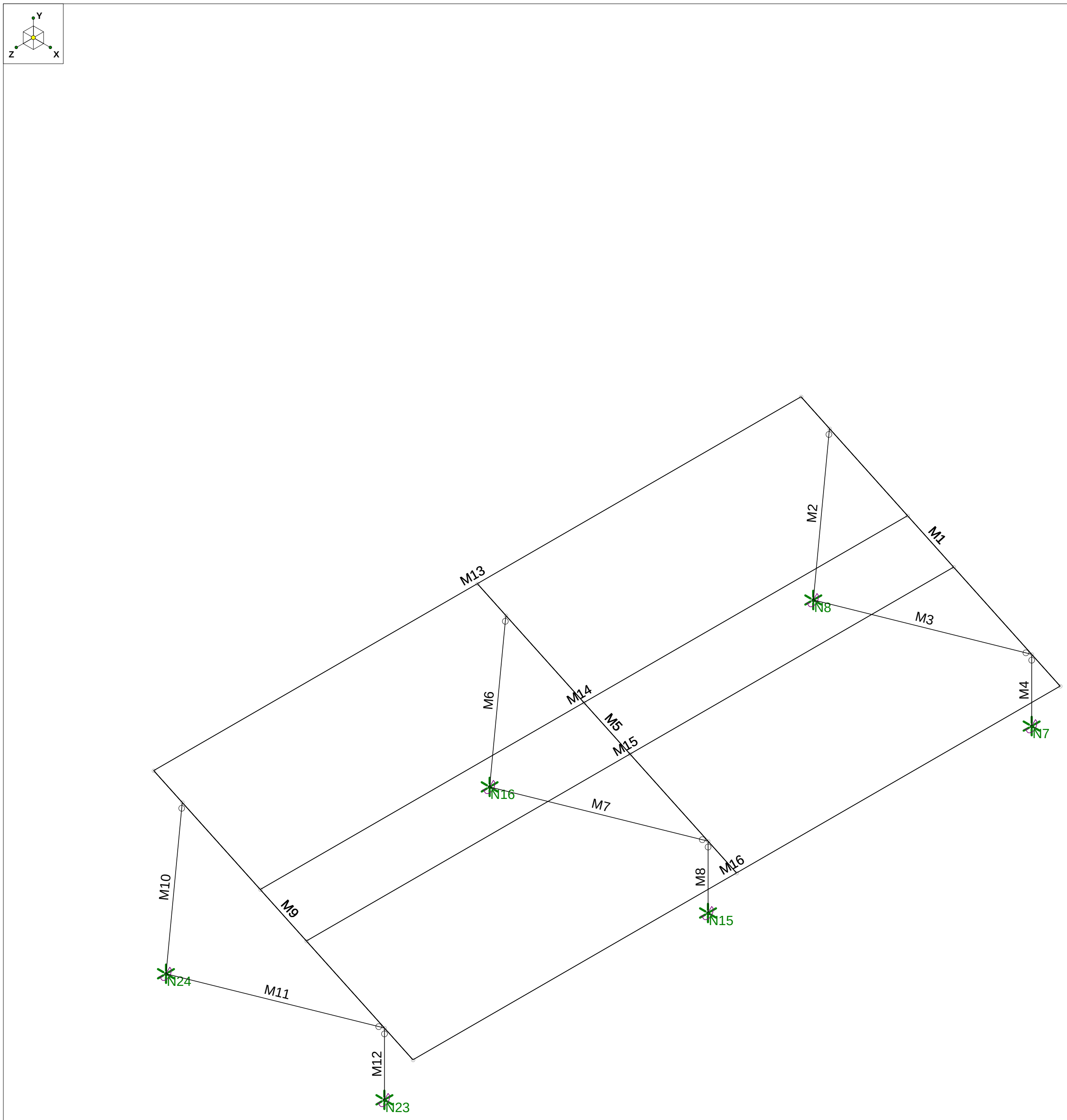


Schletter, Inc.		25ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

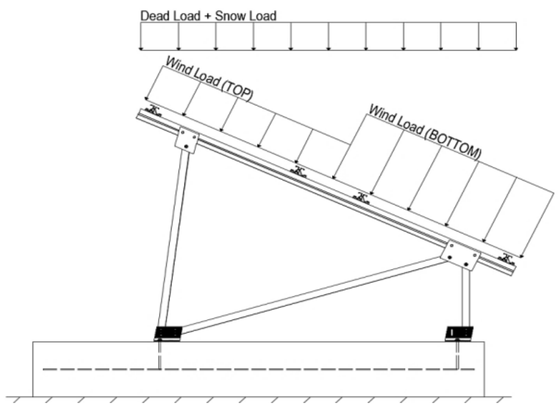
1.2 Construction

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 = 2
Module Tilt = 25°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

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

2.3 Wind Loads

Design Wind Speed, V = 150 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.100	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.700	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.500	
$Cf-_{TOP, INNER PURLIN}$	=	-1.900	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
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
M14	Mid-Top
M15	Mid-Bottom
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

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

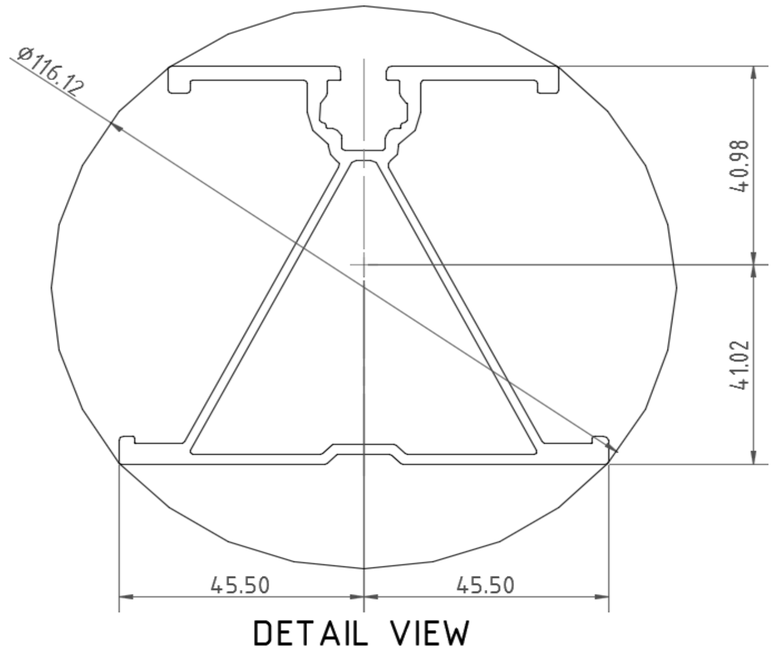
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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).

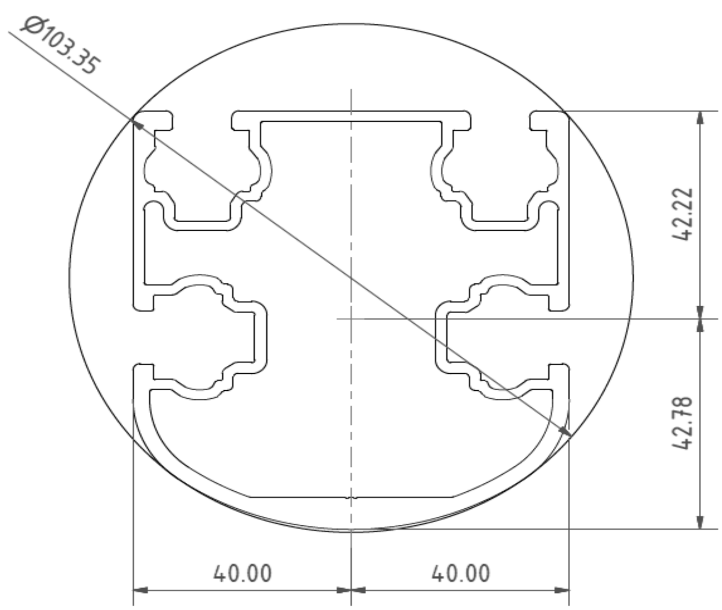
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	111	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-2.576	k-ft
M_z =	0.010	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	94%	



4.2 Girder Design

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

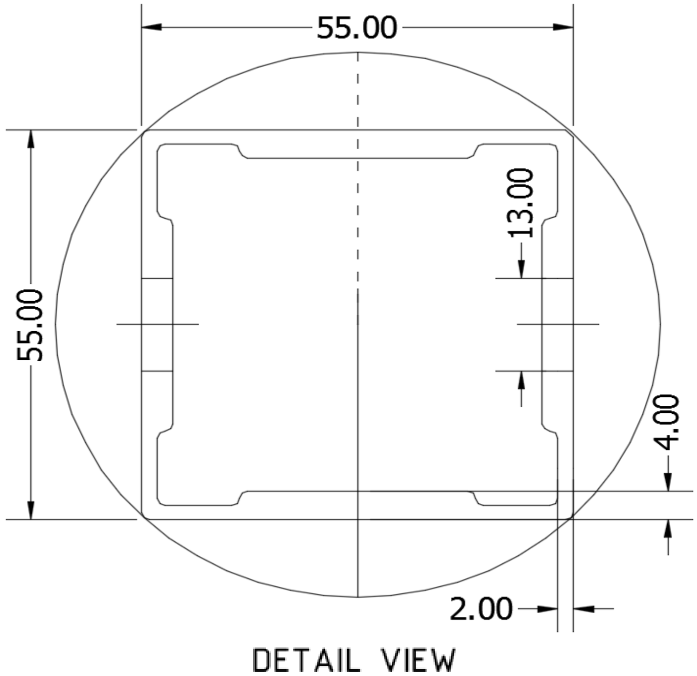
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.359	k-ft
M_z =	0.000	k-ft
P_n =	-0.877	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



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 M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

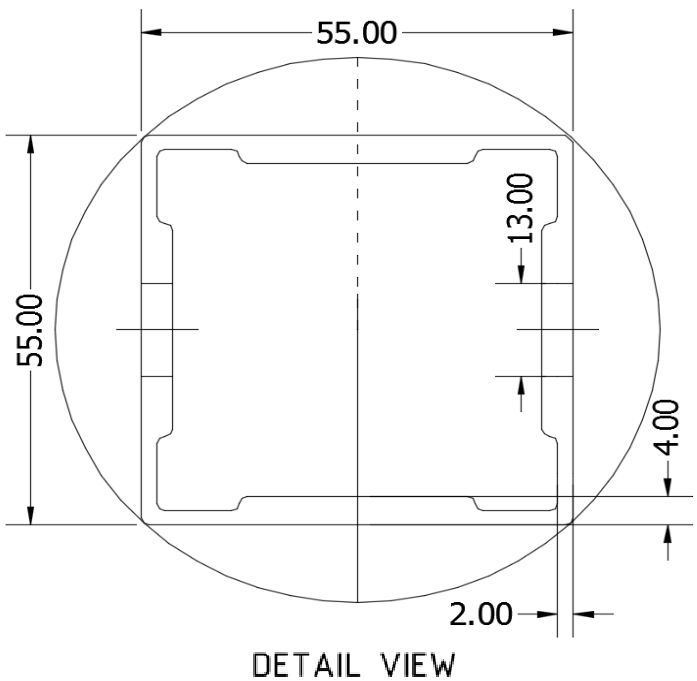
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.085	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



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 M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

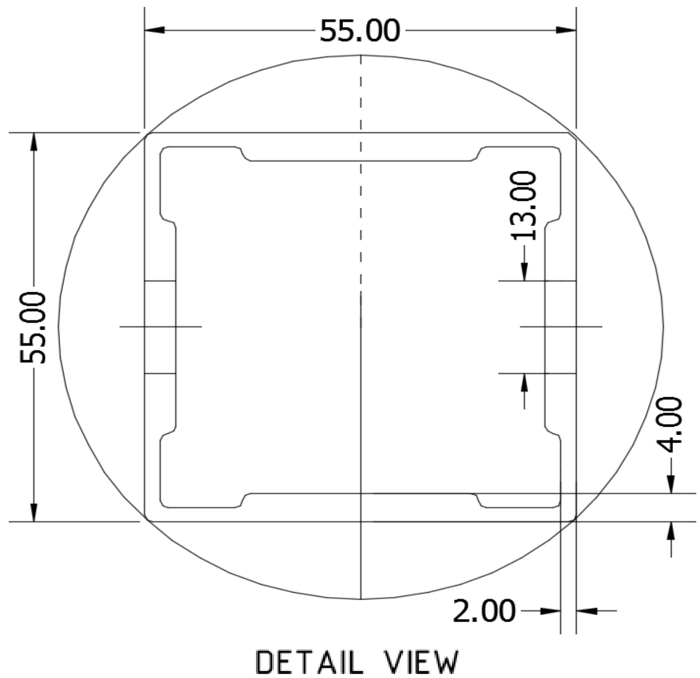
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.490	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	35%	



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 M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	63.42	in
$\Phi F_{ty\ AXIAL}$ =	12.77	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.585	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	29%	



5. FOUNDATION DESIGN CALCULATIONS

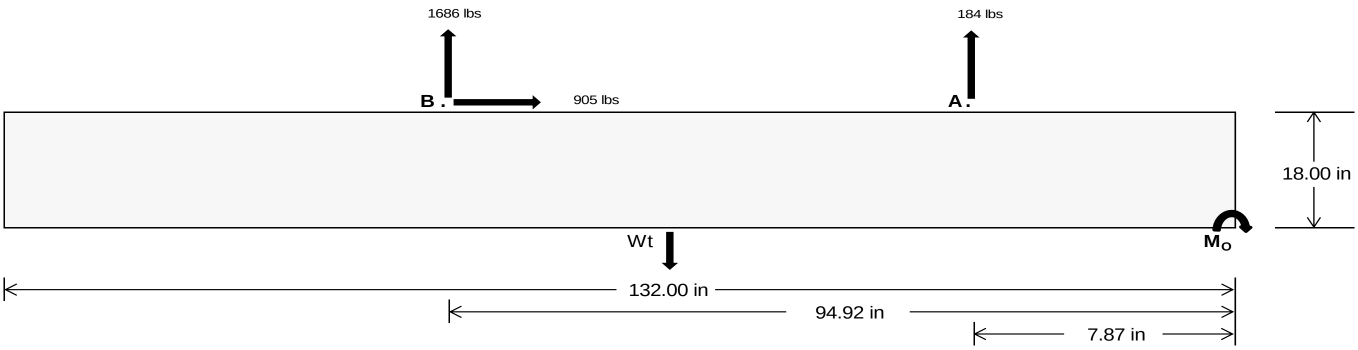
5.1 Helical Pile Foundations

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 =	818.14	7323.45	k
Compressive Load =	4010.24	5531.69	k
Lateral Load =	11.78	3923.85	k
Moment (Weak Axis) =	0.02	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	
Weight of Concrete =	145 pcf
Compressive Strength =	2500 psi
Yield Strength =	60000 psi

Footing Reinforcement

Use fiber reinforcing with (3) #5 rebar.

Overturning Check	
M_O =	177771.8 in-lbs
Resisting Force Required =	2693.51 lbs
S.F. =	1.67
Weight Required =	4489.19 lbs
Minimum Width =	37 in in
Weight Provided =	7376.88 lbs

A minimum 132in long x 37in wide x 18in tall ballast foundation is required to resist overturning.

Sliding	
Force =	905.19 lbs
Friction =	0.4
Weight Required =	2262.96 lbs
Resisting Weight =	7376.88 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 37in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion	
Sliding Force =	905.19 lbs
Cohesion =	130 psf
Area =	33.92 ft^2
Resisting =	3688.44 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 37in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	37 in	38 in	39 in	40 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.08 ft) =	7377 lbs	7576 lbs	7776 lbs	7975 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	37 in	38 in	39 in	40 in	37 in	38 in	39 in	40 in	37 in	38 in	39 in	40 in	37 in	38 in	39 in	40 in
F_A	1283 lbs	1283 lbs	1283 lbs	1283 lbs	1595 lbs	1595 lbs	1595 lbs	1595 lbs	2039 lbs	2039 lbs	2039 lbs	2039 lbs	-368 lbs	-368 lbs	-368 lbs	-368 lbs
F_B	1270 lbs	1270 lbs	1270 lbs	1270 lbs	2308 lbs	2308 lbs	2308 lbs	2308 lbs	2566 lbs	2566 lbs	2566 lbs	2566 lbs	-3372 lbs	-3372 lbs	-3372 lbs	-3372 lbs
F_V	169 lbs	169 lbs	169 lbs	169 lbs	1622 lbs	1622 lbs	1622 lbs	1622 lbs	1329 lbs	1329 lbs	1329 lbs	1329 lbs	-1810 lbs	-1810 lbs	-1810 lbs	-1810 lbs
P_{total}	9930 lbs	10130 lbs	10329 lbs	10528 lbs	11281 lbs	11480 lbs	11680 lbs	11879 lbs	11981 lbs	12181 lbs	12380 lbs	12580 lbs	686 lbs	806 lbs	925 lbs	1045 lbs
M	3408 lbs-ft	3408 lbs-ft	3408 lbs-ft	3408 lbs-ft	4598 lbs-ft	4598 lbs-ft	4598 lbs-ft	4598 lbs-ft	5685 lbs-ft	5685 lbs-ft	5685 lbs-ft	5685 lbs-ft	3627 lbs-ft	3627 lbs-ft	3627 lbs-ft	3627 lbs-ft
e	0.34 ft	0.34 ft	0.33 ft	0.32 ft	0.41 ft	0.40 ft	0.39 ft	0.39 ft	0.47 ft	0.47 ft	0.46 ft	0.45 ft	5.29 ft	4.50 ft	3.92 ft	3.47 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	238.0 psf	237.4 psf	236.9 psf	236.4 psf	258.7 psf	257.6 psf	256.5 psf	255.6 psf	261.8 psf	260.7 psf	259.6 psf	258.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	347.6 psf	344.2 psf	340.9 psf	337.8 psf	406.5 psf	401.6 psf	396.9 psf	392.4 psf	444.7 psf	438.7 psf	433.0 psf	427.7 psf	696.2 psf	169.9 psf	120.1 psf	103.0 psf

Maximum Bearing Pressure = 696 psf
Allowable Bearing Pressure = 1500 psf

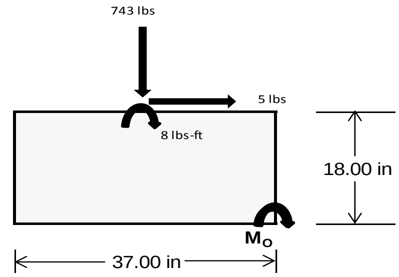
Use a 132in long x 37in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1130.1 ft-lbs
Resisting Force Required = 733.01 lbs
S.F. = 1.67
Weight Required = 1221.68 lbs
Minimum Width = 37 in in
Weight Provided = 7376.88 lbs

A minimum 132in long x 37in 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	37 in			37 in			37 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	231 lbs	590 lbs	231 lbs	743 lbs	2120 lbs	743 lbs	68 lbs	173 lbs	68 lbs
F_V	1 lbs	0 lbs	1 lbs	5 lbs	0 lbs	5 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9363 lbs	7377 lbs	9363 lbs	9436 lbs	7377 lbs	9436 lbs	2738 lbs	7377 lbs	2738 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	15 lbs-ft	0 lbs-ft	15 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.51 ft	0.51 ft	0.51 ft	0.51 ft	0.51 ft	0.51 ft	0.51 ft	0.51 ft	0.51 ft
f_{min}	275.8 psf	217.5 psf	275.8 psf	277.4 psf	217.5 psf	277.4 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.4 psf	217.5 psf	276.4 psf	279.1 psf	217.5 psf	279.1 psf	80.8 psf	217.5 psf	80.8 psf

Maximum Bearing Pressure = 279 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 37in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 37in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

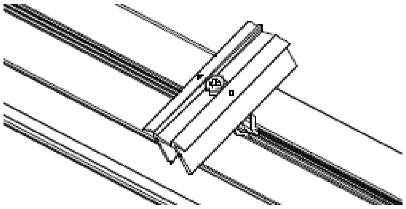
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

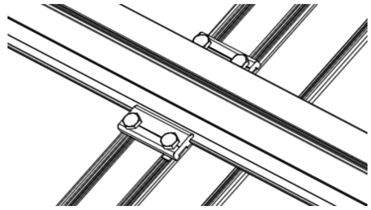
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

Modules are secured to the purlins with Schletter, Inc. Rapid2+ mounting clamps. Purlins are secured to the girders with the use of 80mm mounting clamps. The reliability of calculations is uncertain due to limited standards, therefore the strength of the clamp fasteners has been evaluated by load testing.

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.833	k
Allowable Uplift =	1.214	k
Utilization =	69%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.756	k
Allowable Uplift =	4.357	k
Utilization =	63%	



6.2 Strut Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 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 =	3.085	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	42%	

Rear Strut		
Maximum Axial Load =	4.956	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	67%	

Diagonal Strut		
Maximum Axial Load =	2.607	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	35%	

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 M12 bolts are located at each end of the strut and are subjected to double shear.

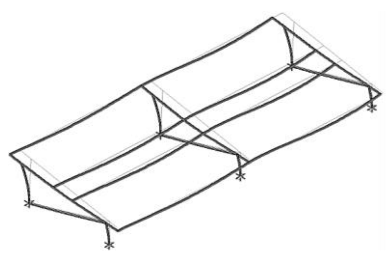
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	46.89	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.938	in
Max Drift, Δ_{MAX} =	0.037	in
N/A		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 111 in

J = 0.432

307.078

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

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= 27.6 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 111

J = 0.432

195.283

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.8

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

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= 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

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= 29.2

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 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = \varphi b[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.363 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

$M_{max}Wk$ = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi c[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 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= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

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= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

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= 29.6

3.4.16
b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 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

3.4.18
h/t = 24.5

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

S1 = 36.9
m = 0.65
C_0 = 27.5
Cc = 27.5

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LSt= 28.2 ksi
Ix = 279836 mm^4
0.672 in^4
y = 27.5 mm
Sx = 0.621 in^3
M_{max}St = 1.460 k-ft

3.4.16
b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.16.1
N/A for Weak Direction

3.4.18
h/t = 24.5

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

S1 = 36.9
m = 0.65
C_0 = 27.5
Cc = 27.5

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 28.2 ksi
Iy = 279836 mm^4
0.672 in^4
x = 27.5 mm
Sy = 0.621 in^3
M_{max}Wk = 1.460 k-ft

Compression

3.4.7
λ = 2.00335
r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671
φcc = 0.86047
φF_L= (φccFcy)/(λ²)
φF_L= 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 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= 7.50 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 7.72 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 63.42 in
J = 0.942
98.9729

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

Weak Axis:

3.4.14

L_b = 63.42
J = 0.942
98.9729

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7854

φF_L= (φccFcy)/(λ²)

φF_L= 12.7711 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 12.77 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 13.14 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				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL								

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	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	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	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	-46.9	-46.9	0	0
2	M14	Y	-46.9	-46.9	0	0
3	M15	Y	-46.9	-46.9	0	0
4	M16	Y	-46.9	-46.9	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	-108.369	-108.369	0	0
2	M14	y	-108.369	-108.369	0	0
3	M15	y	-167.479	-167.479	0	0
4	M16	y	-167.479	-167.479	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	246.293	246.293	0	0
2	M14	y	187.183	187.183	0	0
3	M15	y	98.517	98.517	0	0
4	M16	y	98.517	98.517	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												

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...
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
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	777.383	2	1317.062	2	.629	1	.003	1	0	1	0	1
2		min	-955.284	3	-1734.511	3	.03	15	0	15	0	1	0	1
3	N7	max	.032	9	1126.81	1	-.388	15	0	15	0	1	0	1
4		min	-.228	2	-167.852	3	-9.058	1	-.018	1	0	1	0	1
5	N15	max	.026	9	3084.802	1	0	11	0	11	0	1	0	1
6		min	-2.529	2	-629.339	3	0	3	0	3	0	1	0	1
7	N16	max	2761.618	2	4255.144	2	0	3	0	3	0	1	0	1
8		min	-3018.345	3	-5633.423	3	0	1	0	1	0	1	0	1
9	N23	max	.032	9	1126.81	1	9.058	1	.018	1	0	1	0	1
10		min	-.228	2	-167.852	3	.388	15	0	15	0	1	0	1
11	N24	max	777.383	2	1317.062	2	-.03	15	0	15	0	1	0	1
12		min	-955.284	3	-1734.511	3	-.629	1	-.003	1	0	1	0	1
13	Totals:	max	4313.401	2	12005.266	2	0	11						
14		min	-4929.603	3	-10067.488	3	0	2						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	91.197	1	479.763	2	-6.705	15	0	3	.217	1	0	2
2			min	3.796	15	-838.114	3	-162.45	1	-.015	2	.009	15	0	3
3		2	max	91.197	1	335.508	2	-5.153	15	0	3	.07	1	.734	3
4			min	3.796	15	-589.971	3	-124.711	1	-.015	2	.003	15	-.419	2
5		3	max	91.197	1	191.253	2	-3.601	15	0	3	.001	3	1.213	3
6			min	3.796	15	-341.828	3	-86.972	1	-.015	2	-.039	1	-.69	2
7		4	max	91.197	1	46.998	2	-2.049	15	0	3	-.003	12	1.437	3
8			min	3.796	15	-93.685	3	-49.233	1	-.015	2	-.109	1	-.812	2
9		5	max	91.197	1	154.458	3	-.497	15	0	3	-.005	12	1.405	3
10			min	3.796	15	-97.257	2	-11.494	1	-.015	2	-.14	1	-.786	2
11		6	max	91.197	1	402.6	3	26.244	1	0	3	-.005	15	1.119	3
12			min	3.796	15	-241.513	2	-.014	3	-.015	2	-.133	1	-.612	2
13		7	max	91.197	1	650.743	3	63.983	1	0	3	-.004	15	.578	3
14			min	3.796	15	-385.768	2	1.648	12	-.015	2	-.086	1	-.29	2
15		8	max	91.197	1	898.886	3	101.722	1	0	3	.002	2	.181	2
16			min	3.796	15	-530.023	2	3.199	12	-.015	2	-.005	3	-.219	3
17		9	max	91.197	1	1147.029	3	139.461	1	0	3	.123	1	.8	2
18			min	3.796	15	-674.278	2	4.751	12	-.015	2	.001	12	-1.27	3
19		10	max	91.197	1	1395.172	3	177.2	1	.015	2	.286	1	1.567	2
20			min	3.796	15	-818.533	2	6.303	12	0	12	.007	12	-2.576	3
21		11	max	91.197	1	674.278	2	-4.751	12	.015	2	.123	1	.8	2
22			min	3.796	15	-1147.029	3	-139.461	1	0	3	.001	12	-1.27	3
23		12	max	91.197	1	530.023	2	-3.199	12	.015	2	.002	2	.181	2
24			min	3.796	15	-898.886	3	-101.722	1	0	3	-.005	3	-.219	3
25		13	max	91.197	1	385.768	2	-1.648	12	.015	2	-.004	15	.578	3
26			min	3.796	15	-650.743	3	-63.983	1	0	3	-.086	1	-.29	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
27		14	max	91.197	1	241.513	2	.014	3	.015	2	-.005	15	1.119	3
28			min	3.796	15	-402.6	3	-26.244	1	0	3	-.133	1	-.612	2
29		15	max	91.197	1	97.257	2	11.494	1	.015	2	-.005	12	1.405	3
30			min	3.796	15	-154.458	3	.497	15	0	3	-.14	1	-.786	2
31		16	max	91.197	1	93.685	3	49.233	1	.015	2	-.003	12	1.437	3
32			min	3.796	15	-46.998	2	2.049	15	0	3	-.109	1	-.812	2
33		17	max	91.197	1	341.828	3	86.972	1	.015	2	.001	3	1.213	3
34			min	3.796	15	-191.253	2	3.601	15	0	3	-.039	1	-.69	2
35		18	max	91.197	1	589.971	3	124.711	1	.015	2	.07	1	.734	3
36			min	3.796	15	-335.508	2	5.153	15	0	3	.003	15	-.419	2
37		19	max	91.197	1	838.114	3	162.45	1	.015	2	.217	1	0	2
38			min	3.796	15	-479.763	2	6.705	15	0	3	.009	15	0	3
39	M14	1	max	44.434	1	517.896	2	-6.926	15	.011	3	.25	1	0	1
40			min	1.85	15	-655.48	3	-167.818	1	-.013	2	.01	15	0	3
41		2	max	44.434	1	373.641	2	-5.374	15	.011	3	.097	1	.577	3
42			min	1.85	15	-468.089	3	-130.079	1	-.013	2	.004	15	-.458	2
43		3	max	44.434	1	229.386	2	-3.822	15	.011	3	.003	3	.962	3
44			min	1.85	15	-280.698	3	-92.341	1	-.013	2	-.017	1	-.768	2
45		4	max	44.434	1	85.131	2	-2.27	15	.011	3	-.002	12	1.154	3
46			min	1.85	15	-93.307	3	-54.602	1	-.013	2	-.092	1	-.93	2
47		5	max	44.434	1	94.084	3	-.719	15	.011	3	-.005	12	1.154	3
48			min	1.85	15	-59.125	2	-16.863	1	-.013	2	-.129	1	-.943	2
49		6	max	44.434	1	281.475	3	20.876	1	.011	3	-.005	15	.961	3
50			min	1.85	15	-203.38	2	-.336	3	-.013	2	-.127	1	-.808	2
51		7	max	44.434	1	468.866	3	58.615	1	.011	3	-.004	15	.575	3
52			min	1.85	15	-347.635	2	1.432	12	-.013	2	-.086	1	-.525	2
53		8	max	44.434	1	656.257	3	96.353	1	.011	3	0	10	-.001	15
54			min	1.85	15	-491.89	2	2.984	12	-.013	2	-.007	1	-.094	2
55		9	max	44.434	1	843.648	3	134.092	1	.011	3	.112	1	.486	2
56			min	1.85	15	-636.145	2	4.536	12	-.013	2	0	3	-.774	3
57		10	max	44.434	1	1031.039	3	171.831	1	.013	2	.269	1	1.214	2
58			min	1.85	15	-780.4	2	6.087	12	-.011	3	.007	12	-1.737	3
59		11	max	44.434	1	636.145	2	-4.536	12	.013	2	.112	1	.486	2
60			min	1.85	15	-843.648	3	-134.092	1	-.011	3	0	3	-.774	3
61		12	max	44.434	1	491.89	2	-2.984	12	.013	2	0	10	-.001	15
62			min	1.85	15	-656.257	3	-96.353	1	-.011	3	-.007	1	-.094	2
63		13	max	44.434	1	347.635	2	-1.432	12	.013	2	-.004	15	.575	3
64			min	1.85	15	-468.866	3	-58.615	1	-.011	3	-.086	1	-.525	2
65		14	max	44.434	1	203.38	2	.336	3	.013	2	-.005	15	.961	3
66			min	1.85	15	-281.475	3	-20.876	1	-.011	3	-.127	1	-.808	2
67		15	max	44.434	1	59.125	2	16.863	1	.013	2	-.005	12	1.154	3
68			min	1.85	15	-94.084	3	.719	15	-.011	3	-.129	1	-.943	2
69		16	max	44.434	1	93.307	3	54.602	1	.013	2	-.002	12	1.154	3
70			min	1.85	15	-85.131	2	2.27	15	-.011	3	-.092	1	-.93	2
71		17	max	44.434	1	280.698	3	92.341	1	.013	2	.003	3	.962	3
72			min	1.85	15	-229.386	2	3.822	15	-.011	3	-.017	1	-.768	2
73		18	max	44.434	1	468.089	3	130.079	1	.013	2	.097	1	.577	3
74			min	1.85	15	-373.641	2	5.374	15	-.011	3	.004	15	-.458	2
75		19	max	44.434	1	655.48	3	167.818	1	.013	2	.25	1	0	1
76			min	1.85	15	-517.896	2	6.926	15	-.011	3	.01	15	0	3
77	M15	1	max	-1.941	15	722.976	2	-6.925	15	.013	2	.25	1	0	2
78			min	-46.488	1	-348.256	3	-167.808	1	-.009	3	.01	15	0	3
79		2	max	-1.941	15	517.969	2	-5.373	15	.013	2	.097	1	.308	3
80			min	-46.488	1	-251.994	3	-130.069	1	-.009	3	.004	15	-.638	2
81		3	max	-1.941	15	312.962	2	-3.821	15	.013	2	.003	3	.518	3
82			min	-46.488	1	-155.732	3	-92.33	1	-.009	3	-.017	1	-1.065	2
83		4	max	-1.941	15	107.955	2	-2.269	15	.013	2	-.002	12	.629	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
84			min	-46.488	1	-59.47	3	-54.592	1	-.009	3	-.093	1	-1.281	2
85		5	max	-1.941	15	36.792	3	-.717	15	.013	2	-.005	12	.64	3
86			min	-46.488	1	-97.052	2	-16.853	1	-.009	3	-.129	1	-1.287	2
87		6	max	-1.941	15	133.054	3	20.886	1	.013	2	-.005	15	.553	3
88			min	-46.488	1	-302.06	2	-.211	3	-.009	3	-.127	1	-1.082	2
89		7	max	-1.941	15	229.316	3	58.625	1	.013	2	-.004	15	.367	3
90			min	-46.488	1	-507.067	2	1.507	12	-.009	3	-.086	1	-.666	2
91		8	max	-1.941	15	325.578	3	96.364	1	.013	2	0	10	.082	3
92			min	-46.488	1	-712.074	2	3.059	12	-.009	3	-.007	1	-.047	1
93		9	max	-1.941	15	421.84	3	134.102	1	.013	2	.112	1	.798	2
94			min	-46.488	1	-917.081	2	4.611	12	-.009	3	.001	12	-.303	3
95		10	max	-1.941	15	518.102	3	171.841	1	.009	3	.269	1	1.846	2
96			min	-46.488	1	-1122.088	2	6.163	12	-.013	2	.007	12	-.786	3
97		11	max	-1.941	15	917.081	2	-4.611	12	.009	3	.112	1	.798	2
98			min	-46.488	1	-421.84	3	-134.102	1	-.013	2	.001	12	-.303	3
99		12	max	-1.941	15	712.074	2	-3.059	12	.009	3	0	10	.082	3
100			min	-46.488	1	-325.578	3	-96.364	1	-.013	2	-.007	1	-.047	1
101		13	max	-1.941	15	507.067	2	-1.507	12	.009	3	-.004	15	.367	3
102			min	-46.488	1	-229.316	3	-58.625	1	-.013	2	-.086	1	-.666	2
103		14	max	-1.941	15	302.06	2	.211	3	.009	3	-.005	15	.553	3
104			min	-46.488	1	-133.054	3	-20.886	1	-.013	2	-.127	1	-1.082	2
105		15	max	-1.941	15	97.052	2	16.853	1	.009	3	-.005	12	.64	3
106			min	-46.488	1	-36.792	3	.717	15	-.013	2	-.129	1	-1.287	2
107		16	max	-1.941	15	59.47	3	54.592	1	.009	3	-.002	12	.629	3
108			min	-46.488	1	-107.955	2	2.269	15	-.013	2	-.093	1	-1.281	2
109		17	max	-1.941	15	155.732	3	92.33	1	.009	3	.003	3	.518	3
110			min	-46.488	1	-312.962	2	3.821	15	-.013	2	-.017	1	-1.065	2
111		18	max	-1.941	15	251.994	3	130.069	1	.009	3	.097	1	.308	3
112			min	-46.488	1	-517.969	2	5.373	15	-.013	2	.004	15	-.638	2
113		19	max	-1.941	15	348.256	3	167.808	1	.009	3	.25	1	0	2
114			min	-46.488	1	-722.976	2	6.925	15	-.013	2	.01	15	0	3
115	M16	1	max	-4.063	15	686.209	2	-6.712	15	.011	2	.219	1	0	2
116			min	-97.572	1	-318.512	3	-162.736	1	-.013	3	.009	15	0	3
117		2	max	-4.063	15	481.202	2	-5.16	15	.011	2	.071	1	.278	3
118			min	-97.572	1	-222.25	3	-124.997	1	-.013	3	.003	15	-.6	2
119		3	max	-4.063	15	276.195	2	-3.608	15	.011	2	0	3	.457	3
120			min	-97.572	1	-125.988	3	-87.258	1	-.013	3	-.038	1	-.989	2
121		4	max	-4.063	15	71.188	2	-2.056	15	.011	2	-.003	12	.537	3
122			min	-97.572	1	-29.726	3	-49.519	1	-.013	3	-.108	1	-1.168	2
123		5	max	-4.063	15	66.536	3	-.504	15	.011	2	-.006	12	.518	3
124			min	-97.572	1	-133.819	2	-11.781	1	-.013	3	-.14	1	-1.135	2
125		6	max	-4.063	15	162.798	3	25.958	1	.011	2	-.005	15	.4	3
126			min	-97.572	1	-338.826	2	.349	12	-.013	3	-.133	1	-.893	2
127		7	max	-4.063	15	259.06	3	63.697	1	.011	2	-.004	15	.183	3
128			min	-97.572	1	-543.833	2	1.9	12	-.013	3	-.086	1	-.439	2
129		8	max	-4.063	15	355.322	3	101.436	1	.011	2	.001	2	.225	2
130			min	-97.572	1	-748.841	2	3.452	12	-.013	3	-.003	3	-.132	3
131		9	max	-4.063	15	451.584	3	139.175	1	.011	2	.122	1	1.1	2
132			min	-97.572	1	-953.848	2	5.004	12	-.013	3	.002	12	-.547	3
133		10	max	-4.063	15	547.846	3	176.913	1	.013	3	.284	1	2.186	2
134			min	-97.572	1	-1158.855	2	6.555	12	-.011	2	.008	12	-1.061	3
135		11	max	-4.063	15	953.848	2	-5.004	12	.013	3	.122	1	1.1	2
136			min	-97.572	1	-451.584	3	-139.175	1	-.011	2	.002	12	-.547	3
137		12	max	-4.063	15	748.841	2	-3.452	12	.013	3	.001	2	.225	2
138			min	-97.572	1	-355.322	3	-101.436	1	-.011	2	-.003	3	-.132	3
139		13	max	-4.063	15	543.833	2	-1.9	12	.013	3	-.004	15	.183	3
140			min	-97.572	1	-259.06	3	-63.697	1	-.011	2	-.086	1	-.439	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
141		14	max	-4.063	15	338.826	2	-.349	12	.013	3	-.005	15	.4	3
142			min	-97.572	1	-162.798	3	-25.958	1	-.011	2	-.133	1	-.893	2
143		15	max	-4.063	15	133.819	2	11.781	1	.013	3	-.006	12	.518	3
144			min	-97.572	1	-66.536	3	.504	15	-.011	2	-.14	1	-1.135	2
145		16	max	-4.063	15	29.726	3	49.519	1	.013	3	-.003	12	.537	3
146			min	-97.572	1	-71.188	2	2.056	15	-.011	2	-.108	1	-1.168	2
147		17	max	-4.063	15	125.988	3	87.258	1	.013	3	0	3	.457	3
148			min	-97.572	1	-276.195	2	3.608	15	-.011	2	-.038	1	-.989	2
149		18	max	-4.063	15	222.25	3	124.997	1	.013	3	.071	1	.278	3
150			min	-97.572	1	-481.202	2	5.16	15	-.011	2	.003	15	-.6	2
151		19	max	-4.063	15	318.512	3	162.736	1	.013	3	.219	1	0	2
152			min	-97.572	1	-686.209	2	6.712	15	-.011	2	.009	15	0	3
153	M2	1	max	1120.578	2	1.922	4	.589	1	0	3	0	3	0	1
154			min	-1525.202	3	.452	15	.024	15	0	1	0	2	0	1
155		2	max	1121.006	2	1.865	4	.589	1	0	3	0	1	0	15
156			min	-1524.881	3	.439	15	.024	15	0	1	0	15	0	4
157		3	max	1121.435	2	1.808	4	.589	1	0	3	0	1	0	15
158			min	-1524.559	3	.426	15	.024	15	0	1	0	15	-.001	4
159		4	max	1121.863	2	1.752	4	.589	1	0	3	0	1	0	15
160			min	-1524.238	3	.412	15	.024	15	0	1	0	15	-.002	4
161		5	max	1122.292	2	1.695	4	.589	1	0	3	0	1	0	15
162			min	-1523.917	3	.399	15	.024	15	0	1	0	15	-.002	4
163		6	max	1122.72	2	1.638	4	.589	1	0	3	0	1	0	15
164			min	-1523.595	3	.386	15	.024	15	0	1	0	15	-.003	4
165		7	max	1123.149	2	1.581	4	.589	1	0	3	.001	1	0	15
166			min	-1523.274	3	.372	15	.024	15	0	1	0	15	-.003	4
167		8	max	1123.577	2	1.524	4	.589	1	0	3	.001	1	0	15
168			min	-1522.953	3	.359	15	.024	15	0	1	0	15	-.004	4
169		9	max	1124.006	2	1.468	4	.589	1	0	3	.001	1	0	15
170			min	-1522.631	3	.341	12	.024	15	0	1	0	15	-.004	4
171		10	max	1124.434	2	1.411	4	.589	1	0	3	.002	1	-.001	15
172			min	-1522.31	3	.319	12	.024	15	0	1	0	15	-.004	4
173		11	max	1124.863	2	1.354	4	.589	1	0	3	.002	1	-.001	15
174			min	-1521.989	3	.297	12	.024	15	0	1	0	15	-.005	4
175		12	max	1125.291	2	1.297	4	.589	1	0	3	.002	1	-.001	15
176			min	-1521.667	3	.275	12	.024	15	0	1	0	15	-.005	4
177		13	max	1125.72	2	1.251	2	.589	1	0	3	.002	1	-.001	15
178			min	-1521.346	3	.253	12	.024	15	0	1	0	15	-.006	4
179		14	max	1126.148	2	1.207	2	.589	1	0	3	.002	1	-.001	15
180			min	-1521.024	3	.23	12	.024	15	0	1	0	15	-.006	4
181		15	max	1126.577	2	1.162	2	.589	1	0	3	.002	1	-.001	15
182			min	-1520.703	3	.208	12	.024	15	0	1	0	15	-.006	4
183		16	max	1127.005	2	1.118	2	.589	1	0	3	.003	1	-.002	12
184			min	-1520.382	3	.186	12	.024	15	0	1	0	15	-.007	4
185		17	max	1127.434	2	1.074	2	.589	1	0	3	.003	1	-.002	12
186			min	-1520.06	3	.164	12	.024	15	0	1	0	15	-.007	4
187		18	max	1127.862	2	1.03	2	.589	1	0	3	.003	1	-.002	12
188			min	-1519.739	3	.142	12	.024	15	0	1	0	15	-.007	4
189		19	max	1128.291	2	.985	2	.589	1	0	3	.003	1	-.002	12
190			min	-1519.418	3	.12	12	.024	15	0	1	0	15	-.007	4
191	M3	1	max	688.739	2	7.883	4	.144	1	0	3	0	1	.007	4
192			min	-829.601	3	1.853	15	.006	15	0	1	0	15	.002	12
193		2	max	688.568	2	7.115	4	.144	1	0	3	0	1	.005	2
194			min	-829.729	3	1.673	15	.006	15	0	1	0	15	0	12
195		3	max	688.398	2	6.348	4	.144	1	0	3	0	1	.002	2
196			min	-829.856	3	1.493	15	.006	15	0	1	0	15	0	3
197		4	max	688.228	2	5.581	4	.144	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-829.984	3	1.312	15	.006	15	0	1	0	15	-.002	3
199		5	max	688.057	2	4.814	4	.144	1	0	3	0	1	0	15
200			min	-830.112	3	1.132	15	.006	15	0	1	0	15	-.003	3
201		6	max	687.887	2	4.047	4	.144	1	0	3	0	1	-.001	15
202			min	-830.24	3	.952	15	.006	15	0	1	0	15	-.005	4
203		7	max	687.717	2	3.279	4	.144	1	0	3	0	1	-.002	15
204			min	-830.368	3	.771	15	.006	15	0	1	0	15	-.007	4
205		8	max	687.546	2	2.512	4	.144	1	0	3	0	1	-.002	15
206			min	-830.495	3	.591	15	.006	15	0	1	0	15	-.008	4
207		9	max	687.376	2	1.745	4	.144	1	0	3	0	1	-.002	15
208			min	-830.623	3	.411	15	.006	15	0	1	0	15	-.009	4
209		10	max	687.206	2	.978	4	.144	1	0	3	0	1	-.002	15
210			min	-830.751	3	.221	12	.006	15	0	1	0	15	-.009	4
211		11	max	687.035	2	.361	2	.144	1	0	3	0	1	-.002	15
212			min	-830.879	3	-.144	3	.006	15	0	1	0	15	-.01	4
213		12	max	686.865	2	-.13	15	.144	1	0	3	0	1	-.002	15
214			min	-831.006	3	-.592	3	.006	15	0	1	0	15	-.01	4
215		13	max	686.695	2	-.311	15	.144	1	0	3	.001	1	-.002	15
216			min	-831.134	3	-1.324	4	.006	15	0	1	0	15	-.009	4
217		14	max	686.524	2	-.491	15	.144	1	0	3	.001	1	-.002	15
218			min	-831.262	3	-2.091	4	.006	15	0	1	0	15	-.008	4
219		15	max	686.354	2	-.671	15	.144	1	0	3	.001	1	-.002	15
220			min	-831.39	3	-2.858	4	.006	15	0	1	0	15	-.007	4
221		16	max	686.183	2	-.852	15	.144	1	0	3	.001	1	-.001	15
222			min	-831.517	3	-3.626	4	.006	15	0	1	0	15	-.006	4
223		17	max	686.013	2	-1.032	15	.144	1	0	3	.001	1	-.001	15
224			min	-831.645	3	-4.393	4	.006	15	0	1	0	15	-.004	4
225		18	max	685.843	2	-1.212	15	.144	1	0	3	.001	1	0	15
226			min	-831.773	3	-5.16	4	.006	15	0	1	0	15	-.002	4
227		19	max	685.672	2	-1.393	15	.144	1	0	3	.001	1	0	1
228			min	-831.901	3	-5.927	4	.006	15	0	1	0	15	0	1
229	M4	1	max	1123.744	1	0	1	-.388	15	0	1	.001	1	0	1
230			min	-170.151	3	0	1	-9.365	1	0	1	0	15	0	1
231		2	max	1123.914	1	0	1	-.388	15	0	1	0	3	0	1
232			min	-170.024	3	0	1	-9.365	1	0	1	0	1	0	1
233		3	max	1124.085	1	0	1	-.388	15	0	1	0	15	0	1
234			min	-169.896	3	0	1	-9.365	1	0	1	-.001	1	0	1
235		4	max	1124.255	1	0	1	-.388	15	0	1	0	15	0	1
236			min	-169.768	3	0	1	-9.365	1	0	1	-.002	1	0	1
237		5	max	1124.425	1	0	1	-.388	15	0	1	0	15	0	1
238			min	-169.64	3	0	1	-9.365	1	0	1	-.003	1	0	1
239		6	max	1124.596	1	0	1	-.388	15	0	1	0	15	0	1
240			min	-169.513	3	0	1	-9.365	1	0	1	-.004	1	0	1
241		7	max	1124.766	1	0	1	-.388	15	0	1	0	15	0	1
242			min	-169.385	3	0	1	-9.365	1	0	1	-.005	1	0	1
243		8	max	1124.937	1	0	1	-.388	15	0	1	0	15	0	1
244			min	-169.257	3	0	1	-9.365	1	0	1	-.007	1	0	1
245		9	max	1125.107	1	0	1	-.388	15	0	1	0	15	0	1
246			min	-169.129	3	0	1	-9.365	1	0	1	-.008	1	0	1
247		10	max	1125.277	1	0	1	-.388	15	0	1	0	15	0	1
248			min	-169.002	3	0	1	-9.365	1	0	1	-.009	1	0	1
249		11	max	1125.448	1	0	1	-.388	15	0	1	0	15	0	1
250			min	-168.874	3	0	1	-9.365	1	0	1	-.01	1	0	1
251		12	max	1125.618	1	0	1	-.388	15	0	1	0	15	0	1
252			min	-168.746	3	0	1	-9.365	1	0	1	-.011	1	0	1
253		13	max	1125.788	1	0	1	-.388	15	0	1	0	15	0	1
254			min	-168.618	3	0	1	-9.365	1	0	1	-.012	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
255		14	max	1125.959	1	0	1	-.388	15	0	1	0	15	0	1
256			min	-168.491	3	0	1	-9.365	1	0	1	-.013	1	0	1
257		15	max	1126.129	1	0	1	-.388	15	0	1	0	15	0	1
258			min	-168.363	3	0	1	-9.365	1	0	1	-.014	1	0	1
259		16	max	1126.299	1	0	1	-.388	15	0	1	0	15	0	1
260			min	-168.235	3	0	1	-9.365	1	0	1	-.015	1	0	1
261		17	max	1126.47	1	0	1	-.388	15	0	1	0	15	0	1
262			min	-168.107	3	0	1	-9.365	1	0	1	-.016	1	0	1
263		18	max	1126.64	1	0	1	-.388	15	0	1	0	15	0	1
264			min	-167.979	3	0	1	-9.365	1	0	1	-.017	1	0	1
265		19	max	1126.81	1	0	1	-.388	15	0	1	0	15	0	1
266			min	-167.852	3	0	1	-9.365	1	0	1	-.018	1	0	1
267	M6	1	max	3577.414	2	2.485	2	0	1	0	1	0	1	0	1
268			min	-4955.78	3	-.108	3	0	1	0	1	0	1	0	1
269		2	max	3577.842	2	2.441	2	0	1	0	1	0	1	0	3
270			min	-4955.458	3	-.141	3	0	1	0	1	0	1	0	2
271		3	max	3578.27	2	2.397	2	0	1	0	1	0	1	0	3
272			min	-4955.137	3	-.174	3	0	1	0	1	0	1	-.001	2
273		4	max	3578.699	2	2.352	2	0	1	0	1	0	1	0	3
274			min	-4954.816	3	-.207	3	0	1	0	1	0	1	-.002	2
275		5	max	3579.127	2	2.308	2	0	1	0	1	0	1	0	3
276			min	-4954.494	3	-.24	3	0	1	0	1	0	1	-.003	2
277		6	max	3579.556	2	2.264	2	0	1	0	1	0	1	0	3
278			min	-4954.173	3	-.274	3	0	1	0	1	0	1	-.003	2
279		7	max	3579.984	2	2.22	2	0	1	0	1	0	1	0	3
280			min	-4953.852	3	-.307	3	0	1	0	1	0	1	-.004	2
281		8	max	3580.413	2	2.175	2	0	1	0	1	0	1	0	3
282			min	-4953.53	3	-.34	3	0	1	0	1	0	1	-.005	2
283		9	max	3580.841	2	2.131	2	0	1	0	1	0	1	0	3
284			min	-4953.209	3	-.373	3	0	1	0	1	0	1	-.005	2
285		10	max	3581.27	2	2.087	2	0	1	0	1	0	1	0	3
286			min	-4952.888	3	-.406	3	0	1	0	1	0	1	-.006	2
287		11	max	3581.698	2	2.043	2	0	1	0	1	0	1	0	3
288			min	-4952.566	3	-.439	3	0	1	0	1	0	1	-.007	2
289		12	max	3582.127	2	1.998	2	0	1	0	1	0	1	0	3
290			min	-4952.245	3	-.473	3	0	1	0	1	0	1	-.007	2
291		13	max	3582.555	2	1.954	2	0	1	0	1	0	1	.001	3
292			min	-4951.923	3	-.506	3	0	1	0	1	0	1	-.008	2
293		14	max	3582.984	2	1.91	2	0	1	0	1	0	1	.001	3
294			min	-4951.602	3	-.539	3	0	1	0	1	0	1	-.008	2
295		15	max	3583.412	2	1.866	2	0	1	0	1	0	1	.001	3
296			min	-4951.281	3	-.572	3	0	1	0	1	0	1	-.009	2
297		16	max	3583.841	2	1.821	2	0	1	0	1	0	1	.002	3
298			min	-4950.959	3	-.605	3	0	1	0	1	0	1	-.009	2
299		17	max	3584.269	2	1.777	2	0	1	0	1	0	1	.002	3
300			min	-4950.638	3	-.639	3	0	1	0	1	0	1	-.01	2
301		18	max	3584.698	2	1.733	2	0	1	0	1	0	1	.002	3
302			min	-4950.317	3	-.672	3	0	1	0	1	0	1	-.01	2
303		19	max	3585.126	2	1.689	2	0	1	0	1	0	1	.002	3
304			min	-4949.995	3	-.705	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2490.456	2	7.915	4	0	1	0	1	0	1	.011	2
306			min	-2604.65	3	1.858	15	0	1	0	1	0	1	-.002	3
307		2	max	2490.286	2	7.148	4	0	1	0	1	0	1	.008	2
308			min	-2604.778	3	1.678	15	0	1	0	1	0	1	-.004	3
309		3	max	2490.115	2	6.381	4	0	1	0	1	0	1	.006	2
310			min	-2604.906	3	1.497	15	0	1	0	1	0	1	-.005	3
311		4	max	2489.945	2	5.613	4	0	1	0	1	0	1	.003	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
312			min	-2605.033	3	1.317	15	0	1	0	1	0	1	-.006	3
313		5	max	2489.775	2	4.846	4	0	1	0	1	0	1	.001	2
314			min	-2605.161	3	1.137	15	0	1	0	1	0	1	-.007	3
315		6	max	2489.604	2	4.079	4	0	1	0	1	0	1	0	2
316			min	-2605.289	3	.956	15	0	1	0	1	0	1	-.008	3
317		7	max	2489.434	2	3.312	4	0	1	0	1	0	1	-.002	15
318			min	-2605.417	3	.766	12	0	1	0	1	0	1	-.008	3
319		8	max	2489.263	2	2.642	2	0	1	0	1	0	1	-.002	15
320			min	-2605.544	3	.467	12	0	1	0	1	0	1	-.009	3
321		9	max	2489.093	2	2.044	2	0	1	0	1	0	1	-.002	15
322			min	-2605.672	3	.167	3	0	1	0	1	0	1	-.009	3
323		10	max	2488.923	2	1.446	2	0	1	0	1	0	1	-.002	15
324			min	-2605.8	3	-.282	3	0	1	0	1	0	1	-.009	4
325		11	max	2488.752	2	.848	2	0	1	0	1	0	1	-.002	15
326			min	-2605.928	3	-.73	3	0	1	0	1	0	1	-.009	4
327		12	max	2488.582	2	.25	2	0	1	0	1	0	1	-.002	15
328			min	-2606.055	3	-1.178	3	0	1	0	1	0	1	-.009	4
329		13	max	2488.412	2	-.306	15	0	1	0	1	0	1	-.002	15
330			min	-2606.183	3	-1.627	3	0	1	0	1	0	1	-.009	4
331		14	max	2488.241	2	-.486	15	0	1	0	1	0	1	-.002	15
332			min	-2606.311	3	-2.075	3	0	1	0	1	0	1	-.008	4
333		15	max	2488.071	2	-.667	15	0	1	0	1	0	1	-.002	15
334			min	-2606.439	3	-2.826	4	0	1	0	1	0	1	-.007	4
335		16	max	2487.901	2	-.847	15	0	1	0	1	0	1	-.001	15
336			min	-2606.566	3	-3.593	4	0	1	0	1	0	1	-.006	4
337		17	max	2487.73	2	-1.027	15	0	1	0	1	0	1	-.001	15
338			min	-2606.694	3	-4.361	4	0	1	0	1	0	1	-.004	4
339		18	max	2487.56	2	-1.208	15	0	1	0	1	0	1	0	15
340			min	-2606.822	3	-5.128	4	0	1	0	1	0	1	-.002	4
341		19	max	2487.39	2	-1.388	15	0	1	0	1	0	1	0	1
342			min	-2606.95	3	-5.895	4	0	1	0	1	0	1	0	1
343	M8	1	max	3081.735	1	0	1	0	1	0	1	0	1	0	1
344			min	-631.639	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3081.906	1	0	1	0	1	0	1	0	1	0	1
346			min	-631.511	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3082.076	1	0	1	0	1	0	1	0	1	0	1
348			min	-631.384	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3082.246	1	0	1	0	1	0	1	0	1	0	1
350			min	-631.256	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3082.417	1	0	1	0	1	0	1	0	1	0	1
352			min	-631.128	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3082.587	1	0	1	0	1	0	1	0	1	0	1
354			min	-631	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3082.758	1	0	1	0	1	0	1	0	1	0	1
356			min	-630.873	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3082.928	1	0	1	0	1	0	1	0	1	0	1
358			min	-630.745	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3083.098	1	0	1	0	1	0	1	0	1	0	1
360			min	-630.617	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3083.269	1	0	1	0	1	0	1	0	1	0	1
362			min	-630.489	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3083.439	1	0	1	0	1	0	1	0	1	0	1
364			min	-630.362	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3083.609	1	0	1	0	1	0	1	0	1	0	1
366			min	-630.234	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3083.78	1	0	1	0	1	0	1	0	1	0	1
368			min	-630.106	3	0	1	0	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
369		14	max	3083.95	1	0	1	0	1	0	1	0	1	0	1
370			min	-629.978	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3084.12	1	0	1	0	1	0	1	0	1	0	1
372			min	-629.85	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3084.291	1	0	1	0	1	0	1	0	1	0	1
374			min	-629.723	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3084.461	1	0	1	0	1	0	1	0	1	0	1
376			min	-629.595	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3084.631	1	0	1	0	1	0	1	0	1	0	1
378			min	-629.467	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3084.802	1	0	1	0	1	0	1	0	1	0	1
380			min	-629.339	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1120.578	2	1.922	4	-.024	15	0	1	0	2	0	1
382			min	-1525.202	3	.452	15	-.589	1	0	3	0	3	0	1
383		2	max	1121.006	2	1.865	4	-.024	15	0	1	0	15	0	15
384			min	-1524.881	3	.439	15	-.589	1	0	3	0	1	0	4
385		3	max	1121.435	2	1.808	4	-.024	15	0	1	0	15	0	15
386			min	-1524.559	3	.426	15	-.589	1	0	3	0	1	-.001	4
387		4	max	1121.863	2	1.752	4	-.024	15	0	1	0	15	0	15
388			min	-1524.238	3	.412	15	-.589	1	0	3	0	1	-.002	4
389		5	max	1122.292	2	1.695	4	-.024	15	0	1	0	15	0	15
390			min	-1523.917	3	.399	15	-.589	1	0	3	0	1	-.002	4
391		6	max	1122.72	2	1.638	4	-.024	15	0	1	0	15	0	15
392			min	-1523.595	3	.386	15	-.589	1	0	3	0	1	-.003	4
393		7	max	1123.149	2	1.581	4	-.024	15	0	1	0	15	0	15
394			min	-1523.274	3	.372	15	-.589	1	0	3	-.001	1	-.003	4
395		8	max	1123.577	2	1.524	4	-.024	15	0	1	0	15	0	15
396			min	-1522.953	3	.359	15	-.589	1	0	3	-.001	1	-.004	4
397		9	max	1124.006	2	1.468	4	-.024	15	0	1	0	15	0	15
398			min	-1522.631	3	.341	12	-.589	1	0	3	-.001	1	-.004	4
399		10	max	1124.434	2	1.411	4	-.024	15	0	1	0	15	-.001	15
400			min	-1522.31	3	.319	12	-.589	1	0	3	-.002	1	-.004	4
401		11	max	1124.863	2	1.354	4	-.024	15	0	1	0	15	-.001	15
402			min	-1521.989	3	.297	12	-.589	1	0	3	-.002	1	-.005	4
403		12	max	1125.291	2	1.297	4	-.024	15	0	1	0	15	-.001	15
404			min	-1521.667	3	.275	12	-.589	1	0	3	-.002	1	-.005	4
405		13	max	1125.72	2	1.251	2	-.024	15	0	1	0	15	-.001	15
406			min	-1521.346	3	.253	12	-.589	1	0	3	-.002	1	-.006	4
407		14	max	1126.148	2	1.207	2	-.024	15	0	1	0	15	-.001	15
408			min	-1521.024	3	.23	12	-.589	1	0	3	-.002	1	-.006	4
409		15	max	1126.577	2	1.162	2	-.024	15	0	1	0	15	-.001	15
410			min	-1520.703	3	.208	12	-.589	1	0	3	-.002	1	-.006	4
411		16	max	1127.005	2	1.118	2	-.024	15	0	1	0	15	-.002	12
412			min	-1520.382	3	.186	12	-.589	1	0	3	-.003	1	-.007	4
413		17	max	1127.434	2	1.074	2	-.024	15	0	1	0	15	-.002	12
414			min	-1520.06	3	.164	12	-.589	1	0	3	-.003	1	-.007	4
415		18	max	1127.862	2	1.03	2	-.024	15	0	1	0	15	-.002	12
416			min	-1519.739	3	.142	12	-.589	1	0	3	-.003	1	-.007	4
417		19	max	1128.291	2	.985	2	-.024	15	0	1	0	15	-.002	12
418			min	-1519.418	3	.12	12	-.589	1	0	3	-.003	1	-.007	4
419	M11	1	max	688.739	2	7.883	4	-.006	15	0	1	0	15	.007	4
420			min	-829.601	3	1.853	15	-.144	1	0	3	0	1	.002	12
421		2	max	688.568	2	7.115	4	-.006	15	0	1	0	15	.005	2
422			min	-829.729	3	1.673	15	-.144	1	0	3	0	1	0	12
423		3	max	688.398	2	6.348	4	-.006	15	0	1	0	15	.002	2
424			min	-829.856	3	1.493	15	-.144	1	0	3	0	1	0	3
425		4	max	688.228	2	5.581	4	-.006	15	0	1	0	15	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
426			min	-829.984	3	1.312	15	-.144	1	0	3	0	1	-.002	3
427		5	max	688.057	2	4.814	4	-.006	15	0	1	0	15	0	15
428			min	-830.112	3	1.132	15	-.144	1	0	3	0	1	-.003	3
429		6	max	687.887	2	4.047	4	-.006	15	0	1	0	15	-.001	15
430			min	-830.24	3	.952	15	-.144	1	0	3	0	1	-.005	4
431		7	max	687.717	2	3.279	4	-.006	15	0	1	0	15	-.002	15
432			min	-830.368	3	.771	15	-.144	1	0	3	0	1	-.007	4
433		8	max	687.546	2	2.512	4	-.006	15	0	1	0	15	-.002	15
434			min	-830.495	3	.591	15	-.144	1	0	3	0	1	-.008	4
435		9	max	687.376	2	1.745	4	-.006	15	0	1	0	15	-.002	15
436			min	-830.623	3	.411	15	-.144	1	0	3	0	1	-.009	4
437		10	max	687.206	2	.978	4	-.006	15	0	1	0	15	-.002	15
438			min	-830.751	3	.221	12	-.144	1	0	3	0	1	-.009	4
439		11	max	687.035	2	.361	2	-.006	15	0	1	0	15	-.002	15
440			min	-830.879	3	-.144	3	-.144	1	0	3	0	1	-.01	4
441		12	max	686.865	2	-.13	15	-.006	15	0	1	0	15	-.002	15
442			min	-831.006	3	-.592	3	-.144	1	0	3	0	1	-.01	4
443		13	max	686.695	2	-.311	15	-.006	15	0	1	0	15	-.002	15
444			min	-831.134	3	-1.324	4	-.144	1	0	3	-.001	1	-.009	4
445		14	max	686.524	2	-.491	15	-.006	15	0	1	0	15	-.002	15
446			min	-831.262	3	-2.091	4	-.144	1	0	3	-.001	1	-.008	4
447		15	max	686.354	2	-.671	15	-.006	15	0	1	0	15	-.002	15
448			min	-831.39	3	-2.858	4	-.144	1	0	3	-.001	1	-.007	4
449		16	max	686.183	2	-.852	15	-.006	15	0	1	0	15	-.001	15
450			min	-831.517	3	-3.626	4	-.144	1	0	3	-.001	1	-.006	4
451		17	max	686.013	2	-1.032	15	-.006	15	0	1	0	15	-.001	15
452			min	-831.645	3	-4.393	4	-.144	1	0	3	-.001	1	-.004	4
453		18	max	685.843	2	-1.212	15	-.006	15	0	1	0	15	0	15
454			min	-831.773	3	-5.16	4	-.144	1	0	3	-.001	1	-.002	4
455		19	max	685.672	2	-1.393	15	-.006	15	0	1	0	15	0	1
456			min	-831.901	3	-5.927	4	-.144	1	0	3	-.001	1	0	1
457	M12	1	max	1123.744	1	0	1	9.365	1	0	1	0	15	0	1
458			min	-170.151	3	0	1	.388	15	0	1	-.001	1	0	1
459		2	max	1123.914	1	0	1	9.365	1	0	1	0	1	0	1
460			min	-170.024	3	0	1	.388	15	0	1	0	3	0	1
461		3	max	1124.085	1	0	1	9.365	1	0	1	.001	1	0	1
462			min	-169.896	3	0	1	.388	15	0	1	0	15	0	1
463		4	max	1124.255	1	0	1	9.365	1	0	1	.002	1	0	1
464			min	-169.768	3	0	1	.388	15	0	1	0	15	0	1
465		5	max	1124.425	1	0	1	9.365	1	0	1	.003	1	0	1
466			min	-169.64	3	0	1	.388	15	0	1	0	15	0	1
467		6	max	1124.596	1	0	1	9.365	1	0	1	.004	1	0	1
468			min	-169.513	3	0	1	.388	15	0	1	0	15	0	1
469		7	max	1124.766	1	0	1	9.365	1	0	1	.005	1	0	1
470			min	-169.385	3	0	1	.388	15	0	1	0	15	0	1
471		8	max	1124.937	1	0	1	9.365	1	0	1	.007	1	0	1
472			min	-169.257	3	0	1	.388	15	0	1	0	15	0	1
473		9	max	1125.107	1	0	1	9.365	1	0	1	.008	1	0	1
474			min	-169.129	3	0	1	.388	15	0	1	0	15	0	1
475		10	max	1125.277	1	0	1	9.365	1	0	1	.009	1	0	1
476			min	-169.002	3	0	1	.388	15	0	1	0	15	0	1
477		11	max	1125.448	1	0	1	9.365	1	0	1	.01	1	0	1
478			min	-168.874	3	0	1	.388	15	0	1	0	15	0	1
479		12	max	1125.618	1	0	1	9.365	1	0	1	.011	1	0	1
480			min	-168.746	3	0	1	.388	15	0	1	0	15	0	1
481		13	max	1125.788	1	0	1	9.365	1	0	1	.012	1	0	1
482			min	-168.618	3	0	1	.388	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1125.959	1	0	1	9.365	1	0	1	.013	1	0	1
484			min	-168.491	3	0	1	.388	15	0	1	0	15	0	1
485		15	max	1126.129	1	0	1	9.365	1	0	1	.014	1	0	1
486			min	-168.363	3	0	1	.388	15	0	1	0	15	0	1
487		16	max	1126.299	1	0	1	9.365	1	0	1	.015	1	0	1
488			min	-168.235	3	0	1	.388	15	0	1	0	15	0	1
489		17	max	1126.47	1	0	1	9.365	1	0	1	.016	1	0	1
490			min	-168.107	3	0	1	.388	15	0	1	0	15	0	1
491		18	max	1126.64	1	0	1	9.365	1	0	1	.017	1	0	1
492			min	-167.979	3	0	1	.388	15	0	1	0	15	0	1
493		19	max	1126.81	1	0	1	9.365	1	0	1	.018	1	0	1
494			min	-167.852	3	0	1	.388	15	0	1	0	15	0	1
495	M1	1	max	162.456	1	838.081	3	-3.796	15	0	2	.217	1	0	3
496			min	6.705	15	-479.119	2	-91.095	1	0	3	.009	15	-.015	2
497		2	max	163.061	1	837.107	3	-3.796	15	0	2	.169	1	.238	2
498			min	6.888	15	-480.417	2	-91.095	1	0	3	.007	15	-.442	3
499		3	max	512.138	3	573.668	2	-3.772	15	0	3	.121	1	.479	2
500			min	-298.936	2	-608.598	3	-90.688	1	0	2	.005	15	-.866	3
501		4	max	512.592	3	572.37	2	-3.772	15	0	3	.073	1	.18	1
502			min	-298.331	2	-609.572	3	-90.688	1	0	2	.003	15	-.545	3
503		5	max	513.046	3	571.072	2	-3.772	15	0	3	.026	1	-.003	15
504			min	-297.725	2	-610.545	3	-90.688	1	0	2	.001	15	-.223	3
505		6	max	513.501	3	569.773	2	-3.772	15	0	3	0	15	.1	3
506			min	-297.12	2	-611.519	3	-90.688	1	0	2	-.022	1	-.426	2
507		7	max	513.955	3	568.475	2	-3.772	15	0	3	-.003	15	.422	3
508			min	-296.514	2	-612.493	3	-90.688	1	0	2	-.07	1	-.727	2
509		8	max	514.409	3	567.177	2	-3.772	15	0	3	-.005	15	.746	3
510			min	-295.909	2	-613.466	3	-90.688	1	0	2	-.118	1	-1.026	2
511		9	max	526.836	3	51.419	2	-5.621	15	0	9	.07	1	.872	3
512			min	-228.102	2	.395	15	-135.16	1	0	3	.003	15	-1.174	2
513		10	max	527.29	3	50.12	2	-5.621	15	0	9	0	15	.848	3
514			min	-227.497	2	.004	15	-135.16	1	0	3	0	1	-1.201	2
515		11	max	527.744	3	48.822	2	-5.621	15	0	9	-.003	15	.826	3
516			min	-226.891	2	-1.595	4	-135.16	1	0	3	-.072	1	-1.227	2
517		12	max	540.048	3	394.219	3	-3.681	15	0	2	.117	1	.72	3
518			min	-159.039	2	-673.786	2	-88.707	1	0	3	.005	15	-1.088	2
519		13	max	540.502	3	393.245	3	-3.681	15	0	2	.07	1	.512	3
520			min	-158.433	2	-675.085	2	-88.707	1	0	3	.003	15	-.732	2
521		14	max	540.956	3	392.272	3	-3.681	15	0	2	.023	1	.305	3
522			min	-157.828	2	-676.383	2	-88.707	1	0	3	0	15	-.375	2
523		15	max	541.41	3	391.298	3	-3.681	15	0	2	0	15	.098	3
524			min	-157.223	2	-677.681	2	-88.707	1	0	3	-.024	1	-.04	1
525		16	max	541.864	3	390.324	3	-3.681	15	0	2	-.003	15	.34	2
526			min	-156.617	2	-678.979	2	-88.707	1	0	3	-.071	1	-.108	3
527		17	max	542.318	3	389.351	3	-3.681	15	0	2	-.005	15	.698	2
528			min	-156.012	2	-680.277	2	-88.707	1	0	3	-.117	1	-.314	3
529		18	max	-6.895	15	688.067	2	-4.063	15	0	3	-.007	15	.351	2
530			min	-163.336	1	-317.614	3	-97.672	1	0	2	-.167	1	-.155	3
531		19	max	-6.712	15	686.768	2	-4.063	15	0	3	-.009	15	.013	3
532			min	-162.731	1	-318.588	3	-97.672	1	0	2	-.219	1	-.011	2
533	M5	1	max	354.387	1	2790.261	3	0	1	0	1	0	1	.031	2
534			min	12.607	12	-1633.399	2	0	1	0	1	0	1	0	3
535		2	max	354.992	1	2789.287	3	0	1	0	1	0	1	.893	2
536			min	12.909	12	-1634.697	2	0	1	0	1	0	1	-1.472	3
537		3	max	1638.355	3	1711.082	2	0	1	0	1	0	1	1.716	2
538			min	-1022.939	2	-1928.797	3	0	1	0	1	0	1	-2.887	3
539		4	max	1638.809	3	1709.783	2	0	1	0	1	0	1	.813	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
540			min	-1022.333	2	-1929.77	3	0	1	0	1	0	1	-1.869	3
541		5	max	1639.263	3	1708.485	2	0	1	0	1	0	1	.012	9
542			min	-1021.728	2	-1930.744	3	0	1	0	1	0	1	-.85	3
543		6	max	1639.717	3	1707.187	2	0	1	0	1	0	1	.169	3
544			min	-1021.123	2	-1931.718	3	0	1	0	1	0	1	-.99	2
545		7	max	1640.171	3	1705.889	2	0	1	0	1	0	1	1.189	3
546			min	-1020.517	2	-1932.692	3	0	1	0	1	0	1	-1.89	2
547		8	max	1640.625	3	1704.591	2	0	1	0	1	0	1	2.209	3
548			min	-1019.912	2	-1933.665	3	0	1	0	1	0	1	-2.79	2
549		9	max	1659.029	3	172.387	2	0	1	0	1	0	1	2.543	3
550			min	-877.765	2	.391	15	0	1	0	1	0	1	-3.178	2
551		10	max	1659.483	3	171.089	2	0	1	0	1	0	1	2.46	3
552			min	-877.159	2	0	15	0	1	0	1	0	1	-3.269	2
553		11	max	1659.937	3	169.791	2	0	1	0	1	0	1	2.376	3
554			min	-876.554	2	-1.487	4	0	1	0	1	0	1	-3.359	2
555		12	max	1678.588	3	1230.305	3	0	1	0	1	0	1	2.086	3
556			min	-734.498	2	-2053.714	2	0	1	0	1	0	1	-3.007	2
557		13	max	1679.042	3	1229.331	3	0	1	0	1	0	1	1.437	3
558			min	-733.892	2	-2055.012	2	0	1	0	1	0	1	-1.923	2
559		14	max	1679.496	3	1228.357	3	0	1	0	1	0	1	.788	3
560			min	-733.287	2	-2056.31	2	0	1	0	1	0	1	-.838	2
561		15	max	1679.95	3	1227.384	3	0	1	0	1	0	1	.247	2
562			min	-732.681	2	-2057.608	2	0	1	0	1	0	1	-.003	13
563		16	max	1680.404	3	1226.41	3	0	1	0	1	0	1	1.334	2
564			min	-732.076	2	-2058.907	2	0	1	0	1	0	1	-.507	3
565		17	max	1680.858	3	1225.436	3	0	1	0	1	0	1	2.42	2
566			min	-731.471	2	-2060.205	2	0	1	0	1	0	1	-1.154	3
567		18	max	-13.413	12	2322	2	0	1	0	1	0	1	1.247	2
568			min	-354.442	1	-1095.114	3	0	1	0	1	0	1	-.604	3
569		19	max	-13.11	12	2320.702	2	0	1	0	1	0	1	.023	2
570			min	-353.837	1	-1096.088	3	0	1	0	1	0	1	-.026	3
571	M9	1	max	162.456	1	838.081	3	91.095	1	0	3	-.009	15	0	3
572			min	6.705	15	-479.119	2	3.796	15	0	2	-.217	1	-.015	2
573		2	max	163.061	1	837.107	3	91.095	1	0	3	-.007	15	.238	2
574			min	6.888	15	-480.417	2	3.796	15	0	2	-.169	1	-.442	3
575		3	max	512.138	3	573.668	2	90.688	1	0	2	-.005	15	.479	2
576			min	-298.936	2	-608.598	3	3.772	15	0	3	-.121	1	-.866	3
577		4	max	512.592	3	572.37	2	90.688	1	0	2	-.003	15	.18	1
578			min	-298.331	2	-609.572	3	3.772	15	0	3	-.073	1	-.545	3
579		5	max	513.046	3	571.072	2	90.688	1	0	2	-.001	15	-.003	15
580			min	-297.725	2	-610.545	3	3.772	15	0	3	-.026	1	-.223	3
581		6	max	513.501	3	569.773	2	90.688	1	0	2	.022	1	.1	3
582			min	-297.12	2	-611.519	3	3.772	15	0	3	0	15	-.426	2
583		7	max	513.955	3	568.475	2	90.688	1	0	2	.07	1	.422	3
584			min	-296.514	2	-612.493	3	3.772	15	0	3	.003	15	-.727	2
585		8	max	514.409	3	567.177	2	90.688	1	0	2	.118	1	.746	3
586			min	-295.909	2	-613.466	3	3.772	15	0	3	.005	15	-1.026	2
587		9	max	526.836	3	51.419	2	135.16	1	0	3	-.003	15	.872	3
588			min	-228.102	2	.395	15	5.621	15	0	9	-.07	1	-1.174	2
589		10	max	527.29	3	50.12	2	135.16	1	0	3	0	1	.848	3
590			min	-227.497	2	.004	15	5.621	15	0	9	0	15	-1.201	2
591		11	max	527.744	3	48.822	2	135.16	1	0	3	.072	1	.826	3
592			min	-226.891	2	-1.595	4	5.621	15	0	9	.003	15	-1.227	2
593		12	max	540.048	3	394.219	3	88.707	1	0	3	-.005	15	.72	3
594			min	-159.039	2	-673.786	2	3.681	15	0	2	-.117	1	-1.088	2
595		13	max	540.502	3	393.245	3	88.707	1	0	3	-.003	15	.512	3
596			min	-158.433	2	-675.085	2	3.681	15	0	2	-.07	1	-.732	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
597		14	max	540.956	3	392.272	3	88.707	1	0	3	0	15	.305	3
598			min	-157.828	2	-676.383	2	3.681	15	0	2	-.023	1	-.375	2
599		15	max	541.41	3	391.298	3	88.707	1	0	3	.024	1	.098	3
600			min	-157.223	2	-677.681	2	3.681	15	0	2	0	15	-.04	1
601		16	max	541.864	3	390.324	3	88.707	1	0	3	.071	1	.34	2
602			min	-156.617	2	-678.979	2	3.681	15	0	2	.003	15	-.108	3
603		17	max	542.318	3	389.351	3	88.707	1	0	3	.117	1	.698	2
604			min	-156.012	2	-680.277	2	3.681	15	0	2	.005	15	-.314	3
605		18	max	-6.895	15	688.067	2	97.672	1	0	2	.167	1	.351	2
606			min	-163.336	1	-317.614	3	4.063	15	0	3	.007	15	-.155	3
607		19	max	-6.712	15	686.768	2	97.672	1	0	2	.219	1	.013	3
608			min	-162.731	1	-318.588	3	4.063	15	0	3	.009	15	-.011	2

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	M13	1	max	0	1	.123	2	.009	3	1.015e-2	2	NC	1	NC	1
2			min	0	15	-.021	3	-.005	2	-1.904e-3	3	NC	1	NC	1
3		2	max	0	1	.294	3	.03	1	1.155e-2	2	NC	5	NC	2
4			min	0	15	-.045	1	0	10	-1.893e-3	3	704.744	3	7533.851	1
5		3	max	0	1	.549	3	.072	1	1.295e-2	2	NC	5	NC	3
6			min	0	15	-.163	1	.003	15	-1.883e-3	3	389.281	3	3116.082	1
7		4	max	0	1	.705	3	.107	1	1.435e-2	2	NC	5	NC	3
8			min	0	15	-.228	1	.005	15	-1.872e-3	3	305.919	3	2074.635	1
9		5	max	0	1	.742	3	.125	1	1.575e-2	2	NC	5	NC	3
10			min	0	15	-.23	1	.005	15	-1.862e-3	3	291.167	3	1776.452	1
11		6	max	0	1	.662	3	.12	1	1.716e-2	2	NC	5	NC	3
12			min	0	15	-.169	1	.005	15	-1.851e-3	3	324.94	3	1851.986	1
13		7	max	0	1	.491	3	.093	1	1.856e-2	2	NC	5	NC	3
14			min	0	15	-.061	1	.001	10	-1.841e-3	3	433.649	3	2387.28	1
15		8	max	0	1	.273	3	.053	1	1.996e-2	2	NC	4	NC	2
16			min	0	15	.002	15	-.004	10	-1.83e-3	3	755.044	3	4257.575	1
17		9	max	0	1	.221	2	.029	3	2.136e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.011	2	-1.82e-3	3	2271.932	2	NC	1
19		10	max	0	1	.276	2	.028	3	2.276e-2	2	NC	3	NC	1
20			min	0	1	-.014	3	-.019	2	-1.809e-3	3	1454.894	2	NC	1
21		11	max	0	15	.221	2	.029	3	2.136e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.011	2	-1.82e-3	3	2271.932	2	NC	1
23		12	max	0	15	.273	3	.053	1	1.996e-2	2	NC	4	NC	2
24			min	0	1	.002	15	-.004	10	-1.83e-3	3	755.044	3	4257.575	1
25		13	max	0	15	.491	3	.093	1	1.856e-2	2	NC	5	NC	3
26			min	0	1	-.061	1	.001	10	-1.841e-3	3	433.649	3	2387.28	1
27		14	max	0	15	.662	3	.12	1	1.716e-2	2	NC	5	NC	3
28			min	0	1	-.169	1	.005	15	-1.851e-3	3	324.94	3	1851.986	1
29		15	max	0	15	.742	3	.125	1	1.575e-2	2	NC	5	NC	3
30			min	0	1	-.23	1	.005	15	-1.862e-3	3	291.167	3	1776.452	1
31		16	max	0	15	.705	3	.107	1	1.435e-2	2	NC	5	NC	3
32			min	0	1	-.228	1	.005	15	-1.872e-3	3	305.919	3	2074.635	1
33		17	max	0	15	.549	3	.072	1	1.295e-2	2	NC	5	NC	3
34			min	0	1	-.163	1	.003	15	-1.883e-3	3	389.281	3	3116.082	1
35		18	max	0	15	.294	3	.03	1	1.155e-2	2	NC	5	NC	2
36			min	0	1	-.045	1	0	10	-1.893e-3	3	704.744	3	7533.851	1
37		19	max	0	15	.123	2	.009	3	1.015e-2	2	NC	1	NC	1
38			min	0	1	-.021	3	-.005	2	-1.904e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.26	3	.008	3	5.946e-3	2	NC	1	NC	1
40			min	0	15	-.393	2	-.005	2	-4.637e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.577	3	.02	1	7.081e-3	2	NC	5	NC	1
42			min	0	15	-.683	2	-.001	10	-5.613e-3	3	701.796	3	NC	1
43		3	max	0	1	.846	3	.057	1	8.217e-3	2	NC	5	NC	2
44			min	0	15	-.935	2	.002	10	-6.589e-3	3	379.092	3	3937.074	1
45		4	max	0	1	1.036	3	.091	1	9.352e-3	2	NC	15	NC	3
46			min	0	15	-1.124	2	.004	15	-7.565e-3	3	286.238	3	2446.673	1
47		5	max	0	1	1.131	3	.111	1	1.049e-2	2	NC	15	NC	3
48			min	0	15	-1.236	2	.005	15	-8.541e-3	3	255.134	3	2017.239	1
49		6	max	0	1	1.13	3	.109	1	1.162e-2	2	NC	15	NC	3
50			min	0	15	-1.271	2	.005	15	-9.517e-3	3	252.971	2	2052.718	1
51		7	max	0	1	1.05	3	.086	1	1.276e-2	2	NC	15	NC	3
52			min	0	15	-1.238	2	.001	10	-1.049e-2	3	262.715	2	2600.247	1
53		8	max	0	1	.923	3	.049	1	1.389e-2	2	NC	15	NC	2
54			min	0	15	-1.162	2	-.004	10	-1.147e-2	3	288.498	2	4566.657	1
55		9	max	0	1	.797	3	.026	3	1.503e-2	2	NC	5	NC	1
56			min	0	15	-1.08	2	-.01	2	-1.244e-2	3	323.06	2	NC	1
57		10	max	0	1	.738	3	.025	3	1.616e-2	2	NC	5	NC	1
58			min	0	1	-1.04	2	-.018	2	-1.342e-2	3	343.313	2	NC	1
59		11	max	0	15	.797	3	.026	3	1.503e-2	2	NC	5	NC	1
60			min	0	1	-1.08	2	-.01	2	-1.244e-2	3	323.06	2	NC	1
61		12	max	0	15	.923	3	.049	1	1.389e-2	2	NC	15	NC	2
62			min	0	1	-1.162	2	-.004	10	-1.147e-2	3	288.498	2	4566.657	1
63		13	max	0	15	1.05	3	.086	1	1.276e-2	2	NC	15	NC	3
64			min	0	1	-1.238	2	.001	10	-1.049e-2	3	262.715	2	2600.247	1
65		14	max	0	15	1.13	3	.109	1	1.162e-2	2	NC	15	NC	3
66			min	0	1	-1.271	2	.005	15	-9.517e-3	3	252.971	2	2052.718	1
67		15	max	0	15	1.131	3	.111	1	1.049e-2	2	NC	15	NC	3
68			min	0	1	-1.236	2	.005	15	-8.541e-3	3	255.134	3	2017.239	1
69		16	max	0	15	1.036	3	.091	1	9.352e-3	2	NC	15	NC	3
70			min	0	1	-1.124	2	.004	15	-7.565e-3	3	286.238	3	2446.673	1
71		17	max	0	15	.846	3	.057	1	8.217e-3	2	NC	5	NC	2
72			min	0	1	-.935	2	.002	10	-6.589e-3	3	379.092	3	3937.074	1
73		18	max	0	15	.577	3	.02	1	7.081e-3	2	NC	5	NC	1
74			min	0	1	-.683	2	-.001	10	-5.613e-3	3	701.796	3	NC	1
75		19	max	0	15	.26	3	.008	3	5.946e-3	2	NC	1	NC	1
76			min	0	1	-.393	2	-.005	2	-4.637e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.266	3	.008	3	3.935e-3	3	NC	1	NC	1
78			min	0	1	-.392	2	-.004	2	-6.184e-3	2	NC	1	NC	1
79		2	max	0	15	.469	3	.02	1	4.767e-3	3	NC	5	NC	1
80			min	0	1	-.759	2	0	10	-7.37e-3	2	605.722	2	NC	1
81		3	max	0	15	.646	3	.057	1	5.599e-3	3	NC	5	NC	2
82			min	0	1	-1.073	2	.003	15	-8.555e-3	2	325.978	2	3924.021	1
83		4	max	0	15	.781	3	.092	1	6.432e-3	3	NC	15	NC	3
84			min	0	1	-1.3	2	.004	15	-9.741e-3	2	244.555	2	2439.814	1
85		5	max	0	15	.864	3	.111	1	7.264e-3	3	NC	15	NC	3
86			min	0	1	-1.421	2	.005	15	-1.093e-2	2	215.825	2	2011.619	1
87		6	max	0	15	.893	3	.109	1	8.096e-3	3	NC	15	NC	3
88			min	0	1	-1.435	2	.005	15	-1.211e-2	2	212.834	2	2046.165	1
89		7	max	0	15	.878	3	.086	1	8.928e-3	3	NC	15	NC	3
90			min	0	1	-1.36	2	.002	10	-1.33e-2	2	229.258	2	2588.919	1
91		8	max	0	15	.832	3	.05	1	9.76e-3	3	NC	15	NC	2
92			min	0	1	-1.231	2	-.003	10	-1.448e-2	2	264.512	2	4530.235	1
93		9	max	0	15	.779	3	.024	3	1.059e-2	3	NC	5	NC	1
94			min	0	1	-1.101	2	-.009	2	-1.567e-2	2	313.378	2	NC	1
95		10	max	0	1	.753	3	.023	3	1.142e-2	3	NC	5	NC	1
96			min	0	1	-1.038	2	-.017	2	-1.685e-2	2	343.706	2	NC	1
97		11	max	0	1	.779	3	.024	3	1.059e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.101	2	-.009	2	-1.567e-2	2	313.378	2	NC	1
99		12	max	0	1	.832	3	.05	1	9.76e-3	3	NC	15	NC	2
100			min	0	15	-1.231	2	-.003	10	-1.448e-2	2	264.512	2	4530.235	1
101		13	max	0	1	.878	3	.086	1	8.928e-3	3	NC	15	NC	3
102			min	0	15	-1.36	2	.002	10	-1.33e-2	2	229.258	2	2588.919	1
103		14	max	0	1	.893	3	.109	1	8.096e-3	3	NC	15	NC	3
104			min	0	15	-1.435	2	.005	15	-1.211e-2	2	212.834	2	2046.165	1
105		15	max	0	1	.864	3	.111	1	7.264e-3	3	NC	15	NC	3
106			min	0	15	-1.421	2	.005	15	-1.093e-2	2	215.825	2	2011.619	1
107		16	max	0	1	.781	3	.092	1	6.432e-3	3	NC	15	NC	3
108			min	0	15	-1.3	2	.004	15	-9.741e-3	2	244.555	2	2439.814	1
109		17	max	0	1	.646	3	.057	1	5.599e-3	3	NC	5	NC	2
110			min	0	15	-1.073	2	.003	15	-8.555e-3	2	325.978	2	3924.021	1
111		18	max	0	1	.469	3	.02	1	4.767e-3	3	NC	5	NC	1
112			min	0	15	-.759	2	0	10	-7.37e-3	2	605.722	2	NC	1
113		19	max	0	1	.266	3	.008	3	3.935e-3	3	NC	1	NC	1
114			min	0	15	-.392	2	-.004	2	-6.184e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.11	2	.007	3	7.106e-3	3	NC	1	NC	1
116			min	0	1	-.089	3	-.004	2	-8.519e-3	2	NC	1	NC	1
117		2	max	0	15	.01	3	.03	1	8.286e-3	3	NC	5	NC	2
118			min	0	1	-.129	2	0	10	-9.538e-3	2	930.239	2	7574.661	1
119		3	max	0	15	.087	3	.072	1	9.467e-3	3	NC	5	NC	3
120			min	0	1	-.319	2	.003	15	-1.056e-2	2	518.109	2	3121.041	1
121		4	max	0	15	.126	3	.108	1	1.065e-2	3	NC	5	NC	3
122			min	0	1	-.427	2	.005	15	-1.157e-2	2	413.505	2	2072.946	1
123		5	max	0	15	.121	3	.126	1	1.183e-2	3	NC	5	NC	3
124			min	0	1	-.439	2	.005	15	-1.259e-2	2	404.475	2	1770.886	1
125		6	max	0	15	.073	3	.121	1	1.301e-2	3	NC	5	NC	3
126			min	0	1	-.357	2	.005	15	-1.361e-2	2	475.233	2	1840.408	1
127		7	max	0	15	-.001	15	.095	1	1.419e-2	3	NC	5	NC	3
128			min	0	1	-.202	2	.003	10	-1.463e-2	2	711.378	2	2358.833	1
129		8	max	0	15	.022	9	.054	1	1.537e-2	3	NC	3	NC	2
130			min	0	1	-.104	3	-.002	10	-1.565e-2	2	1824.512	2	4142.731	1
131		9	max	0	15	.16	1	.021	3	1.655e-2	3	NC	4	NC	1
132			min	0	1	-.188	3	-.007	2	-1.667e-2	2	2245.316	3	NC	1
133		10	max	0	1	.234	2	.02	3	1.773e-2	3	NC	4	NC	1
134			min	0	1	-.225	3	-.015	2	-1.769e-2	2	1631.091	3	NC	1
135		11	max	0	1	.16	1	.021	3	1.655e-2	3	NC	4	NC	1
136			min	0	15	-.188	3	-.007	2	-1.667e-2	2	2245.316	3	NC	1
137		12	max	0	1	.022	9	.054	1	1.537e-2	3	NC	3	NC	2
138			min	0	15	-.104	3	-.002	10	-1.565e-2	2	1824.512	2	4142.731	1
139		13	max	0	1	-.001	15	.095	1	1.419e-2	3	NC	5	NC	3
140			min	0	15	-.202	2	.003	10	-1.463e-2	2	711.378	2	2358.833	1
141		14	max	0	1	.073	3	.121	1	1.301e-2	3	NC	5	NC	3
142			min	0	15	-.357	2	.005	15	-1.361e-2	2	475.233	2	1840.408	1
143		15	max	0	1	.121	3	.126	1	1.183e-2	3	NC	5	NC	3
144			min	0	15	-.439	2	.005	15	-1.259e-2	2	404.475	2	1770.886	1
145		16	max	0	1	.126	3	.108	1	1.065e-2	3	NC	5	NC	3
146			min	0	15	-.427	2	.005	15	-1.157e-2	2	413.505	2	2072.946	1
147		17	max	0	1	.087	3	.072	1	9.467e-3	3	NC	5	NC	3
148			min	0	15	-.319	2	.003	15	-1.056e-2	2	518.109	2	3121.041	1
149		18	max	0	1	.01	3	.03	1	8.286e-3	3	NC	5	NC	2
150			min	0	15	-.129	2	0	10	-9.538e-3	2	930.239	2	7574.661	1
151		19	max	0	1	.11	2	.007	3	7.106e-3	3	NC	1	NC	1
152			min	0	15	-.089	3	-.004	2	-8.519e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.007	1	-7.947e-6	15	NC	1	NC	2
154			min	-.009	3	-.013	3	0	15	-1.91e-4	1	8159.743	2	8868.921	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
155		2	max	.006	2	.007	2	.006	1	-7.459e-6	15	NC	1	NC	2
156			min	-.009	3	-.012	3	0	15	-1.793e-4	1	9323.598	2	9674.187	1
157		3	max	.006	2	.006	2	.006	1	-6.97e-6	15	NC	1	NC	1
158			min	-.008	3	-.012	3	0	15	-1.675e-4	1	NC	1	NC	1
159		4	max	.006	2	.005	2	.005	1	-6.482e-6	15	NC	1	NC	1
160			min	-.008	3	-.011	3	0	15	-1.558e-4	1	NC	1	NC	1
161		5	max	.005	2	.004	2	.005	1	-5.994e-6	15	NC	1	NC	1
162			min	-.007	3	-.011	3	0	15	-1.44e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.004	1	-5.505e-6	15	NC	1	NC	1
164			min	-.007	3	-.01	3	0	15	-1.323e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.004	1	-5.017e-6	15	NC	1	NC	1
166			min	-.006	3	-.01	3	0	15	-1.205e-4	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.003	1	-4.528e-6	15	NC	1	NC	1
168			min	-.006	3	-.009	3	0	15	-1.088e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-4.04e-6	15	NC	1	NC	1
170			min	-.005	3	-.008	3	0	15	-9.7e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-3.551e-6	15	NC	1	NC	1
172			min	-.005	3	-.008	3	0	15	-8.524e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.002	1	-3.063e-6	15	NC	1	NC	1
174			min	-.004	3	-.007	3	0	15	-7.349e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	.001	1	-2.574e-6	15	NC	1	NC	1
176			min	-.004	3	-.006	3	0	15	-6.173e-5	1	NC	1	NC	1
177		13	max	.002	2	0	2	.001	1	-2.086e-6	15	NC	1	NC	1
178			min	-.003	3	-.005	3	0	15	-4.998e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-1.598e-6	15	NC	1	NC	1
180			min	-.003	3	-.005	3	0	15	-3.822e-5	1	NC	1	NC	1
181		15	max	.002	2	0	15	0	1	-1.109e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-2.647e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-6.207e-7	15	NC	1	NC	1
184			min	-.002	3	-.003	3	0	15	-1.471e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.311e-7	10	NC	1	NC	1
186			min	-.001	3	-.002	3	0	15	-2.955e-6	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	8.8e-6	1	NC	1	NC	1
188			min	0	3	-.001	3	0	15	1.697e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.055e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	8.446e-7	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.841e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-6.9e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.348e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	5.598e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	3.386e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	15	1.404e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	5.425e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	2.248e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	7.463e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	3.092e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	9.501e-5	1	NC	1	NC	1
202			min	-.002	2	-.009	4	0	15	3.936e-6	15	NC	1	NC	1
203		7	max	.002	3	-.003	15	0	1	1.154e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	4.779e-6	15	8610.037	4	NC	1
205		8	max	.003	3	-.003	15	.001	1	1.358e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	5.623e-6	15	7729.862	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	1.562e-4	1	NC	2	NC	1
208			min	-.003	2	-.013	4	0	15	6.467e-6	15	7209.422	4	NC	1
209		10	max	.004	3	-.003	15	.002	1	1.765e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	7.311e-6	15	6958.044	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	1.969e-4	1	NC	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
212			min	-.003	2	-.013	4	0	15	8.155e-6	15	6938.693	4	NC	1
213		12	max	.004	3	-.003	15	.003	1	2.173e-4	1	NC	2	NC	1
214			min	-.004	2	-.013	4	0	15	8.999e-6	15	7153.768	4	NC	1
215		13	max	.005	3	-.003	15	.003	1	2.377e-4	1	NC	1	NC	1
216			min	-.004	2	-.012	4	0	15	9.843e-6	15	7647.84	4	NC	1
217		14	max	.005	3	-.003	15	.003	1	2.581e-4	1	NC	1	NC	1
218			min	-.004	2	-.011	4	0	15	1.069e-5	15	8530.768	4	NC	1
219		15	max	.006	3	-.002	15	.004	1	2.785e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	1.153e-5	15	NC	1	NC	1
221		16	max	.006	3	-.002	15	.005	1	2.988e-4	1	NC	1	NC	1
222			min	-.005	2	-.008	4	0	15	1.237e-5	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.005	1	3.192e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	1	0	15	1.322e-5	15	NC	1	NC	1
225		18	max	.007	3	0	15	.006	1	3.396e-4	1	NC	1	NC	1
226			min	-.006	2	-.004	1	0	15	1.406e-5	15	NC	1	NC	1
227		19	max	.007	3	0	15	.007	1	3.6e-4	1	NC	1	NC	1
228			min	-.006	2	-.002	1	0	15	1.491e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.006	2	0	15	5.423e-5	1	NC	1	NC	3
230			min	0	3	-.007	3	-.007	1	2.26e-6	15	NC	1	3671.894	1
231		2	max	.003	1	.005	2	0	15	5.423e-5	1	NC	1	NC	2
232			min	0	3	-.007	3	-.006	1	2.26e-6	15	NC	1	3991.883	1
233		3	max	.002	1	.005	2	0	15	5.423e-5	1	NC	1	NC	2
234			min	0	3	-.007	3	-.006	1	2.26e-6	15	NC	1	4372.78	1
235		4	max	.002	1	.005	2	0	15	5.423e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.005	1	2.26e-6	15	NC	1	4830.397	1
237		5	max	.002	1	.004	2	0	15	5.423e-5	1	NC	1	NC	2
238			min	0	3	-.006	3	-.005	1	2.26e-6	15	NC	1	5386.223	1
239		6	max	.002	1	.004	2	0	15	5.423e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.004	1	2.26e-6	15	NC	1	6070.056	1
241		7	max	.002	1	.004	2	0	15	5.423e-5	1	NC	1	NC	2
242			min	0	3	-.005	3	-.004	1	2.26e-6	15	NC	1	6924.197	1
243		8	max	.002	1	.003	2	0	15	5.423e-5	1	NC	1	NC	2
244			min	0	3	-.005	3	-.003	1	2.26e-6	15	NC	1	8010.339	1
245		9	max	.001	1	.003	2	0	15	5.423e-5	1	NC	1	NC	2
246			min	0	3	-.004	3	-.003	1	2.26e-6	15	NC	1	9421.35	1
247		10	max	.001	1	.003	2	0	15	5.423e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.002	1	2.26e-6	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	5.423e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	2.26e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	5.423e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	2.26e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	5.423e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.26e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	5.423e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.26e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	5.423e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	2.26e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	5.423e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.26e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	5.423e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.26e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	5.423e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.26e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.423e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.26e-6	15	NC	1	NC	1
267	M6	1	max	.022	2	.028	2	0	1	0	1	NC	4	NC	1
268			min	-.03	3	-.04	3	0	1	0	1	1563.548	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
269		2	max	.02	2	.026	2	0	1	0	1	NC	4	NC	1
270			min	-.028	3	-.038	3	0	1	0	1	1659.316	3	NC	1
271		3	max	.019	2	.024	2	0	1	0	1	NC	4	NC	1
272			min	-.027	3	-.035	3	0	1	0	1	1767.541	3	NC	1
273		4	max	.018	2	.021	2	0	1	0	1	NC	4	NC	1
274			min	-.025	3	-.033	3	0	1	0	1	1890.767	3	NC	1
275		5	max	.017	2	.019	2	0	1	0	1	NC	4	NC	1
276			min	-.023	3	-.031	3	0	1	0	1	2032.267	3	NC	1
277		6	max	.016	2	.017	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.029	3	0	1	0	1	2196.324	3	NC	1
279		7	max	.014	2	.015	2	0	1	0	1	NC	4	NC	1
280			min	-.02	3	-.026	3	0	1	0	1	2388.65	3	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.018	3	-.024	3	0	1	0	1	2617.04	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.022	3	0	1	0	1	2892.414	3	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.019	3	0	1	0	1	3230.55	3	NC	1
287		11	max	.01	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.013	3	-.017	3	0	1	0	1	3655.125	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.015	3	0	1	0	1	4203.357	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.013	3	0	1	0	1	4937.293	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.011	3	0	1	0	1	5968.64	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.008	3	0	1	0	1	7520.84	3	NC	1
297		16	max	.004	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	2	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8497.057	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.014	3	0	1	0	1	7597.911	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.015	3	0	1	0	1	7067.233	3	NC	1
321		9	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.01	2	-.015	3	0	1	0	1	6795.21	3	NC	1
323		10	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6732.777	3	NC	1
325		11	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.012	2	-.016	3	0	1	0	1	6867.947	3	NC	1
327		12	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.013	2	-.016	3	0	1	0	1	7220.328	3	NC	1
329		13	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.014	2	-.015	3	0	1	0	1	7762.567	4	NC	1
331		14	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.016	2	-.014	3	0	1	0	1	8654.202	4	NC	1
333		15	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.017	2	-.012	3	0	1	0	1	NC	1	NC	1
335		16	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.018	2	-.011	3	0	1	0	1	NC	1	NC	1
337		17	max	.02	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.019	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.021	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.02	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.023	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.022	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.02	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.023	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.019	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.022	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.018	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.021	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.019	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.018	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.017	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.015	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.008	2	0	15	1.91e-4	1	NC	1	NC	2
382			min	-.009	3	-.013	3	-.007	1	7.947e-6	15	8159.743	2	8868.921	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
383		2	max	.006	2	.007	2	0	15	1.793e-4	1	NC	1	NC	2
384			min	-.009	3	-.012	3	-.006	1	7.459e-6	15	9323.598	2	9674.187	1
385		3	max	.006	2	.006	2	0	15	1.675e-4	1	NC	1	NC	1
386			min	-.008	3	-.012	3	-.006	1	6.97e-6	15	NC	1	NC	1
387		4	max	.006	2	.005	2	0	15	1.558e-4	1	NC	1	NC	1
388			min	-.008	3	-.011	3	-.005	1	6.482e-6	15	NC	1	NC	1
389		5	max	.005	2	.004	2	0	15	1.44e-4	1	NC	1	NC	1
390			min	-.007	3	-.011	3	-.005	1	5.994e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.323e-4	1	NC	1	NC	1
392			min	-.007	3	-.01	3	-.004	1	5.505e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	1.205e-4	1	NC	1	NC	1
394			min	-.006	3	-.01	3	-.004	1	5.017e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	1.088e-4	1	NC	1	NC	1
396			min	-.006	3	-.009	3	-.003	1	4.528e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	9.7e-5	1	NC	1	NC	1
398			min	-.005	3	-.008	3	-.003	1	4.04e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	8.524e-5	1	NC	1	NC	1
400			min	-.005	3	-.008	3	-.002	1	3.551e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	7.349e-5	1	NC	1	NC	1
402			min	-.004	3	-.007	3	-.002	1	3.063e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	6.173e-5	1	NC	1	NC	1
404			min	-.004	3	-.006	3	-.001	1	2.574e-6	15	NC	1	NC	1
405		13	max	.002	2	0	2	0	15	4.998e-5	1	NC	1	NC	1
406			min	-.003	3	-.005	3	-.001	1	2.086e-6	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	3.822e-5	1	NC	1	NC	1
408			min	-.003	3	-.005	3	0	1	1.598e-6	15	NC	1	NC	1
409		15	max	.002	2	0	15	0	15	2.647e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	1.109e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.471e-5	1	NC	1	NC	1
412			min	-.002	3	-.003	3	0	1	6.207e-7	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	2.955e-6	1	NC	1	NC	1
414			min	-.001	3	-.002	3	0	1	1.311e-7	10	NC	1	NC	1
415		18	max	0	2	0	15	0	15	-1.697e-7	12	NC	1	NC	1
416			min	0	3	-.001	3	0	1	-8.8e-6	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-8.446e-7	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.055e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	6.9e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.841e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-5.598e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.348e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.404e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-3.386e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-2.248e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-5.425e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	15	-3.092e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-7.463e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-3.936e-6	15	NC	1	NC	1
430			min	-.002	2	-.009	4	0	1	-9.501e-5	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	0	15	-4.779e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-1.154e-4	1	8610.037	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-5.623e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.358e-4	1	7729.862	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-6.467e-6	15	NC	2	NC	1
436			min	-.003	2	-.013	4	-.001	1	-1.562e-4	1	7209.422	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-7.311e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-1.765e-4	1	6958.044	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-8.155e-6	15	NC	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
440			min	-.003	2	-.013	4	-.002	1	-1.969e-4	1	6938.693	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-8.999e-6	15	NC	2	NC	1
442			min	-.004	2	-.013	4	-.003	1	-2.173e-4	1	7153.768	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-9.843e-6	15	NC	1	NC	1
444			min	-.004	2	-.012	4	-.003	1	-2.377e-4	1	7647.84	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-1.069e-5	15	NC	1	NC	1
446			min	-.004	2	-.011	4	-.003	1	-2.581e-4	1	8530.768	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-1.153e-5	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.004	1	-2.785e-4	1	NC	1	NC	1
449		16	max	.006	3	-.002	15	0	15	-1.237e-5	15	NC	1	NC	1
450			min	-.005	2	-.008	4	-.005	1	-2.988e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-1.322e-5	15	NC	1	NC	1
452			min	-.005	2	-.006	1	-.005	1	-3.192e-4	1	NC	1	NC	1
453		18	max	.007	3	0	15	0	15	-1.406e-5	15	NC	1	NC	1
454			min	-.006	2	-.004	1	-.006	1	-3.396e-4	1	NC	1	NC	1
455		19	max	.007	3	0	15	0	15	-1.491e-5	15	NC	1	NC	1
456			min	-.006	2	-.002	1	-.007	1	-3.6e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.006	2	.007	1	-2.26e-6	15	NC	1	NC	3
458			min	0	3	-.007	3	0	15	-5.423e-5	1	NC	1	3671.894	1
459		2	max	.003	1	.005	2	.006	1	-2.26e-6	15	NC	1	NC	2
460			min	0	3	-.007	3	0	15	-5.423e-5	1	NC	1	3991.883	1
461		3	max	.002	1	.005	2	.006	1	-2.26e-6	15	NC	1	NC	2
462			min	0	3	-.007	3	0	15	-5.423e-5	1	NC	1	4372.78	1
463		4	max	.002	1	.005	2	.005	1	-2.26e-6	15	NC	1	NC	2
464			min	0	3	-.006	3	0	15	-5.423e-5	1	NC	1	4830.397	1
465		5	max	.002	1	.004	2	.005	1	-2.26e-6	15	NC	1	NC	2
466			min	0	3	-.006	3	0	15	-5.423e-5	1	NC	1	5386.223	1
467		6	max	.002	1	.004	2	.004	1	-2.26e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-5.423e-5	1	NC	1	6070.056	1
469		7	max	.002	1	.004	2	.004	1	-2.26e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-5.423e-5	1	NC	1	6924.197	1
471		8	max	.002	1	.003	2	.003	1	-2.26e-6	15	NC	1	NC	2
472			min	0	3	-.005	3	0	15	-5.423e-5	1	NC	1	8010.339	1
473		9	max	.001	1	.003	2	.003	1	-2.26e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-5.423e-5	1	NC	1	9421.35	1
475		10	max	.001	1	.003	2	.002	1	-2.26e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-5.423e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.002	1	-2.26e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-5.423e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-2.26e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-5.423e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-2.26e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-5.423e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-2.26e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-5.423e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-2.26e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-5.423e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.26e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-5.423e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.26e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-5.423e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.26e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-5.423e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.26e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.423e-5	1	NC	1	NC	1
495	M1	1	max	.009	3	.123	2	0	1	1.33e-2	2	NC	1	NC	1
496			min	-.005	2	-.021	3	0	15	-2.65e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.009	3	.059	2	0	15	6.528e-3	2	NC	4	NC	1
498			min	-.005	2	-.008	3	-.005	1	-1.311e-2	3	1786.617	2	NC	1
499		3	max	.009	3	.014	3	0	15	3.222e-5	10	NC	5	NC	1
500			min	-.005	2	-.011	2	-.007	1	-1.332e-4	3	861.096	2	NC	1
501		4	max	.009	3	.051	3	0	15	4.474e-3	2	NC	5	NC	1
502			min	-.005	2	-.089	2	-.007	1	-4.998e-3	3	543.603	2	NC	1
503		5	max	.009	3	.1	3	0	15	8.932e-3	2	NC	5	NC	1
504			min	-.005	2	-.17	2	-.005	1	-9.862e-3	3	392.342	2	NC	1
505		6	max	.008	3	.153	3	0	15	1.339e-2	2	NC	15	NC	1
506			min	-.005	2	-.249	2	-.002	1	-1.473e-2	3	309.015	2	NC	1
507		7	max	.008	3	.204	3	0	1	1.785e-2	2	NC	15	NC	1
508			min	-.005	2	-.32	2	0	3	-1.959e-2	3	259.829	2	NC	1
509		8	max	.008	3	.247	3	0	1	2.231e-2	2	9603.901	15	NC	1
510			min	-.005	2	-.376	2	0	15	-2.446e-2	3	230.736	2	NC	1
511		9	max	.008	3	.275	3	0	15	2.53e-2	2	8979.588	15	NC	1
512			min	-.004	2	-.411	2	0	1	-2.46e-2	3	215.592	2	NC	1
513		10	max	.008	3	.285	3	0	1	2.731e-2	2	8789.266	15	NC	1
514			min	-.004	2	-.423	2	0	15	-2.161e-2	3	211.147	2	NC	1
515		11	max	.008	3	.278	3	0	1	2.933e-2	2	8979.242	15	NC	1
516			min	-.004	2	-.411	2	0	15	-1.862e-2	3	216.302	2	NC	1
517		12	max	.007	3	.255	3	0	15	2.83e-2	2	9603.163	15	NC	1
518			min	-.004	2	-.374	2	0	1	-1.558e-2	3	232.895	2	NC	1
519		13	max	.007	3	.217	3	0	15	2.27e-2	2	NC	15	NC	1
520			min	-.004	2	-.316	2	0	1	-1.248e-2	3	265.078	2	NC	1
521		14	max	.007	3	.169	3	.002	1	1.709e-2	2	NC	15	NC	1
522			min	-.004	2	-.242	2	0	15	-9.366e-3	3	320.217	2	NC	1
523		15	max	.007	3	.115	3	.004	1	1.149e-2	2	NC	5	NC	1
524			min	-.004	2	-.162	2	0	15	-6.257e-3	3	415.365	2	NC	1
525		16	max	.007	3	.059	3	.006	1	5.881e-3	2	NC	5	NC	1
526			min	-.004	2	-.08	2	0	15	-3.148e-3	3	592.077	2	NC	1
527		17	max	.007	3	.005	3	.007	1	4.816e-4	1	NC	5	NC	1
528			min	-.004	2	-.006	2	0	15	-3.925e-5	3	970.854	2	NC	1
529		18	max	.007	3	.055	2	.005	1	1.003e-2	2	NC	4	NC	1
530			min	-.004	2	-.044	3	0	15	-4.14e-3	3	2065.832	2	NC	1
531		19	max	.007	3	.11	2	0	15	2.014e-2	2	NC	1	NC	1
532			min	-.004	2	-.089	3	0	1	-8.409e-3	3	NC	1	NC	1
533	M5	1	max	.028	3	.276	2	0	1	0	1	NC	1	NC	1
534			min	-.019	2	-.014	3	0	1	0	1	NC	1	NC	1
535		2	max	.028	3	.13	2	0	1	0	1	NC	5	NC	1
536			min	-.019	2	0	3	0	1	0	1	794.017	2	NC	1
537		3	max	.028	3	.043	3	0	1	0	1	NC	5	NC	1
538			min	-.02	2	-.034	2	0	1	0	1	373.681	2	NC	1
539		4	max	.028	3	.14	3	0	1	0	1	NC	15	NC	1
540			min	-.019	2	-.229	2	0	1	0	1	228.806	2	NC	1
541		5	max	.027	3	.275	3	0	1	0	1	7609.403	15	NC	1
542			min	-.019	2	-.441	2	0	1	0	1	161.093	2	NC	1
543		6	max	.026	3	.427	3	0	1	0	1	5855.481	15	NC	1
544			min	-.019	2	-.651	2	0	1	0	1	124.547	2	NC	1
545		7	max	.026	3	.575	3	0	1	0	1	4843.207	15	NC	1
546			min	-.018	2	-.841	2	0	1	0	1	103.335	2	NC	1
547		8	max	.025	3	.7	3	0	1	0	1	4254.893	15	NC	1
548			min	-.018	2	-.993	2	0	1	0	1	90.958	2	NC	1
549		9	max	.025	3	.78	3	0	1	0	1	3953.297	15	NC	1
550			min	-.018	2	-1.09	2	0	1	0	1	84.596	2	NC	1
551		10	max	.024	3	.809	3	0	1	0	1	3862.453	15	NC	1
552			min	-.017	2	-1.122	2	0	1	0	1	82.733	2	NC	1
553		11	max	.024	3	.789	3	0	1	0	1	3953.433	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.017	2	-1.09	2	0	1	0	1	84.887	2	NC	1
555		12	max	.023	3	.721	3	0	1	0	1	4255.21	15	NC	1
556			min	-.017	2	-.989	2	0	1	0	1	91.915	2	NC	1
557		13	max	.023	3	.611	3	0	1	0	1	4843.846	15	NC	1
558			min	-.016	2	-.829	2	0	1	0	1	105.818	2	NC	1
559		14	max	.022	3	.472	3	0	1	0	1	5856.719	15	NC	1
560			min	-.016	2	-.63	2	0	1	0	1	130.145	2	NC	1
561		15	max	.021	3	.318	3	0	1	0	1	7611.836	15	NC	1
562			min	-.016	2	-.414	2	0	1	0	1	173.296	2	NC	1
563		16	max	.021	3	.161	3	0	1	0	1	NC	15	NC	1
564			min	-.016	2	-.203	2	0	1	0	1	256.378	2	NC	1
565		17	max	.02	3	.014	3	0	1	0	1	NC	5	NC	1
566			min	-.015	2	-.019	2	0	1	0	1	441.614	2	NC	1
567		18	max	.02	3	.12	2	0	1	0	1	NC	5	NC	1
568			min	-.015	2	-.111	3	0	1	0	1	978.055	2	NC	1
569		19	max	.02	3	.234	2	0	1	0	1	NC	1	NC	1
570			min	-.015	2	-.225	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.009	3	.123	2	0	15	2.65e-2	3	NC	1	NC	1
572			min	-.005	2	-.021	3	0	1	-1.33e-2	2	NC	1	NC	1
573		2	max	.009	3	.059	2	.005	1	1.311e-2	3	NC	4	NC	1
574			min	-.005	2	-.008	3	0	15	-6.528e-3	2	1786.617	2	NC	1
575		3	max	.009	3	.014	3	.007	1	1.332e-4	3	NC	5	NC	1
576			min	-.005	2	-.011	2	0	15	-3.222e-5	10	861.096	2	NC	1
577		4	max	.009	3	.051	3	.007	1	4.998e-3	3	NC	5	NC	1
578			min	-.005	2	-.089	2	0	15	-4.474e-3	2	543.603	2	NC	1
579		5	max	.009	3	.1	3	.005	1	9.862e-3	3	NC	5	NC	1
580			min	-.005	2	-.17	2	0	15	-8.932e-3	2	392.342	2	NC	1
581		6	max	.008	3	.153	3	.002	1	1.473e-2	3	NC	15	NC	1
582			min	-.005	2	-.249	2	0	15	-1.339e-2	2	309.015	2	NC	1
583		7	max	.008	3	.204	3	0	3	1.959e-2	3	NC	15	NC	1
584			min	-.005	2	-.32	2	0	1	-1.785e-2	2	259.829	2	NC	1
585		8	max	.008	3	.247	3	0	15	2.446e-2	3	9603.901	15	NC	1
586			min	-.005	2	-.376	2	0	1	-2.231e-2	2	230.736	2	NC	1
587		9	max	.008	3	.275	3	0	1	2.46e-2	3	8979.588	15	NC	1
588			min	-.004	2	-.411	2	0	15	-2.53e-2	2	215.592	2	NC	1
589		10	max	.008	3	.285	3	0	15	2.161e-2	3	8789.266	15	NC	1
590			min	-.004	2	-.423	2	0	1	-2.731e-2	2	211.147	2	NC	1
591		11	max	.008	3	.278	3	0	15	1.862e-2	3	8979.242	15	NC	1
592			min	-.004	2	-.411	2	0	1	-2.933e-2	2	216.302	2	NC	1
593		12	max	.007	3	.255	3	0	1	1.558e-2	3	9603.163	15	NC	1
594			min	-.004	2	-.374	2	0	15	-2.83e-2	2	232.895	2	NC	1
595		13	max	.007	3	.217	3	0	1	1.248e-2	3	NC	15	NC	1
596			min	-.004	2	-.316	2	0	15	-2.27e-2	2	265.078	2	NC	1
597		14	max	.007	3	.169	3	0	15	9.366e-3	3	NC	15	NC	1
598			min	-.004	2	-.242	2	-.002	1	-1.709e-2	2	320.217	2	NC	1
599		15	max	.007	3	.115	3	0	15	6.257e-3	3	NC	5	NC	1
600			min	-.004	2	-.162	2	-.004	1	-1.149e-2	2	415.365	2	NC	1
601		16	max	.007	3	.059	3	0	15	3.148e-3	3	NC	5	NC	1
602			min	-.004	2	-.08	2	-.006	1	-5.881e-3	2	592.077	2	NC	1
603		17	max	.007	3	.005	3	0	15	3.925e-5	3	NC	5	NC	1
604			min	-.004	2	-.006	2	-.007	1	-4.816e-4	1	970.854	2	NC	1
605		18	max	.007	3	.055	2	0	15	4.14e-3	3	NC	4	NC	1
606			min	-.004	2	-.044	3	-.005	1	-1.003e-2	2	2065.832	2	NC	1
607		19	max	.007	3	.11	2	0	1	8.409e-3	3	NC	1	NC	1
608			min	-.004	2	-.089	3	0	15	-2.014e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-42 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

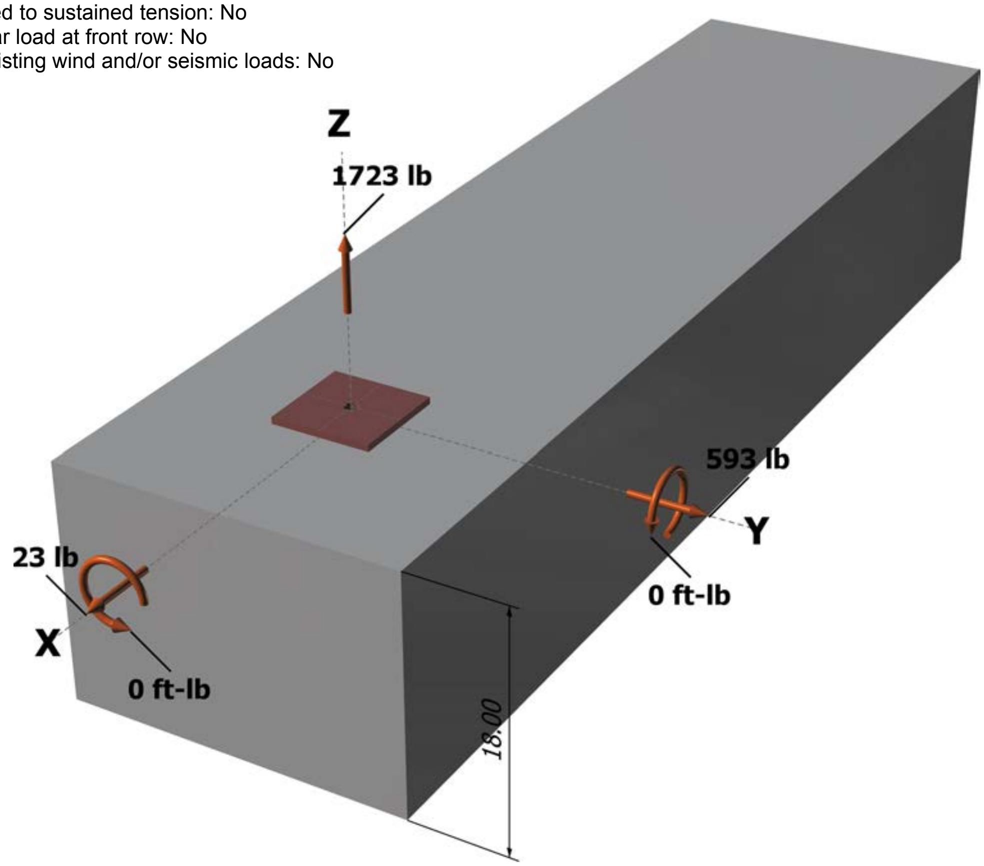
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

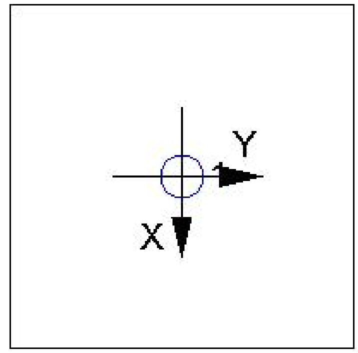
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
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	5.247	10215

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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	7.00	6947

$\phi V_{cby} = \phi\ (A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

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)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

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	7.00	6947

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

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)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

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)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**593**	**3156**	**0.19**	**Pass (Governs)**
T Concrete breakout y+	593	3934	0.15	Pass
T Concrete breakout x+	23	3018	0.01	Pass
|| Concrete breakout y+	23	8508	0.00	Pass
|| Concrete breakout x+	593	6875	0.09	Pass
Concrete breakout, combined	-	-	0.15	Pass
Pryout	593	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	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:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 37-42 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

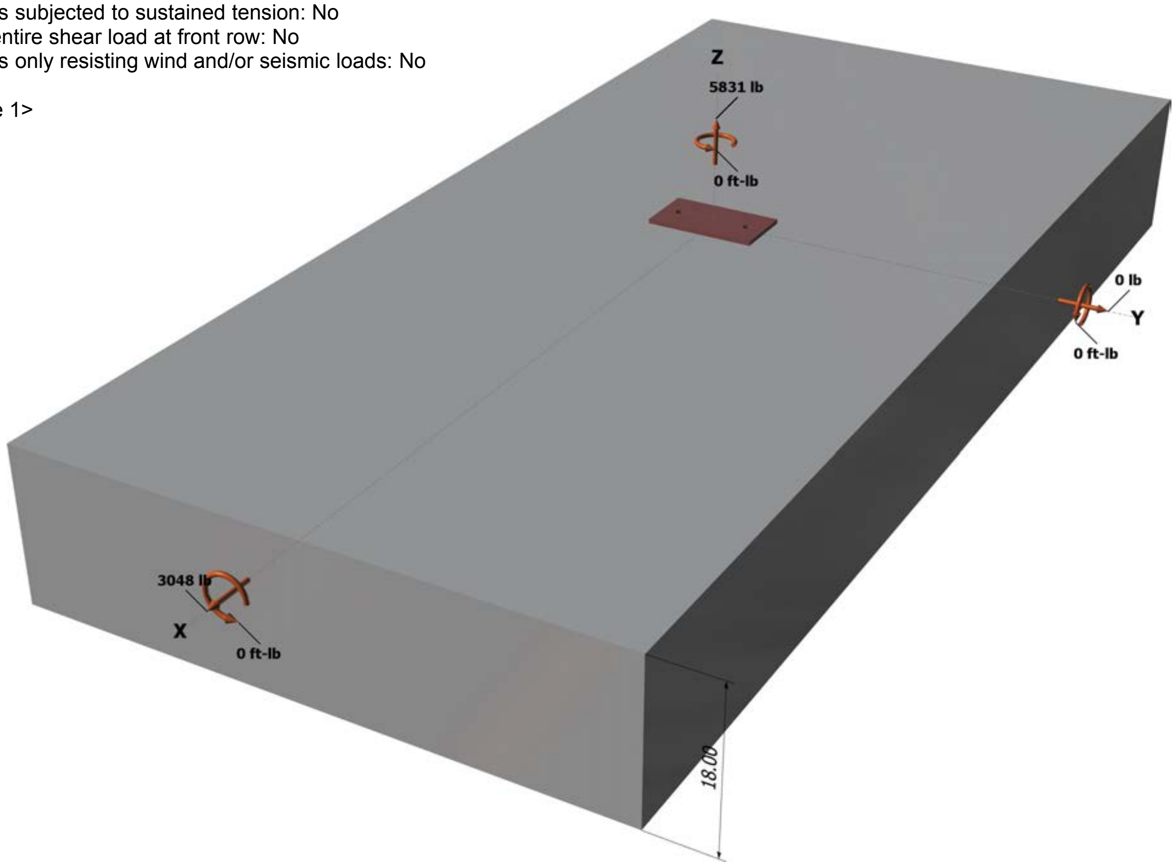
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

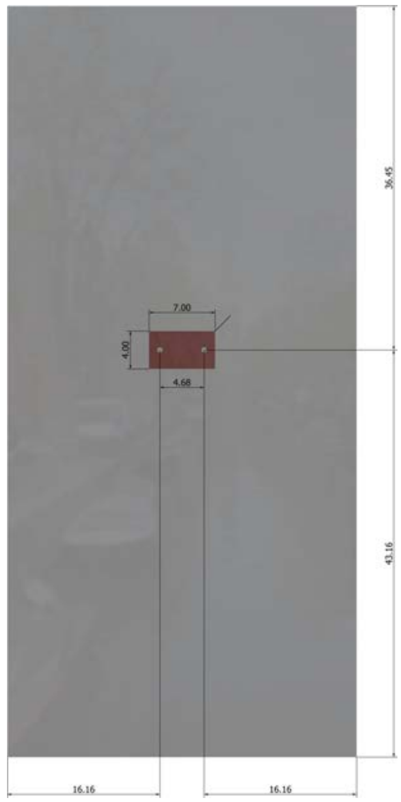
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

Base Plate
Length x Width x Thickness (inch): 4.00 x 7.00 x 0.28

<Figure 1>



<Figure 2>



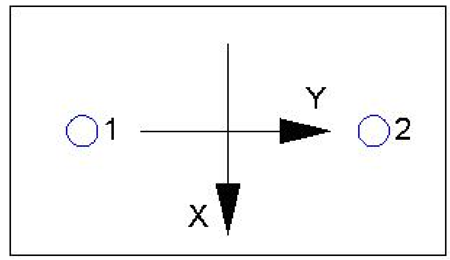
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2915.5	1524.0	0.0	1524.0
2	2915.5	1524.0	0.0	1524.0
Sum	5831.0	3048.0	0.0	3048.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5831
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	6.000	12492

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
666.00	648.00	1.000	0.969	1.000	1.000	15593	0.70	10875

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	16.16	24369

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
872.64	1175.16	1.000	1.000	1.000	24369	0.70	25334

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	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

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
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

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	2916	6071	0.48	Pass
Concrete breakout	5831	10231	0.57	Pass
Adhesive	**5831**	**8093**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1524**	**3156**	**0.48**	**Pass (Governs)**
T Concrete breakout x+	3048	10875	0.28	Pass
|| Concrete breakout y-	1524	25334	0.06	Pass
Pryout	3048	20601	0.15	Pass

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

Sec. D.7.3	0.72	0.48	120.3 %	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.