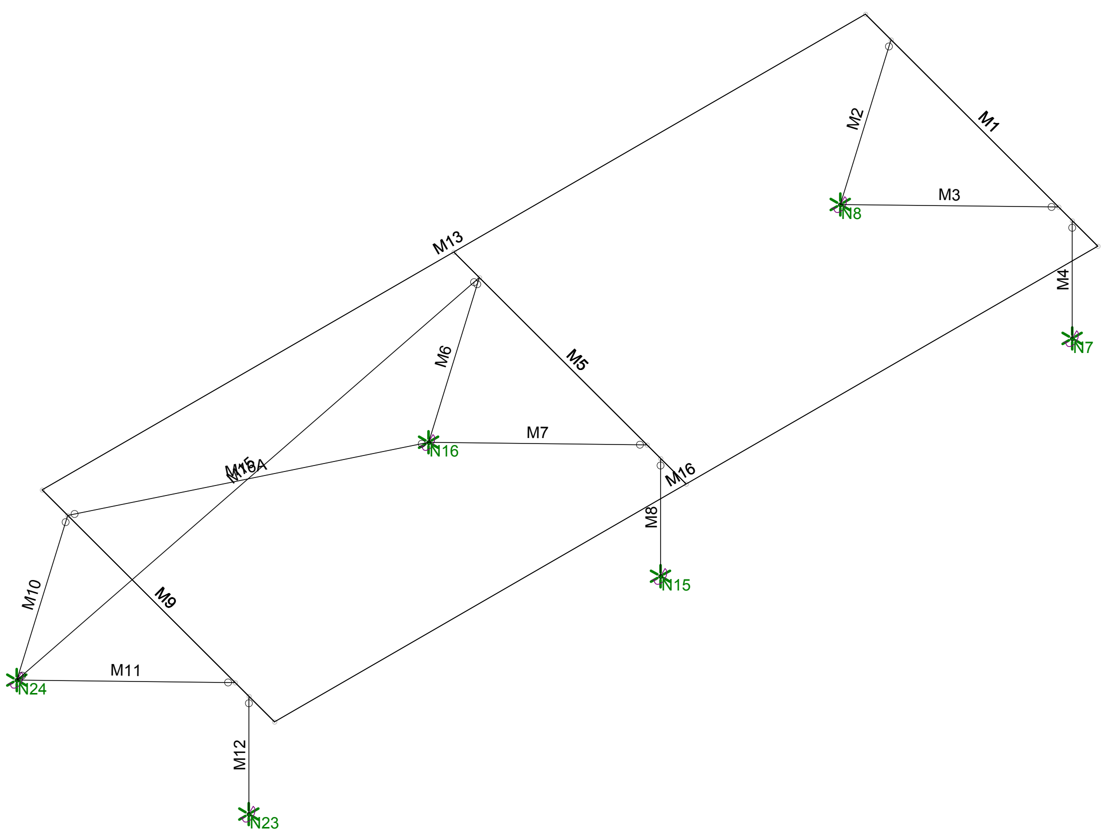


Schletter, Inc.		20° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

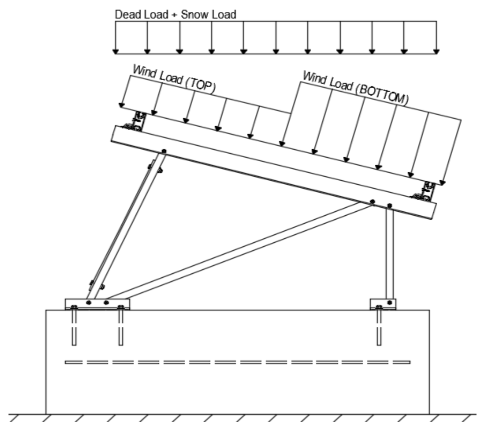
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row =	1
Module Tilt =	20°
Maximum Height Above Grade =	3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} =	3.00	psf	*Self-weight of the PV modules.*
g_{MIN} =	1.75	psf	

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	20.62	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.91		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	160	mph	Exposure Category = C
Height ≤	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	40.19	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.05	*(Pressure)*	
$Cf+_{BOTTOM}$ =	1.65		
$Cf-_{TOP}$ =	-2.12	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1		

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

2.4 Seismic Loads

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M16	Bottom

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Bracing
M15
M16A

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

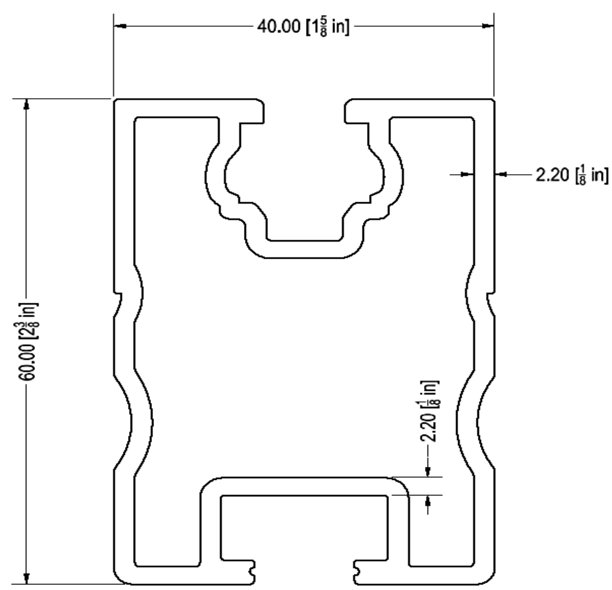
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

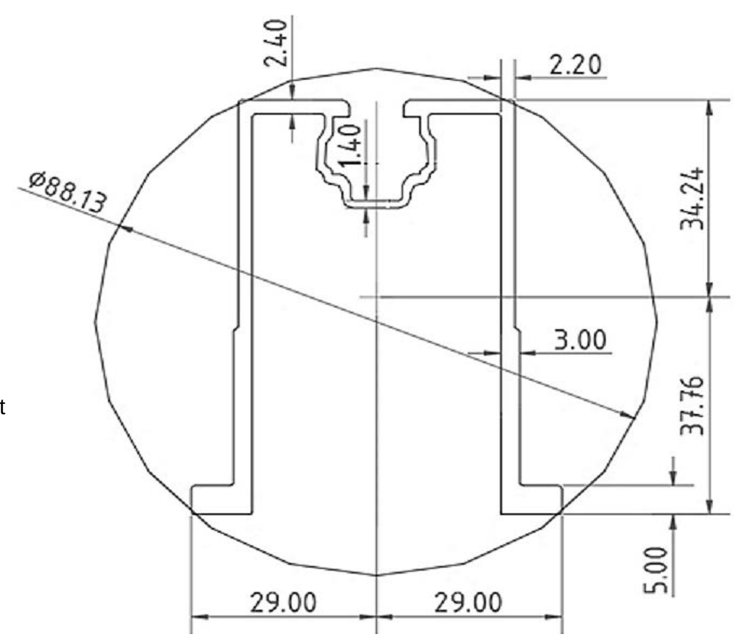
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	45	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.87	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	-0.374	k-ft
M_z =	-0.012	k-ft
$M_{y\ allowable}$ =	1.271	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	31%	



4.2 Girder Design

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

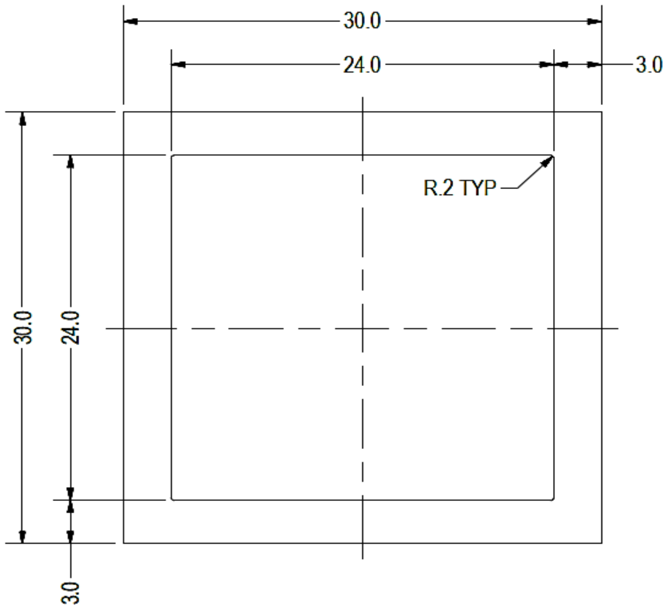
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.91	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	-0.460	k-ft
M_z =	-0.018	k-ft
P_n =	0.060	k
$M_{y\ allowable}$ =	1.468	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	35%	



4.3 Front Strut Design

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

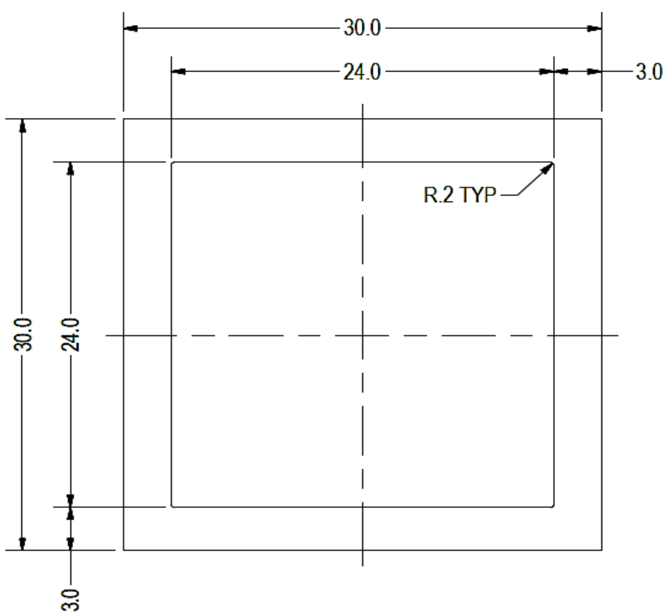
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.914	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	7%	



4.4 Diagonal Strut Design

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

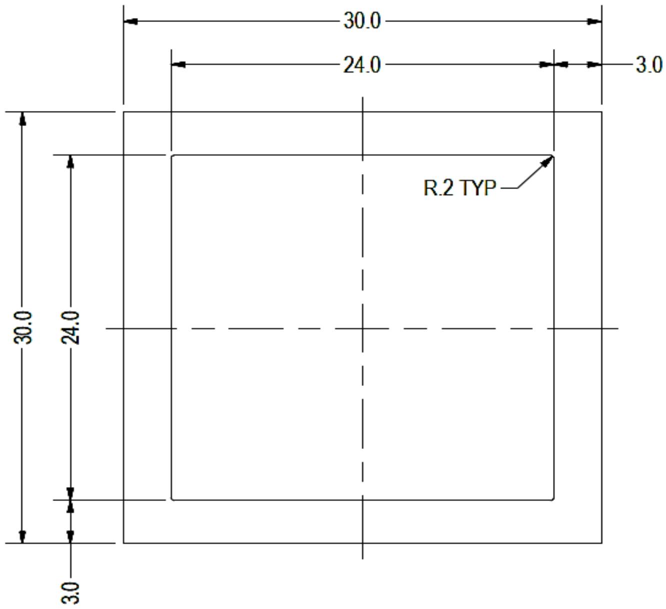
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.319	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	8%	



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).

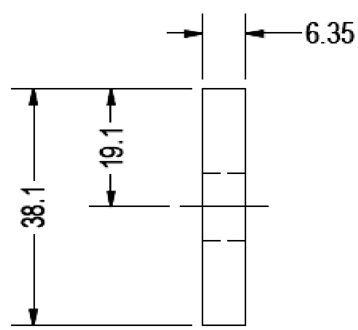
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.697	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	k
Utilization =	10%	



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 =	0.002	k-ft
P_n =	0.158	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	6%	



A cross brace kit is required every 34 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

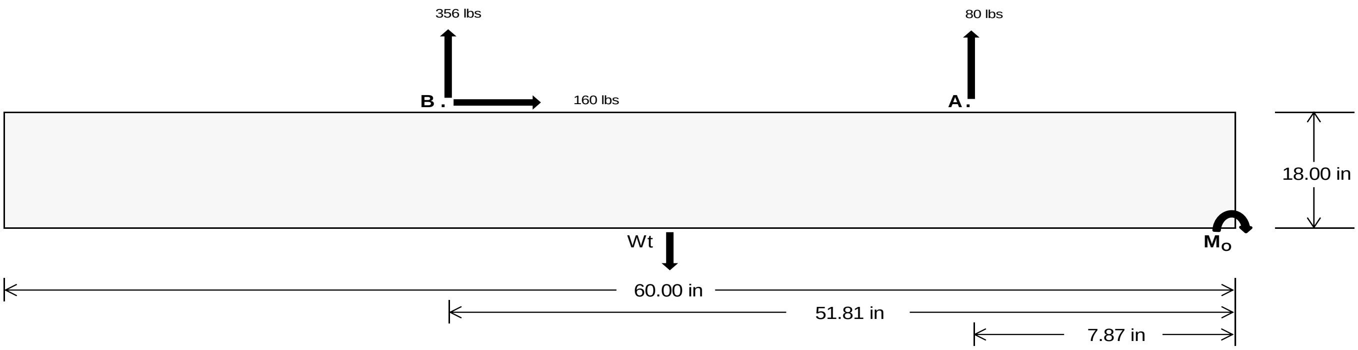
5.1 Helical Pile Foundations

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 =	351.44	1544.28	k
Compressive Load =	1188.80	1004.52	k
Lateral Load =	20.08	691.55	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties		**Footing Reinforcement**
Weight of Concrete =	145 pcf	*Use fiber reinforcing with (1) #5 rebar.*
Compressive Strength =	2500 psi	
Yield Strength =	60000 psi	

Overturning Check		
M_O =	21928.5 in-lbs	
Resisting Force Required =	730.95 lbs	*A minimum 60in long x 20in wide x 18in tall ballast foundation is required to resist overturning.*
S.F. =	1.67	
Weight Required =	1218.25 lbs	
Minimum Width =	20 in in	
Weight Provided =	1812.50 lbs	

Sliding		
Force =	159.57 lbs	
Friction =	0.4	*Use a 60in long x 20in wide x 18in tall ballast foundation to resist sliding. Friction is OK.*
Weight Required =	398.92 lbs	
Resisting Weight =	1812.50 lbs	
Additional Weight Required =	0 lbs	

Cohesion		
Sliding Force =	159.57 lbs	
Cohesion =	130 psf	*Use a 60in long x 20in wide x 18in tall ballast foundation. Cohesion is OK.*
Area =	8.33 ft^2	
Resisting =	906.25 lbs	
Additional Weight Required =	0 lbs	

Shear Key		
Additional Force =	0 lbs	
Lateral Bearing Pressure =	200 psf/ft	
Required Depth =	0.00 ft	*Shear key is not required.*
f'_c =	2500 psi	
Length =	8 in	

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in
F_A	362 lbs	362 lbs	362 lbs	362 lbs	473 lbs	473 lbs	473 lbs	473 lbs	598 lbs	598 lbs	598 lbs	598 lbs	-160 lbs	-160 lbs	-160 lbs	-160 lbs
F_B	256 lbs	256 lbs	256 lbs	256 lbs	410 lbs	410 lbs	410 lbs	410 lbs	480 lbs	480 lbs	480 lbs	480 lbs	-711 lbs	-711 lbs	-711 lbs	-711 lbs
F_V	22 lbs	22 lbs	22 lbs	22 lbs	280 lbs	280 lbs	280 lbs	280 lbs	225 lbs	225 lbs	225 lbs	225 lbs	-319 lbs	-319 lbs	-319 lbs	-319 lbs
P_{total}	2431 lbs	2521 lbs	2612 lbs	2703 lbs	2695 lbs	2786 lbs	2877 lbs	2967 lbs	2890 lbs	2981 lbs	3071 lbs	3162 lbs	216 lbs	271 lbs	325 lbs	379 lbs
M	235 lbs-ft	235 lbs-ft	235 lbs-ft	235 lbs-ft	545 lbs-ft	545 lbs-ft	545 lbs-ft	545 lbs-ft	568 lbs-ft	568 lbs-ft	568 lbs-ft	568 lbs-ft	519 lbs-ft	519 lbs-ft	519 lbs-ft	519 lbs-ft
e	0.10 ft	0.09 ft	0.09 ft	0.09 ft	0.20 ft	0.20 ft	0.19 ft	0.18 ft	0.20 ft	0.19 ft	0.19 ft	0.18 ft	2.40 ft	1.92 ft	1.60 ft	1.37 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}	257.9 psf	256.0 psf	254.2 psf	252.6 psf	245.0 psf	243.7 psf	242.5 psf	241.4 psf	265.0 psf	262.7 psf	260.6 psf	258.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	325.5 psf	320.3 psf	315.7 psf	311.4 psf	401.9 psf	393.1 psf	385.2 psf	377.9 psf	428.7 psf	418.6 psf	409.5 psf	401.1 psf	874.2 psf	177.3 psf	130.9 psf	116.6 psf

Maximum Bearing Pressure = 874 psf
Allowable Bearing Pressure = 1500 psf

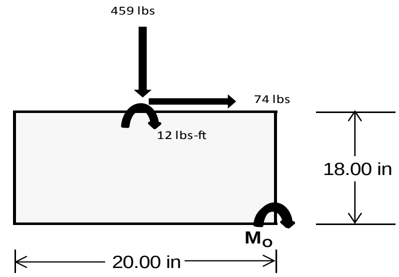
Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 260.3 ft-lbs
Resisting Force Required = 312.33 lbs
S.F. = 1.67
Weight Required = 520.56 lbs
Minimum Width = 20 in in
Weight Provided = 1812.50 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	20 in			20 in			20 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	105 lbs	59 lbs	50 lbs	217 lbs	459 lbs	175 lbs	71 lbs	-26 lbs	18 lbs
F_V	12 lbs	98 lbs	12 lbs	8 lbs	74 lbs	9 lbs	12 lbs	98 lbs	12 lbs
P_{total}	2349 lbs	2303 lbs	2294 lbs	2353 lbs	2595 lbs	2311 lbs	727 lbs	630 lbs	674 lbs
M	33 lbs-ft	163 lbs-ft	33 lbs-ft	24 lbs-ft	122 lbs-ft	25 lbs-ft	33 lbs-ft	163 lbs-ft	33 lbs-ft
e	0.01 ft	0.07 ft	0.01 ft	0.01 ft	0.05 ft	0.01 ft	0.04 ft	0.26 ft	0.05 ft
L/6	0.28 ft	1.53 ft	1.64 ft	1.65 ft	1.57 ft	1.64 ft	1.58 ft	1.15 ft	1.57 ft
f_{min}	267.9 sqft	205.9 sqft	260.9 sqft	272.1 sqft	258.5 sqft	266.4 sqft	73.2 sqft	5.2 sqft	66.4 sqft
f_{max}	296.0 psf	346.7 psf	289.7 psf	292.6 psf	364.3 psf	288.2 psf	101.4 psf	146.0 psf	95.3 psf

Maximum Bearing Pressure = 364 psf
Allowable Bearing Pressure = 1500 psf

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

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

5.3 Foundation Anchors

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

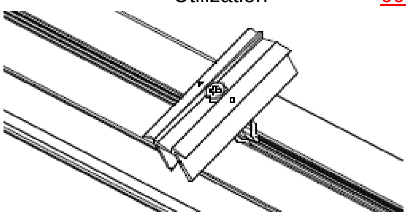
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

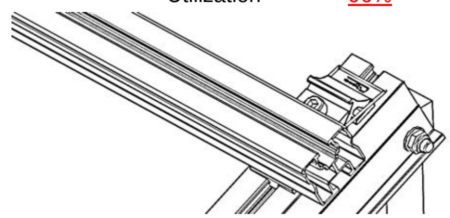
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.803 k
Allowable Uplift =	1.214 k
Utilization =	66%



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.075 k
Allowable Uplift =	1.116 k
Utilization =	96%



6.2 Bolted Connections

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

Front Strut

Maximum Axial Load =	0.914 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	16%

Rear Strut

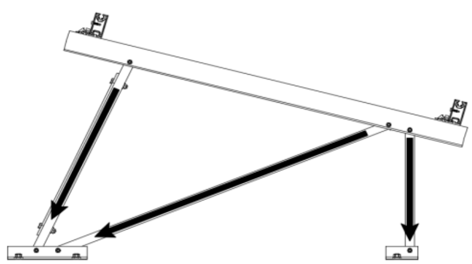
Maximum Axial Load =	1.089 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	19%

Diagonal Strut

Maximum Axial Load =	0.319 k
M8 Bolt Shear Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	6%

Bracing

Maximum Axial Load =	0.158 k
M10 Bolt Capacity =	8.894 k
Strut Bearing Capacity =	7.952 k
Utilization =	2%



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

7. SEISMIC DESIGN

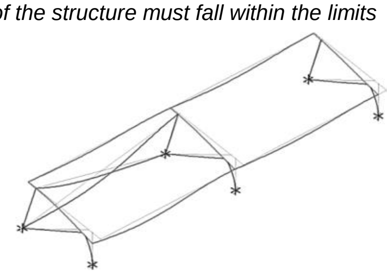
7.1 Seismic Drift

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

Mean Height, h_{sx} =	29.57 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.591 in
Max Drift, Δ_{MAX} =	0.05 in

0.05 ≤ 0.591, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 45.00 in

J = 0.255

117.177

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

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= 29.9 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 45.00 in

J = 0.255

121.682

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

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 = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 23.9

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

S1 = 36.9

m = 0.65

C_0 = 30

Cc = 30

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.9 ksi

Ix = 250988 mm^4

0.603 in^4

y = 30 mm

Sx = 0.511 in^3

$M_{max}St$ = 1.271 k-ft

3.4.18

h/t = 7.4

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

S1 = 36.9

m = 0.65

C_0 = 20

Cc = 20

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 28.5 ksi

Iy = 120291 mm^4

0.289 in^4

x = 20 mm

Sy = 0.367 in^3

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

<u>Compression</u>

3.4.9

b/t = 7.4

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 23.9

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.47 ksi

A = 578.06 mm^2

0.90 in^2

P_{max} = 25.51 kips

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.43
20.5689

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.9 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 = 1.43
24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.9 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

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

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

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.9 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.468 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:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	18.00 in	L_b =	18.00 in
J =	0.16	J =	0.16
	47.2194		47.2194
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	31.2 ksi	φF_L=	31.2
3.4.16		**3.4.16**	
b/t =	7.75	b/t =	7.75
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$	
S1 =	12.2	S1 =	12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$		$S2 = \frac{k_1 Bp}{1.6Dp}$	
S2 =	46.7	S2 =	46.7
φF_L=	φyFcy	φF_L=	φyFcy
φF_L=	33.3 ksi	φF_L=	33.3 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =	0.0	N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L=	1.17φyFcy		
φF_L=	38.9 ksi		
3.4.18		**3.4.18**	
h/t =	7.75	h/t =	7.75
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	15	C_0 =	15
Cc =	15	Cc =	15
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
$\varphi F_L St$=	31.2 ksi	$\varphi F_L Wk$=	31.2 ksi
Ix =	39958.2 mm^4	Iy =	39958.2 mm^4
	0.096 in^4		0.096 in^4
y =	15 mm	x =	15 mm
Sx =	0.163 in^3	Sy =	0.163 in^3
$M_{max}St$ =	0.423 k-ft	$M_{max}Wk$ =	0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

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 = 33.07 in

J = 0.16

86.7548

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

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= 30.4 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= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

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= 30.4

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

$\lambda =$ 1.41804

$r =$ 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.77853

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

$\varphi F_L =$ 13.5508 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

$\varphi F_L =$ 13.55 ksi

$A =$ 323.87 mm^2

0.50 in^2

$P_{max} =$ 6.80 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	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	-117.695	-117.695	0	0
2	M16	y	-184.95	-184.95	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	237.633	237.633	0	0
2	M16	y	112.091	112.091	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	151.372	2	248.797	2	.005	10	0	10	0	1	0	1
2		min	-182.195	3	-377.526	3	-2.195	4	0	3	0	1	0	1
3	N7	max	0	4	307.566	1	.032	10	0	10	0	1	0	1
4		min	-.114	2	-74.814	3	-15.087	4	-.024	4	0	1	0	1
5	N15	max	0	15	914.461	2	.085	9	0	9	0	1	0	1
6		min	-1.127	2	-270.337	3	-15.448	5	-.024	4	0	1	0	1
7	N16	max	474.94	2	772.71	2	0	11	0	9	0	1	0	1
8		min	-531.963	3	-1187.911	3	-130.402	4	0	3	0	1	0	1
9	N23	max	0	15	307.819	1	.467	1	0	1	0	1	0	1
10		min	-.114	2	-74.355	3	-14.395	5	-.022	5	0	1	0	1
11	N24	max	151.373	2	251.04	2	71.86	3	0	4	0	1	0	1
12		min	-182.627	3	-376.725	3	-3.067	5	0	3	0	1	0	1
13	Totals:	max	776.33	2	2772.113	2	0	9						
14		min	-897.095	3	-2361.667	3	-180.209	5						

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	222.952	1	.644	6	.905	4	0	10	0	12	0	1
2			min	-356.333	3	.15	15	-.112	3	0	4	0	4	0	1
3		2	max	223.059	1	.603	6	.809	4	0	10	0	4	0	15
4			min	-356.253	3	.14	15	-.112	3	0	4	0	3	0	6
5		3	max	223.165	1	.562	6	.713	4	0	10	0	4	0	15
6			min	-356.173	3	.13	15	-.112	3	0	4	0	3	0	6
7		4	max	223.272	1	.52	6	.616	4	0	10	0	4	0	15
8			min	-356.093	3	.12	15	-.112	3	0	4	0	3	0	6
9		5	max	223.379	1	.479	6	.52	4	0	10	0	4	0	15
10			min	-356.013	3	.111	15	-.112	3	0	4	0	3	0	6
11		6	max	223.485	1	.438	6	.423	4	0	10	0	4	0	15
12			min	-355.933	3	.101	15	-.112	3	0	4	0	3	0	6
13		7	max	223.592	1	.397	6	.327	4	0	10	0	4	0	15
14			min	-355.853	3	.091	15	-.112	3	0	4	0	3	0	6
15		8	max	223.698	1	.355	6	.23	4	0	10	0	4	0	15
16			min	-355.773	3	.082	15	-.112	3	0	4	0	3	0	6
17		9	max	223.805	1	.314	6	.134	4	0	10	0	4	0	15
18			min	-355.694	3	.072	15	-.112	3	0	4	0	3	0	6
19		10	max	223.911	1	.273	6	.093	1	0	10	0	4	0	15
20			min	-355.614	3	.062	15	-.112	3	0	4	0	3	0	6
21		11	max	224.018	1	.231	6	.093	1	0	10	0	4	0	15
22			min	-355.534	3	.053	15	-.112	3	0	4	0	3	0	6
23		12	max	224.124	1	.19	6	.093	1	0	10	0	4	0	15
24			min	-355.454	3	.043	15	-.184	5	0	4	0	3	0	6
25		13	max	224.231	1	.149	6	.093	1	0	10	0	4	0	15
26			min	-355.374	3	.033	15	-.28	5	0	4	0	3	0	6
27		14	max	224.337	1	.114	2	.093	1	0	10	0	4	0	15
28			min	-355.294	3	.023	15	-.377	5	0	4	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	224.444	1	.082	2	.093	1	0	10	0	4	0	15
30			min	-355.214	3	.014	15	-.473	5	0	4	0	3	0	6
31		16	max	224.551	1	.05	2	.093	1	0	10	0	4	0	15
32			min	-355.134	3	-.005	3	-.57	5	0	4	0	3	0	6
33		17	max	224.657	1	.018	2	.093	1	0	10	0	4	0	15
34			min	-355.054	3	-.029	3	-.666	5	0	4	0	3	0	6
35		18	max	224.764	1	-.015	2	.093	1	0	10	0	14	0	15
36			min	-354.974	3	-.058	4	-.762	5	0	4	0	3	0	6
37		19	max	224.87	1	-.025	15	.093	1	0	10	0	1	0	15
38			min	-354.894	3	-.099	4	-.859	5	0	4	0	3	0	6
39	M3	1	max	101.163	2	1.796	6	.007	10	0	5	0	4	0	6
40			min	-88.038	3	.421	15	-1.338	4	0	1	0	10	0	15
41		2	max	101.095	2	1.618	6	.007	10	0	5	0	1	0	6
42			min	-88.089	3	.379	15	-1.204	4	0	1	0	10	0	15
43		3	max	101.027	2	1.44	6	.007	10	0	5	0	1	0	2
44			min	-88.14	3	.337	15	-1.071	4	0	1	0	5	0	3
45		4	max	100.96	2	1.263	6	.007	10	0	5	0	1	0	15
46			min	-88.191	3	.296	15	-.937	4	0	1	0	5	0	4
47		5	max	100.892	2	1.085	6	.007	10	0	5	0	1	0	15
48			min	-88.242	3	.254	15	-.804	4	0	1	0	5	0	4
49		6	max	100.824	2	.908	6	.007	10	0	5	0	1	0	15
50			min	-88.293	3	.212	15	-.67	4	0	1	0	5	0	4
51		7	max	100.756	2	.73	6	.007	10	0	5	0	1	0	15
52			min	-88.344	3	.17	15	-.536	4	0	1	0	5	0	4
53		8	max	100.688	2	.552	6	.007	10	0	5	0	1	0	15
54			min	-88.395	3	.128	15	-.403	4	0	1	0	5	0	4
55		9	max	100.62	2	.375	6	.007	10	0	5	0	1	0	15
56			min	-88.445	3	.087	15	-.269	4	0	1	0	5	-.001	4
57		10	max	100.552	2	.197	6	.007	10	0	5	0	1	0	15
58			min	-88.496	3	.045	15	-.136	4	0	1	0	5	-.001	4
59		11	max	100.485	2	.037	2	.026	5	0	5	0	1	0	15
60			min	-88.547	3	-.003	3	-.125	1	0	1	0	5	-.001	4
61		12	max	100.417	2	-.039	15	.16	5	0	5	0	1	0	15
62			min	-88.598	3	-.159	4	-.125	1	0	1	0	5	-.001	4
63		13	max	100.349	2	-.08	15	.293	5	0	5	0	1	0	15
64			min	-88.649	3	-.336	4	-.125	1	0	1	0	5	-.001	4
65		14	max	100.281	2	-.122	15	.427	5	0	5	0	9	0	15
66			min	-88.7	3	-.514	4	-.125	1	0	1	0	5	-.001	4
67		15	max	100.213	2	-.164	15	.56	5	0	5	0	10	0	15
68			min	-88.751	3	-.692	4	-.125	1	0	1	0	4	0	4
69		16	max	100.145	2	-.206	15	.694	5	0	5	0	10	0	15
70			min	-88.802	3	-.869	4	-.125	1	0	1	0	4	0	4
71		17	max	100.077	2	-.247	15	.828	5	0	5	0	10	0	15
72			min	-88.853	3	-1.047	4	-.125	1	0	1	0	4	0	4
73		18	max	100.009	2	-.289	15	.961	5	0	5	0	10	0	15
74			min	-88.903	3	-1.224	4	-.125	1	0	1	0	4	0	4
75		19	max	99.942	2	-.331	15	1.095	5	0	5	0	5	0	1
76			min	-88.954	3	-1.402	4	-.125	1	0	1	0	1	0	1
77	M4	1	max	306.402	1	0	1	.033	10	0	1	0	5	0	1
78			min	-75.687	3	0	1	-14.246	4	0	1	0	2	0	1
79		2	max	306.466	1	0	1	.033	10	0	1	0	10	0	1
80			min	-75.639	3	0	1	-14.302	4	0	1	-.001	4	0	1
81		3	max	306.531	1	0	1	.033	10	0	1	0	10	0	1
82			min	-75.59	3	0	1	-14.358	4	0	1	-.003	4	0	1
83		4	max	306.596	1	0	1	.033	10	0	1	0	10	0	1
84			min	-75.542	3	0	1	-14.414	4	0	1	-.004	4	0	1
85		5	max	306.661	1	0	1	.033	10	0	1	0	10	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-75.493	3	0	1	-14.47	4	0	1	-.005	4	0	1
87		6	max	306.725	1	0	1	.033	10	0	1	0	10	0	1
88			min	-75.445	3	0	1	-14.527	4	0	1	-.006	4	0	1
89		7	max	306.79	1	0	1	.033	10	0	1	0	10	0	1
90			min	-75.396	3	0	1	-14.583	4	0	1	-.008	4	0	1
91		8	max	306.855	1	0	1	.033	10	0	1	0	10	0	1
92			min	-75.348	3	0	1	-14.639	4	0	1	-.009	4	0	1
93		9	max	306.919	1	0	1	.033	10	0	1	0	10	0	1
94			min	-75.299	3	0	1	-14.695	4	0	1	-.01	4	0	1
95		10	max	306.984	1	0	1	.033	10	0	1	0	10	0	1
96			min	-75.25	3	0	1	-14.751	4	0	1	-.012	4	0	1
97		11	max	307.049	1	0	1	.033	10	0	1	0	10	0	1
98			min	-75.202	3	0	1	-14.807	4	0	1	-.013	4	0	1
99		12	max	307.114	1	0	1	.033	10	0	1	0	10	0	1
100			min	-75.153	3	0	1	-14.863	4	0	1	-.014	4	0	1
101		13	max	307.178	1	0	1	.033	10	0	1	0	10	0	1
102			min	-75.105	3	0	1	-14.919	4	0	1	-.016	4	0	1
103		14	max	307.243	1	0	1	.033	10	0	1	0	10	0	1
104			min	-75.056	3	0	1	-14.975	4	0	1	-.017	4	0	1
105		15	max	307.308	1	0	1	.033	10	0	1	0	10	0	1
106			min	-75.008	3	0	1	-15.031	4	0	1	-.018	4	0	1
107		16	max	307.372	1	0	1	.033	10	0	1	0	10	0	1
108			min	-74.959	3	0	1	-15.087	4	0	1	-.02	4	0	1
109		17	max	307.437	1	0	1	.033	10	0	1	0	10	0	1
110			min	-74.911	3	0	1	-15.143	4	0	1	-.021	4	0	1
111		18	max	307.502	1	0	1	.033	10	0	1	0	10	0	1
112			min	-74.862	3	0	1	-15.2	4	0	1	-.022	4	0	1
113		19	max	307.566	1	0	1	.033	10	0	1	0	10	0	1
114			min	-74.814	3	0	1	-15.256	4	0	1	-.024	4	0	1
115	M6	1	max	695.253	1	.632	6	.884	4	0	3	0	3	0	1
116			min	-1089.04	3	.144	15	-.292	3	0	5	0	2	0	1
117		2	max	695.359	1	.591	6	.788	4	0	3	0	4	0	15
118			min	-1088.96	3	.134	15	-.292	3	0	5	0	2	0	6
119		3	max	695.466	1	.55	6	.691	4	0	3	0	4	0	15
120			min	-1088.88	3	.125	15	-.292	3	0	5	0	2	0	6
121		4	max	695.572	1	.509	6	.595	4	0	3	0	4	0	15
122			min	-1088.801	3	.115	15	-.292	3	0	5	0	1	0	6
123		5	max	695.679	1	.467	6	.499	4	0	3	0	4	0	15
124			min	-1088.721	3	.105	15	-.292	3	0	5	0	1	0	6
125		6	max	695.785	1	.426	6	.402	4	0	3	0	4	0	15
126			min	-1088.641	3	.095	15	-.292	3	0	5	0	3	0	6
127		7	max	695.892	1	.388	2	.306	4	0	3	0	4	0	15
128			min	-1088.561	3	.086	15	-.292	3	0	5	0	3	0	6
129		8	max	695.999	1	.356	2	.209	4	0	3	0	4	0	15
130			min	-1088.481	3	.076	15	-.292	3	0	5	0	3	0	6
131		9	max	696.105	1	.324	2	.113	4	0	3	0	4	0	15
132			min	-1088.401	3	.066	15	-.292	3	0	5	0	3	0	6
133		10	max	696.212	1	.292	2	.023	14	0	3	0	4	0	15
134			min	-1088.321	3	.057	15	-.292	3	0	5	0	3	0	6
135		11	max	696.318	1	.259	2	.022	9	0	3	0	4	0	15
136			min	-1088.241	3	.047	15	-.292	3	0	5	0	3	0	6
137		12	max	696.425	1	.227	2	.022	9	0	3	0	4	0	15
138			min	-1088.161	3	.037	15	-.292	3	0	5	0	3	0	6
139		13	max	696.531	1	.195	2	.022	9	0	3	0	4	0	15
140			min	-1088.081	3	.022	12	-.292	3	0	5	0	3	0	2
141		14	max	696.638	1	.163	2	.022	9	0	3	0	4	0	15
142			min	-1088.001	3	.002	3	-.378	5	0	5	0	3	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	696.744	1	.131	2	.022	9	0	3	0	4	0	15
144			min	-1087.922	3	-.022	3	-.474	5	0	5	0	3	0	2
145		16	max	696.851	1	.099	2	.022	9	0	3	0	4	0	15
146			min	-1087.842	3	-.046	3	-.571	5	0	5	0	3	0	2
147		17	max	696.957	1	.066	2	.022	9	0	3	0	4	0	15
148			min	-1087.762	3	-.07	3	-.667	5	0	5	0	3	0	2
149		18	max	697.064	1	.034	2	.022	9	0	3	0	4	0	15
150			min	-1087.682	3	-.094	3	-.764	5	0	5	0	3	0	2
151		19	max	697.171	1	.002	2	.022	9	0	3	0	4	0	15
152			min	-1087.602	3	-.119	3	-.86	5	0	5	0	3	0	2
153	M7	1	max	318.527	2	1.806	4	.012	3	0	9	0	4	0	2
154			min	-224.386	3	.429	15	-1.377	4	0	3	0	3	0	12
155		2	max	318.459	2	1.629	4	.012	3	0	9	0	4	0	2
156			min	-224.437	3	.387	15	-1.243	4	0	3	0	3	0	12
157		3	max	318.391	2	1.451	4	.012	3	0	9	0	1	0	2
158			min	-224.488	3	.345	15	-1.11	4	0	3	0	3	0	3
159		4	max	318.323	2	1.274	4	.012	3	0	9	0	1	0	2
160			min	-224.539	3	.304	15	-.976	4	0	3	0	3	0	3
161		5	max	318.255	2	1.096	4	.012	3	0	9	0	1	0	15
162			min	-224.589	3	.262	15	-.843	4	0	3	0	5	0	6
163		6	max	318.187	2	.918	4	.012	3	0	9	0	1	0	15
164			min	-224.64	3	.22	15	-.709	4	0	3	0	5	0	6
165		7	max	318.119	2	.741	4	.012	3	0	9	0	1	0	15
166			min	-224.691	3	.178	15	-.575	4	0	3	0	5	0	6
167		8	max	318.052	2	.563	4	.012	3	0	9	0	1	0	15
168			min	-224.742	3	.137	15	-.442	4	0	3	0	5	0	6
169		9	max	317.984	2	.385	4	.012	3	0	9	0	1	0	15
170			min	-224.793	3	.095	15	-.308	4	0	3	0	5	-.001	6
171		10	max	317.916	2	.21	2	.012	3	0	9	0	1	0	15
172			min	-224.844	3	.051	12	-.175	4	0	3	0	5	-.001	6
173		11	max	317.848	2	.072	2	.012	3	0	9	0	1	0	15
174			min	-224.895	3	-.032	3	-.041	4	0	3	0	5	-.001	6
175		12	max	317.78	2	-.031	15	.095	5	0	9	0	1	0	15
176			min	-224.946	3	-.148	6	-.018	1	0	3	0	5	-.001	6
177		13	max	317.712	2	-.072	15	.228	5	0	9	0	1	0	15
178			min	-224.997	3	-.326	6	-.018	1	0	3	0	5	-.001	6
179		14	max	317.644	2	-.114	15	.362	5	0	9	0	1	0	15
180			min	-225.048	3	-.503	6	-.018	1	0	3	0	5	-.001	6
181		15	max	317.576	2	-.156	15	.495	5	0	9	0	1	0	15
182			min	-225.098	3	-.681	6	-.018	1	0	3	0	5	0	6
183		16	max	317.509	2	-.198	15	.629	5	0	9	0	1	0	15
184			min	-225.149	3	-.859	6	-.018	1	0	3	0	5	0	6
185		17	max	317.441	2	-.239	15	.763	5	0	9	0	9	0	15
186			min	-225.2	3	-1.036	6	-.018	1	0	3	0	5	0	6
187		18	max	317.373	2	-.281	15	.896	5	0	9	0	9	0	15
188			min	-225.251	3	-1.214	6	-.018	1	0	3	0	3	0	6
189		19	max	317.305	2	-.323	15	1.03	5	0	9	0	9	0	1
190			min	-225.302	3	-1.392	6	-.018	1	0	3	0	3	0	1
191	M8	1	max	913.296	2	0	1	.09	9	0	1	0	4	0	1
192			min	-271.21	3	0	1	-14.563	4	0	1	0	3	0	1
193		2	max	913.361	2	0	1	.09	9	0	1	0	9	0	1
194			min	-271.162	3	0	1	-14.619	4	0	1	-.001	4	0	1
195		3	max	913.425	2	0	1	.09	9	0	1	0	9	0	1
196			min	-271.113	3	0	1	-14.675	4	0	1	-.003	4	0	1
197		4	max	913.49	2	0	1	.09	9	0	1	0	9	0	1
198			min	-271.065	3	0	1	-14.731	4	0	1	-.004	4	0	1
199		5	max	913.555	2	0	1	.09	9	0	1	0	9	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-271.016	3	0	1	-14.787	4	0	1	-.005	4	0	1
201		6	max	913.619	2	0	1	.09	9	0	1	0	9	0	1
202			min	-270.968	3	0	1	-14.843	4	0	1	-.007	4	0	1
203		7	max	913.684	2	0	1	.09	9	0	1	0	9	0	1
204			min	-270.919	3	0	1	-14.899	4	0	1	-.008	4	0	1
205		8	max	913.749	2	0	1	.09	9	0	1	0	9	0	1
206			min	-270.871	3	0	1	-14.956	4	0	1	-.009	4	0	1
207		9	max	913.814	2	0	1	.09	9	0	1	0	9	0	1
208			min	-270.822	3	0	1	-15.012	4	0	1	-.011	4	0	1
209		10	max	913.878	2	0	1	.09	9	0	1	0	9	0	1
210			min	-270.774	3	0	1	-15.068	4	0	1	-.012	4	0	1
211		11	max	913.943	2	0	1	.09	9	0	1	0	9	0	1
212			min	-270.725	3	0	1	-15.124	4	0	1	-.013	4	0	1
213		12	max	914.008	2	0	1	.09	9	0	1	0	9	0	1
214			min	-270.677	3	0	1	-15.18	4	0	1	-.015	4	0	1
215		13	max	914.072	2	0	1	.09	9	0	1	0	9	0	1
216			min	-270.628	3	0	1	-15.236	4	0	1	-.016	4	0	1
217		14	max	914.137	2	0	1	.09	9	0	1	0	9	0	1
218			min	-270.58	3	0	1	-15.292	4	0	1	-.017	4	0	1
219		15	max	914.202	2	0	1	.09	9	0	1	0	9	0	1
220			min	-270.531	3	0	1	-15.348	4	0	1	-.019	4	0	1
221		16	max	914.266	2	0	1	.09	9	0	1	0	9	0	1
222			min	-270.483	3	0	1	-15.404	4	0	1	-.02	4	0	1
223		17	max	914.331	2	0	1	.09	9	0	1	0	9	0	1
224			min	-270.434	3	0	1	-15.46	4	0	1	-.021	4	0	1
225		18	max	914.396	2	0	1	.09	9	0	1	0	9	0	1
226			min	-270.385	3	0	1	-15.516	4	0	1	-.023	4	0	1
227		19	max	914.461	2	0	1	.09	9	0	1	0	9	0	1
228			min	-270.337	3	0	1	-15.572	4	0	1	-.024	4	0	1
229	M10	1	max	224.174	1	.674	4	.997	5	0	1	0	1	0	1
230			min	-302.992	3	.17	15	-.106	1	-.001	5	0	3	0	1
231		2	max	224.28	1	.633	4	.9	5	0	1	0	4	0	15
232			min	-302.912	3	.16	15	-.106	1	-.001	5	0	3	0	4
233		3	max	224.387	1	.592	4	.804	5	0	1	0	4	0	15
234			min	-302.832	3	.151	15	-.106	1	-.001	5	0	3	0	4
235		4	max	224.494	1	.551	4	.707	5	0	1	0	4	0	15
236			min	-302.752	3	.141	15	-.106	1	-.001	5	0	3	0	4
237		5	max	224.6	1	.509	4	.611	5	0	1	0	4	0	15
238			min	-302.672	3	.131	15	-.106	1	-.001	5	0	3	0	4
239		6	max	224.707	1	.468	4	.515	5	0	1	0	5	0	15
240			min	-302.592	3	.122	15	-.106	1	-.001	5	0	3	0	4
241		7	max	224.813	1	.427	4	.418	5	0	1	0	5	0	15
242			min	-302.512	3	.112	15	-.106	1	-.001	5	0	3	0	4
243		8	max	224.92	1	.386	4	.322	5	0	1	0	5	0	15
244			min	-302.432	3	.102	15	-.106	1	-.001	5	0	3	0	4
245		9	max	225.026	1	.344	4	.225	5	0	1	0	5	0	15
246			min	-302.352	3	.092	15	-.106	1	-.001	5	0	3	0	4
247		10	max	225.133	1	.303	4	.129	5	0	1	0	5	0	15
248			min	-302.273	3	.083	15	-.106	1	-.001	5	0	3	0	4
249		11	max	225.239	1	.262	4	.032	5	0	1	0	5	0	15
250			min	-302.193	3	.073	15	-.106	1	-.001	5	0	3	0	4
251		12	max	225.346	1	.221	4	.002	10	0	1	0	5	0	15
252			min	-302.113	3	.063	15	-.106	1	-.001	5	0	3	0	4
253		13	max	225.452	1	.179	4	.002	10	0	1	0	5	0	15
254			min	-302.033	3	.054	15	-.173	4	-.001	5	0	3	0	4
255		14	max	225.559	1	.138	4	.002	10	0	1	0	5	0	15
256			min	-301.953	3	.044	15	-.269	4	-.001	5	0	3	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	225.666	1	.097	4	.002	10	0	1	0	5	0	15
258			min	-301.873	3	.028	12	-.366	4	-.001	5	0	3	0	4
259		16	max	225.772	1	.055	4	.002	10	0	1	0	5	0	15
260			min	-301.793	3	.011	9	-.462	4	-.001	5	0	3	0	4
261		17	max	225.879	1	.022	5	.002	10	0	1	0	5	0	15
262			min	-301.713	3	-.016	9	-.559	4	-.001	5	0	3	0	4
263		18	max	225.985	1	.007	5	.002	10	0	1	0	5	0	15
264			min	-301.633	3	-.042	9	-.655	4	-.001	5	0	3	0	4
265		19	max	226.092	1	-.005	15	.002	10	0	1	0	5	0	15
266			min	-301.553	3	-.072	1	-.751	4	-.001	5	0	3	0	4
267	M11	1	max	100.776	2	1.792	6	.128	1	0	4	0	5	0	6
268			min	-88.757	3	.418	15	-1.258	5	0	10	0	1	0	15
269		2	max	100.708	2	1.615	6	.128	1	0	4	0	5	0	2
270			min	-88.808	3	.377	15	-1.124	5	0	10	0	1	0	15
271		3	max	100.64	2	1.437	6	.128	1	0	4	0	3	0	2
272			min	-88.858	3	.335	15	-.991	5	0	10	0	1	0	3
273		4	max	100.572	2	1.259	6	.128	1	0	4	0	3	0	15
274			min	-88.909	3	.293	15	-.857	5	0	10	0	1	0	4
275		5	max	100.504	2	1.082	6	.128	1	0	4	0	3	0	15
276			min	-88.96	3	.251	15	-.723	5	0	10	0	1	0	4
277		6	max	100.436	2	.904	6	.128	1	0	4	0	3	0	15
278			min	-89.011	3	.21	15	-.59	5	0	10	0	1	0	4
279		7	max	100.369	2	.726	6	.128	1	0	4	0	3	0	15
280			min	-89.062	3	.168	15	-.456	5	0	10	0	4	0	4
281		8	max	100.301	2	.549	6	.128	1	0	4	0	3	0	15
282			min	-89.113	3	.126	15	-.322	5	0	10	0	4	-.001	4
283		9	max	100.233	2	.371	6	.128	1	0	4	0	3	0	15
284			min	-89.164	3	.084	15	-.189	5	0	10	0	4	-.001	4
285		10	max	100.165	2	.193	6	.128	1	0	4	0	3	0	15
286			min	-89.215	3	.043	15	-.055	5	0	10	0	4	-.001	4
287		11	max	100.097	2	.037	2	.128	1	0	4	0	3	0	15
288			min	-89.266	3	-.015	3	-.035	3	0	10	0	4	-.001	4
289		12	max	100.029	2	-.041	15	.241	4	0	4	0	3	0	15
290			min	-89.317	3	-.162	4	-.035	3	0	10	0	4	-.001	4
291		13	max	99.961	2	-.083	15	.375	4	0	4	0	3	0	15
292			min	-89.367	3	-.34	4	-.035	3	0	10	0	4	-.001	4
293		14	max	99.894	2	-.125	15	.509	4	0	4	0	3	0	15
294			min	-89.418	3	-.518	4	-.035	3	0	10	0	5	-.001	4
295		15	max	99.826	2	-.166	15	.642	4	0	4	0	3	0	15
296			min	-89.469	3	-.695	4	-.035	3	0	10	0	5	0	4
297		16	max	99.758	2	-.208	15	.776	4	0	4	0	3	0	15
298			min	-89.52	3	-.873	4	-.035	3	0	10	0	10	0	4
299		17	max	99.69	2	-.25	15	.909	4	0	4	0	3	0	15
300			min	-89.571	3	-1.05	4	-.035	3	0	10	0	10	0	4
301		18	max	99.622	2	-.292	15	1.043	4	0	4	0	4	0	15
302			min	-89.622	3	-1.228	4	-.035	3	0	10	0	10	0	4
303		19	max	99.554	2	-.333	15	1.177	4	0	4	0	4	0	1
304			min	-89.673	3	-1.406	4	-.035	3	0	10	0	10	0	1
305	M12	1	max	306.655	1	0	1	.492	1	0	1	0	4	0	1
306			min	-75.228	3	0	1	-13.389	5	0	1	0	3	0	1
307		2	max	306.719	1	0	1	.492	1	0	1	0	1	0	1
308			min	-75.18	3	0	1	-13.445	5	0	1	-.001	5	0	1
309		3	max	306.784	1	0	1	.492	1	0	1	0	1	0	1
310			min	-75.131	3	0	1	-13.501	5	0	1	-.002	5	0	1
311		4	max	306.849	1	0	1	.492	1	0	1	0	1	0	1
312			min	-75.083	3	0	1	-13.557	5	0	1	-.004	5	0	1
313		5	max	306.913	1	0	1	.492	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-75.034	3	0	1	-13.613	5	0	1	-.005	5	0	1
315		6	max	306.978	1	0	1	.492	1	0	1	0	1	0	1
316			min	-74.985	3	0	1	-13.669	5	0	1	-.006	5	0	1
317		7	max	307.043	1	0	1	.492	1	0	1	0	1	0	1
318			min	-74.937	3	0	1	-13.726	5	0	1	-.007	5	0	1
319		8	max	307.108	1	0	1	.492	1	0	1	0	1	0	1
320			min	-74.888	3	0	1	-13.782	5	0	1	-.008	5	0	1
321		9	max	307.172	1	0	1	.492	1	0	1	0	1	0	1
322			min	-74.84	3	0	1	-13.838	5	0	1	-.01	5	0	1
323		10	max	307.237	1	0	1	.492	1	0	1	0	1	0	1
324			min	-74.791	3	0	1	-13.894	5	0	1	-.011	5	0	1
325		11	max	307.302	1	0	1	.492	1	0	1	0	1	0	1
326			min	-74.743	3	0	1	-13.95	5	0	1	-.012	5	0	1
327		12	max	307.366	1	0	1	.492	1	0	1	0	1	0	1
328			min	-74.694	3	0	1	-14.006	5	0	1	-.013	5	0	1
329		13	max	307.431	1	0	1	.492	1	0	1	0	1	0	1
330			min	-74.646	3	0	1	-14.062	5	0	1	-.015	5	0	1
331		14	max	307.496	1	0	1	.492	1	0	1	0	1	0	1
332			min	-74.597	3	0	1	-14.118	5	0	1	-.016	5	0	1
333		15	max	307.561	1	0	1	.492	1	0	1	0	1	0	1
334			min	-74.549	3	0	1	-14.174	5	0	1	-.017	5	0	1
335		16	max	307.625	1	0	1	.492	1	0	1	0	1	0	1
336			min	-74.5	3	0	1	-14.23	5	0	1	-.019	5	0	1
337		17	max	307.69	1	0	1	.492	1	0	1	0	1	0	1
338			min	-74.452	3	0	1	-14.286	5	0	1	-.02	5	0	1
339		18	max	307.755	1	0	1	.492	1	0	1	0	1	0	1
340			min	-74.403	3	0	1	-14.342	5	0	1	-.021	5	0	1
341		19	max	307.819	1	0	1	.492	1	0	1	0	1	0	1
342			min	-74.355	3	0	1	-14.399	5	0	1	-.022	5	0	1
343	M1	1	max	58.549	1	337.118	3	.703	10	0	2	.026	4	0	2
344			min	3.232	10	-226.986	1	-14.772	4	0	3	-.001	10	0	3
345		2	max	58.644	1	336.921	3	.703	10	0	2	.023	4	.05	1
346			min	3.311	10	-227.248	1	-14.53	4	0	3	-.001	10	-.073	3
347		3	max	46.755	1	4.542	4	.7	10	0	5	.019	4	.098	1
348			min	-2.118	10	-19.06	3	-13.383	4	0	1	-.001	10	-.145	3
349		4	max	46.85	1	4.205	4	.7	10	0	5	.016	4	.102	2
350			min	-2.038	10	-19.256	3	-13.141	4	0	1	0	10	-.141	3
351		5	max	46.946	1	3.874	14	.7	10	0	5	.014	4	.105	2
352			min	-1.958	10	-19.453	3	-12.899	4	0	1	0	10	-.137	3
353		6	max	47.041	1	3.616	14	.7	10	0	5	.011	1	.109	2
354			min	-1.879	10	-19.65	3	-12.657	4	0	1	0	10	-.132	3
355		7	max	47.137	1	3.358	14	.7	10	0	5	.008	1	.113	2
356			min	-1.799	10	-19.847	3	-12.415	4	0	1	0	10	-.128	3
357		8	max	47.232	1	3.101	14	.7	10	0	5	.005	1	.117	2
358			min	-1.72	10	-20.044	3	-12.402	1	0	1	0	10	-.124	3
359		9	max	47.328	1	2.843	14	.7	10	0	5	.003	4	.121	2
360			min	-1.64	10	-20.24	3	-12.402	1	0	1	0	10	-.119	3
361		10	max	47.423	1	2.585	14	.7	10	0	5	.002	3	.125	2
362			min	-1.56	10	-20.437	3	-12.402	1	0	1	0	10	-.115	3
363		11	max	47.519	1	2.327	14	.7	10	0	5	0	3	.13	2
364			min	-1.481	10	-20.634	3	-12.402	1	0	1	-.003	1	-.111	3
365		12	max	47.614	1	2.069	14	.7	10	0	5	0	10	.134	2
366			min	-1.401	10	-20.831	3	-12.402	1	0	1	-.005	1	-.106	3
367		13	max	47.71	1	1.812	14	.7	10	0	5	0	10	.138	2
368			min	-1.322	10	-21.028	3	-12.402	1	0	1	-.008	1	-.102	3
369		14	max	47.805	1	1.578	9	.7	10	0	5	0	10	.142	2
370			min	-1.242	10	-21.224	3	-12.402	1	0	1	-.011	1	-.097	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	47.901	1	1.36	9	.7	10	0	5	0	10	.147	2
372			min	-1.162	10	-21.421	3	-12.402	1	0	1	-.013	1	-.092	3
373		16	max	79.838	2	50.887	2	.707	10	0	1	0	10	.151	2
374			min	-31.045	3	-86.231	3	-12.517	1	0	5	-.016	1	-.087	3
375		17	max	79.933	2	50.625	2	.707	10	0	1	.001	10	.14	2
376			min	-30.973	3	-86.427	3	-12.517	1	0	5	-.019	1	-.068	3
377		18	max	-3.225	12	323.685	2	.74	10	0	3	.001	10	.071	2
378			min	-58.611	1	-157.817	3	-22.756	4	0	2	-.022	1	-.034	3
379		19	max	-3.177	12	323.423	2	.74	10	0	3	.001	10	0	2
380			min	-58.515	1	-158.013	3	-22.514	4	0	2	-.026	4	0	3
381	M5	1	max	147.967	1	1073.036	3	0	11	0	9	.028	4	0	3
382			min	-3.912	3	-717.293	1	-64.612	3	0	3	0	11	0	2
383		2	max	148.062	1	1072.839	3	0	11	0	9	.024	4	.155	1
384			min	-3.84	3	-717.555	1	-64.612	3	0	3	-.004	3	-.232	3
385		3	max	109.936	1	5.561	9	6.892	3	0	3	.02	4	.308	1
386			min	-.438	15	-68.529	3	-15.828	4	0	4	-.018	3	-.46	3
387		4	max	110.031	1	5.342	9	6.892	3	0	3	.017	4	.319	2
388			min	-.409	15	-68.726	3	-15.586	4	0	4	-.016	3	-.445	3
389		5	max	110.127	1	5.124	9	6.892	3	0	3	.013	4	.332	2
390			min	-.38	15	-68.922	3	-15.344	4	0	4	-.015	3	-.43	3
391		6	max	110.222	1	4.905	9	6.892	3	0	3	.01	4	.345	2
392			min	-.351	15	-69.119	3	-15.102	4	0	4	-.013	3	-.415	3
393		7	max	110.318	1	4.686	9	6.892	3	0	3	.007	4	.358	2
394			min	-.323	15	-69.316	3	-14.86	4	0	4	-.012	3	-.4	3
395		8	max	110.413	1	4.468	9	6.892	3	0	3	.004	4	.371	2
396			min	-.294	15	-69.513	3	-14.618	4	0	4	-.01	3	-.385	3
397		9	max	110.509	1	4.249	9	6.892	3	0	3	0	4	.384	2
398			min	-.265	15	-69.71	3	-14.376	4	0	4	-.009	3	-.37	3
399		10	max	110.604	1	4.03	9	6.892	3	0	3	0	1	.397	2
400			min	-.236	15	-69.906	3	-14.134	4	0	4	-.007	3	-.355	3
401		11	max	110.7	1	3.812	9	6.892	3	0	3	0	2	.411	2
402			min	-.207	15	-70.103	3	-13.892	4	0	4	-.006	3	-.339	3
403		12	max	110.795	1	3.593	9	6.892	3	0	3	0	2	.424	2
404			min	-.178	15	-70.3	3	-13.65	4	0	4	-.009	4	-.324	3
405		13	max	110.891	1	3.374	9	6.892	3	0	3	0	2	.437	2
406			min	-.15	15	-70.497	3	-13.408	4	0	4	-.011	4	-.309	3
407		14	max	110.986	1	3.156	9	6.892	3	0	3	0	11	.451	2
408			min	-.121	15	-70.694	3	-13.166	4	0	4	-.014	4	-.294	3
409		15	max	111.082	1	2.937	9	6.892	3	0	3	0	3	.464	2
410			min	-.092	15	-70.89	3	-12.924	4	0	4	-.017	4	-.278	3
411		16	max	249.517	2	168.037	2	6.863	3	0	3	.001	3	.476	2
412			min	-94.447	3	-233.341	3	-11.658	4	0	4	-.02	4	-.261	3
413		17	max	249.612	2	167.775	2	6.863	3	0	3	.003	3	.439	2
414			min	-94.376	3	-233.537	3	-11.416	4	0	4	-.023	4	-.211	3
415		18	max	-1.537	12	1022.108	2	6.347	3	0	4	.004	3	.221	2
416			min	-148.142	1	-489.36	3	-25.463	5	0	9	-.028	4	-.106	3
417		19	max	-1.489	12	1021.846	2	6.347	3	0	4	.006	3	0	3
418			min	-148.047	1	-489.557	3	-25.221	5	0	9	-.034	4	0	2
419	M9	1	max	58.538	1	337.049	3	106.708	4	0	3	.001	10	0	2
420			min	-.056	15	-226.986	1	-.703	10	0	2	-.025	1	0	3
421		2	max	58.634	1	336.852	3	106.95	4	0	3	.023	5	.05	1
422			min	-.027	15	-227.248	1	-.703	10	0	2	-.022	1	-.073	3
423		3	max	47.066	1	3.973	9	12.348	1	0	1	.044	5	.098	2
424			min	-1.815	10	-18.961	3	-20.527	5	0	10	-.019	1	-.145	3
425		4	max	47.161	1	3.754	9	12.348	1	0	1	.039	5	.102	2
426			min	-1.736	10	-19.158	3	-20.285	5	0	10	-.016	1	-.141	3
427		5	max	47.257	1	3.535	9	12.348	1	0	1	.035	5	.105	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-1.656	10	-19.354	3	-20.043	5	0	10	-.013	1	-.137	3
429		6	max	47.353	1	3.317	9	12.348	1	0	1	.031	5	.109	2
430			min	-1.577	10	-19.551	3	-19.801	5	0	10	-.011	1	-.132	3
431		7	max	47.448	1	3.098	9	12.348	1	0	1	.026	5	.113	2
432			min	-1.497	10	-19.748	3	-19.559	5	0	10	-.008	1	-.128	3
433		8	max	47.544	1	2.879	9	12.348	1	0	1	.022	5	.117	2
434			min	-1.417	10	-19.945	3	-19.317	5	0	10	-.005	1	-.124	3
435		9	max	47.639	1	2.661	9	12.348	1	0	1	.018	5	.121	2
436			min	-1.338	10	-20.142	3	-19.075	5	0	10	-.003	1	-.119	3
437		10	max	47.735	1	2.442	9	12.348	1	0	1	.014	4	.125	2
438			min	-1.258	10	-20.338	3	-18.833	5	0	10	0	1	-.115	3
439		11	max	47.83	1	2.223	9	12.348	1	0	1	.01	4	.13	2
440			min	-1.179	10	-20.535	3	-18.591	5	0	10	0	10	-.111	3
441		12	max	47.926	1	2.005	9	12.348	1	0	1	.008	3	.134	2
442			min	-1.099	10	-20.732	3	-18.349	5	0	10	0	10	-.106	3
443		13	max	48.021	1	1.786	9	12.348	1	0	1	.008	1	.138	2
444			min	-1.019	10	-20.929	3	-18.107	5	0	10	0	10	-.102	3
445		14	max	48.117	1	1.567	9	12.348	1	0	1	.011	1	.142	2
446			min	-.94	10	-21.126	3	-17.865	5	0	10	-.002	5	-.097	3
447		15	max	48.212	1	1.349	9	12.348	1	0	1	.013	1	.147	2
448			min	-.86	10	-21.322	3	-17.623	5	0	10	-.006	5	-.092	3
449		16	max	79.932	2	50.629	2	12.466	1	0	10	.016	1	.151	2
450			min	-31.999	3	-86.655	3	-16.235	5	0	4	-.009	5	-.087	3
451		17	max	80.027	2	50.367	2	12.466	1	0	10	.019	1	.14	2
452			min	-31.928	3	-86.851	3	-15.993	5	0	4	-.012	5	-.068	3
453		18	max	8.825	5	323.685	2	12.956	1	0	2	.022	1	.071	2
454			min	-58.588	1	-157.809	3	-29.136	5	0	3	-.019	5	-.034	3
455		19	max	8.87	5	323.423	2	12.956	1	0	2	.024	1	0	2
456			min	-58.492	1	-158.005	3	-28.894	5	0	3	-.025	5	0	3
457	M13	1	max	106.707	4	226.83	1	.056	15	0	2	.025	1	0	2
458			min	-.703	10	-337.09	3	-58.536	1	0	3	-.001	10	0	3
459		2	max	102.615	4	161.853	1	.718	5	0	2	.012	3	.12	3
460			min	-.703	10	-240.024	3	-43.81	1	0	3	-.003	2	-.081	1
461		3	max	98.523	4	97.037	2	1.472	5	0	2	.01	3	.2	3
462			min	-.703	10	-142.958	3	-29.085	1	0	3	-.012	1	-.135	1
463		4	max	94.43	4	32.304	2	2.225	5	0	2	.007	3	.239	3
464			min	-.703	10	-45.893	3	-14.36	1	0	3	-.021	1	-.162	2
465		5	max	90.338	4	51.173	3	3.228	2	0	2	.005	3	.238	3
466			min	-.703	10	-33.079	1	-5.113	3	0	3	-.024	1	-.162	2
467		6	max	86.246	4	148.239	3	15.091	1	0	2	.004	5	.197	3
468			min	-.703	10	-98.056	1	-4.404	3	0	3	-.021	1	-.135	2
469		7	max	82.153	4	245.305	3	29.816	1	0	2	.005	5	.115	3
470			min	-.703	10	-163.033	1	-3.695	3	0	3	-.011	1	-.081	2
471		8	max	78.061	4	342.371	3	44.541	1	0	2	.008	4	.002	1
472			min	-.703	10	-228.01	1	-2.986	3	0	3	0	3	-.008	3
473		9	max	73.969	4	439.437	3	59.267	1	0	2	.026	1	.11	1
474			min	-.703	10	-292.987	1	-2.278	3	0	3	-.001	3	-.171	3
475		10	max	69.876	4	-7.434	15	73.992	1	0	2	.054	1	.246	1
476			min	-.703	10	-536.503	3	1.187	12	0	3	-.016	5	-.374	3
477		11	max	47.495	4	292.987	1	7.015	5	0	3	.026	1	.11	1
478			min	-.703	10	-439.437	3	-59.256	1	0	2	-.013	5	-.171	3
479		12	max	43.402	4	228.01	1	7.769	5	0	3	.005	2	.002	1
480			min	-.703	10	-342.371	3	-44.531	1	0	2	-.01	5	-.008	3
481		13	max	39.31	4	163.033	1	8.523	5	0	3	0	10	.115	3
482			min	-.703	10	-245.305	3	-29.805	1	0	2	-.011	1	-.081	2
483		14	max	35.218	4	98.056	1	9.276	5	0	3	-.001	10	.197	3
484			min	-.703	10	-148.239	3	-15.08	1	0	2	-.021	1	-.135	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	31.125	4	33.079	1	10.418	4	0	3	.001	5	.238	3
486			min	-.703	10	-51.173	3	-3.228	2	0	2	-.024	1	-.162	2
487		16	max	27.033	4	45.893	3	14.37	1	0	3	.006	5	.239	3
488			min	-.703	10	-32.304	2	-.806	10	0	2	-.021	1	-.162	2
489		17	max	22.941	4	142.959	3	29.096	1	0	3	.01	5	.2	3
490			min	-.703	10	-97.037	2	.54	10	0	2	-.012	1	-.135	1
491		18	max	18.848	4	240.024	3	43.821	1	0	3	.016	4	.12	3
492			min	-.703	10	-161.853	1	1.886	10	0	2	-.003	2	-.081	1
493		19	max	14.756	4	337.09	3	58.546	1	0	3	.026	4	0	2
494			min	-.703	10	-226.83	1	3.232	10	0	2	-.001	10	0	3
495	M16	1	max	28.883	5	323.495	2	8.87	5	0	3	.024	1	0	2
496			min	-12.938	1	-158.024	3	-58.495	1	0	2	-.025	5	0	3
497		2	max	24.791	5	230.739	2	9.623	5	0	3	.004	9	.057	3
498			min	-12.938	1	-113.267	3	-43.77	1	0	2	-.021	5	-.115	2
499		3	max	20.699	5	137.983	2	10.377	5	0	3	0	3	.094	3
500			min	-12.938	1	-68.511	3	-29.045	1	0	2	-.019	4	-.192	2
501		4	max	16.606	5	45.227	2	11.131	5	0	3	-.001	12	.114	3
502			min	-12.938	1	-23.754	3	-14.32	1	0	2	-.021	1	-.23	2
503		5	max	12.514	5	21.003	3	11.884	5	0	3	-.002	12	.114	3
504			min	-12.938	1	-47.529	2	-3.243	3	0	2	-.024	1	-.23	2
505		6	max	8.422	5	65.76	3	15.353	4	0	3	-.001	10	.096	3
506			min	-12.938	1	-140.285	2	-2.534	3	0	2	-.021	1	-.191	2
507		7	max	4.329	5	110.516	3	29.856	1	0	3	.003	5	.059	3
508			min	-12.938	1	-233.04	2	-1.825	3	0	2	-.011	1	-.113	2
509		8	max	2.37	3	155.273	3	44.581	1	0	3	.009	4	.004	3
510			min	-12.938	1	-325.796	2	-1.116	3	0	2	-.006	3	0	5
511		9	max	2.37	3	200.03	3	59.307	1	0	3	.026	1	.158	2
512			min	-12.938	1	-418.552	2	-.407	3	0	2	-.006	3	-.07	3
513		10	max	17.279	5	-7.358	15	74.032	1	0	14	.054	1	.352	2
514			min	-12.938	1	-511.308	2	-1.416	3	0	2	-.006	3	-.163	3
515		11	max	13.187	5	418.552	2	5.94	5	0	2	.026	1	.158	2
516			min	-12.924	1	-200.03	3	-59.284	1	0	3	-.01	5	-.07	3
517		12	max	9.094	5	325.796	2	6.694	5	0	2	.005	2	.004	3
518			min	-12.924	1	-155.273	3	-44.558	1	0	3	-.007	5	0	15
519		13	max	5.002	5	233.04	2	7.447	5	0	2	0	10	.059	3
520			min	-12.924	1	-110.516	3	-29.833	1	0	3	-.011	1	-.113	2
521		14	max	.91	5	140.285	2	8.201	5	0	2	0	12	.096	3
522			min	-12.924	1	-65.76	3	-15.108	1	0	3	-.021	1	-.191	2
523		15	max	.74	10	47.529	2	9.32	4	0	2	.003	5	.114	3
524			min	-12.924	1	-21.003	3	-3.251	2	0	3	-.024	1	-.23	2
525		16	max	.74	10	23.754	3	14.343	1	0	2	.006	5	.114	3
526			min	-12.924	1	-45.227	2	-.817	10	0	3	-.021	1	-.23	2
527		17	max	.74	10	68.511	3	29.068	1	0	2	.011	5	.094	3
528			min	-14.347	4	-137.983	2	.529	10	0	3	-.012	1	-.192	2
529		18	max	.74	10	113.267	3	43.793	1	0	2	.016	4	.057	3
530			min	-18.439	4	-230.739	2	1.875	10	0	3	-.003	2	-.115	2
531		19	max	.74	10	158.024	3	58.518	1	0	2	.026	4	0	2
532			min	-22.532	4	-323.495	2	3.177	12	0	3	-.001	10	0	3
533	M15	1	max	0	1	.776	3	.152	3	0	1	0	1	0	1
534			min	-88.892	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.69	3	.152	3	0	1	0	1	0	1
536			min	-88.952	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.604	3	.152	3	0	1	0	1	0	1
538			min	-89.012	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.518	3	.152	3	0	1	0	1	0	1
540			min	-89.071	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.431	3	.152	3	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-89.131	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.345	3	.152	3	0	1	0	1	0	1
544			min	-89.191	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.259	3	.152	3	0	1	0	3	0	1
546			min	-89.25	3	0	1	0	1	0	3	0	1	0	3
547		8	max	0	1	.173	3	.152	3	0	1	0	3	0	1
548			min	-89.31	3	0	1	0	1	0	3	0	1	0	3
549		9	max	0	1	.086	3	.152	3	0	1	0	3	0	1
550			min	-89.37	3	0	1	0	1	0	3	0	1	0	3
551		10	max	0	1	0	1	.152	3	0	1	0	3	0	1
552			min	-89.429	3	0	1	0	1	0	3	0	1	0	3
553		11	max	0	1	0	1	.152	3	0	1	0	3	0	1
554			min	-89.489	3	-.086	3	0	1	0	3	0	1	0	3
555		12	max	0	1	0	1	.152	3	0	1	0	3	0	1
556			min	-89.549	3	-.173	3	0	1	0	3	0	1	0	3
557		13	max	0	1	0	1	.152	3	0	1	0	3	0	1
558			min	-89.608	3	-.259	3	0	1	0	3	0	1	0	3
559		14	max	0	1	0	1	.152	3	0	1	0	3	0	1
560			min	-89.668	3	-.345	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.152	3	0	1	0	3	0	1
562			min	-89.728	3	-.431	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.152	3	0	1	0	3	0	1
564			min	-89.787	3	-.518	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.152	3	0	1	0	3	0	1
566			min	-89.847	3	-.604	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.152	3	0	1	0	3	0	1
568			min	-89.907	3	-.69	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.152	3	0	1	0	3	0	1
570			min	-89.966	3	-.776	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	1.936	4	.264	4	0	3	0	3	0	1
572			min	-158.044	4	0	2	-.061	3	0	1	0	4	0	1
573		2	max	0	2	1.72	4	.239	4	0	3	0	3	0	2
574			min	-158.039	4	0	2	-.061	3	0	1	0	4	0	4
575		3	max	0	2	1.505	4	.214	4	0	3	0	3	0	2
576			min	-158.035	4	0	2	-.061	3	0	1	0	4	0	4
577		4	max	0	2	1.29	4	.188	4	0	3	0	3	0	2
578			min	-158.03	4	0	2	-.061	3	0	1	0	1	-.001	4
579		5	max	0	2	1.075	4	.163	4	0	3	0	3	0	2
580			min	-158.025	4	0	2	-.061	3	0	1	0	1	-.002	4
581		6	max	0	2	.86	4	.138	4	0	3	0	3	0	2
582			min	-158.021	4	0	2	-.061	3	0	1	0	1	-.002	4
583		7	max	0	2	.645	4	.113	4	0	3	0	3	0	2
584			min	-158.016	4	0	2	-.061	3	0	1	0	1	-.002	4
585		8	max	0	2	.43	4	.087	4	0	3	0	5	0	2
586			min	-158.012	4	0	2	-.061	3	0	1	0	1	-.002	4
587		9	max	0	2	.215	4	.062	4	0	3	0	5	0	2
588			min	-158.007	4	0	2	-.061	3	0	1	0	1	-.002	4
589		10	max	0	2	0	1	.047	1	0	3	0	5	0	2
590			min	-158.002	4	0	1	-.061	3	0	1	0	1	-.002	4
591		11	max	0	2	0	2	.047	1	0	3	0	5	0	2
592			min	-157.998	4	-.215	4	-.061	3	0	1	0	1	-.002	4
593		12	max	.077	1	0	2	.047	1	0	3	0	5	0	2
594			min	-157.993	4	-.43	4	-.061	3	0	1	0	1	-.002	4
595		13	max	.156	1	0	2	.047	1	0	3	0	5	0	2
596			min	-157.989	4	-.645	4	-.061	3	0	1	0	3	-.002	4
597		14	max	.236	1	0	2	.047	1	0	3	0	5	0	2
598			min	-157.984	4	-.86	4	-.069	5	0	1	0	3	-.002	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.315	1	0	2	.047	1	0	3	0	5	0	2
600			min	-157.979	4	-1.075	4	-.094	5	0	1	0	3	-.002	4
601		16	max	.395	1	0	2	.047	1	0	3	0	4	0	2
602			min	-157.975	4	-1.29	4	-.119	5	0	1	0	3	-.001	4
603		17	max	.474	1	0	2	.047	1	0	3	0	1	0	2
604			min	-158.009	5	-1.505	4	-.145	5	0	1	0	3	0	4
605		18	max	.554	1	0	2	.047	1	0	3	0	1	0	2
606			min	-158.07	5	-1.72	4	-.17	5	0	1	0	3	0	4
607		19	max	.634	1	0	2	.047	1	0	3	0	1	0	1
608			min	-158.13	5	-1.936	4	-.195	5	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	.002	1	.007	2	.002	1	8.143e-4	5	NC	3	NC	1
2			min	-.003	3	-.006	3	-.008	5	-1.906e-4	1	4998.868	2	NC	1
3		2	max	.002	1	.006	2	.002	1	8.337e-4	5	NC	3	NC	1
4			min	-.003	3	-.006	3	-.008	5	-1.82e-4	1	5439.83	2	NC	1
5		3	max	.002	1	.006	2	.001	1	8.531e-4	5	NC	1	NC	1
6			min	-.003	3	-.006	3	-.008	5	-1.735e-4	1	5961.642	2	NC	1
7		4	max	.002	1	.005	2	.001	1	8.724e-4	5	NC	1	NC	1
8			min	-.002	3	-.005	3	-.007	5	-1.649e-4	1	6583.583	2	NC	1
9		5	max	.001	1	.005	2	.001	1	8.918e-4	5	NC	1	NC	1
10			min	-.002	3	-.005	3	-.007	5	-1.564e-4	1	7331.281	2	NC	1
11		6	max	.001	1	.004	2	.001	1	9.112e-4	5	NC	1	NC	1
12			min	-.002	3	-.005	3	-.007	5	-1.478e-4	1	8239.384	2	NC	1
13		7	max	.001	1	.004	2	0	1	9.306e-4	5	NC	1	NC	1
14			min	-.002	3	-.005	3	-.006	5	-1.393e-4	1	9355.649	2	NC	1
15		8	max	.001	1	.003	2	0	1	9.5e-4	5	NC	1	NC	1
16			min	-.002	3	-.004	3	-.006	5	-1.307e-4	1	NC	1	NC	1
17		9	max	.001	1	.003	2	0	1	9.694e-4	5	NC	1	NC	1
18			min	-.002	3	-.004	3	-.006	5	-1.222e-4	1	NC	1	NC	1
19		10	max	0	1	.002	2	0	1	9.887e-4	5	NC	1	NC	1
20			min	-.001	3	-.004	3	-.005	5	-1.136e-4	1	NC	1	NC	1
21		11	max	0	1	.002	2	0	1	1.008e-3	5	NC	1	NC	1
22			min	-.001	3	-.003	3	-.005	5	-1.051e-4	1	NC	1	NC	1
23		12	max	0	1	.002	2	0	1	1.028e-3	5	NC	1	NC	1
24			min	-.001	3	-.003	3	-.004	5	-9.656e-5	1	NC	1	NC	1
25		13	max	0	1	.001	2	0	1	1.047e-3	5	NC	1	NC	1
26			min	0	3	-.003	3	-.004	5	-8.801e-5	1	NC	1	NC	1
27		14	max	0	1	0	2	0	1	1.066e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.003	5	-7.946e-5	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	1.086e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.003	5	-7.092e-5	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	1.105e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.002	5	-6.237e-5	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	1.124e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.001	5	-5.383e-5	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	1.144e-3	5	NC	1	NC	1
36			min	0	3	0	3	0	5	-4.528e-5	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	1.163e-3	5	NC	1	NC	1
38			min	0	1	0	1	0	1	-3.673e-5	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.696e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	-5.346e-4	5	NC	1	NC	1
41		2	max	0	3	0	2	.003	5	2.405e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	-5.375e-4	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	3	0	2	.006	5	3.115e-5	1	NC	1	NC	1
44			min	0	2	-.001	3	0	9	-5.404e-4	5	NC	1	NC	1
45		4	max	0	3	0	2	.008	5	3.824e-5	1	NC	1	NC	1
46			min	0	2	-.002	3	0	9	-5.432e-4	5	NC	1	NC	1
47		5	max	0	3	0	2	.011	4	4.534e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	9	-5.461e-4	5	NC	1	NC	1
49		6	max	0	3	0	2	.014	4	5.243e-5	1	NC	1	NC	1
50			min	0	2	-.004	3	0	9	-5.489e-4	5	NC	1	NC	1
51		7	max	0	3	0	2	.017	4	5.953e-5	1	NC	1	NC	1
52			min	0	2	-.004	3	0	9	-5.518e-4	5	NC	1	NC	1
53		8	max	0	3	0	2	.019	4	6.662e-5	1	NC	1	NC	1
54			min	0	2	-.005	3	0	10	-5.547e-4	5	NC	1	NC	1
55		9	max	0	3	0	2	.022	4	7.372e-5	1	NC	1	NC	1
56			min	0	2	-.005	3	0	10	-5.575e-4	5	NC	1	NC	1
57		10	max	0	3	.001	2	.025	4	8.081e-5	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	-5.604e-4	5	NC	1	NC	1
59		11	max	0	3	.002	2	.027	4	8.79e-5	1	NC	1	NC	1
60			min	0	2	-.006	3	0	10	-5.633e-4	5	NC	1	NC	1
61		12	max	0	3	.002	2	.029	4	9.5e-5	1	NC	1	NC	1
62			min	0	2	-.007	3	0	10	-5.661e-4	5	NC	1	NC	1
63		13	max	0	3	.003	2	.032	4	1.021e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	10	-5.69e-4	5	NC	1	NC	1
65		14	max	0	3	.004	2	.034	4	1.092e-4	1	NC	1	NC	1
66			min	0	2	-.007	3	0	10	-5.719e-4	5	NC	1	NC	1
67		15	max	0	3	.004	2	.036	4	1.163e-4	1	NC	1	NC	1
68			min	0	2	-.007	3	0	10	-5.747e-4	5	NC	1	NC	1
69		16	max	0	3	.005	2	.038	4	1.234e-4	1	NC	1	NC	1
70			min	0	2	-.007	3	0	10	-5.776e-4	5	8831.148	2	NC	1
71		17	max	0	3	.006	2	.04	4	1.305e-4	1	NC	1	NC	1
72			min	-.001	2	-.007	3	0	10	-5.805e-4	5	7526.36	2	NC	1
73		18	max	0	3	.007	2	.042	4	1.376e-4	1	NC	3	NC	1
74			min	-.001	2	-.007	3	0	10	-5.833e-4	5	6520.266	2	NC	1
75		19	max	.001	3	.008	2	.044	4	1.447e-4	1	NC	3	NC	1
76			min	-.001	2	-.007	3	0	10	-5.862e-4	5	5736.088	2	NC	1
77	M4	1	max	.001	1	.008	2	0	10	2.193e-3	5	NC	1	NC	1
78			min	0	3	-.006	3	-.046	4	-1.521e-4	1	NC	1	418.738	4
79		2	max	.001	1	.007	2	0	10	2.193e-3	5	NC	1	NC	1
80			min	0	3	-.006	3	-.042	4	-1.521e-4	1	NC	1	456.42	4
81		3	max	.001	1	.007	2	0	10	2.193e-3	5	NC	1	NC	1
82			min	0	3	-.006	3	-.039	4	-1.521e-4	1	NC	1	501.262	4
83		4	max	.001	1	.006	2	0	10	2.193e-3	5	NC	1	NC	1
84			min	0	3	-.005	3	-.035	4	-1.521e-4	1	NC	1	555.149	4
85		5	max	.001	1	.006	2	0	10	2.193e-3	5	NC	1	NC	1
86			min	0	3	-.005	3	-.031	4	-1.521e-4	1	NC	1	620.649	4
87		6	max	.001	1	.005	2	0	10	2.193e-3	5	NC	1	NC	1
88			min	0	3	-.005	3	-.028	4	-1.521e-4	1	NC	1	701.333	4
89		7	max	0	1	.005	2	0	10	2.193e-3	5	NC	1	NC	1
90			min	0	3	-.004	3	-.024	4	-1.521e-4	1	NC	1	802.288	4
91		8	max	0	1	.005	2	0	10	2.193e-3	5	NC	1	NC	1
92			min	0	3	-.004	3	-.021	4	-1.521e-4	1	NC	1	930.96	4
93		9	max	0	1	.004	2	0	10	2.193e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.018	4	-1.521e-4	1	NC	1	1098.612	4
95		10	max	0	1	.004	2	0	10	2.193e-3	5	NC	1	NC	1
96			min	0	3	-.003	3	-.015	4	-1.521e-4	1	NC	1	1322.946	4
97		11	max	0	1	.003	2	0	10	2.193e-3	5	NC	1	NC	1
98			min	0	3	-.003	3	-.012	4	-1.521e-4	1	NC	1	1633.118	4
99		12	max	0	1	.003	2	0	10	2.193e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.002	3	-.009	4	-1.521e-4	1	NC	1	2079.977	4
101		13	max	0	1	.003	2	0	10	2.193e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.007	4	-1.521e-4	1	NC	1	2758.899	4
103		14	max	0	1	.002	2	0	10	2.193e-3	5	NC	1	NC	1
104			min	0	3	-.002	3	-.005	4	-1.521e-4	1	NC	1	3866.601	4
105		15	max	0	1	.002	2	0	10	2.193e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.003	4	-1.521e-4	1	NC	1	5865.205	4
107		16	max	0	1	.001	2	0	10	2.193e-3	5	NC	1	NC	1
108			min	0	3	-.001	3	-.002	4	-1.521e-4	1	NC	1	NC	1
109		17	max	0	1	0	2	0	10	2.193e-3	5	NC	1	NC	1
110			min	0	3	0	3	0	4	-1.521e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	2.193e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-1.521e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	2.193e-3	5	NC	1	NC	1
114			min	0	1	0	1	0	1	-1.521e-4	1	NC	1	NC	1
115	M6	1	max	.006	1	.021	2	0	9	8.608e-4	4	NC	3	NC	1
116			min	-.009	3	-.018	3	-.008	5	-8.791e-8	2	1577.727	2	6724.388	3
117		2	max	.005	1	.02	2	0	9	8.803e-4	4	NC	3	NC	1
118			min	-.008	3	-.017	3	-.008	5	-9.681e-7	1	1686.725	2	7181.237	3
119		3	max	.005	1	.018	2	0	9	8.997e-4	4	NC	3	NC	1
120			min	-.008	3	-.016	3	-.008	5	-2.195e-6	1	1811.449	2	7718.964	3
121		4	max	.005	1	.017	2	0	9	9.191e-4	4	NC	3	NC	1
122			min	-.007	3	-.015	3	-.007	5	-3.423e-6	1	1955.065	2	8355.493	3
123		5	max	.004	1	.016	2	0	9	9.385e-4	4	NC	3	NC	1
124			min	-.007	3	-.014	3	-.007	5	-4.65e-6	1	2121.655	2	9114.503	3
125		6	max	.004	1	.014	2	0	9	9.579e-4	4	NC	3	NC	1
126			min	-.006	3	-.013	3	-.007	5	-5.877e-6	1	2316.563	2	NC	1
127		7	max	.004	1	.013	2	0	9	9.773e-4	4	NC	3	NC	1
128			min	-.006	3	-.012	3	-.007	5	-7.104e-6	1	2546.926	2	NC	1
129		8	max	.003	1	.012	2	0	9	9.968e-4	4	NC	3	NC	1
130			min	-.005	3	-.011	3	-.006	5	-8.331e-6	1	2822.487	2	NC	1
131		9	max	.003	1	.011	2	0	9	1.016e-3	4	NC	3	NC	1
132			min	-.005	3	-.01	3	-.006	5	-9.559e-6	1	3156.893	2	NC	1
133		10	max	.003	1	.009	2	0	9	1.036e-3	4	NC	3	NC	1
134			min	-.004	3	-.009	3	-.005	5	-1.079e-5	1	3569.869	2	NC	1
135		11	max	.003	1	.008	2	0	9	1.055e-3	4	NC	3	NC	1
136			min	-.004	3	-.008	3	-.005	5	-1.201e-5	1	4091.01	2	NC	1
137		12	max	.002	1	.007	2	0	9	1.074e-3	4	NC	3	NC	1
138			min	-.003	3	-.007	3	-.004	5	-1.324e-5	1	4766.834	2	NC	1
139		13	max	.002	1	.006	2	0	9	1.094e-3	4	NC	3	NC	1
140			min	-.003	3	-.006	3	-.004	5	-1.447e-5	1	5674.88	2	NC	1
141		14	max	.002	1	.005	2	0	9	1.113e-3	4	NC	1	NC	1
142			min	-.002	3	-.005	3	-.003	5	-1.569e-5	1	6954.725	2	NC	1
143		15	max	.001	1	.004	2	0	9	1.133e-3	4	NC	1	NC	1
144			min	-.002	3	-.004	3	-.003	5	-1.692e-5	1	8885.526	2	NC	1
145		16	max	0	1	.003	2	0	9	1.152e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.002	5	-1.815e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	9	1.172e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.001	5	-1.938e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.191e-3	4	NC	1	NC	1
150			min	0	3	-.001	3	0	5	-2.06e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.21e-3	4	NC	1	NC	1
152			min	0	1	0	1	0	1	-2.183e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.006e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-5.562e-4	4	NC	1	NC	1
155		2	max	0	3	.001	2	.003	4	9.814e-6	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-5.484e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	3	.002	2	.006	4	9.568e-6	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-5.406e-4	4	NC	1	NC	1
159		4	max	0	3	.003	2	.009	4	9.321e-6	1	NC	1	NC	1
160			min	0	2	-.005	3	0	1	-5.329e-4	4	NC	1	NC	1
161		5	max	0	3	.004	2	.012	4	9.075e-6	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-5.251e-4	4	NC	1	NC	1
163		6	max	0	3	.005	2	.015	4	1.283e-5	3	NC	1	NC	1
164			min	-.001	2	-.008	3	0	1	-5.173e-4	4	8462.175	2	NC	1
165		7	max	0	3	.007	2	.018	4	3.338e-5	3	NC	1	NC	1
166			min	-.001	2	-.009	3	0	1	-5.095e-4	4	7016.788	2	NC	1
167		8	max	0	3	.008	2	.02	4	5.393e-5	3	NC	3	NC	1
168			min	-.001	2	-.011	3	0	1	-5.018e-4	4	5952.111	2	NC	1
169		9	max	.001	3	.009	2	.023	4	7.448e-5	3	NC	3	NC	1
170			min	-.002	2	-.012	3	0	1	-4.94e-4	4	5130.539	2	NC	1
171		10	max	.001	3	.01	2	.026	4	9.503e-5	3	NC	3	NC	1
172			min	-.002	2	-.013	3	0	9	-4.862e-4	4	4475.817	2	NC	1
173		11	max	.001	3	.012	2	.028	4	1.156e-4	3	NC	3	NC	1
174			min	-.002	2	-.014	3	0	9	-4.784e-4	4	3942.07	2	NC	1
175		12	max	.002	3	.013	2	.031	4	1.361e-4	3	NC	3	NC	1
176			min	-.002	2	-.015	3	0	9	-4.706e-4	4	3499.801	2	NC	1
177		13	max	.002	3	.015	2	.033	4	1.567e-4	3	NC	3	NC	1
178			min	-.002	2	-.016	3	0	9	-4.629e-4	4	3128.967	2	NC	1
179		14	max	.002	3	.016	2	.035	4	1.772e-4	3	NC	3	NC	1
180			min	-.003	2	-.017	3	0	9	-4.551e-4	4	2815.305	2	NC	1
181		15	max	.002	3	.018	2	.037	4	1.978e-4	3	NC	3	NC	1
182			min	-.003	2	-.018	3	0	9	-4.473e-4	4	2548.272	2	NC	1
183		16	max	.002	3	.02	2	.039	4	2.183e-4	3	NC	3	NC	1
184			min	-.003	2	-.019	3	0	9	-4.395e-4	4	2319.836	2	NC	1
185		17	max	.002	3	.022	2	.041	4	2.389e-4	3	NC	3	NC	1
186			min	-.003	2	-.02	3	0	9	-4.318e-4	4	2123.734	2	NC	1
187		18	max	.002	3	.024	2	.043	4	2.594e-4	3	NC	3	NC	1
188			min	-.003	2	-.02	3	0	9	-4.24e-4	4	1954.994	2	NC	1
189		19	max	.003	3	.025	2	.045	4	2.8e-4	3	NC	3	NC	1
190			min	-.004	2	-.021	3	0	9	-4.162e-4	4	1809.625	2	NC	1
191	M8	1	max	.004	2	.024	2	0	9	2.04e-3	4	NC	1	NC	1
192			min	-.001	3	-.019	3	-.047	4	-2.131e-4	3	NC	1	409.881	4
193		2	max	.004	2	.023	2	0	9	2.04e-3	4	NC	1	NC	1
194			min	-.001	3	-.018	3	-.043	4	-2.131e-4	3	NC	1	446.769	4
195		3	max	.004	2	.021	2	0	9	2.04e-3	4	NC	1	NC	1
196			min	-.001	3	-.017	3	-.039	4	-2.131e-4	3	NC	1	490.665	4
197		4	max	.004	2	.02	2	0	9	2.04e-3	4	NC	1	NC	1
198			min	-.001	3	-.015	3	-.036	4	-2.131e-4	3	NC	1	543.415	4
199		5	max	.003	2	.019	2	0	9	2.04e-3	4	NC	1	NC	1
200			min	-.001	3	-.014	3	-.032	4	-2.131e-4	3	NC	1	607.535	4
201		6	max	.003	2	.017	2	0	9	2.04e-3	4	NC	1	NC	1
202			min	0	3	-.013	3	-.028	4	-2.131e-4	3	NC	1	686.519	4
203		7	max	.003	2	.016	2	0	9	2.04e-3	4	NC	1	NC	1
204			min	0	3	-.012	3	-.025	4	-2.131e-4	3	NC	1	785.348	4
205		8	max	.003	2	.015	2	0	9	2.04e-3	4	NC	1	NC	1
206			min	0	3	-.011	3	-.021	4	-2.131e-4	3	NC	1	911.31	4
207		9	max	.002	2	.013	2	0	9	2.04e-3	4	NC	1	NC	1
208			min	0	3	-.01	3	-.018	4	-2.131e-4	3	NC	1	1075.433	4
209		10	max	.002	2	.012	2	0	9	2.04e-3	4	NC	1	NC	1
210			min	0	3	-.009	3	-.015	4	-2.131e-4	3	NC	1	1295.047	4
211		11	max	.002	2	.011	2	0	9	2.04e-3	4	NC	1	NC	1
212			min	0	3	-.008	3	-.012	4	-2.131e-4	3	NC	1	1598.693	4
213		12	max	.002	2	.009	2	0	9	2.04e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.007	3	-.009	4	-2.131e-4	3	NC	1	2036.153	4
215		13	max	.001	2	.008	2	0	9	2.04e-3	4	NC	1	NC	1
216			min	0	3	-.006	3	-.007	4	-2.131e-4	3	NC	1	2700.799	4
217		14	max	.001	2	.007	2	0	9	2.04e-3	4	NC	1	NC	1
218			min	0	3	-.005	3	-.005	4	-2.131e-4	3	NC	1	3785.215	4
219		15	max	0	2	.005	2	0	9	2.04e-3	4	NC	1	NC	1
220			min	0	3	-.004	3	-.003	4	-2.131e-4	3	NC	1	5741.816	4
221		16	max	0	2	.004	2	0	9	2.04e-3	4	NC	1	NC	1
222			min	0	3	-.003	3	-.002	4	-2.131e-4	3	NC	1	9856.624	4
223		17	max	0	2	.003	2	0	9	2.04e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	0	4	-2.131e-4	3	NC	1	NC	1
225		18	max	0	2	.001	2	0	9	2.04e-3	4	NC	1	NC	1
226			min	0	3	-.001	3	0	4	-2.131e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	2.04e-3	4	NC	1	NC	1
228			min	0	1	0	1	0	1	-2.131e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.007	2	0	3	1.9e-4	1	NC	3	NC	1
230			min	-.002	3	-.006	3	-.004	4	-4.646e-4	3	5005.748	2	NC	1
231		2	max	.002	1	.006	2	0	3	1.82e-4	4	NC	3	NC	1
232			min	-.002	3	-.006	3	-.004	4	-4.505e-4	3	5447.485	2	NC	1
233		3	max	.002	1	.006	2	0	3	2.26e-4	4	NC	1	NC	1
234			min	-.002	3	-.006	3	-.004	4	-4.364e-4	3	5970.246	2	NC	1
235		4	max	.002	1	.005	2	0	3	2.7e-4	4	NC	1	NC	1
236			min	-.002	3	-.005	3	-.004	4	-4.224e-4	3	6593.358	2	NC	1
237		5	max	.001	1	.005	2	0	3	3.14e-4	4	NC	1	NC	1
238			min	-.002	3	-.005	3	-.004	4	-4.083e-4	3	7342.516	2	NC	1
239		6	max	.001	1	.004	2	0	3	3.58e-4	4	NC	1	NC	1
240			min	-.002	3	-.005	3	-.004	4	-3.942e-4	3	8252.463	2	NC	1
241		7	max	.001	1	.004	2	0	3	4.02e-4	4	NC	1	NC	1
242			min	-.002	3	-.005	3	-.004	4	-3.802e-4	3	9371.089	2	NC	1
243		8	max	.001	1	.003	2	0	3	4.46e-4	4	NC	1	NC	1
244			min	-.002	3	-.004	3	-.004	4	-3.661e-4	3	NC	1	NC	1
245		9	max	.001	1	.003	2	0	3	4.9e-4	4	NC	1	NC	1
246			min	-.001	3	-.004	3	-.004	4	-3.521e-4	3	NC	1	NC	1
247		10	max	0	1	.002	2	0	3	5.34e-4	4	NC	1	NC	1
248			min	-.001	3	-.004	3	-.003	4	-3.38e-4	3	NC	1	NC	1
249		11	max	0	1	.002	2	0	3	5.78e-4	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.003	4	-3.239e-4	3	NC	1	NC	1
251		12	max	0	1	.002	2	0	3	6.22e-4	4	NC	1	NC	1
252			min	0	3	-.003	3	-.003	4	-3.099e-4	3	NC	1	NC	1
253		13	max	0	1	.001	2	0	3	6.66e-4	4	NC	1	NC	1
254			min	0	3	-.003	3	-.003	4	-2.958e-4	3	NC	1	NC	1
255		14	max	0	1	0	2	0	3	7.1e-4	4	NC	1	NC	1
256			min	0	3	-.002	3	-.002	4	-2.817e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	7.54e-4	4	NC	1	NC	1
258			min	0	3	-.002	3	-.002	4	-2.677e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	7.98e-4	4	NC	1	NC	1
260			min	0	3	-.001	3	-.001	4	-2.536e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	8.42e-4	4	NC	1	NC	1
262			min	0	3	-.001	3	0	4	-2.396e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	8.86e-4	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-2.255e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	9.3e-4	4	NC	1	NC	1
266			min	0	1	0	1	0	1	-2.114e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	9.741e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-4.278e-4	4	NC	1	NC	1
269		2	max	0	3	0	2	.002	4	7.703e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-4.662e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	3	0	2	.005	4	5.664e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-5.046e-4	4	NC	1	NC	1
273		4	max	0	3	0	2	.007	4	3.626e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	-.001	3	-5.43e-4	4	NC	1	NC	1
275		5	max	0	3	0	2	.009	4	1.588e-5	3	NC	1	NC	1
276			min	0	2	-.003	3	-.002	3	-5.814e-4	4	NC	1	NC	1
277		6	max	0	3	0	2	.012	4	2.975e-6	10	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-6.199e-4	4	NC	1	NC	1
279		7	max	0	3	0	2	.014	4	3.416e-6	10	NC	1	NC	1
280			min	0	2	-.004	3	-.002	3	-6.583e-4	4	NC	1	NC	1
281		8	max	0	3	0	2	.016	5	3.858e-6	10	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-6.967e-4	4	NC	1	NC	1
283		9	max	0	3	0	2	.019	5	4.299e-6	10	NC	1	NC	1
284			min	0	2	-.005	3	-.003	3	-7.351e-4	4	NC	1	NC	1
285		10	max	0	3	.001	2	.021	5	4.741e-6	10	NC	1	NC	1
286			min	0	2	-.006	3	-.003	3	-7.735e-4	4	NC	1	NC	1
287		11	max	0	3	.002	2	.023	5	5.182e-6	10	NC	1	NC	1
288			min	0	2	-.006	3	-.003	3	-8.119e-4	4	NC	1	NC	1
289		12	max	0	3	.002	2	.025	5	5.623e-6	10	NC	1	NC	1
290			min	0	2	-.007	3	-.003	3	-8.503e-4	4	NC	1	NC	1
291		13	max	0	3	.003	2	.027	5	6.065e-6	10	NC	1	NC	1
292			min	0	2	-.007	3	-.003	3	-8.887e-4	4	NC	1	NC	1
293		14	max	0	3	.004	2	.029	5	6.506e-6	10	NC	1	NC	1
294			min	0	2	-.007	3	-.003	3	-9.271e-4	4	NC	1	NC	1
295		15	max	0	3	.004	2	.031	5	6.947e-6	10	NC	1	NC	1
296			min	0	2	-.007	3	-.003	3	-9.655e-4	4	NC	1	NC	1
297		16	max	0	3	.005	2	.034	5	7.389e-6	10	NC	1	NC	1
298			min	0	2	-.007	3	-.003	3	-1.004e-3	4	8841.912	2	NC	1
299		17	max	0	3	.006	2	.036	5	7.83e-6	10	NC	1	NC	1
300			min	-.001	2	-.007	3	-.002	3	-1.042e-3	4	7534.578	2	NC	1
301		18	max	0	3	.007	2	.038	5	8.271e-6	10	NC	3	NC	1
302			min	-.001	2	-.007	3	-.002	3	-1.081e-3	4	6526.731	2	NC	1
303		19	max	.001	3	.008	2	.04	5	8.713e-6	10	NC	3	NC	1
304			min	-.001	2	-.007	3	-.002	3	-1.119e-3	4	5741.32	2	NC	1
305	M12	1	max	.001	1	.008	2	.002	1	2.634e-3	4	NC	1	NC	1
306			min	0	3	-.006	3	-.043	5	-9.065e-6	10	NC	1	444.896	5
307		2	max	.001	1	.007	2	.001	1	2.634e-3	4	NC	1	NC	1
308			min	0	3	-.006	3	-.04	5	-9.065e-6	10	NC	1	484.922	5
309		3	max	.001	1	.007	2	.001	1	2.634e-3	4	NC	1	NC	1
310			min	0	3	-.006	3	-.036	5	-9.065e-6	10	NC	1	532.552	5
311		4	max	.001	1	.006	2	.001	1	2.634e-3	4	NC	1	NC	1
312			min	0	3	-.005	3	-.033	5	-9.065e-6	10	NC	1	589.787	5
313		5	max	.001	1	.006	2	.001	1	2.634e-3	4	NC	1	NC	1
314			min	0	3	-.005	3	-.029	5	-9.065e-6	10	NC	1	659.355	5
315		6	max	.001	1	.005	2	0	1	2.634e-3	4	NC	1	NC	1
316			min	0	3	-.005	3	-.026	5	-9.065e-6	10	NC	1	745.05	5
317		7	max	0	1	.005	2	0	1	2.634e-3	4	NC	1	NC	1
318			min	0	3	-.004	3	-.023	5	-9.065e-6	10	NC	1	852.272	5
319		8	max	0	1	.005	2	0	1	2.634e-3	4	NC	1	NC	1
320			min	0	3	-.004	3	-.02	5	-9.065e-6	10	NC	1	988.929	5
321		9	max	0	1	.004	2	0	1	2.634e-3	4	NC	1	NC	1
322			min	0	3	-.004	3	-.017	5	-9.065e-6	10	NC	1	1166.982	5
323		10	max	0	1	.004	2	0	1	2.634e-3	4	NC	1	NC	1
324			min	0	3	-.003	3	-.014	5	-9.065e-6	10	NC	1	1405.229	5
325		11	max	0	1	.003	2	0	1	2.634e-3	4	NC	1	NC	1
326			min	0	3	-.003	3	-.011	5	-9.065e-6	10	NC	1	1734.631	5
327		12	max	0	1	.003	2	0	1	2.634e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.002	3	-.009	5	-9.065e-6	10	NC	1	2209.187	5
329		13	max	0	1	.003	2	0	1	2.634e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.007	5	-9.065e-6	10	NC	1	2930.175	5
331		14	max	0	1	.002	2	0	1	2.634e-3	4	NC	1	NC	1
332			min	0	3	-.002	3	-.005	5	-9.065e-6	10	NC	1	4106.487	5
333		15	max	0	1	.002	2	0	1	2.634e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.003	5	-9.065e-6	10	NC	1	6228.841	5
335		16	max	0	1	.001	2	0	1	2.634e-3	4	NC	1	NC	1
336			min	0	3	-.001	3	-.002	5	-9.065e-6	10	NC	1	NC	1
337		17	max	0	1	0	2	0	1	2.634e-3	4	NC	1	NC	1
338			min	0	3	0	3	0	5	-9.065e-6	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	2.634e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	-9.065e-6	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	2.634e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	-9.065e-6	10	NC	1	NC	1
343	M1	1	max	.006	3	.022	3	.005	5	5.361e-3	2	NC	1	NC	1
344			min	-.007	2	-.018	2	0	9	-7.61e-3	3	NC	1	NC	1
345		2	max	.006	3	.012	3	.006	5	2.65e-3	2	NC	4	NC	1
346			min	-.007	2	-.01	2	-.001	9	-3.735e-3	3	5022.059	3	NC	1
347		3	max	.006	3	.003	3	.008	5	1.969e-4	5	NC	4	NC	1
348			min	-.007	2	-.002	2	-.002	1	-7.743e-5	1	2606.176	3	NC	1
349		4	max	.006	3	.005	2	.011	5	1.912e-4	5	NC	4	NC	1
350			min	-.007	2	-.004	3	-.002	1	-6.09e-5	1	1863.889	3	7935.575	5
351		5	max	.006	3	.011	2	.013	5	1.855e-4	5	NC	4	NC	1
352			min	-.007	2	-.01	3	-.002	1	-4.792e-5	9	1511.284	3	5635.708	5
353		6	max	.006	3	.016	2	.016	5	1.798e-4	5	NC	4	NC	1
354			min	-.007	2	-.015	3	-.002	1	-3.503e-5	9	1315.748	3	4304.541	5
355		7	max	.006	3	.02	2	.018	5	1.741e-4	5	NC	4	NC	1
356			min	-.007	2	-.019	3	-.002	1	-2.214e-5	9	1175.781	2	3449.195	5
357		8	max	.006	3	.023	2	.021	5	1.684e-4	5	NC	4	NC	1
358			min	-.007	2	-.022	3	-.001	1	-9.247e-6	9	1087.271	2	2860.56	5
359		9	max	.006	3	.025	2	.024	5	1.654e-4	4	NC	4	NC	1
360			min	-.007	2	-.023	3	0	9	-1.222e-6	10	1035.226	2	2435.2	4
361		10	max	.006	3	.025	2	.027	4	1.638e-4	4	NC	4	NC	1
362			min	-.007	2	-.023	3	0	9	-2.198e-6	10	1011.718	2	2102.846	4
363		11	max	.006	3	.025	2	.03	4	1.622e-4	4	NC	4	NC	1
364			min	-.007	2	-.022	3	0	10	-3.173e-6	10	1013.929	2	1849.989	4
365		12	max	.006	3	.023	2	.033	4	1.606e-4	4	NC	4	NC	1
366			min	-.007	2	-.021	3	0	10	-4.148e-6	10	1043.089	2	1653.406	4
367		13	max	.006	3	.021	2	.036	4	1.59e-4	4	NC	4	NC	1
368			min	-.007	2	-.018	3	0	10	-5.123e-6	10	1105.126	2	1498.032	4
369		14	max	.006	3	.017	2	.039	4	1.574e-4	4	NC	4	NC	1
370			min	-.007	2	-.014	3	0	10	-6.098e-6	10	1213.633	2	1373.733	4
371		15	max	.006	3	.011	2	.041	4	1.558e-4	4	NC	4	NC	1
372			min	-.007	2	-.009	3	0	10	-7.074e-6	10	1398.34	2	1273.492	4
373		16	max	.006	3	.004	2	.044	4	3.032e-4	4	NC	4	NC	1
374			min	-.007	2	-.004	3	0	10	-7.807e-6	10	1731.566	2	1192.337	4
375		17	max	.006	3	.002	3	.046	4	3.997e-3	4	NC	4	NC	1
376			min	-.007	2	-.004	2	0	10	-2.793e-6	10	2441.285	2	1126.752	4
377		18	max	.006	3	.009	3	.048	4	3.723e-3	2	NC	4	NC	1
378			min	-.007	2	-.013	2	0	10	-1.927e-3	3	4722.155	2	1073.93	4
379		19	max	.006	3	.017	3	.05	4	7.505e-3	2	NC	1	NC	1
380			min	-.007	2	-.023	2	0	9	-3.943e-3	3	NC	1	1033.083	4
381	M5	1	max	.017	3	.067	3	.005	5	1.267e-5	4	NC	1	NC	1
382			min	-.021	2	-.057	2	0	9	0	1	NC	1	NC	1
383		2	max	.017	3	.037	3	.006	5	9.742e-5	3	NC	4	NC	1
384			min	-.021	2	-.031	2	0	9	-1.03e-5	9	1610.298	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.017	3	.009	3	.008	5	1.874e-4	3	NC	5	NC	1
386			min	-.021	2	-.006	2	0	9	-2.046e-5	9	836.087	3	NC	1
387		4	max	.017	3	.016	2	.011	5	1.837e-4	5	NC	5	NC	1
388			min	-.021	2	-.014	3	0	9	-1.925e-5	9	598.704	3	NC	1
389		5	max	.017	3	.035	2	.013	5	1.888e-4	5	NC	5	NC	1
390			min	-.021	2	-.033	3	0	9	-1.804e-5	9	486.08	3	NC	1
391		6	max	.017	3	.05	2	.016	5	1.939e-4	5	NC	5	NC	1
392			min	-.021	2	-.048	3	0	9	-1.683e-5	9	417.14	2	NC	1
393		7	max	.017	3	.063	2	.019	5	1.99e-4	5	NC	5	NC	1
394			min	-.021	2	-.059	3	0	9	-1.562e-5	9	372.176	2	NC	1
395		8	max	.017	3	.072	2	.022	5	2.041e-4	5	NC	5	NC	1
396			min	-.021	2	-.067	3	0	9	-1.441e-5	9	344.076	2	9901.612	3
397		9	max	.017	3	.078	2	.025	4	2.092e-4	5	NC	5	NC	1
398			min	-.021	2	-.071	3	0	9	-1.32e-5	9	327.545	2	NC	1
399		10	max	.017	3	.081	2	.028	4	2.143e-4	5	NC	5	NC	1
400			min	-.021	2	-.072	3	0	9	-1.2e-5	9	320.064	2	NC	1
401		11	max	.017	3	.079	2	.032	4	2.194e-4	5	NC	5	NC	1
402			min	-.021	2	-.069	3	0	9	-1.079e-5	9	320.738	2	NC	1
403		12	max	.017	3	.074	2	.035	4	2.245e-4	5	NC	5	NC	1
404			min	-.021	2	-.063	3	0	9	-9.578e-6	9	329.954	2	NC	1
405		13	max	.017	3	.065	2	.038	4	2.297e-4	4	NC	5	NC	1
406			min	-.021	2	-.055	3	0	9	-8.369e-6	9	349.587	2	NC	1
407		14	max	.017	3	.052	2	.04	4	2.354e-4	4	NC	5	NC	1
408			min	-.021	2	-.043	3	0	9	-7.161e-6	9	383.942	2	NC	1
409		15	max	.017	3	.035	2	.043	4	2.411e-4	4	NC	5	NC	1
410			min	-.021	2	-.029	3	0	9	-5.952e-6	9	442.434	2	NC	1
411		16	max	.017	3	.014	2	.045	4	3.93e-4	4	NC	5	NC	1
412			min	-.021	2	-.012	3	0	9	-5.447e-6	9	547.972	2	NC	1
413		17	max	.017	3	.007	3	.047	4	4.026e-3	4	NC	5	NC	1
414			min	-.021	2	-.012	2	0	9	-2.167e-5	9	772.838	2	NC	1
415		18	max	.017	3	.028	3	.049	4	2.068e-3	4	NC	4	NC	1
416			min	-.021	2	-.042	2	0	9	-1.112e-5	9	1495.3	2	NC	1
417		19	max	.017	3	.051	3	.05	4	5.159e-6	5	NC	1	NC	1
418			min	-.021	2	-.074	2	0	9	-8.322e-7	3	NC	1	NC	1
419	M9	1	max	.006	3	.021	3	.004	5	7.622e-3	3	NC	1	NC	1
420			min	-.007	2	-.018	2	0	9	-5.361e-3	2	NC	1	NC	1
421		2	max	.006	3	.012	3	.004	4	3.78e-3	3	NC	4	NC	1
422			min	-.007	2	-.01	2	0	10	-2.65e-3	2	5024.807	3	NC	1
423		3	max	.006	3	.003	3	.004	4	5.738e-5	1	NC	4	NC	1
424			min	-.007	2	-.002	2	0	3	-3.038e-5	5	2607.636	3	NC	1
425		4	max	.006	3	.005	2	.004	4	4.184e-5	1	NC	4	NC	1
426			min	-.007	2	-.005	3	-.001	3	-3.909e-5	5	1864.924	3	NC	1
427		5	max	.006	3	.011	2	.006	4	2.631e-5	1	NC	4	NC	1
428			min	-.007	2	-.011	3	-.002	3	-4.781e-5	5	1512.081	3	NC	1
429		6	max	.006	3	.016	2	.007	4	1.078e-5	1	NC	4	NC	1
430			min	-.007	2	-.016	3	-.003	3	-5.705e-5	4	1316.393	3	9663.36	3
431		7	max	.006	3	.02	2	.01	4	2.734e-6	11	NC	4	NC	1
432			min	-.007	2	-.019	3	-.004	3	-6.905e-5	4	1176.033	2	8344.54	4
433		8	max	.006	3	.023	2	.012	4	3.877e-7	10	NC	4	NC	1
434			min	-.007	2	-.022	3	-.004	3	-8.105e-5	4	1087.513	2	5739.017	4
435		9	max	.006	3	.025	2	.015	4	1.355e-6	10	NC	4	NC	1
436			min	-.007	2	-.023	3	-.004	3	-9.305e-5	4	1035.466	2	4244.847	4
437		10	max	.006	3	.025	2	.018	4	2.322e-6	10	NC	4	NC	1
438			min	-.007	2	-.023	3	-.004	3	-1.05e-4	4	1011.961	2	3303.995	4
439		11	max	.006	3	.025	2	.022	5	3.288e-6	10	NC	4	NC	1
440			min	-.007	2	-.023	3	-.004	3	-1.17e-4	4	1014.179	2	2671.375	4
441		12	max	.006	3	.023	2	.025	5	4.255e-6	10	NC	4	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.007	2	-.021	3	-.004	3	-1.29e-4	4	1043.353	2	2223.747	5
443		13	max	.006	3	.021	2	.029	5	5.222e-6	10	NC	4	NC	1
444			min	-.007	2	-.018	3	-.004	3	-1.41e-4	4	1105.412	2	1891.479	5
445		14	max	.006	3	.017	2	.033	5	6.189e-6	10	NC	4	NC	1
446			min	-.007	2	-.014	3	-.003	3	-1.53e-4	4	1213.953	2	1643.886	5
447		15	max	.006	3	.011	2	.036	5	7.156e-6	10	NC	4	NC	1
448			min	-.007	2	-.009	3	-.003	3	-1.65e-4	4	1398.711	2	1454.989	5
449		16	max	.006	3	.004	2	.04	5	1.493e-5	5	NC	4	NC	1
450			min	-.007	2	-.004	3	-.002	3	-1.409e-4	1	1732.021	2	1308.295	5
451		17	max	.006	3	.002	3	.043	5	3.942e-3	4	NC	4	NC	1
452			min	-.007	2	-.004	2	-.002	1	-6.589e-5	1	2441.878	2	1192.786	5
453		18	max	.006	3	.009	3	.047	5	1.957e-3	3	NC	4	NC	1
454			min	-.007	2	-.013	2	0	1	-3.723e-3	2	4723.263	2	1096.982	4
455		19	max	.006	3	.017	3	.05	4	3.941e-3	3	NC	1	NC	1
456			min	-.007	2	-.023	2	0	9	-7.506e-3	2	NC	1	1019.901	4
457	M13	1	max	0	9	.021	3	.006	3	3.621e-3	3	NC	1	NC	1
458			min	-.004	5	-.018	2	-.007	2	-3.168e-3	2	NC	1	NC	1
459		2	max	0	9	.058	3	.004	3	4.48e-3	3	NC	4	NC	1
460			min	-.004	5	-.044	2	-.006	2	-3.926e-3	2	2441.349	3	NC	1
461		3	max	0	9	.089	3	.005	9	5.339e-3	3	NC	4	NC	1
462			min	-.004	5	-.066	2	-.006	2	-4.683e-3	2	1323.853	3	NC	1
463		4	max	0	9	.111	3	.007	9	6.197e-3	3	NC	5	NC	1
464			min	-.004	5	-.082	2	-.006	2	-5.441e-3	2	1006.354	3	NC	1
465		5	max	0	9	.121	3	.007	9	7.056e-3	3	NC	5	NC	1
466			min	-.004	5	-.09	2	-.008	2	-6.198e-3	2	906.571	3	NC	1
467		6	max	0	9	.119	3	.008	3	7.915e-3	3	NC	5	NC	1
468			min	-.004	5	-.09	2	-.01	2	-6.956e-3	2	922.436	3	NC	1
469		7	max	0	9	.108	3	.01	3	8.774e-3	3	NC	5	NC	1
470			min	-.004	5	-.083	2	-.013	2	-7.713e-3	2	1042.24	3	NC	1
471		8	max	0	9	.091	3	.013	3	9.632e-3	3	NC	4	NC	1
472			min	-.004	5	-.073	2	-.017	2	-8.471e-3	2	1291.965	3	8784.906	2
473		9	max	0	9	.075	3	.015	3	1.049e-2	3	NC	4	NC	1
474			min	-.004	5	-.062	2	-.02	2	-9.228e-3	2	1681.764	3	6928.675	2
475		10	max	0	9	.067	3	.017	3	1.135e-2	3	NC	4	NC	4
476			min	-.005	5	-.057	2	-.021	2	-9.986e-3	2	1959.762	3	6350.521	2
477		11	max	0	9	.075	3	.019	3	1.049e-2	3	NC	4	NC	1
478			min	-.005	5	-.062	2	-.02	2	-9.228e-3	2	1681.763	3	6928.697	2
479		12	max	0	9	.091	3	.019	3	9.636e-3	3	NC	4	NC	1
480			min	-.005	5	-.073	2	-.017	2	-8.471e-3	2	1291.964	3	6926.608	3
481		13	max	0	9	.108	3	.018	3	8.778e-3	3	NC	5	NC	1
482			min	-.005	5	-.083	2	-.013	2	-7.713e-3	2	1042.24	3	7304.621	3
483		14	max	0	9	.119	3	.017	3	7.921e-3	3	NC	5	NC	1
484			min	-.005	5	-.09	2	-.01	2	-6.956e-3	2	922.436	3	8289.056	3
485		15	max	0	9	.121	3	.015	3	7.064e-3	3	NC	5	NC	1
486			min	-.005	5	-.09	2	-.008	2	-6.198e-3	2	906.571	3	NC	1
487		16	max	0	9	.111	3	.012	3	6.207e-3	3	NC	5	NC	1
488			min	-.005	5	-.082	2	-.006	2	-5.441e-3	2	1006.354	3	NC	1
489		17	max	0	9	.09	3	.01	3	5.35e-3	3	NC	4	NC	1
490			min	-.005	5	-.066	2	-.006	2	-4.683e-3	2	1323.853	3	NC	1
491		18	max	0	9	.058	3	.008	3	4.493e-3	3	NC	4	NC	1
492			min	-.005	5	-.044	2	-.006	2	-3.926e-3	2	2441.348	3	NC	1
493		19	max	0	9	.022	3	.006	3	3.636e-3	3	NC	1	NC	1
494			min	-.005	5	-.018	2	-.007	2	-3.169e-3	2	NC	1	NC	1
495	M16	1	max	0	9	.017	3	.006	3	3.87e-3	2	NC	1	NC	1
496			min	-.05	4	-.023	2	-.007	2	-2.782e-3	3	NC	1	NC	1
497		2	max	0	9	.036	3	.008	3	4.798e-3	2	NC	4	NC	1
498			min	-.05	4	-.06	2	-.006	2	-3.414e-3	3	2474.967	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	0	9	.052	3	.01	3	5.727e-3	2	NC	4	NC	1
500			min	-.05	4	-.091	2	-.006	2	-4.047e-3	3	1339.108	2	NC	1
501		4	max	0	9	.064	3	.012	3	6.655e-3	2	NC	5	NC	1
502			min	-.05	4	-.112	2	-.006	2	-4.679e-3	3	1014.008	2	NC	1
503		5	max	0	9	.07	3	.014	3	7.584e-3	2	NC	5	NC	1
504			min	-.05	4	-.123	2	-.008	2	-5.312e-3	3	907.894	2	NC	1
505		6	max	0	9	.071	3	.016	3	8.512e-3	2	NC	5	NC	1
506			min	-.05	4	-.122	2	-.01	2	-5.944e-3	3	915.063	2	9018.559	3
507		7	max	0	9	.067	3	.017	3	9.441e-3	2	NC	5	NC	1
508			min	-.05	4	-.112	2	-.014	2	-6.576e-3	3	1018.664	2	8055.349	3
509		8	max	0	9	.061	3	.018	3	1.037e-2	2	NC	4	NC	1
510			min	-.05	4	-.096	2	-.017	2	-7.209e-3	3	1233.778	2	7620.76	3
511		9	max	0	9	.054	3	.018	3	1.13e-2	2	NC	4	NC	1
512			min	-.05	4	-.081	2	-.02	2	-7.841e-3	3	1555.308	2	6865.291	2
513		10	max	0	9	.051	3	.017	3	1.223e-2	2	NC	4	NC	4
514			min	-.05	4	-.074	2	-.021	2	-8.474e-3	3	1773.889	2	6295.972	2
515		11	max	0	9	.054	3	.016	3	1.13e-2	2	NC	4	NC	1
516			min	-.05	4	-.081	2	-.02	2	-7.84e-3	3	1555.308	2	6865.306	2
517		12	max	0	9	.061	3	.015	3	1.037e-2	2	NC	4	NC	1
518			min	-.05	4	-.096	2	-.017	2	-7.206e-3	3	1233.778	2	8689.862	2
519		13	max	0	9	.067	3	.014	3	9.441e-3	2	NC	5	NC	1
520			min	-.05	4	-.112	2	-.014	2	-6.572e-3	3	1018.664	2	NC	1
521		14	max	0	9	.071	3	.012	3	8.513e-3	2	NC	5	NC	1
522			min	-.05	4	-.122	2	-.01	2	-5.938e-3	3	915.063	2	NC	1
523		15	max	0	9	.07	3	.011	3	7.584e-3	2	NC	5	NC	1
524			min	-.05	4	-.123	2	-.008	2	-5.305e-3	3	907.894	2	NC	1
525		16	max	0	9	.064	3	.009	3	6.656e-3	2	NC	5	NC	1
526			min	-.05	4	-.112	2	-.007	2	-4.671e-3	3	1014.008	2	NC	1
527		17	max	0	9	.052	3	.008	3	5.728e-3	2	NC	4	NC	1
528			min	-.05	4	-.091	2	-.006	2	-4.037e-3	3	1339.108	2	NC	1
529		18	max	0	9	.036	3	.007	3	4.8e-3	2	NC	4	NC	1
530			min	-.05	4	-.06	2	-.006	2	-3.403e-3	3	2474.967	2	NC	1
531		19	max	0	9	.017	3	.006	3	3.871e-3	2	NC	1	NC	1
532			min	-.05	4	-.023	2	-.007	2	-2.769e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.56e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-4.93e-4	5	NC	1	NC	1
535		2	max	0	3	0	5	.003	4	7.595e-4	3	NC	1	NC	1
536			min	0	4	-.001	1	0	3	-5.041e-4	5	NC	1	NC	1
537		3	max	0	3	0	5	.006	4	1.163e-3	3	NC	1	NC	1
538			min	0	4	-.003	1	-.003	3	-8.356e-4	2	NC	1	8739.92	4
539		4	max	0	3	.001	5	.01	4	1.567e-3	3	NC	1	NC	9
540			min	-.001	4	-.004	1	-.006	3	-1.232e-3	2	NC	1	5729.22	4
541		5	max	0	3	.002	5	.013	4	1.97e-3	3	NC	1	NC	9
542			min	-.002	4	-.005	1	-.01	3	-1.628e-3	2	NC	1	3868.237	3
543		6	max	0	3	.002	5	.016	4	2.374e-3	3	NC	3	9313.901	9
544			min	-.002	4	-.006	1	-.014	3	-2.024e-3	2	8734.741	1	2809.85	3
545		7	max	0	3	.002	5	.018	4	2.777e-3	3	NC	3	7311.791	9
546			min	-.002	4	-.007	1	-.019	3	-2.42e-3	2	7746.14	1	2192.704	3
547		8	max	0	3	.003	5	.019	4	3.181e-3	3	NC	4	6048.212	9
548			min	-.003	4	-.008	1	-.023	3	-2.816e-3	2	7152.83	1	1805.499	3
549		9	max	0	3	.003	5	.022	1	3.584e-3	3	NC	5	5305.226	15
550			min	-.003	4	-.008	1	-.027	3	-3.212e-3	2	6833.476	1	1552.424	3
551		10	max	0	3	.003	5	.024	1	3.988e-3	3	NC	5	5547.771	15
552			min	-.004	4	-.008	1	-.03	3	-3.608e-3	2	6732.447	1	1385.471	3
553		11	max	0	3	.003	5	.026	1	4.391e-3	3	NC	5	6108.747	15
554			min	-.004	4	-.008	1	-.033	3	-4.004e-3	2	6833.476	1	1279.465	3
555		12	max	0	3	.004	5	.027	1	4.795e-3	3	NC	4	7140.099	15

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.004	4	-.007	1	-.033	3	-4.4e-3	2	7152.83	1	1221.892	3
557		13	max	0	3	.004	5	.026	1	5.198e-3	3	NC	3	8999.74	15
558			min	-.005	4	-.007	1	-.033	3	-4.797e-3	2	7746.14	1	1209.044	3
559		14	max	0	3	.004	5	.025	1	5.602e-3	3	NC	3	NC	15
560			min	-.005	4	-.006	9	-.03	3	-5.193e-3	2	8734.741	1	1246.082	3
561		15	max	.001	3	.004	5	.021	1	6.005e-3	3	NC	1	NC	5
562			min	-.006	4	-.005	9	-.026	3	-5.589e-3	2	NC	1	1352.272	3
563		16	max	.001	3	.004	5	.015	1	6.409e-3	3	NC	1	NC	4
564			min	-.006	4	-.004	9	-.019	3	-5.985e-3	2	NC	1	1580.058	3
565		17	max	.001	3	.004	5	.008	1	6.812e-3	3	NC	1	NC	4
566			min	-.006	4	-.003	9	-.009	3	-6.381e-3	2	NC	1	2094.073	3
567		18	max	.001	3	.004	5	.004	3	7.216e-3	3	NC	1	NC	4
568			min	-.007	4	-.002	9	-.007	2	-6.777e-3	2	NC	1	3727.262	3
569		19	max	.001	3	.005	5	.02	3	7.619e-3	3	NC	1	NC	1
570			min	-.007	4	-.001	9	-.021	2	-7.173e-3	2	NC	1	NC	1
571	M16A	1	max	0	2	0	2	.006	3	2.228e-3	3	NC	1	NC	1
572			min	-.002	4	-.003	4	-.007	2	-2.253e-3	2	NC	1	NC	1
573		2	max	0	2	0	10	0	9	2.137e-3	3	NC	1	NC	1
574			min	-.002	4	-.005	4	-.002	2	-2.148e-3	2	NC	1	NC	1
575		3	max	0	2	-.002	12	.003	1	2.047e-3	3	NC	1	NC	4
576			min	-.002	4	-.008	4	-.004	3	-2.044e-3	2	NC	1	5849.619	3
577		4	max	0	2	-.002	12	.006	1	1.957e-3	3	NC	1	NC	4
578			min	-.002	4	-.01	4	-.007	3	-1.939e-3	2	7114.528	4	4446.15	3
579		5	max	0	2	-.003	12	.008	1	1.867e-3	3	NC	1	NC	9
580			min	-.002	4	-.012	4	-.01	3	-1.835e-3	2	5551.538	4	3836.998	3
581		6	max	0	2	-.003	12	.009	1	1.777e-3	3	NC	3	NC	9
582			min	-.002	4	-.014	4	-.012	5	-1.73e-3	2	4672.206	4	3569.691	3
583		7	max	0	2	-.004	12	.009	1	1.687e-3	3	NC	3	NC	9
584			min	-.002	4	-.015	4	-.015	5	-1.625e-3	2	4143.404	4	3502.305	3
585		8	max	0	2	-.004	12	.009	1	1.596e-3	3	NC	12	NC	9
586			min	-.001	4	-.016	4	-.017	5	-1.521e-3	2	3826.043	4	3435.031	5
587		9	max	0	2	-.004	12	.009	1	1.506e-3	3	NC	12	NC	9
588			min	-.001	4	-.017	4	-.019	5	-1.416e-3	2	3655.221	4	3068.889	5
589		10	max	0	2	-.004	12	.008	1	1.416e-3	3	NC	12	NC	9
590			min	-.001	4	-.017	4	-.02	5	-1.312e-3	2	3601.181	4	2875.231	5
591		11	max	0	2	-.004	12	.007	1	1.326e-3	3	NC	12	NC	9
592			min	-.001	4	-.017	4	-.02	5	-1.207e-3	2	3655.221	4	2813.566	5
593		12	max	0	2	-.004	12	.005	1	1.236e-3	3	NC	12	NC	9
594			min	0	4	-.016	4	-.02	5	-1.102e-3	2	3826.043	4	2873.23	5
595		13	max	0	2	-.004	12	.004	1	1.145e-3	3	NC	3	NC	2
596			min	0	4	-.014	4	-.019	5	-9.977e-4	2	4143.404	4	3069.004	5
597		14	max	0	2	-.003	12	.003	1	1.055e-3	3	NC	3	NC	1
598			min	0	4	-.013	4	-.017	5	-8.931e-4	2	4672.206	4	3449.962	5
599		15	max	0	2	-.003	12	.002	1	9.652e-4	3	NC	1	NC	1
600			min	0	4	-.011	4	-.014	5	-7.885e-4	2	5551.538	4	4132.195	5
601		16	max	0	2	-.002	12	0	9	8.75e-4	3	NC	1	NC	1
602			min	0	4	-.008	4	-.011	5	-6.84e-4	2	7114.528	4	5404.416	5
603		17	max	0	2	-.001	12	0	9	7.848e-4	3	NC	1	NC	1
604			min	0	4	-.006	4	-.007	5	-5.794e-4	2	NC	1	8158.1	5
605		18	max	0	2	0	12	0	3	7.675e-4	4	NC	1	NC	1
606			min	0	4	-.003	4	-.003	5	-4.748e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	8.251e-4	4	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.702e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

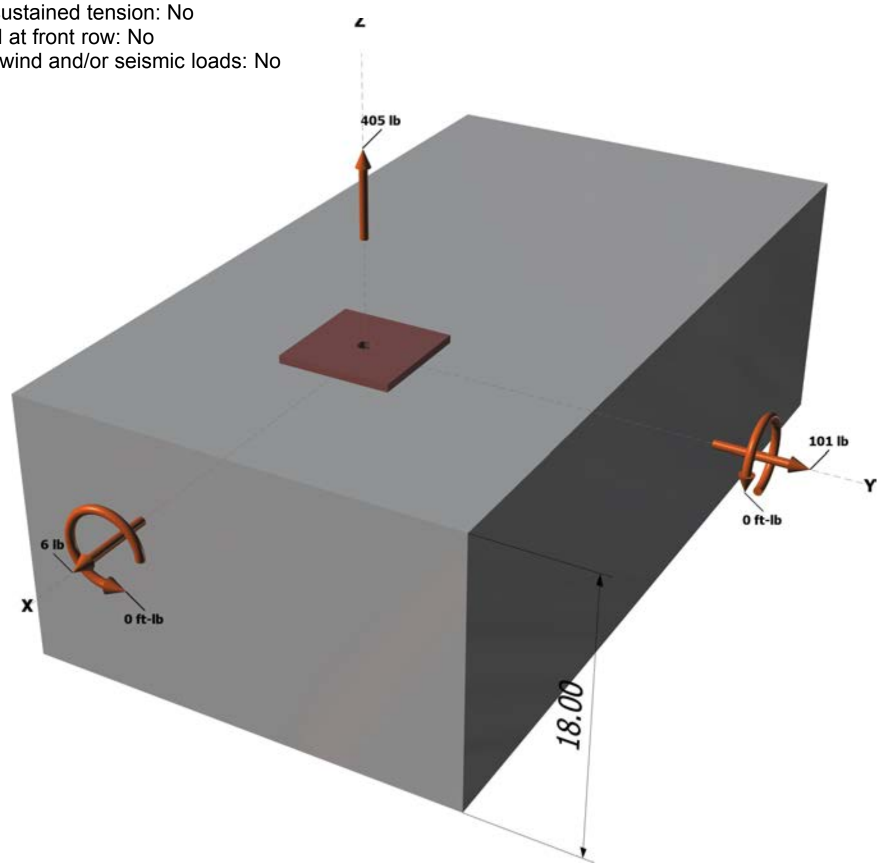
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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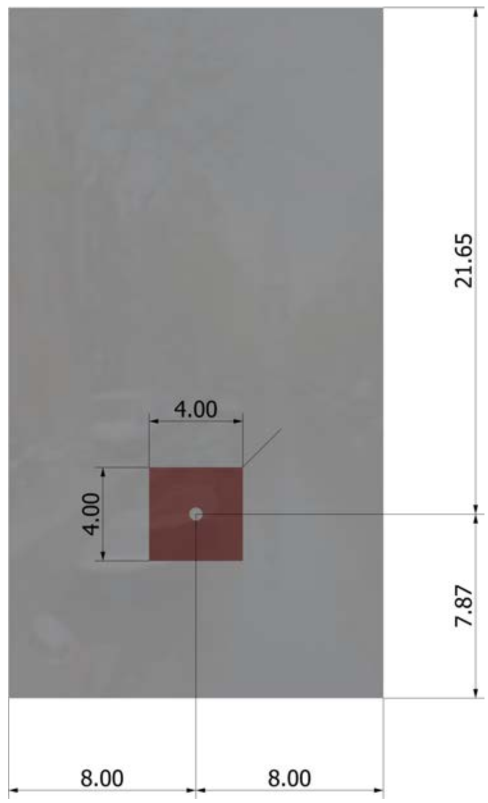


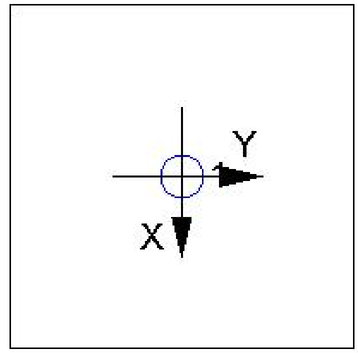
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_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, ϕV_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

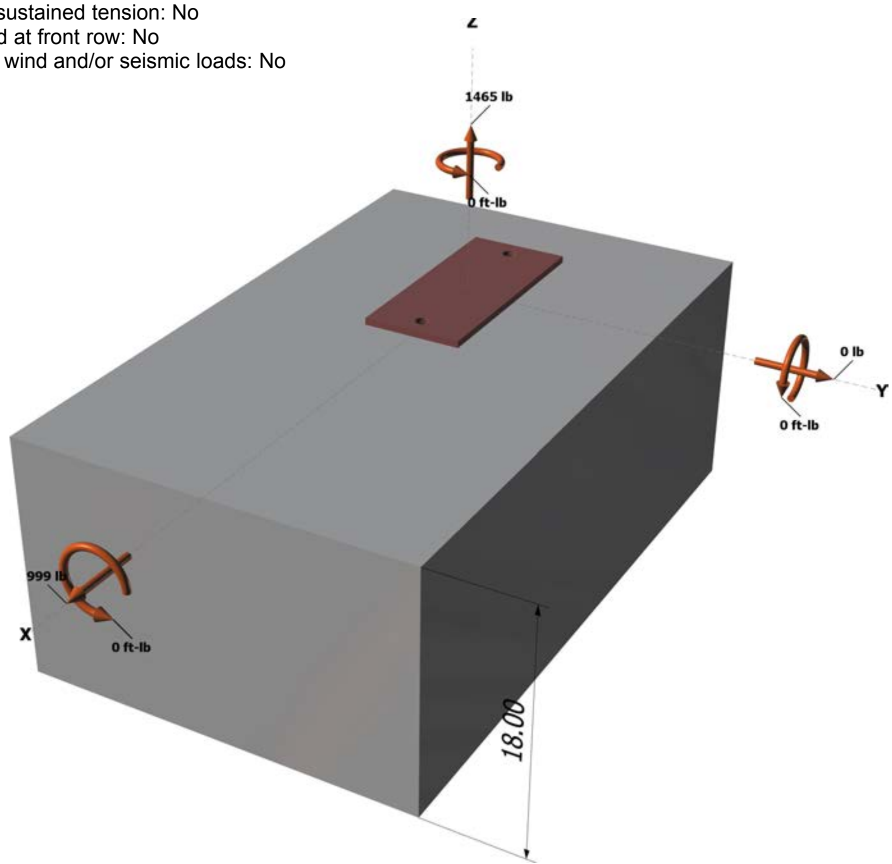
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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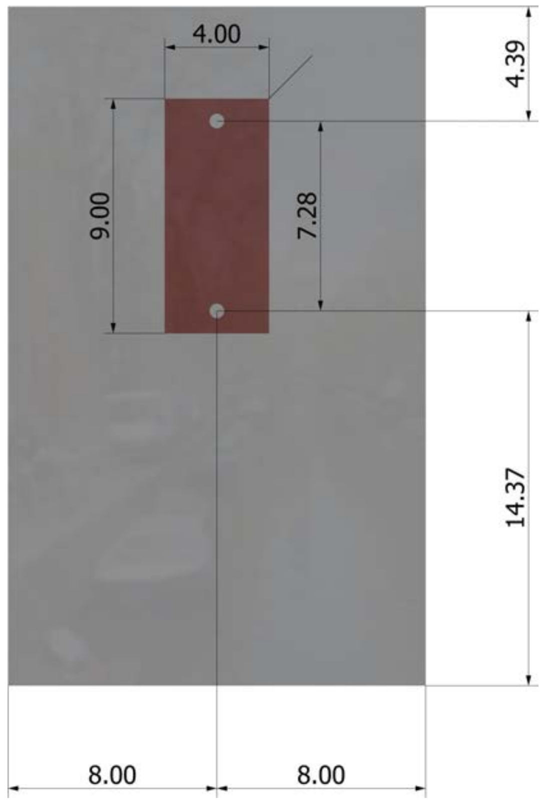


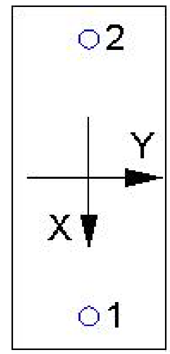
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.