min	-.006	2	-.021	3	0	9	-4.549e-7	9	2411.255	2	NC	1
183		16	max	.005	3	.021	2	.004	3	3.091e-4	3	NC	3	NC	1
184			min	-.006	2	-.022	3	0	9	-6.591e-7	9	2195.862	2	NC	1
185		17	max	.006	3	.023	2	.004	3	3.374e-4	3	NC	3	NC	1
186			min	-.007	2	-.023	3	0	9	-8.634e-7	9	2011.016	2	NC	1
187		18	max	.006	3	.025	2	.004	3	3.658e-4	3	NC	3	NC	1
188			min	-.007	2	-.024	3	0	9	-1.068e-6	9	1851.958	2	NC	1
189		19	max	.006	3	.027	2	.004	3	3.941e-4	3	NC	3	NC	1
190			min	-.007	2	-.025	3	0	9	-1.272e-6	9	1714.881	2	NC	1
191	M8	1	max	.003	2	.035	2	0	9	-5.27e-8	15	NC	1	NC	1
192			min	0	15	-.03	3	-.003	3	-2.674e-4	3	NC	1	6955.533	3
193		2	max	.002	2	.033	2	0	9	-5.27e-8	15	NC	1	NC	1
194			min	0	15	-.028	3	-.003	3	-2.674e-4	3	NC	1	7583.727	3
195		3	max	.002	2	.031	2	0	9	-5.27e-8	15	NC	1	NC	1
196			min	0	15	-.027	3	-.002	3	-2.674e-4	3	NC	1	8331.578	3
197		4	max	.002	2	.029	2	0	9	-5.27e-8	15	NC	1	NC	1
198			min	0	15	-.025	3	-.002	3	-2.674e-4	3	NC	1	9230.607	3
199		5	max	.002	2	.027	2	0	9	-5.27e-8	15	NC	1	NC	1
200			min	0	15	-.023	3	-.002	3	-2.674e-4	3	NC	1	NC	1
201		6	max	.002	2	.025	2	0	9	-5.27e-8	15	NC	1	NC	1
202			min	0	15	-.022	3	-.002	3	-2.674e-4	3	NC	1	NC	1
203		7	max	.002	2	.023	2	0	9	-5.27e-8	15	NC	1	NC	1
204			min	0	15	-.02	3	-.001	3	-2.674e-4	3	NC	1	NC	1
205		8	max	.002	2	.022	2	0	9	-5.27e-8	15	NC	1	NC	1
206			min	0	15	-.018	3	-.001	3	-2.674e-4	3	NC	1	NC	1
207		9	max	.001	2	.02	2	0	9	-5.27e-8	15	NC	1	NC	1
208			min	0	15	-.017	3	-.001	3	-2.674e-4	3	NC	1	NC	1
209		10	max	.001	2	.018	2	0	9	-5.27e-8	15	NC	1	NC	1
210			min	0	15	-.015	3	0	3	-2.674e-4	3	NC	1	NC	1
211		11	max	.001	2	.016	2	0	9	-5.27e-8	15	NC	1	NC	1
212			min	0	15	-.013	3	0	3	-2.674e-4	3	NC	1	NC	1
213		12	max	.001	2	.014	2	0	9	-5.27e-8	15	NC	1	NC	1
214			min	0	15	-.012	3	0	3	-2.674e-4	3	NC	1	NC	1
215		13	max	0	2	.012	2	0	9	-5.27e-8	15	NC	1	NC	1
216			min	0	15	-.01	3	0	3	-2.674e-4	3	NC	1	NC	1
217		14	max	0	2	.01	2	0	9	-5.27e-8	15	NC	1	NC	1
218			min	0	15	-.008	3	0	3	-2.674e-4	3	NC	1	NC	1
219		15	max	0	2	.008	2	0	9	-5.27e-8	15	NC	1	NC	1
220			min	0	15	-.007	3	0	3	-2.674e-4	3	NC	1	NC	1
221		16	max	0	2	.006	2	0	9	-5.27e-8	15	NC	1	NC	1
222			min	0	15	-.005	3	0	3	-2.674e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	2	.004	2	0	9	-5.27e-8	15	NC	1	NC	1
224			min	0	15	-.003	3	0	3	-2.674e-4	3	NC	1	NC	1
225		18	max	0	2	.002	2	0	9	-5.27e-8	15	NC	1	NC	1
226			min	0	15	-.002	3	0	3	-2.674e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-5.27e-8	15	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.674e-4	3	NC	1	NC	1
229	M10	1	max	.002	2	.011	2	0	10	1.191e-4	1	NC	3	NC	1
230			min	-.002	3	-.011	3	0	3	-6.375e-4	3	3927.767	2	NC	1
231		2	max	.002	2	.01	2	0	10	1.134e-4	1	NC	3	NC	1
232			min	-.002	3	-.011	3	0	1	-6.141e-4	3	4296.066	2	NC	1
233		3	max	.002	2	.009	2	0	10	1.077e-4	1	NC	3	NC	1
234			min	-.002	3	-.01	3	0	1	-5.908e-4	3	4735.801	2	NC	1
235		4	max	.002	2	.008	2	0	10	1.02e-4	1	NC	1	NC	1
236			min	-.002	3	-.01	3	0	1	-5.674e-4	3	5264.443	2	NC	1
237		5	max	.002	2	.007	2	0	10	9.632e-5	1	NC	1	NC	1
238			min	-.002	3	-.009	3	0	1	-5.44e-4	3	5905.35	2	NC	1
239		6	max	.001	2	.006	2	0	10	9.061e-5	1	NC	1	NC	1
240			min	-.002	3	-.009	3	0	1	-5.206e-4	3	6690.239	2	NC	1
241		7	max	.001	2	.006	2	0	3	8.49e-5	1	NC	1	NC	1
242			min	-.002	3	-.008	3	0	1	-4.972e-4	3	7663.006	2	NC	1
243		8	max	.001	2	.005	2	0	3	7.919e-5	1	NC	1	NC	1
244			min	-.001	3	-.008	3	0	1	-4.738e-4	3	8885.744	2	NC	1
245		9	max	.001	2	.004	2	0	3	7.349e-5	1	NC	1	NC	1
246			min	-.001	3	-.007	3	0	1	-4.504e-4	3	NC	1	NC	1
247		10	max	0	2	.003	2	0	3	6.778e-5	1	NC	1	NC	1
248			min	-.001	3	-.007	3	0	1	-4.27e-4	3	NC	1	NC	1
249		11	max	0	2	.003	2	0	3	6.207e-5	1	NC	1	NC	1
250			min	-.001	3	-.006	3	0	1	-4.036e-4	3	NC	1	NC	1
251		12	max	0	2	.002	2	0	3	5.636e-5	1	NC	1	NC	1
252			min	0	3	-.005	3	0	1	-3.802e-4	3	NC	1	NC	1
253		13	max	0	2	.002	2	0	3	5.066e-5	1	NC	1	NC	1
254			min	0	3	-.005	3	0	1	-3.568e-4	3	NC	1	NC	1
255		14	max	0	2	.001	2	0	3	4.495e-5	1	NC	1	NC	1
256			min	0	3	-.004	3	0	1	-3.334e-4	3	NC	1	NC	1
257		15	max	0	2	0	2	0	3	3.924e-5	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-3.1e-4	3	NC	1	NC	1
259		16	max	0	2	0	2	0	3	3.353e-5	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-2.866e-4	3	NC	1	NC	1
261		17	max	0	2	0	2	0	3	2.783e-5	1	NC	1	NC	1
262			min	0	3	-.002	3	0	1	-2.632e-4	3	NC	1	NC	1
263		18	max	0	2	0	2	0	3	2.212e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-2.398e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.641e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.164e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	1.036e-4	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-7.902e-6	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	7.74e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.112e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	1	5.116e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.434e-5	1	NC	1	NC	1
273		4	max	0	3	0	2	0	1	2.492e-5	3	NC	1	NC	1
274			min	0	2	-.003	3	-.001	3	-1.757e-5	1	NC	1	NC	1
275		5	max	0	3	0	2	0	1	7.793e-6	10	NC	1	NC	1
276			min	0	2	-.004	3	-.002	3	-2.079e-5	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	8.994e-6	10	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-2.755e-5	3	NC	1	NC	1
279		7	max	0	3	0	2	0	10	1.019e-5	10	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.002	3	-5.378e-5	3	NC	1	NC	1
281		8	max	.001	3	.001	2	0	10	1.139e-5	10	NC	1	NC	1
282			min	-.001	2	-.006	3	-.002	3	-8.002e-5	3	NC	1	NC	1
283		9	max	.001	3	.001	2	0	10	1.259e-5	10	NC	1	NC	1
284			min	-.001	2	-.007	3	-.003	3	-1.063e-4	3	NC	1	NC	1
285		10	max	.001	3	.002	2	0	10	1.379e-5	10	NC	1	NC	1
286			min	-.001	2	-.007	3	-.003	3	-1.325e-4	3	NC	1	NC	1
287		11	max	.001	3	.002	2	0	10	1.499e-5	10	NC	1	NC	1
288			min	-.002	2	-.008	3	-.003	3	-1.587e-4	3	NC	1	NC	1
289		12	max	.002	3	.003	2	0	10	1.619e-5	10	NC	1	NC	1
290			min	-.002	2	-.008	3	-.003	3	-1.85e-4	3	NC	1	NC	1
291		13	max	.002	3	.004	2	0	10	1.739e-5	10	NC	1	NC	1
292			min	-.002	2	-.008	3	-.003	3	-2.112e-4	3	NC	1	NC	1
293		14	max	.002	3	.004	2	0	10	1.859e-5	10	NC	1	NC	1
294			min	-.002	2	-.009	3	-.003	3	-2.374e-4	3	NC	1	NC	1
295		15	max	.002	3	.005	2	0	10	1.98e-5	10	NC	1	NC	1
296			min	-.002	2	-.009	3	-.003	3	-2.637e-4	3	8567.459	2	NC	1
297		16	max	.002	3	.006	2	0	10	2.1e-5	10	NC	1	NC	1
298			min	-.002	2	-.009	3	-.003	3	-2.899e-4	3	7272.275	2	NC	1
299		17	max	.002	3	.007	2	0	10	2.22e-5	10	NC	1	NC	1
300			min	-.002	2	-.009	3	-.003	3	-3.161e-4	3	6267.934	2	NC	1
301		18	max	.002	3	.008	2	0	10	2.34e-5	10	NC	1	NC	1
302			min	-.003	2	-.009	3	-.002	3	-3.424e-4	3	5480.376	2	NC	1
303		19	max	.003	3	.009	2	0	10	2.46e-5	10	NC	3	NC	1
304			min	-.003	2	-.009	3	-.002	3	-3.686e-4	3	4857.373	2	NC	1
305	M12	1	max	0	1	.012	2	.001	3	4.448e-4	3	NC	1	NC	1
306			min	0	15	-.011	3	0	10	-3.082e-5	10	NC	1	NC	1
307		2	max	0	1	.012	2	.001	3	4.448e-4	3	NC	1	NC	1
308			min	0	15	-.011	3	0	10	-3.082e-5	10	NC	1	NC	1
309		3	max	0	1	.011	2	.001	3	4.448e-4	3	NC	1	NC	1
310			min	0	15	-.01	3	0	10	-3.082e-5	10	NC	1	NC	1
311		4	max	0	1	.01	2	0	3	4.448e-4	3	NC	1	NC	1
312			min	0	15	-.009	3	0	10	-3.082e-5	10	NC	1	NC	1
313		5	max	0	1	.01	2	0	3	4.448e-4	3	NC	1	NC	1
314			min	0	15	-.009	3	0	10	-3.082e-5	10	NC	1	NC	1
315		6	max	0	1	.009	2	0	3	4.448e-4	3	NC	1	NC	1
316			min	0	15	-.008	3	0	10	-3.082e-5	10	NC	1	NC	1
317		7	max	0	1	.008	2	0	3	4.448e-4	3	NC	1	NC	1
318			min	0	15	-.007	3	0	10	-3.082e-5	10	NC	1	NC	1
319		8	max	0	1	.008	2	0	3	4.448e-4	3	NC	1	NC	1
320			min	0	15	-.007	3	0	10	-3.082e-5	10	NC	1	NC	1
321		9	max	0	1	.007	2	0	3	4.448e-4	3	NC	1	NC	1
322			min	0	15	-.006	3	0	10	-3.082e-5	10	NC	1	NC	1
323		10	max	0	1	.006	2	0	3	4.448e-4	3	NC	1	NC	1
324			min	0	15	-.006	3	0	10	-3.082e-5	10	NC	1	NC	1
325		11	max	0	1	.006	2	0	3	4.448e-4	3	NC	1	NC	1
326			min	0	15	-.005	3	0	10	-3.082e-5	10	NC	1	NC	1
327		12	max	0	1	.005	2	0	3	4.448e-4	3	NC	1	NC	1
328			min	0	15	-.004	3	0	10	-3.082e-5	10	NC	1	NC	1
329		13	max	0	1	.004	2	0	3	4.448e-4	3	NC	1	NC	1
330			min	0	15	-.004	3	0	10	-3.082e-5	10	NC	1	NC	1
331		14	max	0	1	.003	2	0	3	4.448e-4	3	NC	1	NC	1
332			min	0	15	-.003	3	0	10	-3.082e-5	10	NC	1	NC	1
333		15	max	0	1	.003	2	0	3	4.448e-4	3	NC	1	NC	1
334			min	0	15	-.002	3	0	10	-3.082e-5	10	NC	1	NC	1
335		16	max	0	1	.002	2	0	3	4.448e-4	3	NC	1	NC	1
336			min	0	15	-.002	3	0	10	-3.082e-5	10	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	3	4.448e-4	3	NC	1	NC	1
338			min	0	15	-.001	3	0	10	-3.082e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	3	4.448e-4	3	NC	1	NC	1
340			min	0	15	0	3	0	10	-3.082e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	4.448e-4	3	NC	1	NC	1
342			min	0	1	0	1	0	1	-3.082e-5	10	NC	1	NC	1
343	M1	1	max	.01	3	.027	3	.005	3	3.921e-3	2	NC	1	NC	1
344			min	-.01	2	-.021	2	0	9	-5.817e-3	3	NC	1	NC	1
345		2	max	.01	3	.016	3	.004	3	1.951e-3	2	NC	4	NC	1
346			min	-.01	2	-.013	2	0	9	-2.859e-3	3	5558.076	2	NC	1
347		3	max	.01	3	.007	3	.003	3	4.48e-5	3	NC	4	NC	1
348			min	-.01	2	-.005	2	0	9	-5.761e-5	9	2818.391	3	NC	1
349		4	max	.01	3	.002	2	.002	3	4.791e-5	3	NC	4	NC	1
350			min	-.01	2	-.002	3	-.001	9	-4.871e-5	9	1888.413	3	NC	1
351		5	max	.01	3	.009	2	.002	3	5.101e-5	3	NC	4	NC	1
352			min	-.01	2	-.008	3	-.001	9	-3.982e-5	9	1478.701	3	NC	1
353		6	max	.01	3	.014	2	.002	3	5.412e-5	3	NC	4	NC	1
354			min	-.01	2	-.014	3	-.001	9	-3.093e-5	9	1257.464	3	NC	1
355		7	max	.01	3	.018	2	.002	3	5.723e-5	3	NC	4	NC	1
356			min	-.01	2	-.018	3	0	9	-2.203e-5	9	1127.604	3	NC	1
357		8	max	.01	3	.021	2	.001	3	6.033e-5	3	NC	4	NC	1
358			min	-.01	2	-.021	3	0	9	-1.314e-5	9	1051.15	3	NC	1
359		9	max	.009	3	.024	2	.001	3	6.344e-5	3	NC	4	NC	1
360			min	-.01	2	-.023	3	0	9	-4.243e-6	9	1011.037	3	NC	1
361		10	max	.009	3	.025	2	.002	3	6.655e-5	3	NC	4	NC	1
362			min	-.01	2	-.024	3	0	9	-2.607e-6	10	999.601	3	NC	1
363		11	max	.009	3	.024	2	.002	3	6.966e-5	3	NC	4	NC	1
364			min	-.01	2	-.023	3	0	10	-6.127e-6	10	1014.586	3	NC	1
365		12	max	.009	3	.023	2	.002	3	7.276e-5	3	NC	4	NC	1
366			min	-.01	2	-.021	3	0	10	-9.648e-6	10	1058.087	3	NC	1
367		13	max	.009	3	.02	2	.002	3	7.587e-5	3	NC	4	NC	1
368			min	-.01	2	-.018	3	0	10	-1.317e-5	10	1137.416	3	NC	1
369		14	max	.009	3	.015	2	.002	3	7.898e-5	3	NC	4	NC	1
370			min	-.01	2	-.014	3	0	10	-1.669e-5	10	1268.658	3	NC	1
371		15	max	.009	3	.009	2	.002	3	8.208e-5	3	NC	4	NC	1
372			min	-.01	2	-.008	3	0	10	-2.021e-5	10	1486.735	3	NC	1
373		16	max	.009	3	.002	2	.002	3	8.626e-5	3	NC	4	NC	1
374			min	-.01	2	-.002	3	0	10	-2.279e-5	10	1877.52	3	NC	1
375		17	max	.009	3	.006	3	.002	3	1.158e-4	3	NC	4	NC	1
376			min	-.01	2	-.008	2	0	10	-2.862e-6	10	2724.254	3	NC	1
377		18	max	.009	3	.014	3	.002	3	2.894e-3	2	NC	1	NC	1
378			min	-.01	2	-.018	2	0	10	-1.711e-3	3	5341.638	3	NC	1
379		19	max	.009	3	.023	3	.001	3	5.843e-3	2	NC	1	NC	1
380			min	-.01	2	-.029	2	0	9	-3.572e-3	3	5736.633	2	NC	1
381	M5	1	max	.026	3	.076	3	.005	3	2.195e-5	3	NC	1	NC	1
382			min	-.027	2	-.061	2	0	9	0	15	4204.935	3	NC	1
383		2	max	.026	3	.046	3	.007	3	1.757e-4	3	NC	4	NC	1
384			min	-.027	2	-.037	2	0	9	-2.069e-6	9	1914.723	2	NC	1
385		3	max	.026	3	.018	3	.008	3	3.263e-4	3	NC	4	NC	1
386			min	-.027	2	-.014	2	0	9	-4.172e-6	9	981.355	2	NC	1
387		4	max	.026	3	.007	2	.009	3	3.128e-4	3	NC	5	NC	1
388			min	-.027	2	-.006	3	0	9	-3.901e-6	9	664.131	3	9782.011	3
389		5	max	.026	3	.025	2	.01	3	2.992e-4	3	NC	5	NC	1
390			min	-.027	2	-.026	3	0	9	-3.629e-6	9	519.191	3	8198.947	3
391		6	max	.026	3	.041	2	.01	3	2.856e-4	3	NC	5	NC	1
392			min	-.027	2	-.041	3	0	9	-3.358e-6	9	441.597	3	7422.814	3
393		7	max	.025	3	.053	2	.01	3	2.72e-4	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.027	2	-.054	3	0	9	-3.087e-6	9	396.404	3	7080.451	3
395		8	max	.025	3	.063	2	.01	3	2.585e-4	3	NC	5	NC	1
396			min	-.027	2	-.062	3	0	9	-2.815e-6	9	370.081	3	7030.076	3
397		9	max	.025	3	.069	2	.01	3	2.449e-4	3	NC	5	NC	1
398			min	-.027	2	-.067	3	0	9	-2.544e-6	9	356.587	3	7220.608	3
399		10	max	.025	3	.071	2	.009	3	2.313e-4	3	NC	5	NC	1
400			min	-.027	2	-.068	3	0	9	-2.272e-6	9	352.662	2	7650.516	3
401		11	max	.025	3	.071	2	.008	3	2.177e-4	3	NC	5	NC	1
402			min	-.027	2	-.066	3	0	9	-2.001e-6	9	355.116	2	8358.72	3
403		12	max	.025	3	.066	2	.008	3	2.041e-4	3	NC	5	NC	1
404			min	-.027	2	-.06	3	0	9	-1.729e-6	9	368.338	2	9433.487	3
405		13	max	.025	3	.057	2	.007	3	1.906e-4	3	NC	5	NC	1
406			min	-.027	2	-.051	3	0	9	-1.458e-6	9	395.509	2	NC	1
407		14	max	.025	3	.044	2	.006	3	1.77e-4	3	NC	5	NC	1
408			min	-.027	2	-.039	3	0	9	-1.186e-6	9	443.947	2	NC	1
409		15	max	.025	3	.027	2	.005	3	1.634e-4	3	NC	5	NC	1
410			min	-.027	2	-.024	3	0	9	-9.147e-7	9	530.603	3	NC	1
411		16	max	.025	3	.005	2	.004	3	1.455e-4	3	NC	5	NC	1
412			min	-.027	2	-.005	3	0	9	-9.001e-7	9	670.97	3	NC	1
413		17	max	.025	3	.017	3	.003	3	2.389e-5	3	NC	4	NC	1
414			min	-.027	2	-.022	2	0	9	-7.001e-6	9	973.179	3	NC	1
415		18	max	.025	3	.04	3	.002	3	8.975e-6	3	NC	4	NC	1
416			min	-.027	2	-.053	2	0	9	-3.658e-6	9	1908.322	3	NC	1
417		19	max	.025	3	.065	3	.001	3	-5.056e-8	15	NC	3	NC	1
418			min	-.027	2	-.085	2	0	9	-3.933e-6	3	1967.104	2	NC	1
419	M9	1	max	.01	3	.025	3	.005	3	5.861e-3	3	NC	1	NC	1
420			min	-.01	2	-.021	2	0	9	-3.921e-3	2	NC	1	NC	1
421		2	max	.01	3	.015	3	.003	3	2.867e-3	3	NC	4	NC	1
422			min	-.01	2	-.013	2	0	10	-1.951e-3	2	4617.154	3	NC	1
423		3	max	.01	3	.005	3	0	3	5.554e-5	1	NC	4	NC	1
424			min	-.01	2	-.005	2	0	10	-7.081e-5	3	2388.287	3	NC	1
425		4	max	.01	3	.002	2	.001	1	4.637e-5	1	NC	4	NC	1
426			min	-.01	2	-.003	3	0	3	-7.398e-5	3	1696.708	3	NC	1
427		5	max	.01	3	.009	2	.001	1	3.72e-5	1	NC	4	NC	1
428			min	-.01	2	-.01	3	-.002	3	-7.715e-5	3	1365.979	3	8252.455	3
429		6	max	.01	3	.014	2	.001	1	2.803e-5	1	NC	4	NC	1
430			min	-.01	2	-.015	3	-.003	3	-8.032e-5	3	1180.544	3	7150.266	3
431		7	max	.01	3	.018	2	0	1	1.886e-5	1	NC	4	NC	1
432			min	-.01	2	-.019	3	-.004	3	-8.348e-5	3	1069.876	3	6509.039	3
433		8	max	.01	3	.021	2	0	1	9.694e-6	1	NC	4	NC	1
434			min	-.01	2	-.022	3	-.004	3	-8.665e-5	3	1004.775	3	6146.85	3
435		9	max	.01	3	.024	2	0	1	5.253e-7	1	NC	4	NC	1
436			min	-.01	2	-.024	3	-.005	3	-8.982e-5	3	971.76	3	5981.275	3
437		10	max	.01	3	.025	2	0	1	2.744e-6	10	NC	4	NC	1
438			min	-.01	2	-.024	3	-.005	3	-9.299e-5	3	964.83	3	5976.602	3
439		11	max	.01	3	.024	2	0	10	6.255e-6	10	NC	4	NC	1
440			min	-.01	2	-.023	3	-.005	3	-9.615e-5	3	982.558	3	6125.451	3
441		12	max	.009	3	.023	2	0	10	9.767e-6	10	NC	4	NC	1
442			min	-.01	2	-.021	3	-.005	3	-9.932e-5	3	1027.436	3	6444.669	3
443		13	max	.009	3	.02	2	0	10	1.328e-5	10	NC	4	NC	1
444			min	-.01	2	-.018	3	-.004	3	-1.025e-4	3	1106.89	3	6981.462	3
445		14	max	.009	3	.015	2	0	10	1.679e-5	10	NC	4	NC	1
446			min	-.01	2	-.014	3	-.004	3	-1.057e-4	3	1236.842	3	7834.665	3
447		15	max	.009	3	.009	2	0	10	2.03e-5	10	NC	4	NC	1
448			min	-.01	2	-.008	3	-.003	3	-1.088e-4	3	1451.606	3	9212.565	3
449		16	max	.009	3	.002	2	0	10	2.286e-5	10	NC	4	NC	1
450			min	-.01	2	-.002	3	-.002	3	-1.009e-4	3	1835.338	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.009	3	.006	3	0	10	1.714e-4	3	NC	4	NC	1
452			min	-.01	2	-.008	2	-.001	3	-1.545e-5	9	2665.061	3	NC	1
453		18	max	.009	3	.015	3	0	10	1.855e-3	3	NC	1	NC	1
454			min	-.01	2	-.018	2	0	9	-2.894e-3	2	5227.823	3	NC	1
455		19	max	.009	3	.024	3	.001	3	3.564e-3	3	NC	1	NC	1
456			min	-.01	2	-.029	2	0	9	-5.844e-3	2	5750.217	2	NC	1
457	M13	1	max	0	9	.025	3	.01	3	3.875e-3	3	NC	1	NC	1
458			min	-.005	3	-.021	2	-.01	2	-3.204e-3	2	NC	1	NC	1
459		2	max	0	9	.048	3	.008	3	4.709e-3	3	NC	4	NC	1
460			min	-.005	3	-.037	2	-.01	2	-3.882e-3	2	3170.313	3	NC	1
461		3	max	0	9	.068	3	.008	3	5.542e-3	3	NC	4	NC	1
462			min	-.005	3	-.05	2	-.011	2	-4.559e-3	2	1694.997	3	NC	1
463		4	max	0	9	.083	3	.01	3	6.376e-3	3	NC	4	NC	1
464			min	-.005	3	-.06	2	-.013	2	-5.236e-3	2	1257.513	3	NC	1
465		5	max	0	9	.091	3	.012	3	7.209e-3	3	NC	4	NC	1
466			min	-.005	3	-.067	2	-.015	2	-5.913e-3	2	1091.273	3	NC	1
467		6	max	0	9	.094	3	.014	3	8.043e-3	3	NC	4	NC	1
468			min	-.005	3	-.07	2	-.018	2	-6.59e-3	2	1050.216	3	8582.813	2
469		7	max	0	9	.091	3	.017	3	8.876e-3	3	NC	4	NC	1
470			min	-.005	3	-.069	2	-.021	2	-7.268e-3	2	1092.793	3	6267.259	2
471		8	max	0	9	.085	3	.02	3	9.71e-3	3	NC	4	NC	1
472			min	-.005	3	-.067	2	-.024	2	-7.945e-3	2	1203.278	3	4985.909	2
473		9	max	0	9	.079	3	.023	3	1.054e-2	3	NC	4	NC	4
474			min	-.005	3	-.063	2	-.027	2	-8.622e-3	2	1351.871	3	4307.176	2
475		10	max	0	9	.076	3	.026	3	1.138e-2	3	NC	4	NC	4
476			min	-.005	3	-.061	2	-.027	2	-9.299e-3	2	1440.405	3	4078.545	2
477		11	max	0	9	.079	3	.027	3	1.055e-2	3	NC	4	NC	4
478			min	-.005	3	-.063	2	-.027	2	-8.622e-3	2	1351.87	3	4125.315	3
479		12	max	0	9	.086	3	.027	3	9.719e-3	3	NC	4	NC	1
480			min	-.005	3	-.067	2	-.024	2	-7.945e-3	2	1203.277	3	4123.779	3
481		13	max	0	9	.092	3	.026	3	8.89e-3	3	NC	4	NC	1
482			min	-.005	3	-.069	2	-.021	2	-7.268e-3	2	1092.792	3	4421.879	3
483		14	max	0	9	.095	3	.024	3	8.061e-3	3	NC	4	NC	1
484			min	-.005	3	-.07	2	-.018	2	-6.59e-3	2	1050.215	3	5079.295	3
485		15	max	0	9	.092	3	.021	3	7.232e-3	3	NC	4	NC	1
486			min	-.005	3	-.067	2	-.015	2	-5.913e-3	2	1091.271	3	6309.563	3
487		16	max	0	9	.084	3	.018	3	6.403e-3	3	NC	4	NC	1
488			min	-.005	3	-.06	2	-.013	2	-5.236e-3	2	1257.511	3	8689.715	3
489		17	max	0	9	.069	3	.015	3	5.575e-3	3	NC	4	NC	1
490			min	-.005	3	-.05	2	-.011	2	-4.559e-3	2	1694.995	3	NC	1
491		18	max	0	9	.049	3	.012	3	4.746e-3	3	NC	4	NC	1
492			min	-.005	3	-.037	2	-.01	2	-3.882e-3	2	3170.309	3	NC	1
493		19	max	0	9	.027	3	.01	3	3.917e-3	3	NC	1	NC	1
494			min	-.005	3	-.021	2	-.01	2	-3.205e-3	2	NC	1	NC	1
495	M16	1	max	0	9	.024	3	.009	3	4.259e-3	2	NC	1	NC	1
496			min	-.001	3	-.029	2	-.01	2	-3.383e-3	3	NC	1	NC	1
497		2	max	0	9	.037	3	.012	3	5.16e-3	2	NC	4	NC	1
498			min	-.001	3	-.052	2	-.01	2	-4.046e-3	3	3162.337	2	NC	1
499		3	max	0	9	.05	3	.014	3	6.062e-3	2	NC	4	NC	1
500			min	-.001	3	-.072	2	-.011	2	-4.709e-3	3	1684.602	2	NC	1
501		4	max	0	9	.06	3	.017	3	6.963e-3	2	NC	4	NC	1
502			min	-.001	3	-.087	2	-.013	2	-5.372e-3	3	1242.198	2	9269.287	3
503		5	max	0	9	.066	3	.02	3	7.865e-3	2	NC	4	NC	1
504			min	-.001	3	-.097	2	-.015	2	-6.035e-3	3	1068.299	2	6939.224	3
505		6	max	0	9	.07	3	.022	3	8.766e-3	2	NC	4	NC	1
506			min	-.001	3	-.1	2	-.018	2	-6.698e-3	3	1015.127	2	5689.133	3
507		7	max	0	9	.07	3	.024	3	9.668e-3	2	NC	4	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
508			min	-.001	3	-.099	2	-.021	2	-7.361e-3	3	1038.173	2	4987.565	3
509		8	max	0	9	.068	3	.025	3	1.057e-2	2	NC	4	NC	1
510			min	-.001	3	-.094	2	-.024	2	-8.024e-3	3	1118.157	2	4625.513	3
511		9	max	0	9	.066	3	.025	3	1.147e-2	2	NC	4	NC	4
512			min	-.001	3	-.088	2	-.026	2	-8.687e-3	3	1226.981	2	4329.003	2
513		10	max	0	9	.065	3	.025	3	1.237e-2	2	NC	4	NC	4
514			min	-.001	3	-.085	2	-.027	2	-9.35e-3	3	1290.92	2	4098.569	2
515		11	max	0	9	.066	3	.023	3	1.147e-2	2	NC	4	NC	4
516			min	-.001	3	-.088	2	-.026	2	-8.682e-3	3	1226.981	2	4329.007	2
517		12	max	0	9	.068	3	.022	3	1.057e-2	2	NC	4	NC	1
518			min	-.001	3	-.094	2	-.024	2	-8.015e-3	3	1118.157	2	5013.301	2
519		13	max	0	9	.07	3	.02	3	9.668e-3	2	NC	4	NC	1
520			min	-.001	3	-.099	2	-.021	2	-7.347e-3	3	1038.173	2	6306.074	2
521		14	max	0	9	.07	3	.018	3	8.767e-3	2	NC	4	NC	1
522			min	-.001	3	-.1	2	-.018	2	-6.679e-3	3	1015.127	2	8198.594	3
523		15	max	0	9	.066	3	.016	3	7.866e-3	2	NC	4	NC	1
524			min	-.001	3	-.097	2	-.015	2	-6.012e-3	3	1068.299	2	NC	1
525		16	max	0	9	.06	3	.014	3	6.964e-3	2	NC	4	NC	1
526			min	-.001	3	-.087	2	-.013	2	-5.344e-3	3	1242.198	2	NC	1
527		17	max	0	9	.05	3	.012	3	6.063e-3	2	NC	4	NC	1
528			min	-.001	3	-.072	2	-.011	2	-4.677e-3	3	1684.602	2	NC	1
529		18	max	0	9	.037	3	.01	3	5.162e-3	2	NC	4	NC	1
530			min	-.001	3	-.052	2	-.01	2	-4.009e-3	3	3162.337	2	NC	1
531		19	max	0	9	.023	3	.009	3	4.26e-3	2	NC	1	NC	1
532			min	-.001	3	-.029	2	-.01	2	-3.342e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.968e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-3.169e-5	2	NC	1	NC	1
535		2	max	0	3	0	15	0	1	7.052e-4	3	NC	1	NC	1
536			min	0	2	-.002	4	0	3	-3.319e-4	2	NC	1	NC	1
537		3	max	0	3	0	15	.002	2	1.014e-3	3	NC	1	NC	1
538			min	0	2	-.003	4	-.003	3	-6.322e-4	2	NC	1	8693.889	3
539		4	max	0	3	-.001	15	.005	2	1.322e-3	3	NC	1	NC	4
540			min	0	2	-.004	4	-.006	3	-9.324e-4	2	NC	1	4803.256	3
541		5	max	0	3	-.001	15	.008	2	1.63e-3	3	NC	1	NC	4
542			min	0	2	-.006	4	-.01	3	-1.233e-3	2	9790.17	4	3155.807	3
543		6	max	0	3	-.002	15	.012	2	1.939e-3	3	NC	1	NC	4
544			min	-.001	2	-.007	4	-.015	3	-1.533e-3	2	8239.463	4	2299.466	3
545		7	max	0	3	-.002	15	.016	2	2.247e-3	3	NC	2	NC	4
546			min	-.001	2	-.008	4	-.02	3	-1.833e-3	2	7306.917	4	1798.49	3
547		8	max	0	3	-.002	15	.019	2	2.556e-3	3	NC	2	NC	4
548			min	-.002	2	-.008	4	-.025	3	-2.133e-3	2	6747.249	4	1483.46	3
549		9	max	.001	3	-.002	2	.023	2	2.864e-3	3	NC	2	NC	4
550			min	-.002	2	-.009	4	-.029	3	-2.434e-3	2	6446.003	4	1277.263	3
551		10	max	.001	3	-.001	2	.025	2	3.172e-3	3	NC	2	NC	4
552			min	-.002	2	-.009	4	-.033	3	-2.734e-3	2	6350.703	4	1141.157	3
553		11	max	.001	3	0	2	.027	2	3.481e-3	3	NC	2	NC	4
554			min	-.002	2	-.009	4	-.035	3	-3.034e-3	2	6446.003	4	1054.801	3
555		12	max	.002	3	0	2	.027	2	3.789e-3	3	NC	2	NC	4
556			min	-.003	2	-.008	4	-.035	3	-3.334e-3	2	6747.249	4	1008.106	3
557		13	max	.002	3	.001	2	.026	2	4.097e-3	3	NC	2	NC	4
558			min	-.003	2	-.008	4	-.034	3	-3.634e-3	2	7306.917	4	998.152	3
559		14	max	.002	3	.002	2	.023	2	4.406e-3	3	NC	1	NC	4
560			min	-.003	2	-.007	4	-.031	3	-3.935e-3	2	8239.463	4	1029.304	3
561		15	max	.002	3	.004	2	.018	2	4.714e-3	3	NC	1	NC	4
562			min	-.003	2	-.006	4	-.025	3	-4.235e-3	2	9790.17	4	1117.564	3
563		16	max	.002	3	.005	2	.011	1	5.023e-3	3	NC	1	NC	4
564			min	-.004	2	-.005	3	-.016	3	-4.535e-3	2	NC	1	1306.372	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	.002	3	.007	2	.004	1	5.331e-3	3	NC	1	NC	4
566			min	-.004	2	-.004	3	-.003	3	-4.835e-3	2	7825.388	2	1732.007	3
567		18	max	.002	3	.009	2	.013	3	5.639e-3	3	NC	1	NC	4
568			min	-.004	2	-.003	3	-.013	2	-5.136e-3	2	6274.877	2	3083.857	3
569		19	max	.002	3	.011	2	.032	3	5.948e-3	3	NC	1	NC	1
570			min	-.004	2	-.002	3	-.029	2	-5.436e-3	2	5216.547	2	NC	1
571	M16A	1	max	.002	2	.004	2	.01	3	1.693e-3	3	NC	1	NC	1
572			min	-.002	3	-.004	3	-.01	2	-1.899e-3	2	NC	1	NC	1
573		2	max	.002	2	.003	2	.003	3	1.636e-3	3	NC	1	NC	1
574			min	-.002	3	-.005	3	-.005	2	-1.811e-3	2	NC	1	8375.747	3
575		3	max	.001	2	.001	2	.001	9	1.579e-3	3	NC	1	NC	4
576			min	-.002	3	-.006	3	-.003	3	-1.722e-3	2	NC	1	4747.087	3
577		4	max	.001	2	0	2	.004	1	1.523e-3	3	NC	1	NC	4
578			min	-.002	3	-.006	3	-.007	3	-1.634e-3	2	NC	1	3617.551	3
579		5	max	.001	2	-.001	2	.005	1	1.466e-3	3	NC	1	NC	4
580			min	-.002	3	-.007	3	-.01	3	-1.546e-3	2	9790.17	4	3131.296	3
581		6	max	.001	2	-.002	15	.006	1	1.409e-3	3	NC	1	NC	4
582			min	-.002	3	-.007	4	-.012	3	-1.457e-3	2	8239.463	4	2923.33	3
583		7	max	.001	2	-.002	15	.007	2	1.352e-3	3	NC	3	NC	4
584			min	-.002	3	-.008	4	-.013	3	-1.369e-3	2	7306.917	4	2879.954	3
585		8	max	.001	2	-.002	15	.007	2	1.295e-3	3	NC	3	NC	4
586			min	-.001	3	-.009	4	-.013	3	-1.28e-3	2	6747.249	4	2963.37	3
587		9	max	0	2	-.002	15	.007	2	1.238e-3	3	NC	3	NC	4
588			min	-.001	3	-.009	4	-.012	3	-1.192e-3	2	6446.003	4	3170.641	3
589		10	max	0	2	-.002	15	.006	2	1.182e-3	3	NC	3	NC	4
590			min	-.001	3	-.009	4	-.011	3	-1.103e-3	2	6350.703	4	3524.994	3
591		11	max	0	2	-.002	15	.005	1	1.125e-3	3	NC	3	NC	4
592			min	-.001	3	-.009	4	-.009	3	-1.015e-3	2	6446.003	4	4081.989	3
593		12	max	0	2	-.002	15	.004	1	1.068e-3	3	NC	3	NC	4
594			min	0	3	-.008	4	-.007	3	-9.265e-4	2	6747.249	4	4952.833	3
595		13	max	0	2	-.002	15	.003	1	1.011e-3	3	NC	3	NC	1
596			min	0	3	-.008	4	-.005	3	-8.381e-4	2	7306.917	4	6365.081	3
597		14	max	0	2	-.002	15	.002	1	9.543e-4	3	NC	1	NC	1
598			min	0	3	-.007	4	-.003	3	-7.496e-4	2	8239.463	4	8831.834	3
599		15	max	0	2	-.001	15	.001	4	8.975e-4	3	NC	1	NC	1
600			min	0	3	-.006	4	-.002	3	-6.612e-4	2	9790.17	4	NC	1
601		16	max	0	2	-.001	15	.001	4	8.406e-4	3	NC	1	NC	1
602			min	0	3	-.005	4	0	3	-5.728e-4	2	NC	1	NC	1
603		17	max	0	2	0	15	0	4	7.838e-4	3	NC	1	NC	1
604			min	0	3	-.003	4	0	2	-4.843e-4	2	NC	1	NC	1
605		18	max	0	2	0	15	0	3	7.27e-4	3	NC	1	NC	1
606			min	0	3	-.002	4	0	2	-3.959e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	6.701e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.075e-4	2	NC	1	NC	1

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

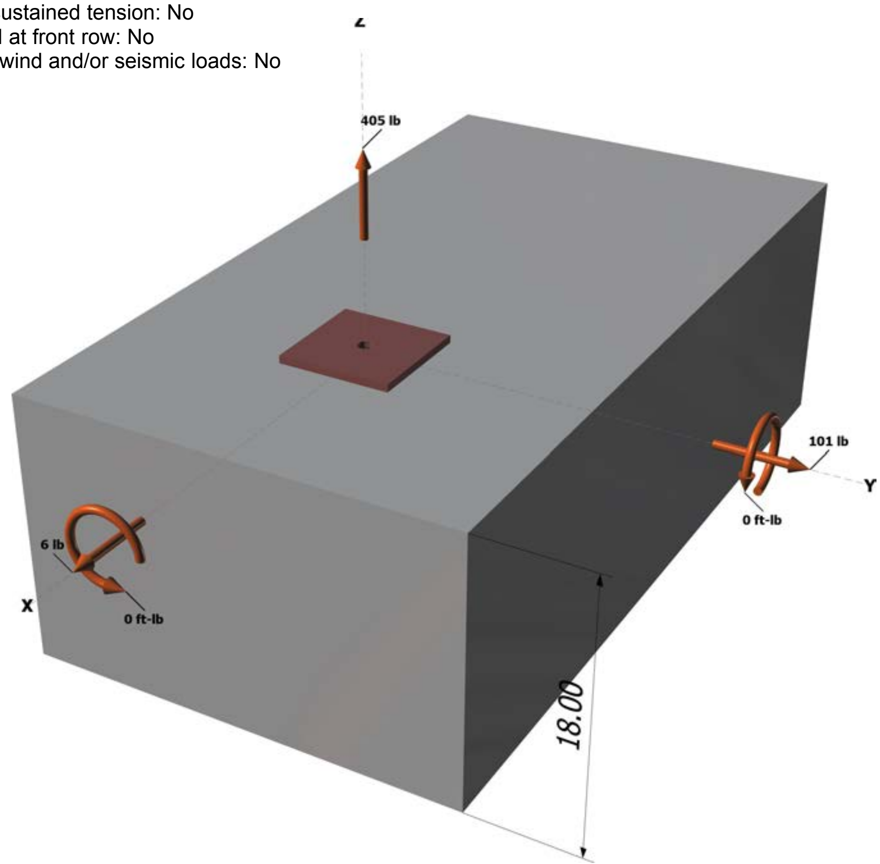
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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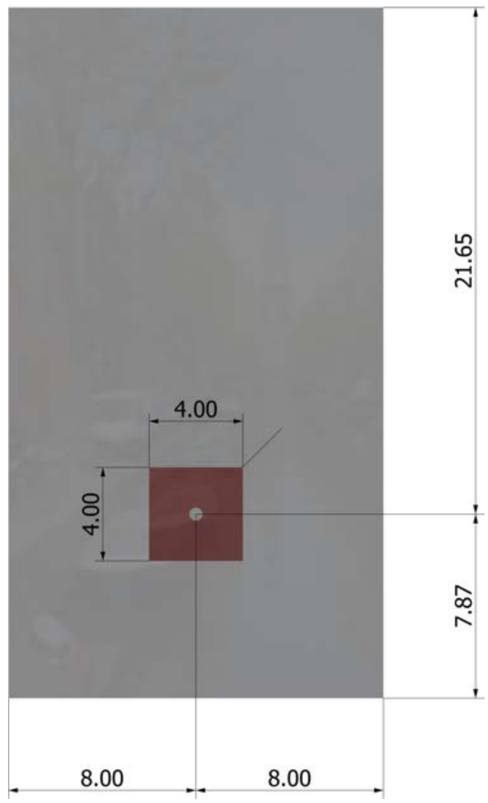


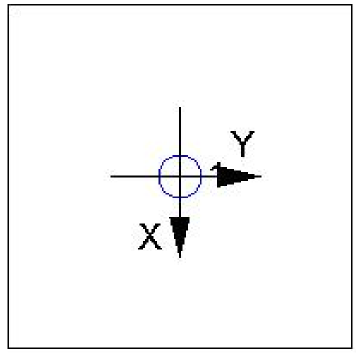
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

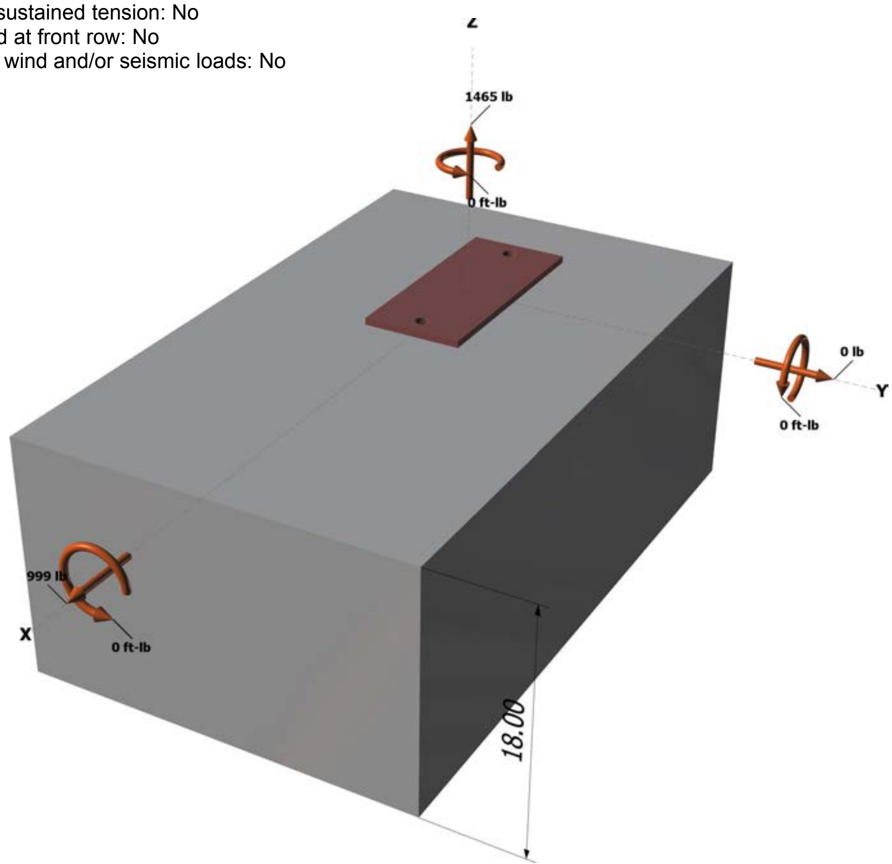
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

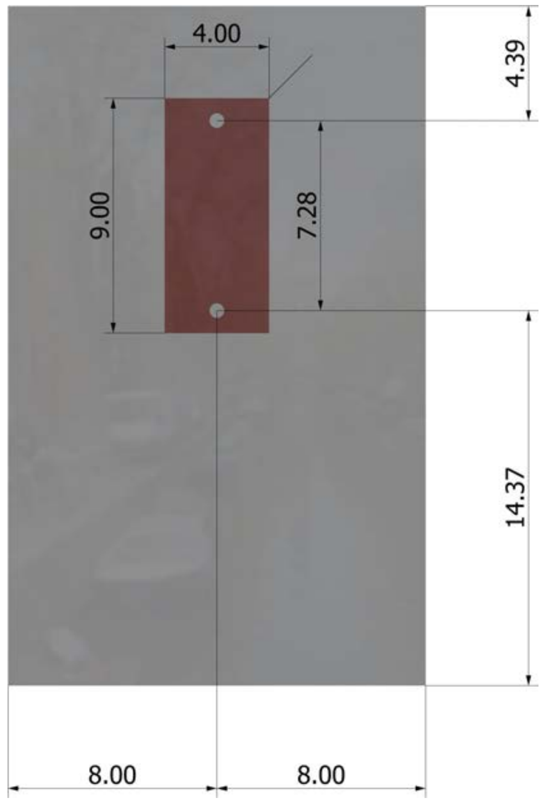
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



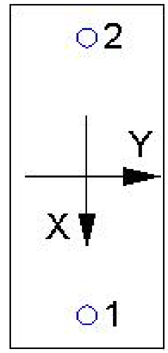
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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