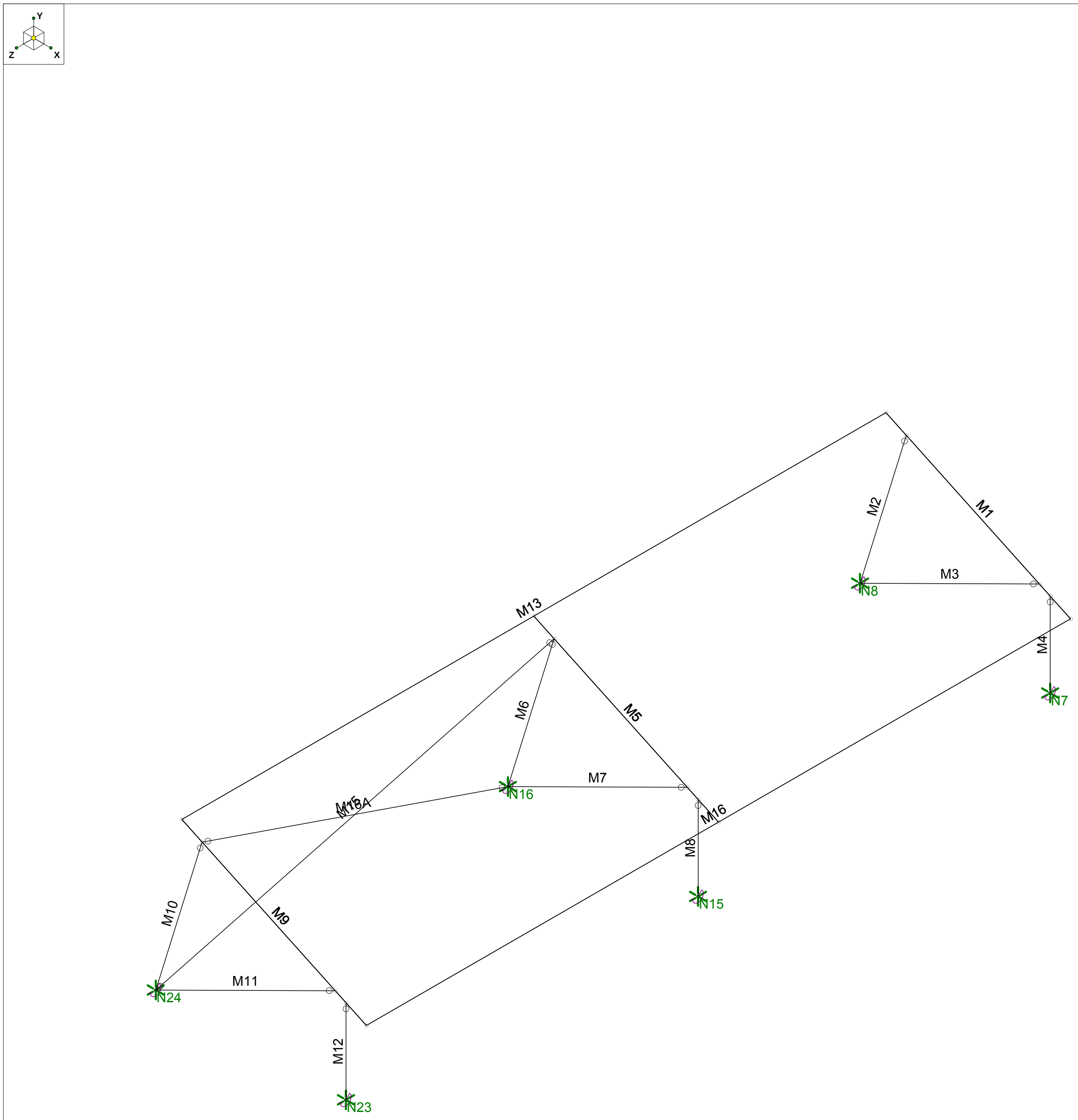


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

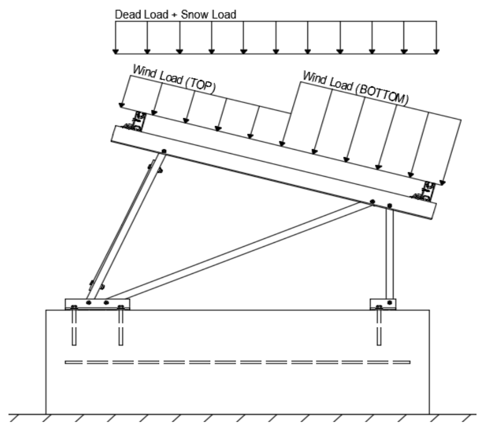
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 = 25°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf

g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf

Sloped Roof Snow Load, P_s = 18.56 psf *(ASCE 7-05, Eq. 7-2)*

I_s = 1.00

C_s = 0.82

C_e = 0.90

C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 85 mph

Height ≤ 15 ft

Exposure Category = C

Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads - 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

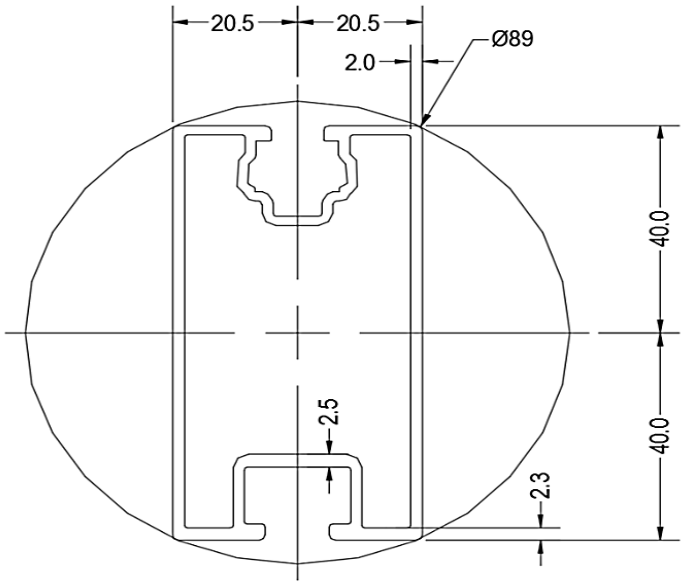
Front Struts	Location	**Bracing**
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

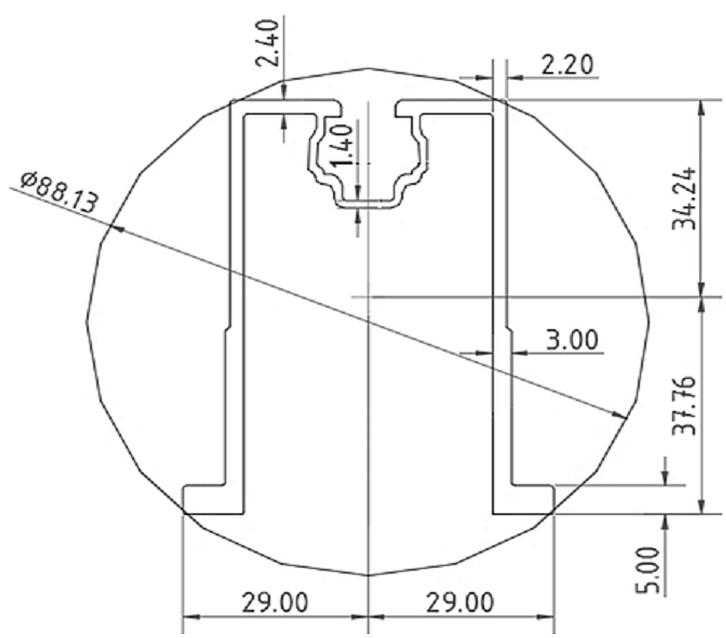
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	102	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.61	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.139	k-ft
M_z =	0.264	k-ft
$M_{y\ allowable}$ =	1.778	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	96%	



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).

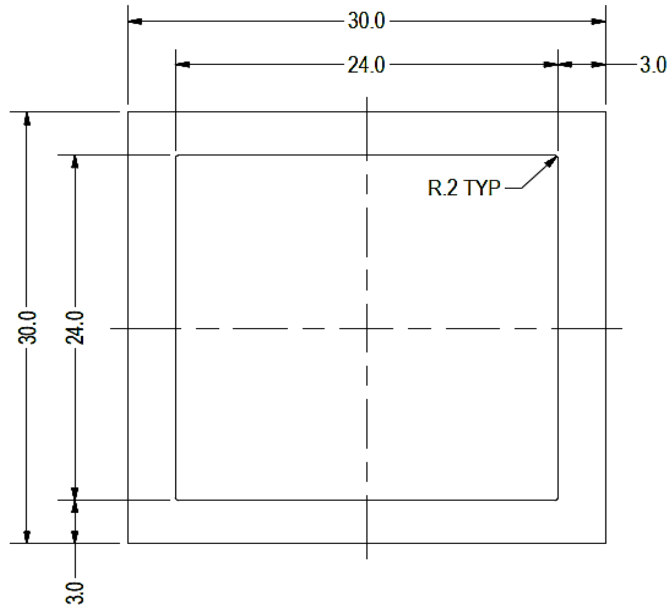
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	30.05	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.190	k-ft
M_z =	-0.151	k-ft
P_n =	0.063	k
$M_{y\ allowable}$ =	1.474	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	43%	



4.3 Front Strut Design

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

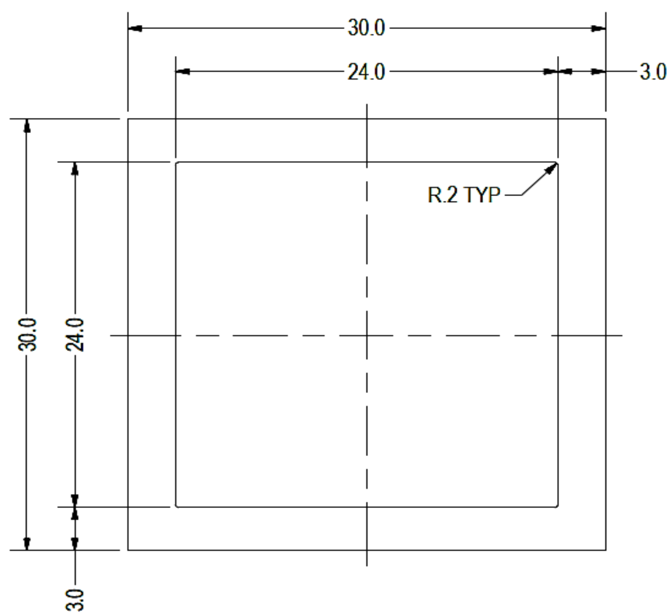
Strut Type =	<u>30x30x3</u>	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	<u>18.00</u>	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.445	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	<u>12%</u>	



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).

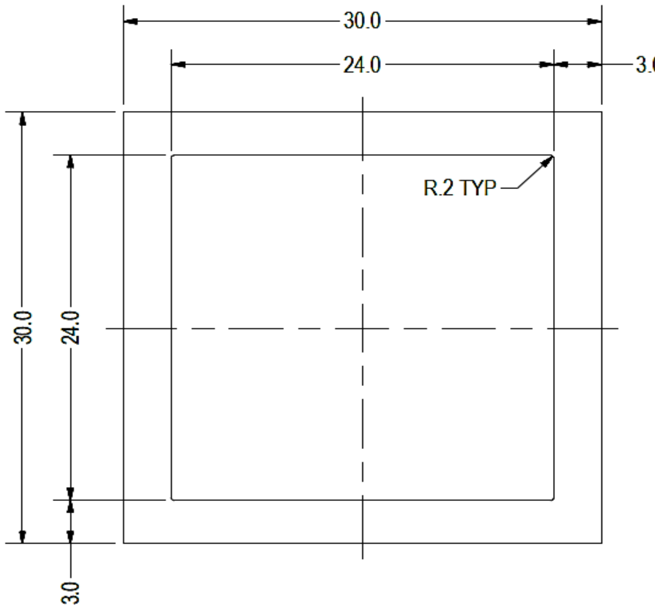
Strut Type =	<u>30x30x3</u>	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	<u>46.38</u>	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.473	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	<u>12%</u>	



4.5 Rear Strut Design

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

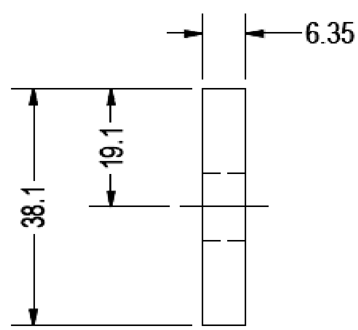
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	36.18	in
$\Phi F_{ty\ AXIAL}$ =	11.59	ksi
$\Phi F_{ty\ BENDING}$ =	30.23	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.204	k
$M_{y\ allowable}$ =	0.410	k-ft
$M_{z\ allowable}$ =	0.410	k-ft
$P_{n\ allowable}$ =	5.820	k
Utilization =	21%	



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 =	0.007	k-ft
P_n =	0.046	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	16%	



A cross brace kit is required every 12 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

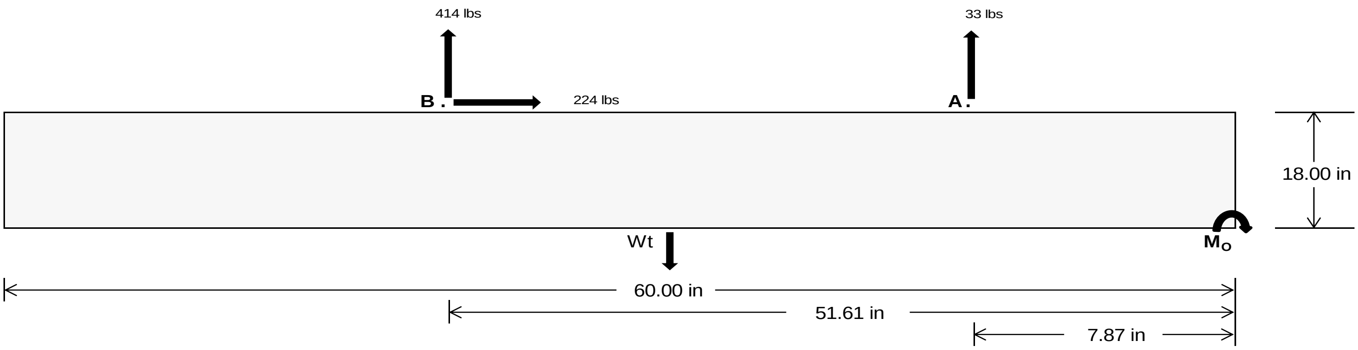
5.1 Helical Pile Foundations

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 =	144.91	1725.77	k
Compressive Load =	1878.19	1544.65	k
Lateral Load =	6.04	930.46	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>
Weight of Concrete = 145 pcf
Compressive Strength = 2500 psi
Yield Strength = 60000 psi

<u>Footing Reinforcement</u>
Use fiber reinforcing with (1) #5 rebar.

<u>Overturning Check</u>
M_O = 25649.2 in-lbs
Resisting Force Required = 854.97 lbs
S.F. = 1.67
Weight Required = 1424.95 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

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

<u>Sliding</u>
Force = 223.55 lbs
Friction = 0.4
Weight Required = 558.87 lbs
Resisting Weight = 1993.75 lbs
Additional Weight Required = 0 lbs

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

<u>Cohesion</u>
Sliding Force = 223.55 lbs
Cohesion = 130 psf
Area = 9.17 ft^2
Resisting = 996.88 lbs
Additional Weight Required = 0 lbs

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

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

Shear key is not required.

<u>Bearing Pressure</u>

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	738 lbs	738 lbs	738 lbs	738 lbs	510 lbs	510 lbs	510 lbs	510 lbs	876 lbs	876 lbs	876 lbs	876 lbs	-67 lbs	-67 lbs	-67 lbs	-67 lbs
F_B	534 lbs	534 lbs	534 lbs	534 lbs	549 lbs	549 lbs	549 lbs	549 lbs	768 lbs	768 lbs	768 lbs	768 lbs	-828 lbs	-828 lbs	-828 lbs	-828 lbs
F_V	80 lbs	80 lbs	80 lbs	80 lbs	408 lbs	408 lbs	408 lbs	408 lbs	360 lbs	360 lbs	360 lbs	360 lbs	-447 lbs	-447 lbs	-447 lbs	-447 lbs
P_{total}	3266 lbs	3357 lbs	3448 lbs	3538 lbs	3053 lbs	3144 lbs	3234 lbs	3325 lbs	3638 lbs	3729 lbs	3819 lbs	3910 lbs	302 lbs	356 lbs	410 lbs	465 lbs
M	519 lbs-ft	519 lbs-ft	519 lbs-ft	519 lbs-ft	563 lbs-ft	563 lbs-ft	563 lbs-ft	563 lbs-ft	772 lbs-ft	772 lbs-ft	772 lbs-ft	772 lbs-ft	697 lbs-ft	697 lbs-ft	697 lbs-ft	697 lbs-ft
e	0.16 ft	0.15 ft	0.15 ft	0.15 ft	0.18 ft	0.18 ft	0.17 ft	0.17 ft	0.21 ft	0.21 ft	0.20 ft	0.20 ft	2.31 ft	1.96 ft	1.70 ft	1.50 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}	288.3 psf	285.3 psf	282.4 psf	279.8 psf	259.4 psf	257.6 psf	255.9 psf	254.4 psf	295.8 psf	292.4 psf	289.3 psf	286.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	424.3 psf	415.3 psf	407.1 psf	399.5 psf	406.7 psf	398.5 psf	391.0 psf	384.0 psf	498.0 psf	485.8 psf	474.6 psf	464.4 psf	580.1 psf	228.5 psf	170.7 psf	148.7 psf

Maximum Bearing Pressure = 580 psf
Allowable Bearing Pressure = 1500 psf

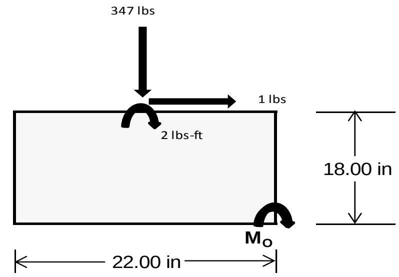
Use a 60in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 314.2 ft-lbs
Resisting Force Required = 342.75 lbs
S.F. = 1.67
Weight Required = 571.25 lbs
Minimum Width = 22 in in
Weight Provided = 1993.75 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	96 lbs	259 lbs	91 lbs	352 lbs	1044 lbs	347 lbs	28 lbs	76 lbs	27 lbs
F_V	6 lbs	6 lbs	0 lbs	27 lbs	26 lbs	1 lbs	2 lbs	2 lbs	0 lbs
P_{total}	2564 lbs	2727 lbs	2559 lbs	2702 lbs	3394 lbs	2697 lbs	750 lbs	797 lbs	748 lbs
M	10 lbs-ft	9 lbs-ft	0 lbs-ft	46 lbs-ft	39 lbs-ft	4 lbs-ft	3 lbs-ft	3 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.02 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.31 ft	1.83 ft	1.83 ft	1.80 ft	1.81 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	276.0 sqft	294.3 sqft	279.0 sqft	278.4 sqft	356.4 sqft	292.8 sqft	80.8 sqft	86.1 sqft	81.6 sqft
f_{max}	283.4 psf	300.7 psf	279.3 psf	311.1 psf	384.1 psf	295.6 psf	82.8 psf	87.9 psf	81.7 psf

Maximum Bearing Pressure = 384 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

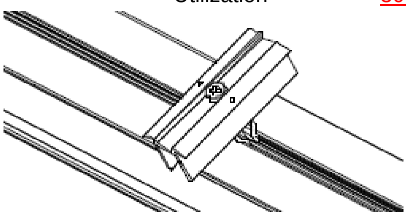
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

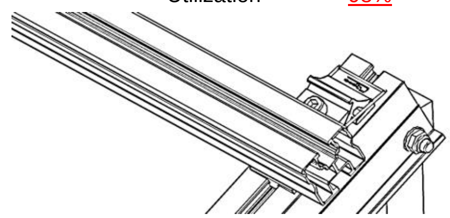
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.368	k
Allowable Uplift =	1.214	k
Utilization =	30%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.099	k
Allowable Uplift =	1.116	k
Utilization =	98%	



6.2 Bolted Connections

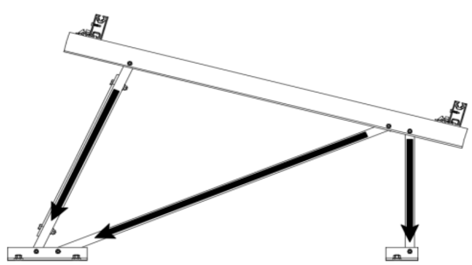
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are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

Front Strut		
Maximum Axial Load =	1.445	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

Rear Strut		
Maximum Axial Load =	1.204	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut		
Maximum Axial Load =	0.473	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	8%	

Bracing		
Maximum Axial Load =	0.046	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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

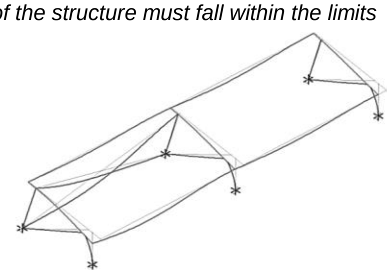
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	30.83	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.617	in
Max Drift, Δ_{MAX} =	0.08	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 XT**

Strong Axis:

3.4.14

L_b = 102.00 in

J = 0.427

212.736

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 102.00 in

J = 0.427

231.168

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 28.6 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.778 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.55
19.7698

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 30.0 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 = 1.55
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= 30.0 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 = 30.0 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.474 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

λ = 1.98863

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.85841

φF_L= (φccFcy)/(λ²)

φF_L= 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 7.60 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 30.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.410 k-ft

Weak Axis:

3.4.14

L_b = 36.18 in

J = 0.16

94.9139

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 30.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

$\lambda =$ 1.5514

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.7972

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

$\varphi F_L =$ 11.5927 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 11.59 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 5.82 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-34.799	-34.799	0	0
2	M16	y	-53.78	-53.78	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	69.597	69.597	0	0
2	M16	y	31.635	31.635	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	168.821	2	318.028	1	-.003	15	0	2	0	1	0	1
2		min	-223.864	3	-404.278	3	-.254	1	0	3	0	1	0	1
3	N7	max	0	15	531.915	1	-.09	15	0	15	0	1	0	1
4		min	-.2	1	-23.813	3	-2.137	1	-.004	1	0	1	0	1
5	N15	max	-.001	15	1444.765	1	.702	1	.001	1	0	1	0	1
6		min	-2.11	1	-111.47	3	-.294	3	0	3	0	1	0	1
7	N16	max	682.241	2	1188.194	1	-.34	10	0	1	0	1	0	1
8		min	-715.742	3	-1327.513	3	-42.75	1	0	3	0	1	0	1
9	N23	max	0	15	531.593	1	4.644	1	.008	1	0	1	0	1
10		min	-.2	1	-23.308	3	.185	15	0	15	0	1	0	1
11	N24	max	169.392	2	324.058	1	39.795	1	.002	1	0	1	0	1
12		min	-223.922	3	-401.234	3	.051	10	0	12	0	1	0	1
13	Totals:	max	1018.235	2	4338.552	1	0	10						
14		min	-1163.684	3	-2291.616	3	0	1						

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	366.645	1	.64	4	.807	1	0	15	0	3	0	1
2			min	-364.515	3	.151	15	-.024	3	-.001	1	0	1	0	1
3		2	max	366.761	1	.595	4	.807	1	0	15	0	12	0	15
4			min	-364.428	3	.14	15	-.024	3	-.001	1	0	1	0	4
5		3	max	366.878	1	.549	4	.807	1	0	15	0	1	0	15
6			min	-364.341	3	.13	15	-.024	3	-.001	1	0	3	0	4
7		4	max	366.994	1	.503	4	.807	1	0	15	0	1	0	15
8			min	-364.253	3	.119	15	-.024	3	-.001	1	0	3	0	4
9		5	max	367.111	1	.458	4	.807	1	0	15	0	1	0	15
10			min	-364.166	3	.108	15	-.024	3	-.001	1	0	3	0	4
11		6	max	367.227	1	.412	4	.807	1	0	15	0	1	0	15
12			min	-364.079	3	.098	15	-.024	3	-.001	1	0	3	0	4
13		7	max	367.343	1	.366	4	.807	1	0	15	0	1	0	15
14			min	-363.992	3	.087	15	-.024	3	-.001	1	0	3	0	4
15		8	max	367.46	1	.321	4	.807	1	0	15	0	1	0	15
16			min	-363.904	3	.076	15	-.024	3	-.001	1	0	3	0	4
17		9	max	367.576	1	.275	4	.807	1	0	15	0	1	0	15
18			min	-363.817	3	.065	15	-.024	3	-.001	1	0	3	0	4
19		10	max	367.693	1	.229	4	.807	1	0	15	0	1	0	15
20			min	-363.73	3	.055	15	-.024	3	-.001	1	0	3	0	4
21		11	max	367.809	1	.184	4	.807	1	0	15	.001	1	0	15
22			min	-363.642	3	.044	15	-.024	3	-.001	1	0	3	0	4
23		12	max	367.925	1	.138	4	.807	1	0	15	.001	1	0	15
24			min	-363.555	3	.033	15	-.024	3	-.001	1	0	3	0	4
25		13	max	368.042	1	.098	2	.807	1	0	15	.001	1	0	15
26			min	-363.468	3	.017	12	-.024	3	-.001	1	0	3	0	4
27		14	max	368.158	1	.062	2	.807	1	0	15	.002	1	0	15
28			min	-363.38	3	-.003	3	-.024	3	-.001	1	0	3	0	4
29		15	max	368.275	1	.027	2	.807	1	0	15	.002	1	0	15
30			min	-363.293	3	-.03	3	-.024	3	-.001	1	0	3	0	4
31		16	max	368.391	1	-.008	10	.807	1	0	15	.002	1	0	15
32			min	-363.206	3	-.056	3	-.024	3	-.001	1	0	3	0	4
33		17	max	368.507	1	-.021	15	.807	1	0	15	.002	1	0	15
34			min	-363.118	3	-.09	4	-.024	3	-.001	1	0	3	0	4
35		18	max	368.624	1	-.031	15	.807	1	0	15	.002	1	0	15
36			min	-363.031	3	-.136	4	-.024	3	-.001	1	0	3	0	4
37		19	max	368.74	1	-.042	15	.807	1	0	15	.002	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-362.944	3	-.182	4	-.024	3	-.001	1	0	3	0	4
39	M3	1	max	100.045	2	1.776	4	-.032	15	0	15	.003	1	0	4
40			min	-130.753	3	.418	15	-.856	1	0	1	0	15	0	15
41		2	max	99.977	2	1.599	4	-.032	15	0	15	.002	1	0	2
42			min	-130.804	3	.376	15	-.856	1	0	1	0	15	0	12
43		3	max	99.908	2	1.422	4	-.032	15	0	15	.002	1	0	2
44			min	-130.856	3	.335	15	-.856	1	0	1	0	15	0	3
45		4	max	99.839	2	1.244	4	-.032	15	0	15	.002	1	0	15
46			min	-130.907	3	.293	15	-.856	1	0	1	0	15	0	4
47		5	max	99.771	2	1.067	4	-.032	15	0	15	.002	1	0	15
48			min	-130.959	3	.251	15	-.856	1	0	1	0	15	0	4
49		6	max	99.702	2	.89	4	-.032	15	0	15	.002	1	0	15
50			min	-131.01	3	.21	15	-.856	1	0	1	0	15	0	4
51		7	max	99.634	2	.713	4	-.032	15	0	15	.002	1	0	15
52			min	-131.062	3	.168	15	-.856	1	0	1	0	15	0	4
53		8	max	99.565	2	.536	4	-.032	15	0	15	.001	1	0	15
54			min	-131.113	3	.126	15	-.856	1	0	1	0	15	-.001	4
55		9	max	99.496	2	.358	4	-.032	15	0	15	.001	1	0	15
56			min	-131.164	3	.085	15	-.856	1	0	1	0	15	-.001	4
57		10	max	99.428	2	.181	4	-.032	15	0	15	.001	1	0	15
58			min	-131.216	3	.043	15	-.856	1	0	1	0	15	-.001	4
59		11	max	99.359	2	.024	2	-.032	15	0	15	0	1	0	15
60			min	-131.267	3	-.022	3	-.856	1	0	1	0	15	-.001	4
61		12	max	99.291	2	-.04	15	-.032	15	0	15	0	1	0	15
62			min	-131.319	3	-.173	4	-.856	1	0	1	0	15	-.001	4
63		13	max	99.222	2	-.082	15	-.032	15	0	15	0	1	0	15
64			min	-131.37	3	-.35	4	-.856	1	0	1	0	15	-.001	4
65		14	max	99.153	2	-.123	15	-.032	15	0	15	0	1	0	15
66			min	-131.422	3	-.528	4	-.856	1	0	1	0	12	-.001	4
67		15	max	99.085	2	-.165	15	-.032	15	0	15	0	1	0	15
68			min	-131.473	3	-.705	4	-.856	1	0	1	0	12	0	4
69		16	max	99.016	2	-.207	15	-.032	15	0	15	0	15	0	15
70			min	-131.525	3	-.882	4	-.856	1	0	1	0	1	0	4
71		17	max	98.948	2	-.248	15	-.032	15	0	15	0	15	0	15
72			min	-131.576	3	-1.059	4	-.856	1	0	1	0	1	0	4
73		18	max	98.879	2	-.29	15	-.032	15	0	15	0	15	0	15
74			min	-131.628	3	-1.237	4	-.856	1	0	1	0	1	0	4
75		19	max	98.81	2	-.332	15	-.032	15	0	15	0	15	0	1
76			min	-131.679	3	-1.414	4	-.856	1	0	1	0	1	0	1
77	M4	1	max	530.75	1	0	1	-.09	15	0	1	0	3	0	1
78			min	-24.687	3	0	1	-2.344	1	0	1	0	1	0	1
79		2	max	530.815	1	0	1	-.09	15	0	1	0	12	0	1
80			min	-24.638	3	0	1	-2.344	1	0	1	0	1	0	1
81		3	max	530.88	1	0	1	-.09	15	0	1	0	15	0	1
82			min	-24.59	3	0	1	-2.344	1	0	1	0	1	0	1
83		4	max	530.944	1	0	1	-.09	15	0	1	0	15	0	1
84			min	-24.541	3	0	1	-2.344	1	0	1	0	1	0	1
85		5	max	531.009	1	0	1	-.09	15	0	1	0	15	0	1
86			min	-24.492	3	0	1	-2.344	1	0	1	0	1	0	1
87		6	max	531.074	1	0	1	-.09	15	0	1	0	15	0	1
88			min	-24.444	3	0	1	-2.344	1	0	1	-.001	1	0	1
89		7	max	531.139	1	0	1	-.09	15	0	1	0	15	0	1
90			min	-24.395	3	0	1	-2.344	1	0	1	-.001	1	0	1
91		8	max	531.203	1	0	1	-.09	15	0	1	0	15	0	1
92			min	-24.347	3	0	1	-2.344	1	0	1	-.002	1	0	1
93		9	max	531.268	1	0	1	-.09	15	0	1	0	15	0	1
94			min	-24.298	3	0	1	-2.344	1	0	1	-.002	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	531.333	1	0	1	-.09	15	0	1	0	15	0	1
96			min	-24.25	3	0	1	-2.344	1	0	1	-.002	1	0	1
97		11	max	531.397	1	0	1	-.09	15	0	1	0	15	0	1
98			min	-24.201	3	0	1	-2.344	1	0	1	-.002	1	0	1
99		12	max	531.462	1	0	1	-.09	15	0	1	0	15	0	1
100			min	-24.153	3	0	1	-2.344	1	0	1	-.002	1	0	1
101		13	max	531.527	1	0	1	-.09	15	0	1	0	15	0	1
102			min	-24.104	3	0	1	-2.344	1	0	1	-.003	1	0	1
103		14	max	531.591	1	0	1	-.09	15	0	1	0	15	0	1
104			min	-24.056	3	0	1	-2.344	1	0	1	-.003	1	0	1
105		15	max	531.656	1	0	1	-.09	15	0	1	0	15	0	1
106			min	-24.007	3	0	1	-2.344	1	0	1	-.003	1	0	1
107		16	max	531.721	1	0	1	-.09	15	0	1	0	15	0	1
108			min	-23.959	3	0	1	-2.344	1	0	1	-.003	1	0	1
109		17	max	531.786	1	0	1	-.09	15	0	1	0	15	0	1
110			min	-23.91	3	0	1	-2.344	1	0	1	-.003	1	0	1
111		18	max	531.85	1	0	1	-.09	15	0	1	0	15	0	1
112			min	-23.862	3	0	1	-2.344	1	0	1	-.004	1	0	1
113		19	max	531.915	1	0	1	-.09	15	0	1	0	15	0	1
114			min	-23.813	3	0	1	-2.344	1	0	1	-.004	1	0	1
115	M6	1	max	1202.234	1	.641	4	.23	1	0	1	0	3	0	1
116			min	-1192.156	3	.151	15	-.112	3	0	15	0	2	0	1
117		2	max	1202.35	1	.595	4	.23	1	0	1	0	3	0	15
118			min	-1192.069	3	.14	15	-.112	3	0	15	0	2	0	4
119		3	max	1202.467	1	.55	4	.23	1	0	1	0	1	0	15
120			min	-1191.981	3	.13	15	-.112	3	0	15	0	15	0	4
121		4	max	1202.583	1	.504	4	.23	1	0	1	0	1	0	15
122			min	-1191.894	3	.119	15	-.112	3	0	15	0	15	0	4
123		5	max	1202.7	1	.458	4	.23	1	0	1	0	1	0	15
124			min	-1191.807	3	.108	15	-.112	3	0	15	0	12	0	4
125		6	max	1202.816	1	.414	2	.23	1	0	1	0	1	0	15
126			min	-1191.719	3	.098	15	-.112	3	0	15	0	3	0	4
127		7	max	1202.932	1	.378	2	.23	1	0	1	0	1	0	15
128			min	-1191.632	3	.082	12	-.112	3	0	15	0	3	0	4
129		8	max	1203.049	1	.343	2	.23	1	0	1	0	1	0	15
130			min	-1191.545	3	.064	12	-.112	3	0	15	0	3	0	4
131		9	max	1203.165	1	.307	2	.23	1	0	1	0	1	0	15
132			min	-1191.457	3	.046	12	-.112	3	0	15	0	3	0	4
133		10	max	1203.282	1	.271	2	.23	1	0	1	0	1	0	15
134			min	-1191.37	3	.029	12	-.112	3	0	15	0	3	0	4
135		11	max	1203.398	1	.236	2	.23	1	0	1	0	1	0	15
136			min	-1191.283	3	.01	3	-.112	3	0	15	0	3	0	2
137		12	max	1203.514	1	.2	2	.23	1	0	1	0	1	0	12
138			min	-1191.196	3	-.017	3	-.112	3	0	15	0	3	0	2
139		13	max	1203.631	1	.165	2	.23	1	0	1	0	1	0	12
140			min	-1191.108	3	-.043	3	-.112	3	0	15	0	3	0	2
141		14	max	1203.747	1	.129	2	.23	1	0	1	0	1	0	12
142			min	-1191.021	3	-.07	3	-.112	3	0	15	0	3	0	2
143		15	max	1203.864	1	.094	2	.23	1	0	1	0	1	0	12
144			min	-1190.934	3	-.097	3	-.112	3	0	15	0	3	0	2
145		16	max	1203.98	1	.058	2	.23	1	0	1	0	1	0	12
146			min	-1190.846	3	-.123	3	-.112	3	0	15	0	3	0	2
147		17	max	1204.096	1	.022	2	.23	1	0	1	0	1	0	12
148			min	-1190.759	3	-.15	3	-.112	3	0	15	0	3	0	2
149		18	max	1204.213	1	-.013	2	.23	1	0	1	0	1	0	12
150			min	-1190.672	3	-.177	3	-.112	3	0	15	0	3	0	2
151		19	max	1204.329	1	-.042	15	.23	1	0	1	0	1	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
152			min	-1190.584	3	-.203	3	-.112	3	0	15	0	3	0	2
153	M7	1	max	472.906	2	1.779	4	.02	1	0	2	0	2	0	2
154			min	-404.916	3	.418	15	-.002	10	0	3	0	3	0	12
155		2	max	472.837	2	1.602	4	.02	1	0	2	0	2	0	2
156			min	-404.968	3	.377	15	-.002	10	0	3	0	3	0	3
157		3	max	472.769	2	1.424	4	.02	1	0	2	0	2	0	2
158			min	-405.019	3	.335	15	-.002	10	0	3	0	3	0	3
159		4	max	472.7	2	1.247	4	.02	1	0	2	0	2	0	2
160			min	-405.071	3	.293	15	-.002	10	0	3	0	3	0	3
161		5	max	472.631	2	1.07	4	.02	1	0	2	0	2	0	15
162			min	-405.122	3	.252	15	-.002	10	0	3	0	3	0	3
163		6	max	472.563	2	.893	4	.02	1	0	2	0	2	0	15
164			min	-405.173	3	.21	15	-.002	10	0	3	0	3	0	4
165		7	max	472.494	2	.716	4	.02	1	0	2	0	2	0	15
166			min	-405.225	3	.169	15	-.002	10	0	3	0	3	0	4
167		8	max	472.426	2	.538	4	.02	1	0	2	0	2	0	15
168			min	-405.276	3	.127	15	-.002	10	0	3	0	3	-.001	4
169		9	max	472.357	2	.363	2	.02	1	0	2	0	2	0	15
170			min	-405.328	3	.085	15	-.002	10	0	3	0	3	-.001	4
171		10	max	472.288	2	.225	2	.02	1	0	2	0	2	0	15
172			min	-405.379	3	.017	12	-.002	10	0	3	0	3	-.001	4
173		11	max	472.22	2	.086	2	.02	1	0	2	0	2	0	15
174			min	-405.431	3	-.084	3	-.002	10	0	3	0	3	-.001	4
175		12	max	472.151	2	-.04	15	.02	1	0	2	0	2	0	15
176			min	-405.482	3	-.188	3	-.002	10	0	3	0	3	-.001	4
177		13	max	472.083	2	-.081	15	.02	1	0	2	0	2	0	15
178			min	-405.534	3	-.348	4	-.002	10	0	3	0	3	-.001	4
179		14	max	472.014	2	-.123	15	.02	1	0	2	0	2	0	15
180			min	-405.585	3	-.525	4	-.002	10	0	3	0	3	-.001	4
181		15	max	471.945	2	-.165	15	.02	1	0	2	0	2	0	15
182			min	-405.637	3	-.702	4	-.002	10	0	3	0	3	0	4
183		16	max	471.877	2	-.206	15	.02	1	0	2	0	2	0	15
184			min	-405.688	3	-.879	4	-.002	10	0	3	0	3	0	4
185		17	max	471.808	2	-.248	15	.02	1	0	2	0	2	0	15
186			min	-405.739	3	-1.056	4	-.002	10	0	3	0	3	0	4
187		18	max	471.74	2	-.29	15	.02	1	0	2	0	2	0	15
188			min	-405.791	3	-1.234	4	-.002	10	0	3	0	3	0	4
189		19	max	471.671	2	-.331	15	.02	1	0	2	0	2	0	1
190			min	-405.842	3	-1.411	4	-.002	10	0	3	0	3	0	1
191	M8	1	max	1443.6	1	0	1	.919	1	0	1	0	15	0	1
192			min	-112.344	3	0	1	-.288	3	0	1	0	1	0	1
193		2	max	1443.665	1	0	1	.919	1	0	1	0	1	0	1
194			min	-112.295	3	0	1	-.288	3	0	1	0	3	0	1
195		3	max	1443.73	1	0	1	.919	1	0	1	0	1	0	1
196			min	-112.247	3	0	1	-.288	3	0	1	0	3	0	1
197		4	max	1443.794	1	0	1	.919	1	0	1	0	1	0	1
198			min	-112.198	3	0	1	-.288	3	0	1	0	3	0	1
199		5	max	1443.859	1	0	1	.919	1	0	1	0	1	0	1
200			min	-112.15	3	0	1	-.288	3	0	1	0	3	0	1
201		6	max	1443.924	1	0	1	.919	1	0	1	0	1	0	1
202			min	-112.101	3	0	1	-.288	3	0	1	0	3	0	1
203		7	max	1443.988	1	0	1	.919	1	0	1	0	1	0	1
204			min	-112.053	3	0	1	-.288	3	0	1	0	3	0	1
205		8	max	1444.053	1	0	1	.919	1	0	1	0	1	0	1
206			min	-112.004	3	0	1	-.288	3	0	1	0	3	0	1
207		9	max	1444.118	1	0	1	.919	1	0	1	0	1	0	1
208			min	-111.956	3	0	1	-.288	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	1444.183	1	0	1	.919	1	0	1	0	1	0	1
210			min	-111.907	3	0	1	-.288	3	0	1	0	3	0	1
211		11	max	1444.247	1	0	1	.919	1	0	1	0	1	0	1
212			min	-111.859	3	0	1	-.288	3	0	1	0	3	0	1
213		12	max	1444.312	1	0	1	.919	1	0	1	0	1	0	1
214			min	-111.81	3	0	1	-.288	3	0	1	0	3	0	1
215		13	max	1444.377	1	0	1	.919	1	0	1	0	1	0	1
216			min	-111.762	3	0	1	-.288	3	0	1	0	3	0	1
217		14	max	1444.441	1	0	1	.919	1	0	1	.001	1	0	1
218			min	-111.713	3	0	1	-.288	3	0	1	0	3	0	1
219		15	max	1444.506	1	0	1	.919	1	0	1	.001	1	0	1
220			min	-111.665	3	0	1	-.288	3	0	1	0	3	0	1
221		16	max	1444.571	1	0	1	.919	1	0	1	.001	1	0	1
222			min	-111.616	3	0	1	-.288	3	0	1	0	3	0	1
223		17	max	1444.635	1	0	1	.919	1	0	1	.001	1	0	1
224			min	-111.567	3	0	1	-.288	3	0	1	0	3	0	1
225		18	max	1444.7	1	0	1	.919	1	0	1	.001	1	0	1
226			min	-111.519	3	0	1	-.288	3	0	1	0	3	0	1
227		19	max	1444.765	1	0	1	.919	1	0	1	.001	1	0	1
228			min	-111.47	3	0	1	-.288	3	0	1	0	3	0	1
229	M10	1	max	384.066	1	.633	4	-.009	15	.001	1	0	1	0	1
230			min	-350.321	3	.15	15	-.237	1	0	3	0	3	0	1
231		2	max	384.182	1	.587	4	-.009	15	.001	1	0	1	0	15
232			min	-350.234	3	.139	15	-.237	1	0	3	0	3	0	4
233		3	max	384.299	1	.541	4	-.009	15	.001	1	0	1	0	15
234			min	-350.147	3	.129	15	-.237	1	0	3	0	3	0	4
235		4	max	384.415	1	.496	4	-.009	15	.001	1	0	1	0	15
236			min	-350.059	3	.118	15	-.237	1	0	3	0	3	0	4
237		5	max	384.531	1	.45	4	-.009	15	.001	1	0	1	0	15
238			min	-349.972	3	.107	15	-.237	1	0	3	0	3	0	4
239		6	max	384.648	1	.404	4	-.009	15	.001	1	0	1	0	15
240			min	-349.885	3	.096	15	-.237	1	0	3	0	3	0	4
241		7	max	384.764	1	.359	4	-.009	15	.001	1	0	2	0	15
242			min	-349.797	3	.086	15	-.237	1	0	3	0	3	0	4
243		8	max	384.881	1	.313	4	-.009	15	.001	1	0	2	0	15
244			min	-349.71	3	.075	15	-.237	1	0	3	0	3	0	4
245		9	max	384.997	1	.267	4	-.009	15	.001	1	0	2	0	15
246			min	-349.623	3	.064	15	-.237	1	0	3	0	3	0	4
247		10	max	385.113	1	.222	4	-.009	15	.001	1	0	2	0	15
248			min	-349.535	3	.053	15	-.237	1	0	3	0	3	0	4
249		11	max	385.23	1	.176	4	-.009	15	.001	1	0	15	0	15
250			min	-349.448	3	.043	15	-.237	1	0	3	0	1	0	4
251		12	max	385.346	1	.13	4	-.009	15	.001	1	0	15	0	15
252			min	-349.361	3	.032	15	-.237	1	0	3	0	1	0	4
253		13	max	385.463	1	.085	4	-.009	15	.001	1	0	15	0	15
254			min	-349.274	3	.021	15	-.237	1	0	3	0	1	0	4
255		14	max	385.579	1	.052	10	-.009	15	.001	1	0	15	0	15
256			min	-349.186	3	-.007	1	-.237	1	0	3	0	1	0	4
257		15	max	385.695	1	.022	10	-.009	15	.001	1	0	15	0	15
258			min	-349.099	3	-.043	1	-.237	1	0	3	0	1	0	4
259		16	max	385.812	1	-.008	10	-.009	15	.001	1	0	15	0	15
260			min	-349.012	3	-.078	1	-.237	1	0	3	0	1	0	4
261		17	max	385.928	1	-.022	15	-.009	15	.001	1	0	15	0	15
262			min	-348.924	3	-.114	1	-.237	1	0	3	0	1	0	4
263		18	max	386.045	1	-.032	15	-.009	15	.001	1	0	15	0	15
264			min	-348.837	3	-.149	1	-.237	1	0	3	0	1	0	4
265		19	max	386.161	1	-.043	15	-.009	15	.001	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-348.75	3	-.189	4	-.237	1	0	3	0	1	0	4
267	M11	1	max	99.833	2	1.781	4	.969	1	.001	1	0	3	0	4
268			min	-131.399	3	.419	15	.021	12	0	15	-.003	1	0	15
269		2	max	99.765	2	1.604	4	.969	1	.001	1	0	3	0	2
270			min	-131.451	3	.377	15	.021	12	0	15	-.002	1	0	12
271		3	max	99.696	2	1.426	4	.969	1	.001	1	0	3	0	2
272			min	-131.502	3	.335	15	.021	12	0	15	-.002	1	0	3
273		4	max	99.627	2	1.249	4	.969	1	.001	1	0	3	0	15
274			min	-131.554	3	.294	15	.021	12	0	15	-.002	1	0	3
275		5	max	99.559	2	1.072	4	.969	1	.001	1	0	3	0	15
276			min	-131.605	3	.252	15	.021	12	0	15	-.002	1	0	4
277		6	max	99.49	2	.895	4	.969	1	.001	1	0	3	0	15
278			min	-131.657	3	.21	15	.021	12	0	15	-.002	1	0	4
279		7	max	99.422	2	.718	4	.969	1	.001	1	0	3	0	15
280			min	-131.708	3	.169	15	.021	12	0	15	-.001	1	0	4
281		8	max	99.353	2	.54	4	.969	1	.001	1	0	3	0	15
282			min	-131.759	3	.127	15	.021	12	0	15	-.001	1	-.001	4
283		9	max	99.284	2	.363	4	.969	1	.001	1	0	3	0	15
284			min	-131.811	3	.085	15	.021	12	0	15	0	1	-.001	4
285		10	max	99.216	2	.186	4	.969	1	.001	1	0	3	0	15
286			min	-131.862	3	.044	15	.021	12	0	15	0	1	-.001	4
287		11	max	99.147	2	.044	2	.969	1	.001	1	0	3	0	15
288			min	-131.914	3	-.039	3	.021	12	0	15	0	1	-.001	4
289		12	max	99.078	2	-.039	15	.969	1	.001	1	0	3	0	15
290			min	-131.965	3	-.168	4	.021	12	0	15	0	1	-.001	4
291		13	max	99.01	2	-.081	15	.969	1	.001	1	0	3	0	15
292			min	-132.017	3	-.346	4	.021	12	0	15	0	1	-.001	4
293		14	max	98.941	2	-.123	15	.969	1	.001	1	0	3	0	15
294			min	-132.068	3	-.523	4	.021	12	0	15	0	2	-.001	4
295		15	max	98.873	2	-.164	15	.969	1	.001	1	0	1	0	15
296			min	-132.12	3	-.7	4	.021	12	0	15	0	10	0	4
297		16	max	98.804	2	-.206	15	.969	1	.001	1	0	1	0	15
298			min	-132.171	3	-.877	4	.021	12	0	15	0	15	0	4
299		17	max	98.735	2	-.248	15	.969	1	.001	1	0	1	0	15
300			min	-132.223	3	-1.054	4	.021	12	0	15	0	15	0	4
301		18	max	98.667	2	-.289	15	.969	1	.001	1	0	1	0	15
302			min	-132.274	3	-1.232	4	.021	12	0	15	0	15	0	4
303		19	max	98.598	2	-.331	15	.969	1	.001	1	.001	1	0	1
304			min	-132.325	3	-1.409	4	.021	12	0	15	0	15	0	1
305	M12	1	max	530.428	1	0	1	5.088	1	0	1	0	1	0	1
306			min	-24.181	3	0	1	.185	15	0	1	0	3	0	1
307		2	max	530.493	1	0	1	5.088	1	0	1	0	1	0	1
308			min	-24.133	3	0	1	.185	15	0	1	0	15	0	1
309		3	max	530.557	1	0	1	5.088	1	0	1	0	1	0	1
310			min	-24.084	3	0	1	.185	15	0	1	0	15	0	1
311		4	max	530.622	1	0	1	5.088	1	0	1	.001	1	0	1
312			min	-24.036	3	0	1	.185	15	0	1	0	15	0	1
313		5	max	530.687	1	0	1	5.088	1	0	1	.002	1	0	1
314			min	-23.987	3	0	1	.185	15	0	1	0	15	0	1
315		6	max	530.752	1	0	1	5.088	1	0	1	.002	1	0	1
316			min	-23.938	3	0	1	.185	15	0	1	0	15	0	1
317		7	max	530.816	1	0	1	5.088	1	0	1	.003	1	0	1
318			min	-23.89	3	0	1	.185	15	0	1	0	15	0	1
319		8	max	530.881	1	0	1	5.088	1	0	1	.003	1	0	1
320			min	-23.841	3	0	1	.185	15	0	1	0	15	0	1
321		9	max	530.946	1	0	1	5.088	1	0	1	.004	1	0	1
322			min	-23.793	3	0	1	.185	15	0	1	0	15	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	531.01	1	0	1	5.088	1	0	1	.004	1	0	1
324			min	-23.744	3	0	1	.185	15	0	1	0	15	0	1
325		11	max	531.075	1	0	1	5.088	1	0	1	.005	1	0	1
326			min	-23.696	3	0	1	.185	15	0	1	0	15	0	1
327		12	max	531.14	1	0	1	5.088	1	0	1	.005	1	0	1
328			min	-23.647	3	0	1	.185	15	0	1	0	15	0	1
329		13	max	531.204	1	0	1	5.088	1	0	1	.005	1	0	1
330			min	-23.599	3	0	1	.185	15	0	1	0	15	0	1
331		14	max	531.269	1	0	1	5.088	1	0	1	.006	1	0	1
332			min	-23.55	3	0	1	.185	15	0	1	0	15	0	1
333		15	max	531.334	1	0	1	5.088	1	0	1	.006	1	0	1
334			min	-23.502	3	0	1	.185	15	0	1	0	15	0	1
335		16	max	531.399	1	0	1	5.088	1	0	1	.007	1	0	1
336			min	-23.453	3	0	1	.185	15	0	1	0	15	0	1
337		17	max	531.463	1	0	1	5.088	1	0	1	.007	1	0	1
338			min	-23.405	3	0	1	.185	15	0	1	0	15	0	1
339		18	max	531.528	1	0	1	5.088	1	0	1	.008	1	0	1
340			min	-23.356	3	0	1	.185	15	0	1	0	15	0	1
341		19	max	531.593	1	0	1	5.088	1	0	1	.008	1	0	1
342			min	-23.308	3	0	1	.185	15	0	1	0	15	0	1
343	M1	1	max	161.948	1	342.178	3	-3.693	15	0	1	.197	1	.013	1
344			min	5.936	15	-363.767	1	-99.798	1	0	3	.007	15	-.01	3
345		2	max	162.066	1	341.988	3	-3.693	15	0	1	.176	1	.092	1
346			min	5.972	15	-364.02	1	-99.798	1	0	3	.006	15	-.084	3
347		3	max	111.573	1	7.892	9	-3.665	15	0	12	.152	1	.169	1
348			min	-1.269	10	-19.153	3	-99.666	1	0	1	.006	15	-.157	3
349		4	max	111.691	1	7.681	9	-3.665	15	0	12	.131	1	.169	1
350			min	-1.171	10	-19.343	3	-99.666	1	0	1	.005	15	-.153	3
351		5	max	111.809	1	7.47	9	-3.665	15	0	12	.109	1	.169	1
352			min	-1.072	10	-19.533	3	-99.666	1	0	1	.004	15	-.149	3
353		6	max	111.927	1	7.259	9	-3.665	15	0	12	.088	1	.17	1
354			min	-.974	10	-19.723	3	-99.666	1	0	1	.003	15	-.144	3
355		7	max	112.045	1	7.048	9	-3.665	15	0	12	.066	1	.17	1
356			min	-.876	10	-19.913	3	-99.666	1	0	1	.002	15	-.14	3
357		8	max	112.163	1	6.837	9	-3.665	15	0	12	.044	1	.17	1
358			min	-.777	10	-20.102	3	-99.666	1	0	1	.002	15	-.136	3
359		9	max	112.281	1	6.626	9	-3.665	15	0	12	.023	1	.171	1
360			min	-.679	10	-20.292	3	-99.666	1	0	1	0	15	-.131	3
361		10	max	112.399	1	6.415	9	-3.665	15	0	12	.001	1	.171	1
362			min	-.581	10	-20.482	3	-99.666	1	0	1	0	10	-.127	3
363		11	max	112.517	1	6.204	9	-3.665	15	0	12	0	12	.172	1
364			min	-.482	10	-20.672	3	-99.666	1	0	1	-.02	1	-.122	3
365		12	max	112.635	1	5.994	9	-3.665	15	0	12	-.001	12	.173	2
366			min	-.384	10	-20.862	3	-99.666	1	0	1	-.042	1	-.118	3
367		13	max	112.753	1	5.783	9	-3.665	15	0	12	-.002	12	.177	2
368			min	-.286	10	-21.051	3	-99.666	1	0	1	-.064	1	-.113	3
369		14	max	112.871	1	5.572	9	-3.665	15	0	12	-.003	15	.182	2
370			min	-.187	10	-21.241	3	-99.666	1	0	1	-.085	1	-.109	3
371		15	max	112.989	1	5.361	9	-3.665	15	0	12	-.004	15	.186	2
372			min	-.089	10	-21.473	2	-99.666	1	0	1	-.107	1	-.104	3
373		16	max	90.393	2	55.23	2	-3.696	15	0	1	-.005	15	.19	2
374			min	-19.584	3	-125.039	3	-100.389	1	0	12	-.13	1	-.099	3
375		17	max	90.511	2	54.977	2	-3.696	15	0	1	-.006	15	.19	1
376			min	-19.496	3	-125.229	3	-100.389	1	0	12	-.151	1	-.071	3
377		18	max	-5.942	15	411.258	1	-3.787	15	0	3	-.006	15	.103	1
378			min	-161.332	1	-147.822	3	-102.958	1	0	1	-.174	1	-.039	3
379		19	max	-5.907	15	411.005	1	-3.787	15	0	3	-.007	15	.014	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
380			min	-161.214	1	-148.012	3	-102.958	1	0	1	-.196	1	-.007	3
381	M5	1	max	353.811	1	1131.257	3	-.128	10	0	1	.006	1	.02	3
382			min	11.621	12	-1203.993	1	-36.541	1	0	3	0	10	-.025	1
383		2	max	353.929	1	1131.067	3	-.128	10	0	1	0	2	.236	1
384			min	11.68	12	-1204.246	1	-36.541	1	0	3	-.003	3	-.225	3
385		3	max	189.376	1	8.278	9	3.604	3	0	3	0	10	.492	1
386			min	-20.852	10	-69.755	2	-.14	2	0	1	-.01	3	-.466	3
387		4	max	189.494	1	8.067	9	3.604	3	0	3	0	10	.498	1
388			min	-20.753	10	-70.008	2	-.14	2	0	1	-.009	3	-.452	3
389		5	max	189.612	1	7.856	9	3.604	3	0	3	0	10	.503	1
390			min	-20.655	10	-70.261	2	-.14	2	0	1	-.008	3	-.438	3
391		6	max	189.73	1	7.645	9	3.604	3	0	3	0	10	.509	1
392			min	-20.556	10	-70.515	2	-.14	2	0	1	-.007	3	-.424	3
393		7	max	189.848	1	7.434	9	3.604	3	0	3	0	10	.514	1
394			min	-20.458	10	-70.768	2	-.14	2	0	1	-.007	1	-.41	3
395		8	max	189.966	1	7.223	9	3.604	3	0	3	0	10	.52	1
396			min	-20.36	10	-71.021	2	-.14	2	0	1	-.006	1	-.396	3
397		9	max	190.084	1	7.012	9	3.604	3	0	3	0	10	.526	1
398			min	-20.261	10	-71.274	2	-.14	2	0	1	-.006	1	-.382	3
399		10	max	190.202	1	6.802	9	3.604	3	0	3	0	10	.532	1
400			min	-20.163	10	-71.527	2	-.14	2	0	1	-.005	1	-.368	3
401		11	max	190.32	1	6.591	9	3.604	3	0	3	0	10	.538	1
402			min	-20.065	10	-71.78	2	-.14	2	0	1	-.004	1	-.353	3
403		12	max	190.438	1	6.38	9	3.604	3	0	3	0	10	.543	1
404			min	-19.966	10	-72.033	2	-.14	2	0	1	-.004	1	-.339	3
405		13	max	190.556	1	6.169	9	3.604	3	0	3	0	10	.549	1
406			min	-19.868	10	-72.286	2	-.14	2	0	1	-.003	1	-.325	3
407		14	max	190.674	1	5.958	9	3.604	3	0	3	0	15	.556	2
408			min	-19.77	10	-72.539	2	-.14	2	0	1	-.003	1	-.311	3
409		15	max	190.792	1	5.747	9	3.604	3	0	3	0	15	.572	2
410			min	-19.671	10	-72.792	2	-.14	2	0	1	-.002	1	-.296	3
411		16	max	314.739	2	299.12	2	3.58	3	0	1	0	3	.584	2
412			min	-65.843	3	-383.728	3	-.155	2	0	15	-.002	1	-.279	3
413		17	max	314.857	2	298.867	2	3.58	3	0	1	0	3	.555	1
414			min	-65.754	3	-383.917	3	-.155	2	0	15	-.001	1	-.196	3
415		18	max	-12.238	12	1354.338	1	3.332	1	0	3	.002	3	.266	1
416			min	-354.912	1	-486.333	3	-.025	10	0	1	0	2	-.091	3
417		19	max	-12.179	12	1354.085	1	3.332	1	0	3	.002	3	.015	3
418			min	-354.794	1	-486.523	3	-.025	10	0	1	0	2	-.027	1
419	M9	1	max	161.175	1	342.162	3	136.26	1	0	3	-.007	15	.013	1
420			min	5.906	15	-363.743	1	5.2	15	0	1	-.197	1	-.01	3
421		2	max	161.293	1	341.972	3	136.26	1	0	3	-.005	12	.092	1
422			min	5.942	15	-363.996	1	5.2	15	0	1	-.167	1	-.084	3
423		3	max	111.474	1	7.863	9	93.642	1	0	1	0	3	.169	1
424			min	-.723	10	-19.095	3	2.03	12	0	15	-.136	1	-.157	3
425		4	max	111.592	1	7.652	9	93.642	1	0	1	.002	3	.169	1
426			min	-.625	10	-19.284	3	2.03	12	0	15	-.116	1	-.153	3
427		5	max	111.71	1	7.441	9	93.642	1	0	1	.002	3	.169	1
428			min	-.526	10	-19.474	3	2.03	12	0	15	-.096	1	-.149	3
429		6	max	111.828	1	7.23	9	93.642	1	0	1	.003	3	.17	1
430			min	-.428	10	-19.664	3	2.03	12	0	15	-.075	1	-.144	3
431		7	max	111.946	1	7.019	9	93.642	1	0	1	.003	3	.17	1
432			min	-.33	10	-19.854	3	2.03	12	0	15	-.055	1	-.14	3
433		8	max	112.064	1	6.809	9	93.642	1	0	1	.004	3	.17	1
434			min	-.231	10	-20.044	3	2.03	12	0	15	-.035	1	-.136	3
435		9	max	112.182	1	6.598	9	93.642	1	0	1	.005	3	.171	1
436			min	-.133	10	-20.233	3	2.03	12	0	15	-.015	1	-.131	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	112.3	1	6.387	9	93.642	1	0	1	.006	1	.171	1
438			min	-.035	10	-20.423	3	2.03	12	0	15	0	10	-.127	3
439		11	max	112.418	1	6.176	9	93.642	1	0	1	.026	1	.172	1
440			min	.064	10	-20.613	3	2.03	12	0	15	0	15	-.122	3
441		12	max	112.536	1	5.965	9	93.642	1	0	1	.046	1	.173	2
442			min	.162	10	-20.803	3	2.03	12	0	15	.002	15	-.118	3
443		13	max	112.654	1	5.754	9	93.642	1	0	1	.067	1	.177	2
444			min	.26	10	-20.993	3	2.03	12	0	15	.002	15	-.113	3
445		14	max	112.772	1	5.543	9	93.642	1	0	1	.087	1	.182	2
446			min	.359	10	-21.235	2	2.03	12	0	15	.003	15	-.109	3
447		15	max	112.89	1	5.332	9	93.642	1	0	1	.107	1	.186	2
448			min	.457	10	-21.488	2	2.03	12	0	15	.004	15	-.104	3
449		16	max	90.667	2	55.062	2	94.492	1	0	15	.129	1	.19	2
450			min	-19.599	3	-125.496	3	2.053	12	0	1	.005	15	-.099	3
451		17	max	90.785	2	54.809	2	94.492	1	0	15	.15	1	.19	1
452			min	-19.51	3	-125.685	3	2.053	12	0	1	.006	15	-.071	3
453		18	max	-5.932	15	411.258	1	99.647	1	0	1	.172	1	.103	1
454			min	-161.044	1	-147.82	3	2.349	12	0	3	.006	15	-.039	3
455		19	max	-5.896	15	411.004	1	99.647	1	0	1	.193	1	.014	1
456			min	-160.926	1	-148.01	3	2.349	12	0	3	.007	15	-.007	3
457	M13	1	max	136.604	1	363.063	1	-5.906	15	.013	1	.197	1	0	1
458			min	5.2	15	-342.143	3	-161.153	1	-.01	3	.007	15	0	3
459		2	max	136.604	1	256.121	1	-4.53	15	.013	1	.063	1	.275	3
460			min	5.2	15	-241.292	3	-123.546	1	-.01	3	.002	15	-.292	1
461		3	max	136.604	1	149.179	1	-3.155	15	.013	1	.001	3	.456	3
462			min	5.2	15	-140.441	3	-85.938	1	-.01	3	-.036	1	-.484	1
463		4	max	136.604	1	42.237	1	-1.779	15	.013	1	-.002	12	.541	3
464			min	5.2	15	-39.589	3	-48.331	1	-.01	3	-.1	1	-.574	1
465		5	max	136.604	1	61.262	3	-.404	15	.013	1	-.003	12	.531	3
466			min	5.2	15	-64.705	1	-10.723	1	-.01	3	-.128	1	-.564	1
467		6	max	136.604	1	162.113	3	26.884	1	.013	1	-.004	12	.425	3
468			min	5.2	15	-171.647	1	.5	12	-.01	3	-.12	1	-.452	1
469		7	max	136.604	1	262.965	3	64.492	1	.013	1	-.002	12	.224	3
470			min	5.2	15	-278.589	1	1.842	12	-.01	3	-.077	1	-.239	1
471		8	max	136.604	1	363.816	3	102.099	1	.013	1	.002	1	.074	1
472			min	5.2	15	-385.531	1	3.184	12	-.01	3	0	3	-.072	3
473		9	max	136.604	1	464.667	3	139.707	1	.013	1	.116	1	.489	1
474			min	5.2	15	-492.474	1	4.527	12	-.01	3	.004	12	-.463	3
475		10	max	136.604	1	565.518	3	177.314	1	.011	2	.266	1	1.005	1
476			min	5.2	15	-599.416	1	5.869	12	-.013	1	.008	12	-.949	3
477		11	max	100.191	1	492.473	1	-4.407	12	.01	3	.11	1	.489	1
478			min	3.694	15	-464.667	3	-138.928	1	-.013	1	.001	12	-.463	3
479		12	max	100.191	1	385.531	1	-3.065	12	.01	3	0	10	.074	1
480			min	3.694	15	-363.816	3	-101.321	1	-.013	1	-.003	3	-.072	3
481		13	max	100.191	1	278.589	1	-1.723	12	.01	3	-.003	15	.224	3
482			min	3.694	15	-262.964	3	-63.713	1	-.013	1	-.081	1	-.239	1
483		14	max	100.191	1	171.647	1	-.38	12	.01	3	-.005	15	.425	3
484			min	3.694	15	-162.113	3	-26.106	1	-.013	1	-.123	1	-.452	1
485		15	max	100.191	1	64.705	1	11.502	1	.01	3	-.005	15	.531	3
486			min	3.694	15	-61.262	3	.434	15	-.013	1	-.13	1	-.564	1
487		16	max	100.191	1	39.589	3	49.109	1	.01	3	-.003	12	.541	3
488			min	3.694	15	-42.237	1	1.809	15	-.013	1	-.102	1	-.574	1
489		17	max	100.191	1	140.441	3	86.717	1	.01	3	0	12	.456	3
490			min	3.694	15	-149.179	1	3.185	15	-.013	1	-.038	1	-.484	1
491		18	max	100.191	1	241.292	3	124.324	1	.01	3	.062	1	.275	3
492			min	3.694	15	-256.121	1	4.561	15	-.013	1	.002	15	-.292	1
493		19	max	100.191	1	342.143	3	161.932	1	.01	3	.197	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	3.694	15	-363.064	1	5.936	15	-.013	1	.007	15	0	3
495	M16	1	max	-2.348	12	411.732	1	-5.896	15	.007	3	.193	1	0	1
496			min	-99.216	1	-148.036	3	-160.943	1	-.014	1	.007	15	0	3
497		2	max	-2.348	12	290.449	1	-4.521	15	.007	3	.059	1	.119	3
498			min	-99.216	1	-104.55	3	-123.335	1	-.014	1	.002	15	-.332	1
499		3	max	-2.348	12	169.166	1	-3.145	15	.007	3	-.001	12	.197	3
500			min	-99.216	1	-61.063	3	-85.728	1	-.014	1	-.04	1	-.549	1
501		4	max	-2.348	12	47.882	1	-1.77	15	.007	3	-.004	15	.235	3
502			min	-99.216	1	-17.577	3	-48.12	1	-.014	1	-.103	1	-.651	1
503		5	max	-2.348	12	25.91	3	-.394	15	.007	3	-.005	15	.231	3
504			min	-99.216	1	-73.401	1	-10.513	1	-.014	1	-.131	1	-.639	1
505		6	max	-2.348	12	69.396	3	27.095	1	.007	3	-.005	15	.186	3
506			min	-99.216	1	-194.684	1	.65	12	-.014	1	-.123	1	-.512	1
507		7	max	-2.348	12	112.883	3	64.702	1	.007	3	-.003	15	.1	3
508			min	-99.216	1	-315.968	1	1.992	12	-.014	1	-.08	1	-.271	1
509		8	max	-2.348	12	156.369	3	102.31	1	.007	3	.001	2	.084	1
510			min	-99.216	1	-437.251	1	3.334	12	-.014	1	-.002	3	-.028	3
511		9	max	-2.348	12	199.856	3	139.917	1	.007	3	.114	1	.555	1
512			min	-99.216	1	-558.534	1	4.676	12	-.014	1	.002	12	-.196	3
513		10	max	-3.786	15	-16.537	15	177.525	1	0	15	.264	1	1.139	1
514			min	-102.583	1	-679.818	1	-9.226	3	-.014	1	.009	12	-.405	3
515		11	max	-3.786	15	558.534	1	-4.818	12	.014	1	.114	1	.555	1
516			min	-102.583	1	-199.856	3	-139.628	1	-.007	3	.004	12	-.196	3
517		12	max	-3.786	15	437.251	1	-3.476	12	.014	1	0	2	.084	1
518			min	-102.583	1	-156.369	3	-102.021	1	-.007	3	0	3	-.028	3
519		13	max	-3.786	15	315.968	1	-2.134	12	.014	1	-.003	12	.1	3
520			min	-102.583	1	-112.883	3	-64.413	1	-.007	3	-.078	1	-.271	1
521		14	max	-3.786	15	194.684	1	-.792	12	.014	1	-.004	12	.186	3
522			min	-102.583	1	-69.396	3	-26.806	1	-.007	3	-.121	1	-.512	1
523		15	max	-3.786	15	73.401	1	10.801	1	.014	1	-.004	12	.231	3
524			min	-102.583	1	-25.91	3	.404	15	-.007	3	-.129	1	-.639	1
525		16	max	-3.786	15	17.577	3	48.409	1	.014	1	-.003	12	.235	3
526			min	-102.583	1	-47.882	1	1.78	15	-.007	3	-.101	1	-.651	1
527		17	max	-3.786	15	61.063	3	86.016	1	.014	1	0	12	.197	3
528			min	-102.583	1	-169.166	1	3.155	15	-.007	3	-.038	1	-.549	1
529		18	max	-3.786	15	104.55	3	123.624	1	.014	1	.061	1	.119	3
530			min	-102.583	1	-290.449	1	4.531	15	-.007	3	.002	15	-.332	1
531		19	max	-3.786	15	148.036	3	161.231	1	.014	1	.196	1	0	1
532			min	-102.583	1	-411.732	1	5.907	15	-.007	3	.007	15	0	3
533	M15	1	max	0	10	2.961	4	.024	3	0	1	0	1	0	1
534			min	-40.623	1	0	10	-.027	1	0	3	0	3	0	1
535		2	max	0	10	2.632	4	.024	3	0	1	0	1	0	10
536			min	-40.71	1	0	10	-.027	1	0	3	0	3	-.001	4
537		3	max	0	10	2.303	4	.024	3	0	1	0	1	0	10
538			min	-40.797	1	0	10	-.027	1	0	3	0	3	-.003	4
539		4	max	0	10	1.974	4	.024	3	0	1	0	1	0	10
540			min	-40.884	1	0	10	-.027	1	0	3	0	3	-.004	4
541		5	max	0	10	1.645	4	.024	3	0	1	0	1	0	10
542			min	-40.971	1	0	10	-.027	1	0	3	0	3	-.005	4
543		6	max	0	10	1.316	4	.024	3	0	1	0	1	0	10
544			min	-41.058	1	0	10	-.027	1	0	3	0	3	-.005	4
545		7	max	0	10	.987	4	.024	3	0	1	0	3	0	10
546			min	-41.145	1	0	10	-.027	1	0	3	0	2	-.006	4
547		8	max	0	10	.658	4	.024	3	0	1	0	3	0	10
548			min	-41.232	1	0	10	-.027	1	0	3	0	1	-.006	4
549		9	max	0	10	.329	4	.024	3	0	1	0	3	0	10
550			min	-41.319	1	0	10	-.027	1	0	3	0	1	-.007	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	10	0	1	.024	3	0	1	0	3	0	10
552			min	-41.406	1	0	1	-.027	1	0	3	0	1	-.007	4
553		11	max	0	10	0	10	.024	3	0	1	0	3	0	10
554			min	-41.493	1	-.329	4	-.027	1	0	3	0	1	-.007	4
555		12	max	0	10	0	10	.024	3	0	1	0	3	0	10
556			min	-41.579	1	-.658	4	-.027	1	0	3	0	1	-.006	4
557		13	max	0	10	0	10	.024	3	0	1	0	3	0	10
558			min	-41.666	1	-.987	4	-.027	1	0	3	0	1	-.006	4
559		14	max	0	10	0	10	.024	3	0	1	0	3	0	10
560			min	-41.753	1	-1.316	4	-.027	1	0	3	0	1	-.005	4
561		15	max	0	10	0	10	.024	3	0	1	0	3	0	10
562			min	-41.84	1	-1.645	4	-.027	1	0	3	0	1	-.005	4
563		16	max	0	10	0	10	.024	3	0	1	0	3	0	10
564			min	-41.927	1	-1.974	4	-.027	1	0	3	0	1	-.004	4
565		17	max	0	10	0	10	.024	3	0	1	0	3	0	10
566			min	-42.014	1	-2.303	4	-.027	1	0	3	0	1	-.003	4
567		18	max	0	10	0	10	.024	3	0	1	0	3	0	10
568			min	-42.101	1	-2.632	4	-.027	1	0	3	0	1	-.001	4
569		19	max	0	10	0	10	.024	3	0	1	0	3	0	1
570			min	-42.188	1	-2.961	4	-.027	1	0	3	0	1	0	1
571	M16A	1	max	-1.024	10	2.961	4	.02	1	0	3	0	3	0	1
572			min	-46.249	1	.696	15	-.01	3	0	1	0	1	0	1
573		2	max	-.952	10	2.632	4	.02	1	0	3	0	3	0	15
574			min	-46.162	1	.619	15	-.01	3	0	1	0	1	-.001	4
575		3	max	-.88	10	2.303	4	.02	1	0	3	0	3	0	15
576			min	-46.075	1	.541	15	-.01	3	0	1	0	1	-.003	4
577		4	max	-.807	10	1.974	4	.02	1	0	3	0	3	0	15
578			min	-45.988	1	.464	15	-.01	3	0	1	0	1	-.004	4
579		5	max	-.735	10	1.645	4	.02	1	0	3	0	3	-.001	15
580			min	-45.901	1	.387	15	-.01	3	0	1	0	1	-.005	4
581		6	max	-.662	10	1.316	4	.02	1	0	3	0	3	-.001	15
582			min	-45.814	1	.309	15	-.01	3	0	1	0	1	-.005	4
583		7	max	-.59	10	.987	4	.02	1	0	3	0	3	-.001	15
584			min	-45.727	1	.232	15	-.01	3	0	1	0	1	-.006	4
585		8	max	-.517	10	.658	4	.02	1	0	3	0	3	-.001	15
586			min	-45.641	1	.155	15	-.01	3	0	1	0	1	-.006	4
587		9	max	-.445	10	.329	4	.02	1	0	3	0	3	-.002	15
588			min	-45.554	1	.077	15	-.01	3	0	1	0	1	-.007	4
589		10	max	-.372	10	0	1	.02	1	0	3	0	3	-.002	15
590			min	-45.467	1	0	1	-.01	3	0	1	0	1	-.007	4
591		11	max	-.3	10	-.077	15	.02	1	0	3	0	3	-.002	15
592			min	-45.38	1	-.329	4	-.01	3	0	1	0	1	-.007	4
593		12	max	-.228	10	-.155	15	.02	1	0	3	0	3	-.001	15
594			min	-45.293	1	-.658	4	-.01	3	0	1	0	1	-.006	4
595		13	max	-.155	10	-.232	15	.02	1	0	3	0	1	-.001	15
596			min	-45.206	1	-.987	4	-.01	3	0	1	0	3	-.006	4
597		14	max	-.083	10	-.309	15	.02	1	0	3	0	1	-.001	15
598			min	-45.119	1	-1.316	4	-.01	3	0	1	0	3	-.005	4
599		15	max	-.01	10	-.387	15	.02	1	0	3	0	1	-.001	15
600			min	-45.032	1	-1.645	4	-.01	3	0	1	0	3	-.005	4
601		16	max	.062	10	-.464	15	.02	1	0	3	0	1	0	15
602			min	-44.945	1	-1.974	4	-.01	3	0	1	0	3	-.004	4
603		17	max	.135	10	-.541	15	.02	1	0	3	0	1	0	15
604			min	-44.858	1	-2.303	4	-.01	3	0	1	0	3	-.003	4
605		18	max	.207	10	-.619	15	.02	1	0	3	0	1	0	15
606			min	-44.771	1	-2.632	4	-.01	3	0	1	0	3	-.001	4
607		19	max	.279	10	-.696	15	.02	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-44.684	1	-2.961	4	-.01	3	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.009	2	.018	1	-5.805e-5	15	NC	3	NC	3
2			min	-.003	3	-.008	3	0	3	-1.579e-3	1	4166.282	2	1970.15	1
3		2	max	.003	1	.008	2	.017	1	-5.557e-5	15	NC	3	NC	3
4			min	-.003	3	-.008	3	0	3	-1.512e-3	1	4526.106	2	2126.925	1
5		3	max	.003	1	.007	2	.016	1	-5.309e-5	15	NC	3	NC	3
6			min	-.003	3	-.007	3	0	3	-1.445e-3	1	4950.335	2	2311.75	1
7		4	max	.003	1	.007	2	.014	1	-5.061e-5	15	NC	3	NC	3
8			min	-.003	3	-.007	3	0	3	-1.378e-3	1	5453.797	2	2531.371	1
9		5	max	.003	1	.006	2	.013	1	-4.814e-5	15	NC	3	NC	3
10			min	-.003	3	-.007	3	0	3	-1.311e-3	1	6056.053	2	2794.784	1
11		6	max	.002	1	.005	2	.012	1	-4.566e-5	15	NC	1	NC	3
12			min	-.002	3	-.006	3	0	3	-1.244e-3	1	6783.314	2	3114.213	1
13		7	max	.002	1	.005	2	.01	1	-4.318e-5	15	NC	1	NC	3
14			min	-.002	3	-.006	3	0	3	-1.177e-3	1	7671.363	2	3506.601	1
15		8	max	.002	1	.004	2	.009	1	-4.071e-5	15	NC	1	NC	3
16			min	-.002	3	-.006	3	0	3	-1.11e-3	1	8770.114	2	3996.009	1
17		9	max	.002	1	.004	2	.008	1	-3.823e-5	15	NC	1	NC	2
18			min	-.002	3	-.005	3	0	3	-1.043e-3	1	NC	1	4617.561	1
19		10	max	.002	1	.003	2	.007	1	-3.575e-5	15	NC	1	NC	2
20			min	-.002	3	-.005	3	0	3	-9.763e-4	1	NC	1	5424.246	1
21		11	max	.001	1	.003	2	.006	1	-3.327e-5	15	NC	1	NC	2
22			min	-.001	3	-.004	3	0	3	-9.094e-4	1	NC	1	6499.22	1
23		12	max	.001	1	.002	2	.005	1	-3.08e-5	15	NC	1	NC	2
24			min	-.001	3	-.004	3	0	3	-8.425e-4	1	NC	1	7979.413	1
25		13	max	.001	1	.002	2	.004	1	-2.832e-5	15	NC	1	NC	1
26			min	-.001	3	-.003	3	0	3	-7.755e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.003	1	-2.584e-5	15	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-7.086e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	-2.336e-5	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-6.417e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	.001	1	-2.089e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	12	-5.748e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.841e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	12	-5.078e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.593e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-4.409e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-1.165e-5	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.74e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.741e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	5.531e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	2.173e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	7.87e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	2.605e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	-.001	1	9.474e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	3.037e-4	1	NC	1	NC	1
46			min	0	2	-.002	3	-.002	1	1.108e-5	15	NC	1	NC	1
47		5	max	0	3	0	2	0	12	3.469e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.002	1	1.268e-5	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	3.901e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.429e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	4.333e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	-.001	1	1.589e-5	15	NC	1	NC	1
53		8	max	0	3	.001	2	0	3	4.765e-4	1	NC	1	NC	1
54			min	0	2	-.005	3	0	1	1.75e-5	15	NC	1	NC	1
55		9	max	0	3	.002	2	0	3	5.196e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	2	1.91e-5	15	NC	1	NC	1
57		10	max	0	3	.002	2	0	1	5.628e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	15	2.07e-5	15	NC	1	NC	1
59		11	max	0	3	.003	2	.002	1	6.06e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	15	2.231e-5	15	NC	1	NC	1
61		12	max	0	3	.003	2	.003	1	6.492e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	15	2.391e-5	15	NC	1	NC	1
63		13	max	0	3	.004	2	.004	1	6.924e-4	1	NC	1	NC	1
64			min	0	2	-.008	3	0	15	2.552e-5	15	NC	1	NC	1
65		14	max	.001	3	.005	2	.005	1	7.356e-4	1	NC	1	NC	1
66			min	0	2	-.008	3	0	15	2.712e-5	15	9523.667	2	NC	1
67		15	max	.001	3	.006	2	.006	1	7.788e-4	1	NC	1	NC	2
68			min	0	2	-.008	3	0	15	2.873e-5	15	8039.685	2	8103.79	1
69		16	max	.001	3	.007	2	.007	1	8.22e-4	1	NC	3	NC	2
70			min	0	2	-.008	3	0	15	3.033e-5	15	6883.618	2	6786.769	1
71		17	max	.001	3	.008	2	.008	1	8.651e-4	1	NC	3	NC	2
72			min	-.001	2	-.008	3	0	15	3.193e-5	15	5974.111	2	5842.406	1
73		18	max	.001	3	.009	2	.009	1	9.083e-4	1	NC	3	NC	2
74			min	-.001	2	-.008	3	0	15	3.354e-5	15	5252.472	2	5142.789	1
75		19	max	.001	3	.01	2	.01	1	9.515e-4	1	NC	3	NC	2
76			min	-.001	2	-.008	3	0	15	3.514e-5	15	4676.077	2	4612.613	1
77	M4	1	max	.003	1	.01	2	0	15	-4.558e-5	15	NC	1	NC	3
78			min	0	3	-.008	3	-.008	1	-1.252e-3	1	NC	1	2573.871	1
79		2	max	.002	1	.01	2	0	15	-4.558e-5	15	NC	1	NC	3
80			min	0	3	-.008	3	-.007	1	-1.252e-3	1	NC	1	2807.367	1
81		3	max	.002	1	.009	2	0	15	-4.558e-5	15	NC	1	NC	3
82			min	0	3	-.007	3	-.006	1	-1.252e-3	1	NC	1	3085.288	1
83		4	max	.002	1	.008	2	0	15	-4.558e-5	15	NC	1	NC	3
84			min	0	3	-.007	3	-.006	1	-1.252e-3	1	NC	1	3419.347	1
85		5	max	.002	1	.008	2	0	15	-4.558e-5	15	NC	1	NC	2
86			min	0	3	-.006	3	-.005	1	-1.252e-3	1	NC	1	3825.501	1
87		6	max	.002	1	.007	2	0	15	-4.558e-5	15	NC	1	NC	2
88			min	0	3	-.006	3	-.004	1	-1.252e-3	1	NC	1	4325.945	1
89		7	max	.002	1	.007	2	0	15	-4.558e-5	15	NC	1	NC	2
90			min	0	3	-.005	3	-.004	1	-1.252e-3	1	NC	1	4952.294	1
91		8	max	.002	1	.006	2	0	15	-4.558e-5	15	NC	1	NC	2
92			min	0	3	-.005	3	-.003	1	-1.252e-3	1	NC	1	5750.842	1
93		9	max	.001	1	.006	2	0	15	-4.558e-5	15	NC	1	NC	2
94			min	0	3	-.004	3	-.003	1	-1.252e-3	1	NC	1	6791.624	1
95		10	max	.001	1	.005	2	0	15	-4.558e-5	15	NC	1	NC	2
96			min	0	3	-.004	3	-.002	1	-1.252e-3	1	NC	1	8184.744	1
97		11	max	.001	1	.004	2	0	15	-4.558e-5	15	NC	1	NC	1
98			min	0	3	-.004	3	-.002	1	-1.252e-3	1	NC	1	NC	1
99		12	max	0	1	.004	2	0	15	-4.558e-5	15	NC	1	NC	1
100			min	0	3	-.003	3	-.001	1	-1.252e-3	1	NC	1	NC	1
101		13	max	0	1	.003	2	0	15	-4.558e-5	15	NC	1	NC	1
102			min	0	3	-.003	3	-.001	1	-1.252e-3	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-4.558e-5	15	NC	1	NC	1
104			min	0	3	-.002	3	0	1	-1.252e-3	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-4.558e-5	15	NC	1	NC	1
106			min	0	3	-.002	3	0	1	-1.252e-3	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-4.558e-5	15	NC	1	NC	1
108			min	0	3	-.001	3	0	1	-1.252e-3	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-4.558e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-1.252e-3	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-4.558e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-1.252e-3	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-4.558e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.252e-3	1	NC	1	NC	1
115	M6	1	max	.011	1	.029	2	.005	1	3.018e-4	1	NC	3	NC	2
116			min	-.011	3	-.023	3	-.003	3	3.817e-6	10	1255.412	2	7129.532	1
117		2	max	.01	1	.027	2	.005	1	2.834e-4	1	NC	3	NC	2
118			min	-.01	3	-.022	3	-.002	3	2.792e-6	10	1341.381	2	7757.913	1
119		3	max	.01	1	.025	2	.004	1	2.649e-4	1	NC	3	NC	2
120			min	-.009	3	-.021	3	-.002	3	1.766e-6	10	1439.644	2	8503.439	1
121		4	max	.009	1	.023	2	.004	1	2.465e-4	1	NC	3	NC	2
122			min	-.009	3	-.02	3	-.002	3	7.409e-7	10	1552.658	2	9396.228	1
123		5	max	.008	1	.022	2	.003	1	2.28e-4	1	NC	3	NC	1
124			min	-.008	3	-.019	3	-.002	3	-2.845e-7	10	1683.586	2	NC	1
125		6	max	.008	1	.02	2	.003	1	2.095e-4	1	NC	3	NC	1
126			min	-.008	3	-.017	3	-.002	3	-1.31e-6	10	1836.573	2	NC	1
127		7	max	.007	1	.018	2	.003	1	1.911e-4	1	NC	3	NC	1
128			min	-.007	3	-.016	3	-.002	3	-2.335e-6	10	2017.145	2	NC	1
129		8	max	.007	1	.016	2	.002	1	1.767e-4	3	NC	3	NC	1
130			min	-.007	3	-.015	3	-.001	3	-3.361e-6	10	2232.844	2	NC	1
131		9	max	.006	1	.015	2	.002	1	1.699e-4	3	NC	3	NC	1
132			min	-.006	3	-.014	3	-.001	3	-4.386e-6	10	2494.228	2	NC	1
133		10	max	.005	1	.013	2	.002	1	1.631e-4	3	NC	3	NC	1
134			min	-.005	3	-.012	3	-.001	3	-5.412e-6	10	2816.552	2	NC	1
135		11	max	.005	1	.011	2	.001	1	1.562e-4	3	NC	3	NC	1
136			min	-.005	3	-.011	3	0	3	-6.437e-6	10	3222.693	2	NC	1
137		12	max	.004	1	.01	2	.001	1	1.494e-4	3	NC	3	NC	1
138			min	-.004	3	-.01	3	0	3	-1.162e-5	2	3748.602	2	NC	1
139		13	max	.004	1	.008	2	0	1	1.425e-4	3	NC	3	NC	1
140			min	-.004	3	-.008	3	0	3	-1.697e-5	2	4454.186	2	NC	1
141		14	max	.003	1	.007	2	0	1	1.357e-4	3	NC	3	NC	1
142			min	-.003	3	-.007	3	0	3	-2.231e-5	2	5447.269	2	NC	1
143		15	max	.002	1	.005	2	0	1	1.288e-4	3	NC	3	NC	1
144			min	-.002	3	-.006	3	0	3	-2.766e-5	2	6943.47	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.22e-4	3	NC	1	NC	1
146			min	-.002	3	-.004	3	0	3	-3.301e-5	2	9445.869	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.151e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-3.836e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	2	1.083e-4	3	NC	1	NC	1
150			min	0	3	-.001	3	0	3	-4.371e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.015e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.906e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.254e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-4.7e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	1.917e-5	2	NC	1	NC	1
156			min	0	2	-.002	3	0	2	-3.475e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	1.745e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	2	-2.251e-5	3	NC	1	NC	1
159		4	max	0	3	.004	2	0	3	1.938e-5	1	NC	1	NC	1
160			min	0	2	-.005	3	0	2	-1.026e-5	3	NC	1	NC	1
161		5	max	.001	3	.006	2	0	3	2.131e-5	1	NC	3	NC	1
162			min	-.001	2	-.007	3	0	2	6.368e-7	15	8068.848	2	NC	1
163		6	max	.001	3	.007	2	0	3	2.323e-5	1	NC	3	NC	1
164			min	-.001	2	-.009	3	0	2	7.811e-7	15	6471.847	2	NC	1
165		7	max	.002	3	.009	2	.001	3	2.647e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.01	3	0	2	9.254e-7	15	5381.279	2	NC	1
167		8	max	.002	3	.01	2	.001	3	3.872e-5	3	NC	3	NC	1
168			min	-.002	2	-.012	3	0	1	-1.041e-6	2	4582.779	2	NC	1
169		9	max	.002	3	.012	2	.001	3	5.096e-5	3	NC	3	NC	1
170			min	-.002	2	-.013	3	0	1	-4.41e-6	2	3969.521	2	NC	1
171		10	max	.002	3	.013	2	.001	3	6.321e-5	3	NC	3	NC	1
172			min	-.003	2	-.015	3	-.001	1	-7.778e-6	2	3482.301	2	NC	1
173		11	max	.003	3	.015	2	.001	3	7.545e-5	3	NC	3	NC	1
174			min	-.003	2	-.016	3	-.001	1	-1.115e-5	2	3085.594	2	NC	1
175		12	max	.003	3	.017	2	.002	3	8.77e-5	3	NC	3	NC	1
176			min	-.003	2	-.017	3	-.001	1	-1.451e-5	2	2756.692	2	NC	1
177		13	max	.003	3	.019	2	.002	3	9.994e-5	3	NC	3	NC	1
178			min	-.004	2	-.018	3	-.002	1	-1.788e-5	2	2480.311	2	NC	1
179		14	max	.003	3	.021	2	.002	3	1.122e-4	3	NC	3	NC	1
180			min	-.004	2	-.019	3	-.002	1	-2.125e-5	2	2245.703	2	NC	1
181		15	max	.004	3	.023	2	.002	3	1.244e-4	3	NC	3	NC	1
182			min	-.004	2	-.02	3	-.002	1	-2.462e-5	2	2045.028	2	NC	1
183		16	max	.004	3	.025	2	.002	3	1.367e-4	3	NC	3	NC	1
184			min	-.004	2	-.021	3	-.002	1	-2.799e-5	2	1872.39	2	NC	1
185		17	max	.004	3	.027	2	.001	3	1.489e-4	3	NC	3	NC	1
186			min	-.005	2	-.022	3	-.002	1	-3.135e-5	2	1723.244	2	NC	1
187		18	max	.004	3	.029	2	.001	3	1.612e-4	3	NC	3	NC	1
188			min	-.005	2	-.022	3	-.002	1	-3.472e-5	2	1594.014	2	NC	1
189		19	max	.005	3	.031	2	.001	3	1.734e-4	3	NC	3	NC	1
190			min	-.005	2	-.023	3	-.003	1	-3.809e-5	2	1481.845	2	NC	1
191	M8	1	max	.007	1	.033	2	.003	1	-4.523e-6	10	NC	1	NC	2
192			min	0	3	-.023	3	0	3	-2.08e-4	1	NC	1	6665.917	1
193		2	max	.006	1	.031	2	.003	1	-4.523e-6	10	NC	1	NC	2
194			min	0	3	-.022	3	0	3	-2.08e-4	1	NC	1	7267.625	1
195		3	max	.006	1	.029	2	.002	1	-4.523e-6	10	NC	1	NC	2
196			min	0	3	-.021	3	0	3	-2.08e-4	1	NC	1	7983.961	1
197		4	max	.006	1	.027	2	.002	1	-4.523e-6	10	NC	1	NC	2
198			min	0	3	-.02	3	0	3	-2.08e-4	1	NC	1	8845.119	1
199		5	max	.005	1	.026	2	.002	1	-4.523e-6	10	NC	1	NC	2
200			min	0	3	-.018	3	0	3	-2.08e-4	1	NC	1	9892.235	1
201		6	max	.005	1	.024	2	.002	1	-4.523e-6	10	NC	1	NC	1
202			min	0	3	-.017	3	0	3	-2.08e-4	1	NC	1	NC	1
203		7	max	.005	1	.022	2	.002	1	-4.523e-6	10	NC	1	NC	1
204			min	0	3	-.016	3	0	3	-2.08e-4	1	NC	1	NC	1
205		8	max	.004	1	.02	2	.001	1	-4.523e-6	10	NC	1	NC	1
206			min	0	3	-.014	3	0	3	-2.08e-4	1	NC	1	NC	1
207		9	max	.004	1	.018	2	.001	1	-4.523e-6	10	NC	1	NC	1
208			min	0	3	-.013	3	0	3	-2.08e-4	1	NC	1	NC	1
209		10	max	.003	1	.016	2	0	1	-4.523e-6	10	NC	1	NC	1
210			min	0	3	-.012	3	0	3	-2.08e-4	1	NC	1	NC	1
211		11	max	.003	1	.015	2	0	1	-4.523e-6	10	NC	1	NC	1
212			min	0	3	-.01	3	0	3	-2.08e-4	1	NC	1	NC	1
213		12	max	.003	1	.013	2	0	1	-4.523e-6	10	NC	1	NC	1
214			min	0	3	-.009	3	0	3	-2.08e-4	1	NC	1	NC	1
215		13	max	.002	1	.011	2	0	1	-4.523e-6	10	NC	1	NC	1
216			min	0	3	-.008	3	0	3	-2.08e-4	1	NC	1	NC	1
217		14	max	.002	1	.009	2	0	1	-4.523e-6	10	NC	1	NC	1
218			min	0	3	-.007	3	0	3	-2.08e-4	1	NC	1	NC	1
219		15	max	.002	1	.007	2	0	1	-4.523e-6	10	NC	1	NC	1
220			min	0	3	-.005	3	0	3	-2.08e-4	1	NC	1	NC	1
221		16	max	.001	1	.005	2	0	1	-4.523e-6	10	NC	1	NC	1
222			min	0	3	-.004	3	0	3	-2.08e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.004	2	0	1	-4.523e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-2.08e-4	1	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-4.523e-6	10	NC	1	NC	1
226			min	0	3	-.001	3	0	3	-2.08e-4	1	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-4.523e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.08e-4	1	NC	1	NC	1
229	M10	1	max	.003	1	.009	2	0	3	1.27e-3	1	NC	3	NC	1
230			min	-.003	3	-.008	3	-.003	1	-1.978e-4	3	4168.396	2	NC	1
231		2	max	.003	1	.008	2	0	3	1.203e-3	1	NC	3	NC	1
232			min	-.003	3	-.008	3	-.002	1	-1.922e-4	3	4517.821	2	NC	1
233		3	max	.003	1	.007	2	0	3	1.136e-3	1	NC	3	NC	1
234			min	-.003	3	-.007	3	-.002	1	-1.866e-4	3	4927.834	2	NC	1
235		4	max	.003	1	.007	2	0	3	1.069e-3	1	NC	3	NC	1
236			min	-.003	3	-.007	3	-.002	1	-1.811e-4	3	5411.877	2	NC	1
237		5	max	.003	1	.006	2	0	3	1.002e-3	1	NC	3	NC	1
238			min	-.002	3	-.007	3	-.002	1	-1.755e-4	3	5987.549	2	NC	1
239		6	max	.002	1	.005	2	0	3	9.347e-4	1	NC	1	NC	1
240			min	-.002	3	-.006	3	-.002	1	-1.699e-4	3	6678.24	2	NC	1
241		7	max	.002	1	.005	2	0	3	8.676e-4	1	NC	1	NC	1
242			min	-.002	3	-.006	3	-.002	1	-1.644e-4	3	7515.611	2	NC	1
243		8	max	.002	1	.004	2	0	3	8.006e-4	1	NC	1	NC	1
244			min	-.002	3	-.006	3	-.001	1	-1.588e-4	3	8543.428	2	NC	1
245		9	max	.002	1	.004	2	0	3	7.336e-4	1	NC	1	NC	1
246			min	-.002	3	-.005	3	-.001	1	-1.532e-4	3	9823.72	2	NC	1
247		10	max	.002	1	.003	2	0	3	6.665e-4	1	NC	1	NC	1
248			min	-.002	3	-.005	3	-.001	1	-1.477e-4	3	NC	1	NC	1
249		11	max	.002	1	.003	2	0	3	5.995e-4	1	NC	1	NC	1
250			min	-.001	3	-.004	3	0	1	-1.421e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	5.325e-4	1	NC	1	NC	1
252			min	-.001	3	-.004	3	0	1	-1.365e-4	3	NC	1	NC	1
253		13	max	.001	1	.002	2	0	3	4.655e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-1.31e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.984e-4	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	-1.254e-4	3	NC	1	NC	1
257		15	max	0	1	.001	2	0	3	3.314e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.199e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.644e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.143e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.973e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-1.087e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.303e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.032e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.399e-5	2	NC	1	NC	1
266			min	0	1	0	1	0	1	-9.759e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	4.539e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.112e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	2	3.04e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-1.116e-4	1	NC	1	NC	1
271		3	max	0	3	0	2	0	2	1.54e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.92e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	4.013e-7	3	NC	1	NC	1
274			min	0	2	-.003	3	0	1	-2.725e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-9.944e-6	12	NC	1	NC	1
276			min	0	2	-.003	3	-.001	1	-3.529e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	15	-1.593e-5	15	NC	1	NC	1
278			min	0	2	-.004	3	-.002	1	-4.334e-4	1	NC	1	NC	1
279		7	max	0	3	.001	2	0	15	-1.895e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.003	1	-5.138e-4	1	NC	1	NC	1
281		8	max	0	3	.001	2	0	15	-2.197e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.004	1	-5.943e-4	1	NC	1	NC	1
283		9	max	0	3	.002	2	0	15	-2.499e-5	15	NC	1	NC	2
284			min	0	2	-.006	3	-.005	1	-6.747e-4	1	NC	1	8408.958	1
285		10	max	0	3	.002	2	0	15	-2.801e-5	15	NC	1	NC	2
286			min	0	2	-.007	3	-.007	1	-7.552e-4	1	NC	1	6761.382	1
287		11	max	0	3	.003	2	0	15	-3.103e-5	15	NC	1	NC	2
288			min	0	2	-.007	3	-.008	1	-8.357e-4	1	NC	1	5602.422	1
289		12	max	0	3	.003	2	0	15	-3.405e-5	15	NC	1	NC	2
290			min	0	2	-.007	3	-.01	1	-9.161e-4	1	NC	1	4756.207	1
291		13	max	0	3	.004	2	0	15	-3.707e-5	15	NC	1	NC	2
292			min	0	2	-.008	3	-.011	1	-9.966e-4	1	NC	1	4120.054	1
293		14	max	.001	3	.005	2	0	15	-4.009e-5	15	NC	1	NC	2
294			min	0	2	-.008	3	-.013	1	-1.077e-3	1	9320.872	2	3630.691	1
295		15	max	.001	3	.006	2	0	15	-4.311e-5	15	NC	1	NC	3
296			min	0	2	-.008	3	-.014	1	-1.157e-3	1	7921.913	2	3247.395	1
297		16	max	.001	3	.007	2	0	15	-4.613e-5	15	NC	3	NC	3
298			min	0	2	-.008	3	-.016	1	-1.238e-3	1	6819.077	2	2943.011	1
299		17	max	.001	3	.008	2	0	15	-4.915e-5	15	NC	3	NC	3
300			min	-.001	2	-.008	3	-.017	1	-1.318e-3	1	5943.161	2	2698.903	1
301		18	max	.001	3	.009	2	0	15	-5.217e-5	15	NC	3	NC	3
302			min	-.001	2	-.008	3	-.018	1	-1.399e-3	1	5242.861	2	2501.989	1
303		19	max	.001	3	.01	2	0	15	-5.519e-5	15	NC	3	NC	3
304			min	-.001	2	-.008	3	-.02	1	-1.479e-3	1	4680.09	2	2342.931	1
305	M12	1	max	.003	1	.01	2	.016	1	1.339e-3	1	NC	1	NC	3
306			min	0	3	-.008	3	0	15	5.066e-5	15	NC	1	1194.981	1
307		2	max	.002	1	.01	2	.015	1	1.339e-3	1	NC	1	NC	3
308			min	0	3	-.008	3	0	15	5.066e-5	15	NC	1	1303.113	1
309		3	max	.002	1	.009	2	.013	1	1.339e-3	1	NC	1	NC	3
310			min	0	3	-.007	3	0	15	5.066e-5	15	NC	1	1431.831	1
311		4	max	.002	1	.008	2	.012	1	1.339e-3	1	NC	1	NC	3
312			min	0	3	-.007	3	0	15	5.066e-5	15	NC	1	1586.561	1
313		5	max	.002	1	.008	2	.011	1	1.339e-3	1	NC	1	NC	3
314			min	0	3	-.006	3	0	15	5.066e-5	15	NC	1	1774.693	1
315		6	max	.002	1	.007	2	.01	1	1.339e-3	1	NC	1	NC	3
316			min	0	3	-.006	3	0	15	5.066e-5	15	NC	1	2006.508	1
317		7	max	.002	1	.007	2	.008	1	1.339e-3	1	NC	1	NC	3
318			min	0	3	-.005	3	0	15	5.066e-5	15	NC	1	2296.65	1
319		8	max	.002	1	.006	2	.007	1	1.339e-3	1	NC	1	NC	3
320			min	0	3	-.005	3	0	15	5.066e-5	15	NC	1	2666.559	1
321		9	max	.001	1	.006	2	.006	1	1.339e-3	1	NC	1	NC	3
322			min	0	3	-.004	3	0	15	5.066e-5	15	NC	1	3148.673	1
323		10	max	.001	1	.005	2	.005	1	1.339e-3	1	NC	1	NC	2
324			min	0	3	-.004	3	0	15	5.066e-5	15	NC	1	3793.986	1
325		11	max	.001	1	.004	2	.004	1	1.339e-3	1	NC	1	NC	2
326			min	0	3	-.004	3	0	15	5.066e-5	15	NC	1	4686.491	1
327		12	max	0	1	.004	2	.003	1	1.339e-3	1	NC	1	NC	2
328			min	0	3	-.003	3	0	15	5.066e-5	15	NC	1	5972.717	1
329		13	max	0	1	.003	2	.002	1	1.339e-3	1	NC	1	NC	2
330			min	0	3	-.003	3	0	15	5.066e-5	15	NC	1	7927.544	1
331		14	max	0	1	.003	2	.002	1	1.339e-3	1	NC	1	NC	1
332			min	0	3	-.002	3	0	15	5.066e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	.001	1	1.339e-3	1	NC	1	NC	1
334			min	0	3	-.002	3	0	15	5.066e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	1.339e-3	1	NC	1	NC	1
336			min	0	3	-.001	3	0	15	5.066e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	1	1.339e-3	1	NC	1	NC	1
338			min	0	3	0	3	0	15	5.066e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	1.339e-3	1	NC	1	NC	1
340			min	0	3	0	3	0	15	5.066e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	1.339e-3	1	NC	1	NC	1
342			min	0	1	0	1	0	1	5.066e-5	15	NC	1	NC	1
343	M1	1	max	.008	3	.024	3	.001	3	1.813e-2	1	NC	1	NC	1
344			min	-.008	2	-.028	1	-.006	1	-1.699e-2	3	NC	1	NC	1
345		2	max	.007	3	.014	3	0	3	8.533e-3	1	NC	4	NC	2
346			min	-.008	2	-.016	1	-.014	1	-8.418e-3	3	3665.668	1	6056.259	1
347		3	max	.007	3	.004	3	0	3	-5.971e-6	12	NC	4	NC	3
348			min	-.008	2	-.004	1	-.019	1	-8.803e-4	1	1895.719	1	3671.352	1
349		4	max	.007	3	.006	1	0	3	-4.597e-7	3	NC	5	NC	3
350			min	-.008	2	-.004	3	-.021	1	-7.43e-4	1	1341.004	1	3036.737	1
351		5	max	.007	3	.015	1	0	12	5.544e-6	3	NC	5	NC	3
352			min	-.008	2	-.011	3	-.022	1	-6.058e-4	1	1074.417	1	2914.239	1
353		6	max	.007	3	.022	1	0	12	1.155e-5	3	NC	5	NC	3
354			min	-.008	2	-.016	3	-.021	1	-4.685e-4	1	923.777	1	3115.435	1
355		7	max	.007	3	.027	1	0	12	1.755e-5	3	NC	5	NC	3
356			min	-.008	2	-.02	3	-.018	1	-3.312e-4	1	832.617	1	3703.848	1
357		8	max	.007	3	.031	1	0	12	2.355e-5	3	NC	5	NC	2
358			min	-.008	2	-.023	3	-.015	1	-1.939e-4	1	777.458	1	5069.025	1
359		9	max	.007	3	.033	1	0	3	2.956e-5	3	NC	5	NC	2
360			min	-.008	2	-.024	3	-.01	1	-5.667e-5	1	747.34	1	9094.486	1
361		10	max	.007	3	.034	1	0	3	8.06e-5	1	NC	5	NC	1
362			min	-.008	2	-.025	3	-.006	1	3.316e-6	15	737.211	1	NC	1
363		11	max	.007	3	.033	1	0	3	2.179e-4	1	NC	5	NC	1
364			min	-.008	2	-.024	3	-.001	1	8.349e-6	15	745.54	1	NC	1
365		12	max	.007	3	.031	1	.003	1	3.551e-4	1	NC	5	NC	2
366			min	-.008	2	-.022	3	0	15	1.338e-5	15	773.684	1	5934.153	1
367		13	max	.007	3	.027	1	.006	1	4.924e-4	1	NC	5	NC	2
368			min	-.008	2	-.019	3	0	15	1.841e-5	15	826.46	1	4112.94	1
369		14	max	.007	3	.021	1	.009	1	6.297e-4	1	NC	5	NC	3
370			min	-.008	2	-.015	3	0	15	2.345e-5	15	914.43	1	3369.309	1
371		15	max	.007	3	.014	1	.01	1	7.67e-4	1	NC	5	NC	3
372			min	-.008	2	-.01	3	0	15	2.848e-5	15	1060.245	1	3101.852	1
373		16	max	.007	3	.005	1	.01	1	8.643e-4	1	NC	5	NC	3
374			min	-.008	2	-.004	3	0	15	3.208e-5	15	1317.944	1	3196.066	1
375		17	max	.007	3	.003	3	.008	1	2.862e-5	3	NC	4	NC	3
376			min	-.008	2	-.006	2	0	15	-3.184e-6	2	1850.158	1	3833.997	1
377		18	max	.007	3	.011	3	.003	1	1.018e-2	1	NC	4	NC	2
378			min	-.008	2	-.018	2	0	15	-3.722e-3	3	3566.193	1	6290.086	1
379		19	max	.007	3	.019	3	0	3	2.055e-2	1	NC	1	NC	1
380			min	-.008	2	-.031	2	-.004	1	-7.543e-3	3	NC	1	NC	1
381	M5	1	max	.022	3	.073	3	.001	3	8.56e-7	1	NC	1	NC	1
382			min	-.027	2	-.087	1	-.007	1	5.56e-8	15	NC	1	NC	1
383		2	max	.022	3	.042	3	.002	3	5.771e-5	3	NC	5	NC	1
384			min	-.028	2	-.049	1	-.006	1	-8.051e-5	1	1215.194	1	NC	1
385		3	max	.022	3	.013	3	.003	3	1.136e-4	3	NC	5	NC	1
386			min	-.028	2	-.013	1	-.005	1	-1.602e-4	1	625.358	1	NC	1
387		4	max	.022	3	.017	1	.003	3	1.111e-4	3	NC	5	NC	1
388			min	-.028	2	-.011	3	-.004	1	-1.501e-4	1	440.959	1	NC	1
389		5	max	.022	3	.044	1	.003	3	1.086e-4	3	NC	15	NC	1
390			min	-.028	2	-.03	3	-.004	1	-1.401e-4	1	352.25	1	NC	1
391		6	max	.022	3	.065	1	.004	3	1.061e-4	3	NC	15	NC	1
392			min	-.028	2	-.046	3	-.003	1	-1.3e-4	1	302.007	1	NC	1
393		7	max	.021	3	.082	1	.004	3	1.036e-4	3	NC	15	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	-.028	2	-.058	3	-.003	1	-1.2e-4	1	271.466	1	NC	1
395		8	max	.021	3	.094	1	.004	3	1.011e-4	3	NC	15	NC	1
396			min	-.028	2	-.066	3	-.002	1	-1.099e-4	1	252.823	1	NC	1
397		9	max	.021	3	.102	1	.004	3	9.863e-5	3	NC	15	NC	1
398			min	-.028	2	-.07	3	-.002	1	-9.986e-5	1	242.426	1	NC	1
399		10	max	.021	3	.104	1	.003	3	9.613e-5	3	9989.253	15	NC	1
400			min	-.028	2	-.071	3	-.002	1	-8.98e-5	1	238.579	1	NC	1
401		11	max	.021	3	.102	1	.003	3	9.364e-5	3	NC	15	NC	1
402			min	-.028	2	-.069	3	-.002	1	-7.974e-5	1	240.748	1	NC	1
403		12	max	.021	3	.095	1	.003	3	9.114e-5	3	NC	15	NC	1
404			min	-.028	2	-.063	3	-.002	1	-6.969e-5	1	249.342	1	NC	1
405		13	max	.021	3	.083	1	.003	3	8.865e-5	3	NC	15	NC	1
406			min	-.028	2	-.054	3	-.002	1	-5.963e-5	1	265.901	1	NC	1
407		14	max	.021	3	.065	1	.002	3	8.615e-5	3	NC	15	NC	1
408			min	-.028	2	-.042	3	-.002	1	-4.957e-5	1	293.833	1	NC	1
409		15	max	.021	3	.043	1	.002	3	8.365e-5	3	NC	15	NC	1
410			min	-.028	2	-.028	3	-.002	1	-4.291e-5	2	340.499	1	NC	1
411		16	max	.021	3	.015	1	.001	3	7.837e-5	3	NC	5	NC	1
412			min	-.028	2	-.01	3	-.003	1	-4.133e-5	2	423.641	1	NC	1
413		17	max	.021	3	.01	3	0	3	6.678e-6	3	NC	5	NC	1
414			min	-.028	2	-.018	2	-.003	1	-2.853e-4	1	598.126	1	NC	1
415		18	max	.021	3	.032	3	0	3	2.627e-6	3	NC	5	NC	1
416			min	-.028	2	-.056	1	-.003	1	-1.463e-4	1	1159.759	1	NC	1
417		19	max	.021	3	.055	3	0	3	0	15	NC	1	NC	1
418			min	-.028	2	-.097	1	-.003	1	-1.506e-7	3	NC	1	NC	1
419	M9	1	max	.008	3	.024	3	0	3	1.699e-2	3	NC	1	NC	1
420			min	-.008	2	-.028	1	-.008	1	-1.812e-2	1	NC	1	NC	1
421		2	max	.008	3	.014	3	0	3	8.414e-3	3	NC	4	NC	2
422			min	-.008	2	-.016	1	-.002	1	-8.859e-3	1	3666.435	1	7217.144	1
423		3	max	.008	3	.004	3	.003	1	2.326e-4	1	NC	4	NC	2
424			min	-.008	2	-.004	1	0	3	-3.407e-6	3	1896.122	1	4504.634	1
425		4	max	.008	3	.006	1	.005	1	1.153e-4	1	NC	5	NC	3
426			min	-.008	2	-.004	3	0	3	-1.287e-5	3	1341.281	1	3837.834	1
427		5	max	.007	3	.015	1	.005	1	7.849e-6	10	NC	5	NC	3
428			min	-.008	2	-.011	3	0	3	-2.234e-5	3	1074.62	1	3832.665	1
429		6	max	.007	3	.022	1	.004	1	-2.963e-6	10	NC	5	NC	3
430			min	-.008	2	-.016	3	-.001	3	-1.192e-4	1	923.933	1	4353.492	1
431		7	max	.007	3	.027	1	.002	1	-8.639e-6	15	NC	5	NC	2
432			min	-.008	2	-.02	3	-.002	3	-2.365e-4	1	832.739	1	5758.594	1
433		8	max	.007	3	.031	1	0	10	-1.296e-5	15	NC	5	NC	1
434			min	-.008	2	-.023	3	-.002	3	-3.537e-4	1	777.553	1	NC	1
435		9	max	.007	3	.033	1	0	10	-1.728e-5	15	NC	5	NC	1
436			min	-.008	2	-.025	3	-.005	1	-4.71e-4	1	747.414	1	NC	1
437		10	max	.007	3	.034	1	0	15	-2.16e-5	15	NC	5	NC	1
438			min	-.008	2	-.025	3	-.009	1	-5.883e-4	1	737.266	1	NC	1
439		11	max	.007	3	.033	1	0	15	-2.592e-5	15	NC	5	NC	2
440			min	-.008	2	-.024	3	-.013	1	-7.055e-4	1	745.578	1	6053.175	1
441		12	max	.007	3	.031	1	0	15	-3.024e-5	15	NC	5	NC	2
442			min	-.008	2	-.022	3	-.016	1	-8.228e-4	1	773.705	1	4078.829	1
443		13	max	.007	3	.027	1	0	15	-3.456e-5	15	NC	5	NC	3
444			min	-.008	2	-.019	3	-.019	1	-9.4e-4	1	826.463	1	3227.17	1
445		14	max	.007	3	.021	1	0	15	-3.888e-5	15	NC	5	NC	3
446			min	-.008	2	-.015	3	-.021	1	-1.057e-3	1	914.414	1	2835.904	1
447		15	max	.007	3	.014	1	0	15	-4.32e-5	15	NC	5	NC	3
448			min	-.008	2	-.01	3	-.021	1	-1.175e-3	1	1060.207	1	2726.71	1
449		16	max	.007	3	.005	1	0	15	-4.629e-5	15	NC	5	NC	3
450			min	-.008	2	-.004	3	-.02	1	-1.26e-3	1	1317.878	1	2893.212	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	.007	3	.003	3	0	15	-4.114e-6	12	NC	4	NC	3
452			min	-.008	2	-.006	2	-.016	1	-5.761e-4	1	1850.074	1	3544.526	1
453		18	max	.007	3	.011	3	0	15	3.735e-3	3	NC	4	NC	2
454			min	-.008	2	-.018	2	-.011	1	-1.046e-2	1	3566.032	1	5907.1	1
455		19	max	.007	3	.019	3	0	3	7.543e-3	3	NC	1	NC	1
456			min	-.008	2	-.031	2	-.002	1	-2.055e-2	1	NC	1	NC	1
457	M13	1	max	.008	1	.024	3	.008	3	4.002e-3	3	NC	1	NC	1
458			min	0	3	-.028	1	-.008	2	-4.822e-3	1	NC	1	NC	1
459		2	max	.008	1	.21	3	.063	1	4.846e-3	3	NC	5	NC	3
460			min	-.001	3	-.227	1	.002	10	-5.881e-3	1	1028.607	1	2985.805	1
461		3	max	.008	1	.362	3	.16	1	5.689e-3	3	NC	5	NC	3
462			min	-.001	3	-.389	1	.006	15	-6.941e-3	1	565.814	1	1239.138	1
463		4	max	.008	1	.457	3	.242	1	6.533e-3	3	NC	5	NC	3
464			min	-.001	3	-.491	1	.009	15	-8.e-3	1	441.264	1	827.132	1
465		5	max	.008	1	.484	3	.282	1	7.377e-3	3	NC	15	NC	3
466			min	-.001	3	-.521	1	.011	15	-9.06e-3	1	414.527	1	710.223	1
467		6	max	.008	1	.445	3	.27	1	8.22e-3	3	NC	5	NC	3
468			min	-.001	3	-.48	1	.01	15	-1.012e-2	1	451.976	1	743.155	1
469		7	max	.007	1	.352	3	.207	1	9.064e-3	3	NC	5	NC	3
470			min	-.001	3	-.383	1	.008	15	-1.118e-2	1	575.992	1	963.572	1
471		8	max	.007	1	.232	3	.112	1	9.908e-3	3	NC	5	NC	3
472			min	-.001	3	-.256	1	0	10	-1.224e-2	1	896.197	1	1739.132	1
473		9	max	.007	1	.123	3	.021	3	1.075e-2	3	NC	5	NC	2
474			min	-.001	3	-.14	1	-.011	10	-1.33e-2	1	1827.891	1	8193.822	1
475		10	max	.007	1	.073	3	.022	3	1.159e-2	3	NC	4	NC	1
476			min	-.001	3	-.087	1	-.027	2	-1.436e-2	1	3467.862	1	NC	1
477		11	max	.007	1	.123	3	.026	1	1.075e-2	3	NC	5	NC	2
478			min	-.001	3	-.14	1	-.011	10	-1.33e-2	1	1827.893	1	6487.97	1
479		12	max	.007	1	.232	3	.123	1	9.908e-3	3	NC	5	NC	5
480			min	-.001	3	-.256	1	0	10	-1.224e-2	1	896.198	1	1593.479	1
481		13	max	.007	1	.352	3	.22	1	9.065e-3	3	NC	5	NC	5
482			min	-.001	3	-.383	1	.008	15	-1.118e-2	1	575.992	1	908.466	1
483		14	max	.007	1	.445	3	.283	1	8.222e-3	3	NC	5	NC	5
484			min	-.001	3	-.48	1	.011	15	-1.012e-2	1	451.977	1	709.007	1
485		15	max	.006	1	.484	3	.294	1	7.379e-3	3	NC	15	NC	5
486			min	-.001	3	-.52	1	.011	15	-9.058e-3	1	414.527	1	681.347	1
487		16	max	.006	1	.457	3	.252	1	6.536e-3	3	NC	5	NC	5
488			min	-.001	3	-.491	1	.009	15	-7.998e-3	1	441.265	1	794.864	1
489		17	max	.006	1	.362	3	.167	1	5.692e-3	3	NC	5	NC	3
490			min	-.001	3	-.389	1	.006	15	-6.938e-3	1	565.815	1	1188.226	1
491		18	max	.006	1	.21	3	.067	1	4.849e-3	3	NC	5	NC	3
492			min	-.001	3	-.227	1	.002	10	-5.878e-3	1	1028.608	1	2835.899	1
493		19	max	.006	1	.024	3	.008	3	4.006e-3	3	NC	1	NC	1
494			min	-.001	3	-.028	1	-.008	2	-4.819e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.019	3	.007	3	5.052e-3	1	NC	1	NC	1
496			min	0	3	-.031	2	-.008	2	-3.081e-3	3	NC	1	NC	1
497		2	max	.002	1	.102	3	.068	1	6.207e-3	1	NC	5	NC	3
498			min	0	3	-.256	1	.002	10	-3.7e-3	3	907.344	1	2770.453	1
499		3	max	.003	1	.17	3	.168	1	7.363e-3	1	NC	5	NC	3
500			min	0	3	-.439	1	.006	15	-4.319e-3	3	499.128	1	1174.325	1
501		4	max	.003	1	.213	3	.253	1	8.518e-3	1	NC	5	NC	5
502			min	0	3	-.555	1	.01	15	-4.938e-3	3	389.282	1	790.557	1
503		5	max	.003	1	.227	3	.294	1	9.674e-3	1	NC	15	NC	5
504			min	0	3	-.589	1	.011	15	-5.557e-3	3	365.734	1	680.901	1
505		6	max	.003	1	.211	3	.281	1	1.083e-2	1	NC	5	NC	5
506			min	0	3	-.542	1	.011	15	-6.176e-3	3	398.85	1	711.911	1
507		7	max	.003	1	.173	3	.217	1	1.199e-2	1	NC	5	NC	5

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.432	1	.008	15	-6.795e-3	3	508.472	1	917.919	1
509		8	max	.003	1	.123	3	.12	1	1.314e-2	1	NC	5	NC	5
510			min	0	3	-.288	1	0	10	-7.414e-3	3	791.787	1	1629.385	1
511		9	max	.003	1	.076	3	.024	3	1.43e-2	1	NC	5	NC	2
512			min	0	3	-.157	1	-.011	10	-8.033e-3	3	1618.617	1	7000.031	1
513		10	max	.003	1	.055	3	.021	3	1.545e-2	1	NC	4	NC	1
514			min	0	3	-.097	1	-.028	2	-8.652e-3	3	3083.067	1	NC	1
515		11	max	.004	1	.076	3	.022	3	1.43e-2	1	NC	5	NC	2
516			min	0	3	-.157	1	-.011	10	-8.033e-3	3	1618.617	1	7556.017	1
517		12	max	.004	1	.123	3	.116	1	1.314e-2	1	NC	5	NC	3
518			min	0	3	-.288	1	0	10	-7.413e-3	3	791.787	1	1683.503	1
519		13	max	.004	1	.173	3	.211	1	1.199e-2	1	NC	5	NC	5
520			min	0	3	-.432	1	.008	15	-6.794e-3	3	508.473	1	941.319	1
521		14	max	.004	1	.211	3	.275	1	1.083e-2	1	NC	5	NC	5
522			min	0	3	-.542	1	.01	15	-6.174e-3	3	398.851	1	728.505	1
523		15	max	.004	1	.227	3	.287	1	9.676e-3	1	NC	15	NC	5
524			min	0	3	-.589	1	.011	15	-5.555e-3	3	365.734	1	696.989	1
525		16	max	.004	1	.213	3	.246	1	8.521e-3	1	NC	5	NC	3
526			min	0	3	-.555	1	.009	15	-4.935e-3	3	389.282	1	811.223	1
527		17	max	.004	1	.17	3	.163	1	7.366e-3	1	NC	5	NC	3
528			min	0	3	-.439	1	.006	15	-4.315e-3	3	499.128	1	1211.894	1
529		18	max	.004	1	.102	3	.065	1	6.211e-3	1	NC	5	NC	3
530			min	0	3	-.256	1	.002	10	-3.696e-3	3	907.345	1	2897.667	1
531		19	max	.004	1	.019	3	.007	3	5.056e-3	1	NC	1	NC	1
532			min	0	3	-.031	2	-.008	2	-3.076e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.441e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-1.121e-4	2	NC	1	NC	1
535		2	max	0	1	-.007	15	.001	1	8.46e-4	3	NC	15	NC	1
536			min	0	10	-.031	4	0	3	-7.2e-4	1	3555.563	4	NC	1
537		3	max	0	1	-.014	15	.004	1	1.348e-3	3	7697.042	15	NC	1
538			min	0	10	-.06	4	-.003	3	-1.389e-3	1	1809.305	4	NC	1
539		4	max	0	1	-.021	15	.008	1	1.85e-3	3	5280.621	15	NC	4
540			min	0	10	-.087	4	-.007	3	-2.057e-3	1	1241.289	4	8503.837	1
541		5	max	0	1	-.026	15	.013	1	2.351e-3	3	4120.522	15	NC	4
542			min	0	10	-.112	4	-.011	3	-2.726e-3	1	968.59	4	5610.588	1
543		6	max	0	1	-.031	15	.019	1	2.853e-3	3	3467.855	15	NC	4
544			min	0	10	-.133	4	-.016	3	-3.395e-3	1	815.171	4	4100.032	1
545		7	max	0	1	-.035	15	.025	1	3.355e-3	3	3075.361	15	NC	4
546			min	0	10	-.15	4	-.021	3	-4.063e-3	1	722.91	4	3213.627	1
547		8	max	0	1	-.038	15	.031	1	3.857e-3	3	2839.807	15	NC	4
548			min	0	10	-.163	4	-.026	3	-4.732e-3	1	667.539	4	2655.053	1
549		9	max	0	1	-.04	15	.036	1	4.359e-3	3	2713.017	15	NC	4
550			min	0	10	-.17	4	-.03	3	-5.401e-3	1	637.735	4	2288.962	1
551		10	max	0	1	-.041	15	.04	1	4.861e-3	3	2672.907	15	NC	4
552			min	0	10	-.173	4	-.033	3	-6.069e-3	1	628.307	4	2047.19	1
553		11	max	0	1	-.04	15	.043	1	5.362e-3	3	2713.017	15	NC	4
554			min	0	10	-.171	4	-.036	3	-6.738e-3	1	637.735	4	1893.909	1
555		12	max	0	1	-.038	15	.044	1	5.864e-3	3	2839.807	15	NC	5
556			min	0	10	-.163	4	-.037	3	-7.406e-3	1	667.539	4	1811.384	1
557		13	max	0	1	-.035	15	.043	1	6.366e-3	3	3075.361	15	NC	5
558			min	0	10	-.151	4	-.036	3	-8.075e-3	1	722.91	4	1794.61	1
559		14	max	0	1	-.031	15	.04	1	6.868e-3	3	3467.855	15	NC	4
560			min	0	10	-.134	4	-.033	3	-8.744e-3	1	815.171	4	1851.609	1
561		15	max	0	1	-.026	15	.034	1	7.37e-3	3	4120.522	15	NC	4
562			min	0	10	-.113	4	-.027	3	-9.412e-3	1	968.59	4	2011.316	1
563		16	max	0	1	-.021	15	.024	1	7.871e-3	3	5280.621	15	NC	4
564			min	0	10	-.089	4	-.019	3	-1.008e-2	1	1241.289	4	2352.081	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
565		17	max	.001	1	-.014	15	.011	1	8.373e-3	3	7697.042	15	NC	4
566			min	0	10	-.061	4	-.008	3	-1.075e-2	1	1809.305	4	3119.555	1
567		18	max	.001	1	-.007	15	.007	3	8.875e-3	3	NC	15	NC	4
568			min	0	10	-.032	4	-.011	2	-1.142e-2	1	3555.563	4	5556.197	1
569		19	max	.001	1	.003	3	.026	3	9.377e-3	3	NC	1	NC	1
570			min	0	10	-.004	1	-.03	2	-1.209e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	10	.009	3	3.153e-3	3	NC	1	NC	1
572			min	-.001	1	-.002	1	-.009	2	-3.517e-3	1	NC	1	NC	1
573		2	max	0	10	-.007	15	.007	1	3.016e-3	3	NC	15	NC	2
574			min	-.001	1	-.031	4	-.001	10	-3.348e-3	1	3555.563	4	8312.084	1
575		3	max	0	10	-.014	15	.017	1	2.88e-3	3	7697.042	15	NC	4
576			min	-.001	1	-.061	4	-.004	3	-3.178e-3	1	1809.305	4	4699.855	1
577		4	max	0	10	-.021	15	.025	1	2.743e-3	3	5280.621	15	NC	4
578			min	-.001	1	-.088	4	-.008	3	-3.009e-3	1	1241.289	4	3571.893	1
579		5	max	0	10	-.026	15	.03	1	2.606e-3	3	4120.522	15	NC	4
580			min	-.001	1	-.112	4	-.01	3	-2.839e-3	1	968.59	4	3082.174	1
581		6	max	0	10	-.031	15	.033	1	2.47e-3	3	3467.855	15	NC	4
582			min	0	1	-.133	4	-.012	3	-2.67e-3	1	815.171	4	2867.078	1
583		7	max	0	10	-.035	15	.034	1	2.333e-3	3	3075.361	15	NC	4
584			min	0	1	-.15	4	-.013	3	-2.5e-3	1	722.91	4	2812.525	1
585		8	max	0	10	-.038	15	.034	1	2.196e-3	3	2839.807	15	NC	4
586			min	0	1	-.163	4	-.013	3	-2.331e-3	1	667.539	4	2879.284	1
587		9	max	0	10	-.04	15	.032	1	2.06e-3	3	2713.017	15	NC	4
588			min	0	1	-.17	4	-.012	3	-2.161e-3	1	637.735	4	3061.645	1
589		10	max	0	10	-.041	15	.029	1	1.923e-3	3	2672.907	15	NC	4
590			min	0	1	-.173	4	-.011	3	-1.992e-3	1	628.307	4	3377.71	1
591		11	max	0	10	-.04	15	.025	1	1.786e-3	3	2713.017	15	NC	4
592			min	0	1	-.17	4	-.01	3	-1.822e-3	1	637.735	4	3873.188	1
593		12	max	0	10	-.038	15	.021	1	1.65e-3	3	2839.807	15	NC	4
594			min	0	1	-.163	4	-.008	3	-1.653e-3	1	667.539	4	4638.902	1
595		13	max	0	10	-.035	15	.016	1	1.513e-3	3	3075.361	15	NC	3
596			min	0	1	-.15	4	-.006	3	-1.497e-3	2	722.91	4	5855.696	1
597		14	max	0	10	-.031	15	.012	1	1.376e-3	3	3467.855	15	NC	2
598			min	0	1	-.133	4	-.004	3	-1.344e-3	2	815.171	4	7913.362	1
599		15	max	0	10	-.026	15	.008	1	1.24e-3	3	4120.522	15	NC	1
600			min	0	1	-.112	4	-.002	3	-1.191e-3	2	968.59	4	NC	1
601		16	max	0	10	-.021	15	.004	1	1.103e-3	3	5280.621	15	NC	1
602			min	0	1	-.087	4	0	3	-1.037e-3	2	1241.289	4	NC	1
603		17	max	0	10	-.014	15	.002	1	9.664e-4	3	7697.042	15	NC	1
604			min	0	1	-.06	4	0	10	-8.842e-4	2	1809.305	4	NC	1
605		18	max	0	10	-.007	15	0	4	8.297e-4	3	NC	15	NC	1
606			min	0	1	-.031	4	0	2	-7.311e-4	2	3555.563	4	NC	1
607		19	max	0	1	0	1	0	1	6.93e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.779e-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

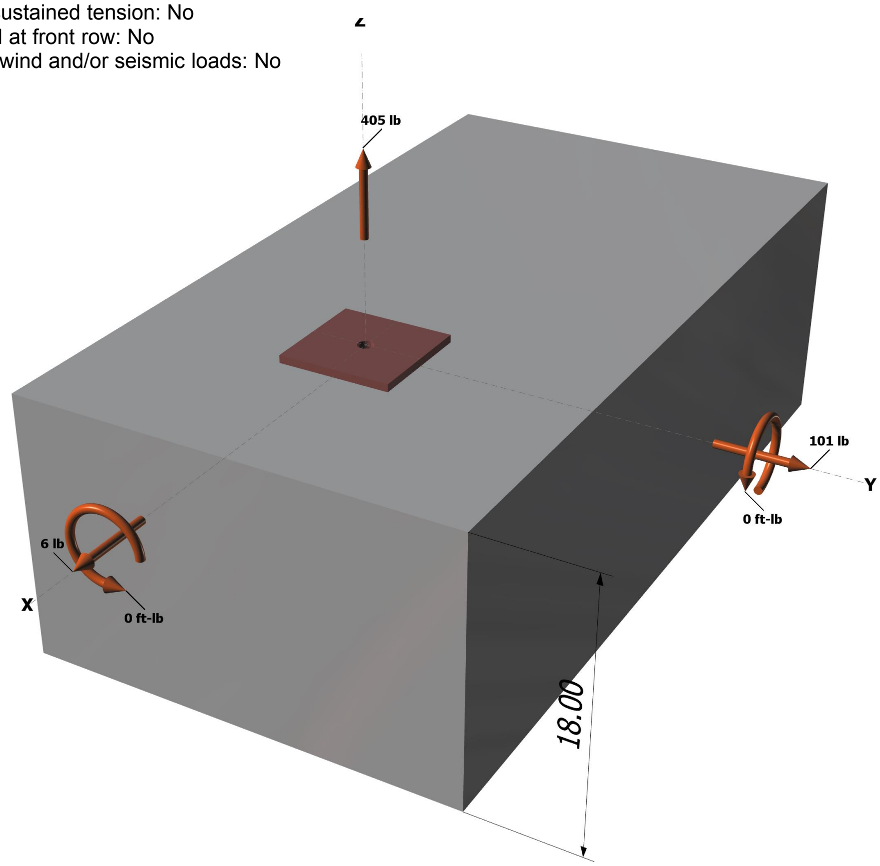
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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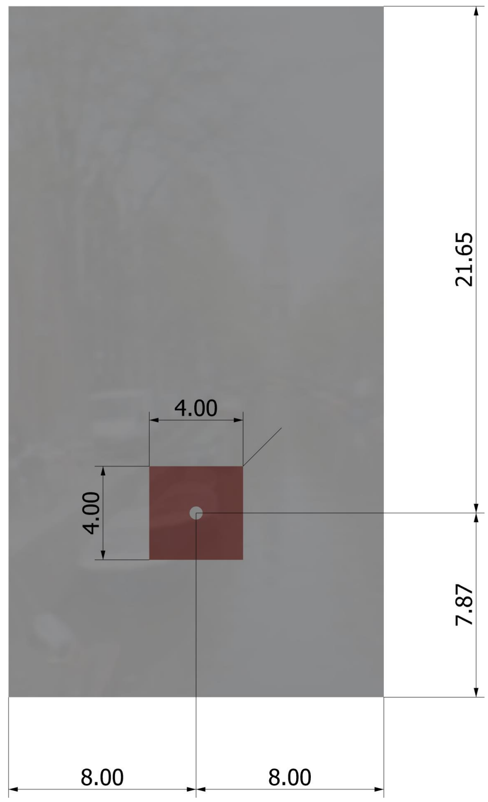


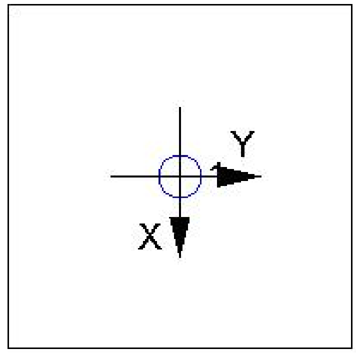
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

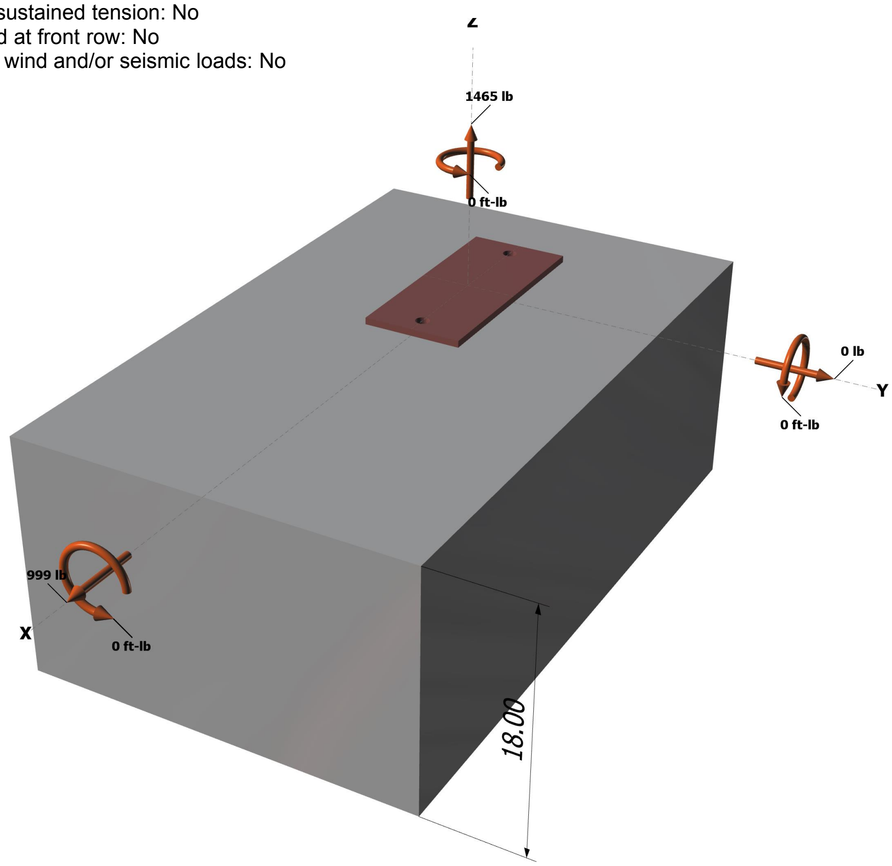
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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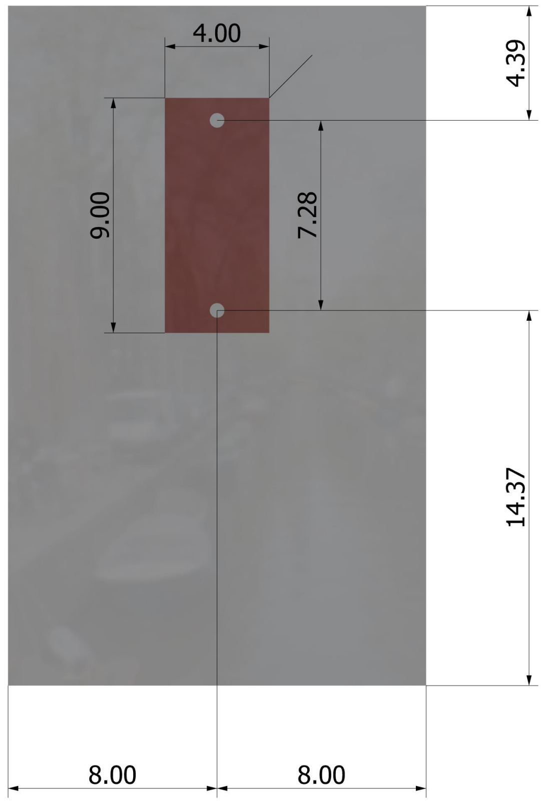


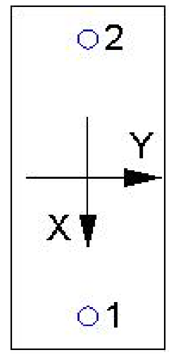
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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