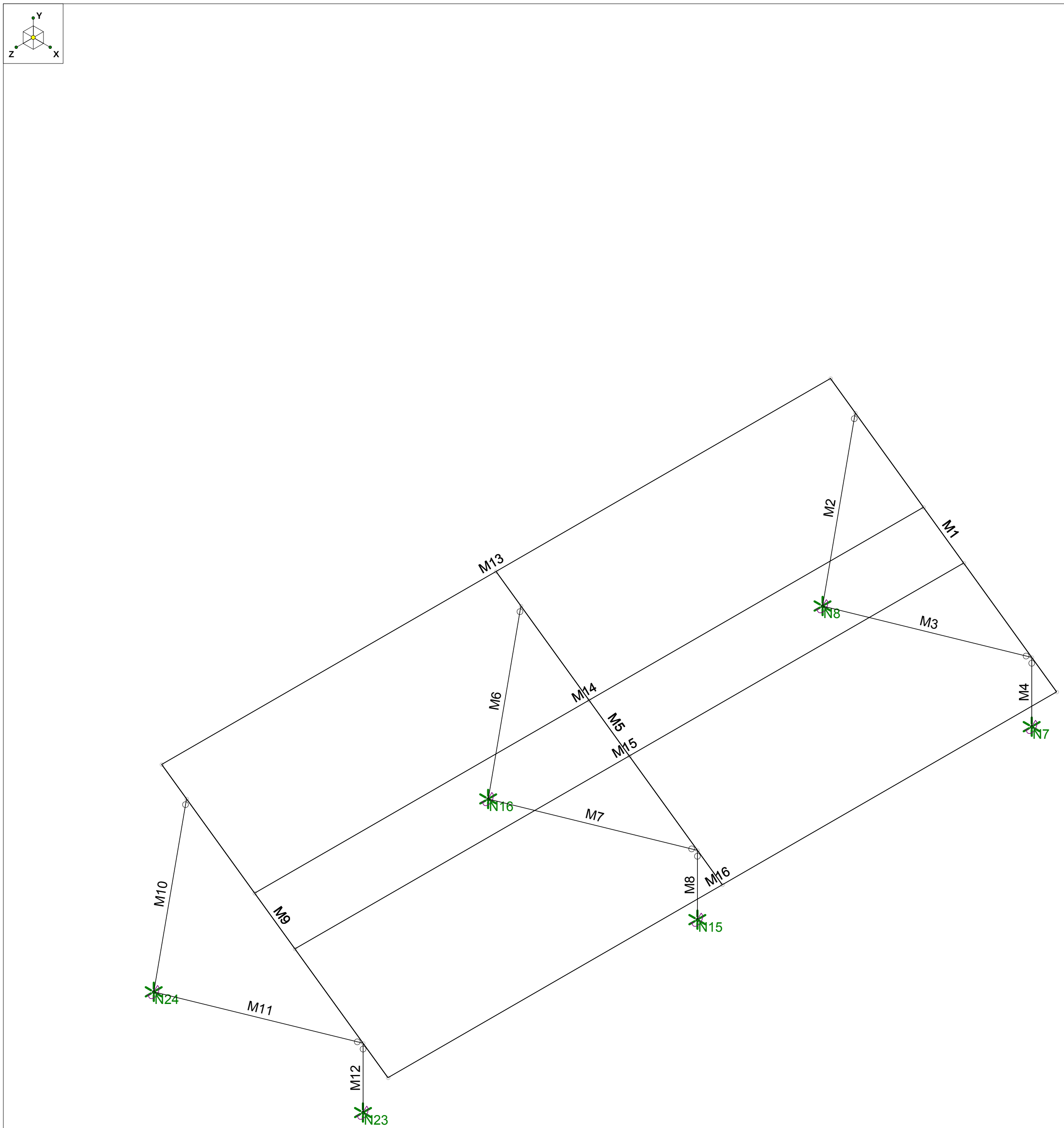


Schletter, Inc.		35° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

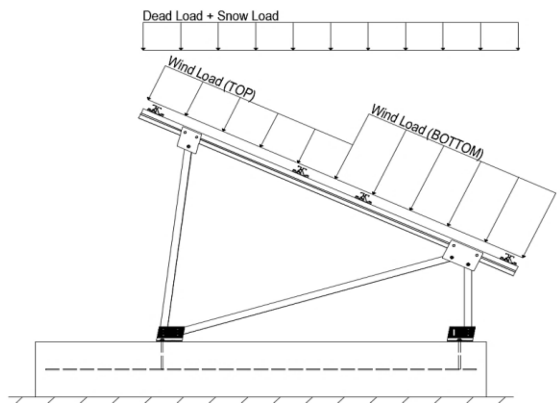
1.2 Construction

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 = 35°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - 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 = 14.43 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.64
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 160 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 40.19 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.200	*(Pressure)*
$Cf+_{BOTTOM}$	=	2.000	
$Cf-_{TOP, OUTER\ PURLIN}$	=	-2.700	
$Cf-_{TOP, INNER\ PURLIN}$	=	-2.100	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.200	

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.06	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	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

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

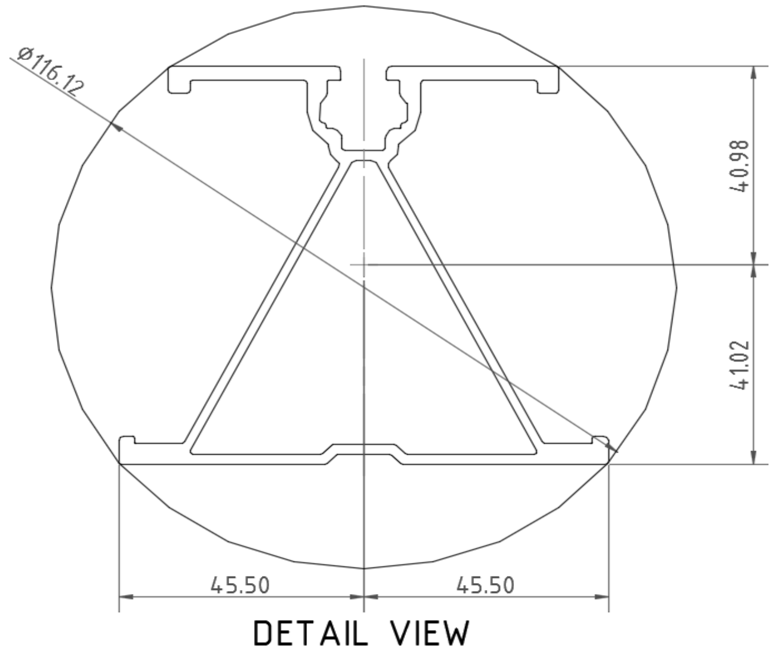
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

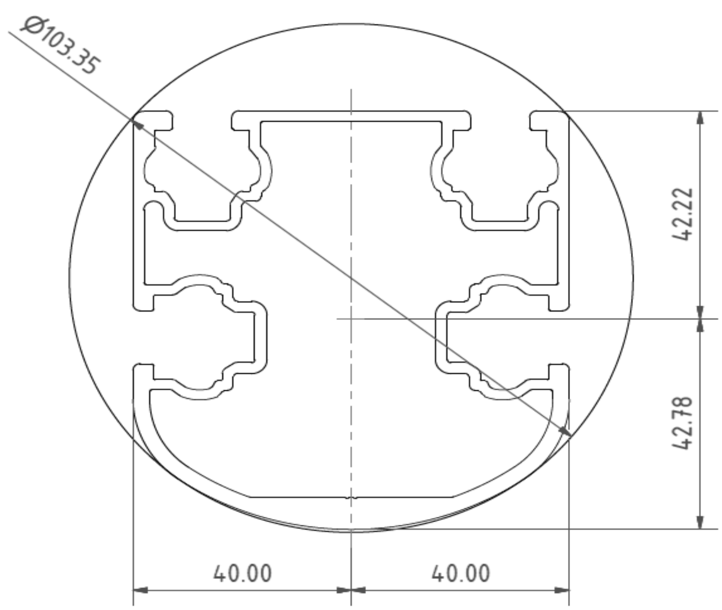
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	75	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.413	k-ft
M_z =	-0.005	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	51%	



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).

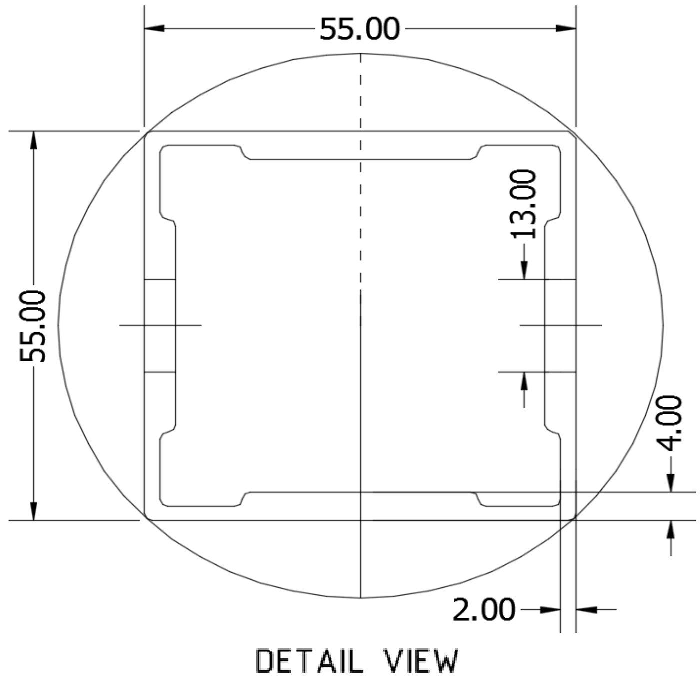
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.508	k-ft
M_z =	0.000	k-ft
P_n =	-0.947	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	74%	



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).

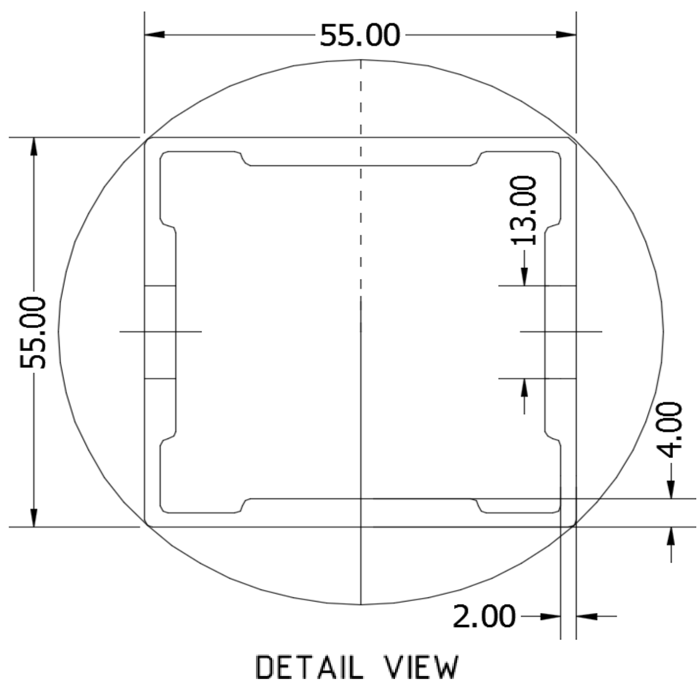
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.364	k-ft
P_n =	0.313	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	27%	



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).

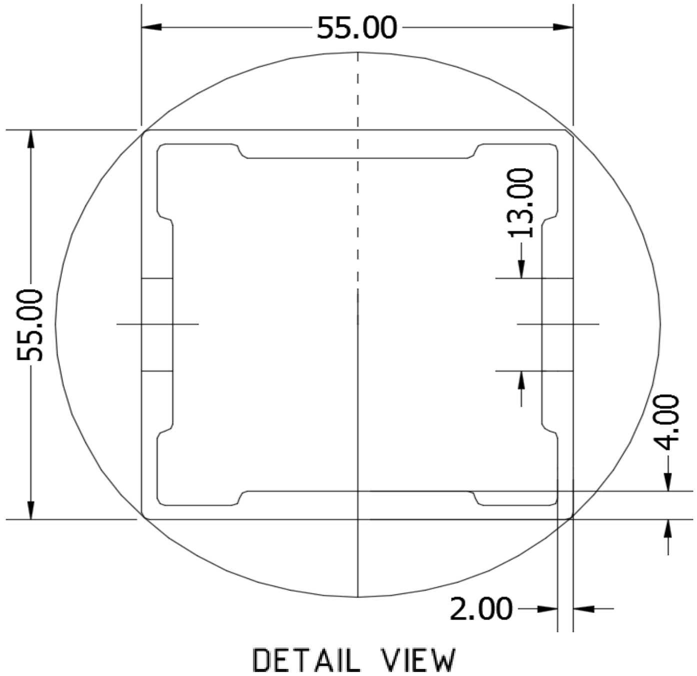
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.755	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	38%	



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 =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	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 =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.814	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

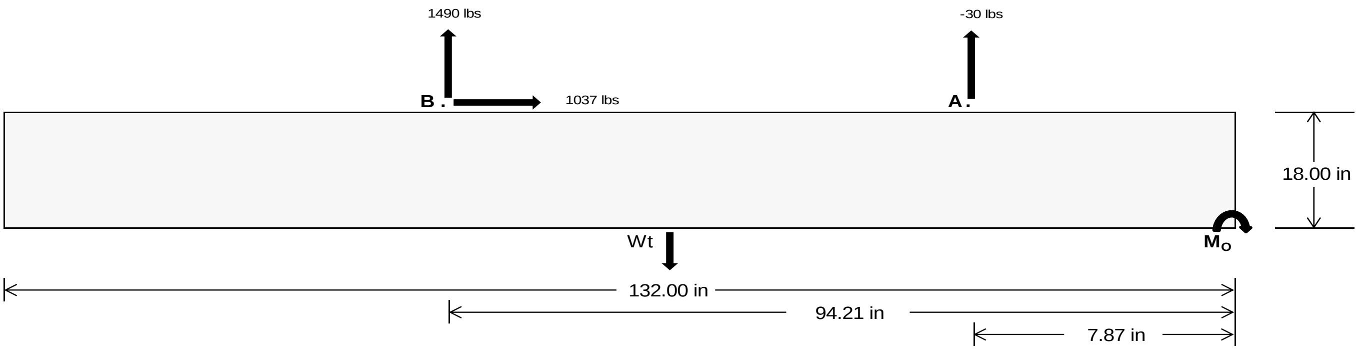
5.1 Helical Pile Foundations

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 =	110.40	6468.09	k
Compressive Load =	2304.77	4599.51	k
Lateral Load =	263.92	4491.43	k
Moment (Weak Axis) =	0.48	0.13	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).



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (2) #5 rebar.

<u>Overturning Check</u>

M_O =	158831.8 in-lbs
Resisting Force Required =	2406.54 lbs
S.F. =	1.67
Weight Required =	4010.90 lbs
Minimum Width =	31 in in
Weight Provided =	6180.63 lbs

A minimum 132in long x 31in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force =	1036.50 lbs
Friction =	0.4
Weight Required =	2591.26 lbs
Resisting Weight =	6180.63 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force =	1036.50 lbs
Cohesion =	130 psf
Area =	28.42 ft^2
Resisting =	3090.31 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 31in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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

Shear key is not required.

<u>Bearing Pressure</u>

	Ballast Width			
	31 in	32 in	33 in	34 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.58 ft) =	6181 lbs	6380 lbs	6579 lbs	6779 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in
F_A	681 lbs	681 lbs	681 lbs	681 lbs	960 lbs	960 lbs	960 lbs	960 lbs	1144 lbs	1144 lbs	1144 lbs	1144 lbs	59 lbs	59 lbs	59 lbs	59 lbs
F_B	591 lbs	591 lbs	591 lbs	591 lbs	2032 lbs	2032 lbs	2032 lbs	2032 lbs	1892 lbs	1892 lbs	1892 lbs	1892 lbs	-2981 lbs	-2981 lbs	-2981 lbs	-2981 lbs
F_V	88 lbs	88 lbs	88 lbs	88 lbs	1867 lbs	1867 lbs	1867 lbs	1867 lbs	1456 lbs	1456 lbs	1456 lbs	1456 lbs	-2073 lbs	-2073 lbs	-2073 lbs	-2073 lbs
P_{total}	7453 lbs	7652 lbs	7851 lbs	8051 lbs	9173 lbs	9373 lbs	9572 lbs	9771 lbs	9217 lbs	9416 lbs	9615 lbs	9815 lbs	787 lbs	906 lbs	1026 lbs	1146 lbs
M	2038 lbs-ft	2038 lbs-ft	2038 lbs-ft	2038 lbs-ft	2674 lbs-ft	2674 lbs-ft	2674 lbs-ft	2674 lbs-ft	3278 lbs-ft	3278 lbs-ft	3278 lbs-ft	3278 lbs-ft	4184 lbs-ft	4184 lbs-ft	4184 lbs-ft	4184 lbs-ft
e	0.27 ft	0.27 ft	0.26 ft	0.25 ft	0.29 ft	0.29 ft	0.28 ft	0.27 ft	0.36 ft	0.35 ft	0.34 ft	0.33 ft	5.32 ft	4.62 ft	4.08 ft	3.65 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}	223.1 psf	223.0 psf	222.8 psf	222.6 psf	271.5 psf	269.8 psf	268.2 psf	266.7 psf	261.4 psf	260.0 psf	258.8 psf	257.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	301.4 psf	298.8 psf	296.3 psf	294.0 psf	374.1 psf	369.2 psf	364.7 psf	360.3 psf	387.3 psf	381.9 psf	377.0 psf	372.3 psf	1116.2 psf	256.4 psf	174.9 psf	145.9 psf

Maximum Bearing Pressure =	1116 psf
Allowable Bearing Pressure =	1500 psf

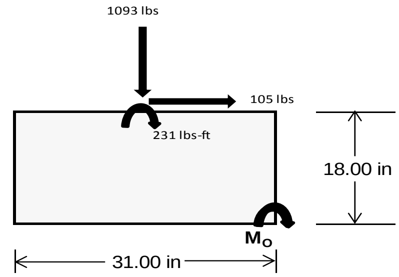
Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 1023.3 ft-lbs
Resisting Force Required = 792.20 lbs
S.F. = 1.67
Weight Required = 1320.33 lbs
Minimum Width = 31 in in
Weight Provided = 6180.63 lbs

A minimum 132in long x 31in 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	31 in			31 in			31 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	245 lbs	402 lbs	117 lbs	484 lbs	1093 lbs	387 lbs	117 lbs	118 lbs	-11 lbs
F_V	144 lbs	141 lbs	146 lbs	107 lbs	105 lbs	112 lbs	145 lbs	142 lbs	146 lbs
P_{total}	7897 lbs	8054 lbs	7769 lbs	7768 lbs	8377 lbs	7671 lbs	2354 lbs	2355 lbs	2227 lbs
M	526 lbs-ft	517 lbs-ft	532 lbs-ft	391 lbs-ft	389 lbs-ft	407 lbs-ft	526 lbs-ft	517 lbs-ft	528 lbs-ft
e	0.07 ft	0.06 ft	0.07 ft	0.05 ft	0.05 ft	0.05 ft	0.22 ft	0.22 ft	0.24 ft
L/6	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft
f_{min}	234.9 psf	241.1 psf	229.9 psf	241.4 psf	263.0 psf	236.7 psf	39.8 psf	40.6 psf	35.2 psf
f_{max}	320.9 psf	325.7 psf	316.8 psf	305.3 psf	326.6 psf	303.2 psf	125.8 psf	125.1 psf	121.5 psf

Maximum Bearing Pressure = 327 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 31in wide x 18in tall ballast foundation and fiber reinforcing with (2) #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.

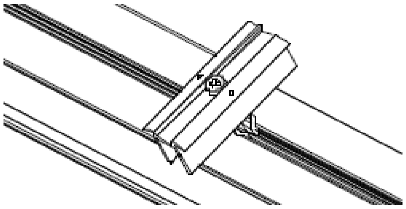
6. DESIGN OF JOINTS AND CONNECTIONS

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.

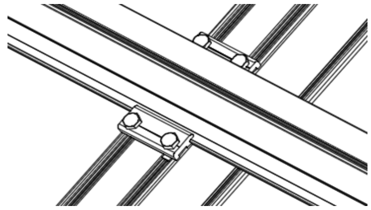
Fastening of Modules to Purlins

Maximum Uplifting Force =	1.027	k
Allowable Uplift =	1.214	k
Utilization =	85%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.308	k
Allowable Uplift =	4.357	k
Utilization =	53%	



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 =	1.773	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	24%	

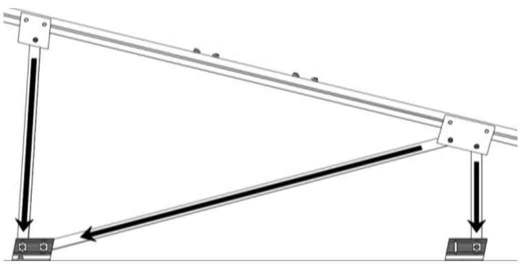
Rear Strut

Maximum Axial Load =	4.276	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	58%	

Diagonal Strut

Maximum Axial Load =	2.814	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	38%	

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

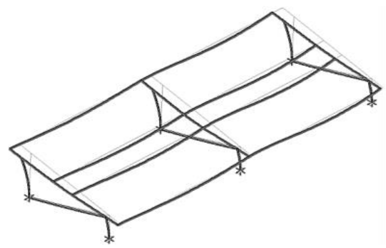
7.1 Seismic Drift

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} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.369	in

$0.369 \le 1.076$, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 75 in

J = 0.432

207.485

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

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= 28.7 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 = 75

J = 0.432

131.948

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

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 = 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

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_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

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 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

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 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)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_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

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_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 = **<u>55x55</u>**

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

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

$\varphi F_L =$ 28.2 ksi

3.4.16 (Weak)

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

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

$\varphi F_L =$ 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

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St$=	28.2	ksi	$\varphi F_L Wk$=	28.2	ksi
Ix =	279836	mm^4	Iy =	279836	mm^4
	0.672	in^4		0.672	in^4
y =	27.5	mm	x =	27.5	mm
Sx =	0.621	in^3	Sy =	0.621	in^3
$M_{max}St$ =	1.460	k-ft	$M_{max}Wk$ =	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

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

$\varphi F_L =$ 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)
$\varphi F_L = \varphi c[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

$L_b =$ 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.8 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
$\varphi F_L = \varphi b[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:

3.4.14

$L_b =$ 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 29.8

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
$\varphi F_L = \varphi b[Bp\text{-}1.6Dp*b/t]$
$\varphi F_L =$ 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 = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 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

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 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			.8			8		

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	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	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	-134.509	-134.509	0	0
2	M14	y	-134.509	-134.509	0	0
3	M15	y	-224.182	-224.182	0	0
4	M16	y	-224.182	-224.182	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	302.645	302.645	0	0
2	M14	y	235.391	235.391	0	0
3	M15	y	134.509	134.509	0	0
4	M16	y	134.509	134.509	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
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	1003.559	2	1181.811	2	.244	1	0	1	0	1	0	1
2		min	-1165.806	3	-1623.186	3	-15.494	5	-.096	4	0	1	0	1
3	N7	max	.032	3	660.843	1	-.448	10	0	10	0	1	0	1
4		min	-.184	2	-84.921	5	-203.019	4	-.37	4	0	1	0	1
5	N15	max	.156	3	1772.9	2	0	11	0	11	0	1	0	1
6		min	-1.682	2	62.423	15	-194.846	4	-.359	4	0	1	0	1
7	N16	max	3138.35	2	3538.086	2	0	1	0	11	0	1	0	1
8		min	-3454.946	3	-4975.451	3	-15.765	5	-.097	4	0	1	0	1
9	N23	max	.032	3	660.843	1	4.34	1	.008	1	0	1	0	1
10		min	-.184	2	59.059	12	-198.869	5	-.364	4	0	1	0	1
11	N24	max	1003.559	2	1181.811	2	-.025	10	0	10	0	1	0	1
12		min	-1165.806	3	-1623.186	3	-15.945	5	-.097	4	0	1	0	1
13	Totals:	max	5143.418	2	8910.444	2	0	3						
14		min	-5786.339	3	-7884.495	3	-641.895	5						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	46.419	4	359.787	2	-9.044	12	0	15	.116	4	0	4
2			min	3.346	10	-705.95	3	-107.749	1	-.011	2	.008	10	0	3
3		2	max	39.29	4	250.263	2	-7.621	12	0	15	.076	4	.418	3
4			min	3.346	10	-498.828	3	-82.02	1	-.011	2	0	10	-.212	2
5		3	max	37.705	1	140.739	2	-6.198	12	0	15	.046	5	.693	3
6			min	3.346	10	-291.706	3	-56.29	1	-.011	2	-.025	1	-.348	2
7		4	max	37.705	1	31.214	2	-2.681	10	0	15	.026	5	.823	3
8			min	3.346	10	-84.584	3	-36.456	4	-.011	2	-.055	1	-.407	2
9		5	max	37.705	1	122.537	3	1.25	10	0	15	.007	5	.81	3
10			min	3.346	10	-78.31	2	-27.775	4	-.011	2	-.067	1	-.391	2
11		6	max	37.705	1	329.659	3	20.899	1	0	15	-.005	12	.653	3
12			min	.333	15	-187.834	2	-23.684	5	-.011	2	-.061	1	-.299	2
13		7	max	37.705	1	536.781	3	46.629	1	0	15	-.003	10	.352	3
14			min	-6.504	5	-297.358	2	-21.482	5	-.011	2	-.038	1	-.13	2
15		8	max	37.705	1	743.903	3	72.359	1	0	15	.007	2	.114	2
16			min	-13.633	5	-406.883	2	-19.281	5	-.011	2	-.04	4	-.092	3
17		9	max	37.705	1	951.025	3	98.089	1	0	15	.062	1	.435	2
18			min	-20.761	5	-516.407	2	-17.079	5	-.011	2	-.052	5	-.681	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
19		10	max	44.646	4	1158.146	3	123.818	1	.004	3	.14	1	.832	2
20			min	3.346	10	-625.931	2	-81.58	14	-.011	2	-.005	3	-1.413	3
21		11	max	37.705	1	516.407	2	-2.34	12	.011	2	.077	4	.435	2
22			min	3.346	10	-951.025	3	-98.089	1	0	15	-.008	3	-.681	3
23		12	max	37.705	1	406.883	2	-.886	3	.011	2	.04	4	.114	2
24			min	3.346	10	-743.903	3	-72.359	1	0	15	-.01	3	-.092	3
25		13	max	37.705	1	297.358	2	1.248	3	.011	2	.019	5	.352	3
26			min	3.346	10	-536.781	3	-46.629	1	0	15	-.038	1	-.13	2
27		14	max	37.705	1	187.834	2	3.383	3	.011	2	0	15	.653	3
28			min	3.346	10	-329.659	3	-31.914	4	0	15	-.061	1	-.299	2
29		15	max	37.705	1	78.31	2	5.517	3	.011	2	-.003	12	.81	3
30			min	-.996	5	-122.537	3	-24.734	5	0	15	-.067	1	-.391	2
31		16	max	37.705	1	84.584	3	30.56	1	.011	2	0	3	.823	3
32			min	-8.125	5	-31.214	2	-22.533	5	0	15	-.055	1	-.407	2
33		17	max	37.705	1	291.706	3	56.29	1	.011	2	.006	3	.693	3
34			min	-15.254	5	-140.739	2	-20.331	5	0	15	-.056	4	-.348	2
35		18	max	37.705	1	498.828	3	82.02	1	.011	2	.023	1	.418	3
36			min	-22.382	5	-250.263	2	-18.129	5	0	15	-.063	5	-.212	2
37		19	max	37.705	1	705.95	3	107.749	1	.011	2	.089	1	0	2
38			min	-29.511	5	-359.787	2	-15.928	5	0	15	-.075	5	0	3
39	M14	1	max	27.361	4	432.49	2	-9.399	12	.011	3	.174	4	0	2
40			min	2.489	10	-594.562	3	-112.547	1	-.012	2	.01	10	0	3
41		2	max	23.771	1	322.966	2	-7.976	12	.011	3	.121	4	.357	3
42			min	2.489	10	-434.144	3	-86.817	1	-.012	2	.001	10	-.262	2
43		3	max	23.771	1	213.442	2	-6.553	12	.011	3	.075	5	.603	3
44			min	2.489	10	-273.726	3	-64.015	4	-.012	2	-.011	1	-.449	2
45		4	max	23.771	1	103.918	2	-3.288	10	.011	3	.042	5	.737	3
46			min	-.211	5	-113.309	3	-55.334	4	-.012	2	-.045	1	-.559	2
47		5	max	23.771	1	47.109	3	.644	10	.011	3	.011	5	.76	3
48			min	-7.34	5	-7.337	1	-46.653	4	-.012	2	-.061	1	-.593	2
49		6	max	23.771	1	207.526	3	16.102	1	.011	3	-.004	12	.672	3
50			min	-14.469	5	-115.131	2	-41.177	5	-.012	2	-.058	1	-.551	2
51		7	max	23.771	1	367.944	3	41.832	1	.011	3	-.004	10	.472	3
52			min	-21.597	5	-224.655	2	-38.975	5	-.012	2	-.056	4	-.433	2
53		8	max	23.771	1	528.362	3	67.562	1	.011	3	.005	2	.161	3
54			min	-28.726	5	-334.179	2	-36.774	5	-.012	2	-.074	4	-.239	2
55		9	max	23.771	1	688.779	3	93.291	1	.011	3	.056	1	.041	1
56			min	-35.854	5	-443.703	2	-34.572	5	-.012	2	-.097	5	-.262	3
57		10	max	53.34	4	849.197	3	119.021	1	.011	3	.173	4	.377	2
58			min	2.489	10	-553.228	2	-87.559	14	-.012	2	-.006	3	-.796	3
59		11	max	46.211	4	443.703	2	-1.985	12	.012	2	.119	4	.041	1
60			min	2.489	10	-688.779	3	-93.291	1	-.011	3	-.008	3	-.262	3
61		12	max	39.082	4	334.179	2	-.34	3	.012	2	.072	5	.161	3
62			min	2.489	10	-528.362	3	-67.562	1	-.011	3	-.009	3	-.239	2
63		13	max	31.954	4	224.655	2	1.794	3	.012	2	.039	5	.472	3
64			min	2.489	10	-367.944	3	-56.155	4	-.011	3	-.038	1	-.433	2
65		14	max	24.825	4	115.131	2	3.929	3	.012	2	.008	5	.672	3
66			min	2.489	10	-207.526	3	-47.474	4	-.011	3	-.058	1	-.551	2
67		15	max	23.771	1	7.337	1	9.628	1	.012	2	-.002	12	.76	3
68			min	2.489	10	-47.109	3	-41.386	5	-.011	3	-.061	1	-.593	2
69		16	max	23.771	1	113.309	3	35.357	1	.012	2	.002	3	.737	3
70			min	2.489	10	-103.918	2	-39.184	5	-.011	3	-.061	4	-.559	2
71		17	max	23.771	1	273.726	3	61.087	1	.012	2	.008	3	.603	3
72			min	-2.911	5	-213.442	2	-36.982	5	-.011	3	-.079	4	-.449	2
73		18	max	23.771	1	434.144	3	86.817	1	.012	2	.04	1	.357	3
74			min	-10.039	5	-322.966	2	-34.781	5	-.011	3	-.101	5	-.262	2
75		19	max	23.771	1	594.562	3	112.547	1	.012	2	.109	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
76			min	-17.168	5	-432.49	2	-32.579	5	-.011	3	-.124	5	0	3
77	M15	1	max	58.432	5	642.782	2	-9.143	12	.013	2	.22	4	0	2
78			min	-24.226	1	-358.52	3	-112.618	1	-.01	3	.011	10	0	3
79		2	max	51.303	5	470.985	2	-7.72	12	.013	2	.157	4	.218	3
80			min	-24.226	1	-268.159	3	-87.181	4	-.01	3	.001	10	-.387	2
81		3	max	44.175	5	299.188	2	-6.297	12	.013	2	.101	5	.372	3
82			min	-24.226	1	-177.799	3	-78.5	4	-.01	3	-.011	1	-.654	2
83		4	max	37.046	5	127.391	2	-3.419	10	.013	2	.058	5	.465	3
84			min	-24.226	1	-87.438	3	-69.819	4	-.01	3	-.045	1	-.802	2
85		5	max	29.917	5	2.923	3	.512	10	.013	2	.017	5	.494	3
86			min	-24.226	1	-44.406	2	-61.138	4	-.01	3	-.061	1	-.831	2
87		6	max	22.789	5	93.283	3	16.031	1	.013	2	-.004	12	.46	3
88			min	-24.226	1	-216.203	2	-55.625	5	-.01	3	-.058	1	-.741	2
89		7	max	15.66	5	183.644	3	41.761	1	.013	2	-.004	10	.364	3
90			min	-24.226	1	-388.001	2	-53.423	5	-.01	3	-.071	4	-.531	2
91		8	max	8.532	5	274.005	3	67.491	1	.013	2	.005	2	.205	3
92			min	-24.226	1	-559.798	2	-51.221	5	-.01	3	-.098	4	-.202	2
93		9	max	1.403	5	364.365	3	93.22	1	.013	2	.055	1	.247	2
94			min	-24.226	1	-731.595	2	-49.02	5	-.01	3	-.131	5	-.016	3
95		10	max	-2.094	10	599.761	1	77.624	9	.013	2	.218	4	.814	2
96			min	-24.226	1	-903.392	2	-118.95	1	-.01	3	-.005	3	-.301	3
97		11	max	-2.094	10	731.595	2	-2.241	12	.01	3	.154	4	.247	2
98			min	-24.226	1	-364.365	3	-93.22	1	-.013	2	-.007	3	-.016	3
99		12	max	-2.094	10	559.798	2	-.766	3	.01	3	.096	5	.205	3
100			min	-24.226	1	-274.005	3	-79.351	4	-.013	2	-.009	3	-.202	2
101		13	max	-2.094	10	388.001	2	1.369	3	.01	3	.053	5	.364	3
102			min	-27.277	4	-183.644	3	-70.67	4	-.013	2	-.038	1	-.531	2
103		14	max	-2.094	10	216.203	2	3.503	3	.01	3	.012	5	.46	3
104			min	-34.405	4	-93.283	3	-61.989	4	-.013	2	-.058	1	-.741	2
105		15	max	-2.094	10	44.406	2	9.699	1	.01	3	-.002	12	.494	3
106			min	-41.534	4	-2.923	3	-55.84	5	-.013	2	-.061	1	-.831	2
107		16	max	-2.094	10	87.438	3	35.428	1	.01	3	.001	3	.465	3
108			min	-48.663	4	-127.391	2	-53.639	5	-.013	2	-.077	4	-.802	2
109		17	max	-2.094	10	177.799	3	61.158	1	.01	3	.007	3	.372	3
110			min	-55.791	4	-299.188	2	-51.437	5	-.013	2	-.105	4	-.654	2
111		18	max	-2.094	10	268.159	3	86.888	1	.01	3	.04	1	.218	3
112			min	-62.92	4	-470.985	2	-49.235	5	-.013	2	-.137	5	-.387	2
113		19	max	-2.094	10	358.52	3	112.618	1	.01	3	.109	1	0	2
114			min	-70.048	4	-642.782	2	-47.034	5	-.013	2	-.17	5	0	5
115	M16	1	max	56.061	5	574.176	2	-8.212	12	.005	2	.166	4	0	2
116			min	-41.347	1	-294.176	3	-108.255	1	-.01	3	.009	10	0	3
117		2	max	48.933	5	402.379	2	-6.789	12	.005	2	.115	4	.173	3
118			min	-41.347	1	-203.816	3	-82.525	1	-.01	3	0	10	-.339	2
119		3	max	41.804	5	230.582	2	-5.366	12	.005	2	.075	5	.283	3
120			min	-41.347	1	-113.455	3	-60.498	4	-.01	3	-.024	1	-.559	2
121		4	max	34.675	5	58.784	2	-3.152	10	.005	2	.044	5	.33	3
122			min	-41.347	1	-23.094	3	-51.817	4	-.01	3	-.054	1	-.659	2
123		5	max	27.547	5	67.266	3	.779	10	.005	2	.015	5	.315	3
124			min	-41.347	1	-113.013	2	-43.136	4	-.01	3	-.067	1	-.64	2
125		6	max	20.418	5	157.627	3	20.394	1	.005	2	-.005	12	.237	3
126			min	-41.347	1	-284.81	2	-38.918	5	-.01	3	-.062	1	-.502	2
127		7	max	13.29	5	247.988	3	46.124	1	.005	2	-.004	10	.096	3
128			min	-41.347	1	-456.607	2	-36.717	5	-.01	3	-.049	4	-.245	2
129		8	max	6.161	5	338.349	3	71.854	1	.005	2	.006	2	.132	2
130			min	-41.347	1	-628.404	2	-34.515	5	-.01	3	-.064	4	-.107	3
131		9	max	-.557	15	428.709	3	97.583	1	.005	2	.061	1	.628	2
132			min	-41.347	1	-800.201	2	-32.313	5	-.01	3	-.087	5	-.374	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
133		10	max	-4.164	10	971.999	2	80.77	9	.005	2	.166	4	1.243	2
134			min	-41.347	1	-560.273	10	-123.313	1	-.01	3	0	3	-.703	3
135		11	max	-4.164	10	800.201	2	-3.172	12	.01	3	.112	4	.628	2
136			min	-41.347	1	-428.709	3	-97.583	1	-.005	2	-.005	3	-.374	3
137		12	max	-4.164	10	628.404	2	-1.749	12	.01	3	.064	4	.132	2
138			min	-41.347	1	-338.349	3	-71.854	1	-.005	2	-.007	3	-.107	3
139		13	max	-4.164	10	456.607	2	-.137	3	.01	3	.032	5	.096	3
140			min	-41.347	1	-247.988	3	-55.87	4	-.005	2	-.038	1	-.245	2
141		14	max	-4.164	10	284.81	2	1.997	3	.01	3	.002	5	.237	3
142			min	-41.347	1	-157.627	3	-47.189	4	-.005	2	-.062	1	-.502	2
143		15	max	-4.164	10	113.013	2	5.336	1	.01	3	-.003	12	.315	3
144			min	-46.362	4	-67.266	3	-39.947	5	-.005	2	-.067	1	-.64	2
145		16	max	-4.164	10	23.094	3	31.065	1	.01	3	-.001	12	.33	3
146			min	-53.491	4	-58.784	2	-37.746	5	-.005	2	-.067	4	-.659	2
147		17	max	-4.164	10	113.455	3	56.795	1	.01	3	.004	3	.283	3
148			min	-60.619	4	-230.582	2	-35.544	5	-.005	2	-.085	4	-.559	2
149		18	max	-4.164	10	203.816	3	82.525	1	.01	3	.025	1	.173	3
150			min	-67.748	4	-402.379	2	-33.342	5	-.005	2	-.103	5	-.339	2
151		19	max	-4.164	10	294.176	3	108.255	1	.01	3	.091	1	0	2
152			min	-74.876	4	-574.176	2	-31.141	5	-.005	2	-.125	5	0	5
153	M2	1	max	940.173	2	2.045	4	.126	1	0	2	0	3	0	1
154			min	-1391.054	3	.492	15	-11.886	4	0	4	0	2	0	1
155		2	max	940.694	2	1.926	4	.126	1	0	2	0	1	0	15
156			min	-1390.664	3	.464	15	-12.344	4	0	4	-.004	4	0	4
157		3	max	941.215	2	1.808	4	.126	1	0	2	0	1	0	15
158			min	-1390.273	3	.436	15	-12.802	4	0	4	-.009	4	-.001	4
159		4	max	941.735	2	1.689	4	.126	1	0	2	0	1	0	15
160			min	-1389.883	3	.408	15	-13.261	4	0	4	-.013	4	-.002	4
161		5	max	942.256	2	1.57	4	.126	1	0	2	0	1	0	15
162			min	-1389.492	3	.38	15	-13.719	4	0	4	-.018	4	-.003	4
163		6	max	942.777	2	1.451	4	.126	1	0	2	0	1	0	15
164			min	-1389.102	3	.352	15	-14.177	4	0	4	-.023	4	-.003	4
165		7	max	943.298	2	1.332	4	.126	1	0	2	0	1	0	15
166			min	-1388.711	3	.324	15	-14.636	4	0	4	-.028	4	-.004	4
167		8	max	943.818	2	1.213	4	.126	1	0	2	0	1	0	15
168			min	-1388.321	3	.295	12	-15.094	4	0	4	-.034	4	-.004	4
169		9	max	944.339	2	1.094	4	.126	1	0	2	0	1	-.001	15
170			min	-1387.93	3	.248	12	-15.552	4	0	4	-.039	4	-.004	4
171		10	max	944.86	2	.976	4	.126	1	0	2	0	1	-.001	15
172			min	-1387.54	3	.202	12	-16.011	4	0	4	-.045	4	-.005	4
173		11	max	945.38	2	.857	4	.126	1	0	2	0	1	-.001	15
174			min	-1387.149	3	.156	12	-16.469	4	0	4	-.051	4	-.005	4
175		12	max	945.901	2	.762	2	.126	1	0	2	0	1	-.001	15
176			min	-1386.758	3	.109	12	-16.928	4	0	4	-.056	4	-.005	4
177		13	max	946.422	2	.669	2	.126	1	0	2	0	1	-.001	15
178			min	-1386.368	3	.063	12	-17.386	4	0	4	-.063	4	-.006	4
179		14	max	946.942	2	.576	2	.126	1	0	2	0	1	-.001	15
180			min	-1385.977	3	-.003	3	-17.844	4	0	4	-.069	4	-.006	4
181		15	max	947.463	2	.484	2	.126	1	0	2	0	1	-.001	12
182			min	-1385.587	3	-.073	3	-18.303	4	0	4	-.075	4	-.006	4
183		16	max	947.984	2	.391	2	.126	1	0	2	0	1	-.001	12
184			min	-1385.196	3	-.142	3	-18.761	4	0	4	-.082	4	-.006	4
185		17	max	948.504	2	.299	2	.126	1	0	2	0	1	-.001	12
186			min	-1384.806	3	-.211	3	-19.219	4	0	4	-.089	4	-.006	4
187		18	max	949.025	2	.206	2	.126	1	0	2	0	1	-.001	12
188			min	-1384.415	3	-.281	3	-19.678	4	0	4	-.096	4	-.006	4
189		19	max	949.546	2	.113	2	.126	1	0	2	0	1	-.001	12

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-1384.025	3	-.35	3	-20.136	4	0	4	-.103	4	-.006	4
191	M3	1	max	872.918	2	7.685	4	4.328	4	0	3	0	1	.006	4
192			min	-958.898	3	1.816	15	.014	10	0	4	-.019	4	.001	12
193		2	max	872.747	2	6.924	4	4.862	4	0	3	0	1	.004	2
194			min	-959.025	3	1.637	15	.014	10	0	4	-.017	4	0	3
195		3	max	872.577	2	6.163	4	5.397	4	0	3	0	1	.001	2
196			min	-959.153	3	1.458	15	.014	10	0	4	-.015	4	-.001	3
197		4	max	872.407	2	5.402	4	5.932	4	0	3	0	1	0	15
198			min	-959.281	3	1.279	15	.014	10	0	4	-.012	5	-.003	3
199		5	max	872.236	2	4.641	4	6.466	4	0	3	0	1	0	15
200			min	-959.409	3	1.1	15	.014	10	0	4	-.01	5	-.004	6
201		6	max	872.066	2	3.88	4	7.001	4	0	3	0	1	-.001	15
202			min	-959.536	3	.922	15	.014	10	0	4	-.007	5	-.006	6
203		7	max	871.895	2	3.119	4	7.536	4	0	3	0	1	-.002	15
204			min	-959.664	3	.743	15	.014	10	0	4	-.004	5	-.007	6
205		8	max	871.725	2	2.358	4	8.07	4	0	3	0	1	-.002	15
206			min	-959.792	3	.564	15	.014	10	0	4	0	5	-.008	6
207		9	max	871.555	2	1.597	4	8.605	4	0	3	.003	4	-.002	15
208			min	-959.92	3	.385	15	.014	10	0	4	0	10	-.009	6
209		10	max	871.384	2	.836	4	9.14	4	0	3	.006	4	-.002	15
210			min	-960.047	3	.173	12	.014	10	0	4	0	10	-.01	6
211		11	max	871.214	2	.219	2	9.675	4	0	3	.01	4	-.002	15
212			min	-960.175	3	-.209	3	.014	10	0	4	0	10	-.01	6
213		12	max	871.044	2	-.152	15	10.209	4	0	3	.015	4	-.002	15
214			min	-960.303	3	-.686	6	.014	10	0	4	0	10	-.01	6
215		13	max	870.873	2	-.331	15	10.744	4	0	3	.019	4	-.002	15
216			min	-960.431	3	-1.447	6	.014	10	0	4	0	10	-.009	6
217		14	max	870.703	2	-.509	15	11.279	4	0	3	.023	4	-.002	15
218			min	-960.558	3	-2.208	6	.014	10	0	4	0	10	-.009	6
219		15	max	870.533	2	-.688	15	11.813	4	0	3	.028	4	-.002	15
220			min	-960.686	3	-2.969	6	.014	10	0	4	0	10	-.007	6
221		16	max	870.362	2	-.867	15	12.348	4	0	3	.033	4	-.001	15
222			min	-960.814	3	-3.73	6	.014	10	0	4	0	10	-.006	6
223		17	max	870.192	2	-1.046	15	12.883	4	0	3	.039	4	-.001	15
224			min	-960.942	3	-4.491	6	.014	10	0	4	0	10	-.004	6
225		18	max	870.022	2	-1.225	15	13.417	4	0	3	.044	4	0	15
226			min	-961.069	3	-5.252	6	.014	10	0	4	0	10	-.002	6
227		19	max	869.851	2	-1.404	15	13.952	4	0	3	.05	4	0	1
228			min	-961.197	3	-6.013	6	.014	10	0	4	0	10	0	1
229	M4	1	max	657.777	1	0	1	-.452	10	0	1	.047	4	0	1
230			min	-86.352	5	0	1	-200.582	4	0	1	0	10	0	1
231		2	max	657.948	1	0	1	-.452	10	0	1	.024	4	0	1
232			min	-86.273	5	0	1	-200.73	4	0	1	0	10	0	1
233		3	max	658.118	1	0	1	-.452	10	0	1	.001	4	0	1
234			min	-86.193	5	0	1	-200.877	4	0	1	0	10	0	1
235		4	max	658.288	1	0	1	-.452	10	0	1	0	12	0	1
236			min	-86.114	5	0	1	-201.025	4	0	1	-.022	4	0	1
237		5	max	658.459	1	0	1	-.452	10	0	1	0	10	0	1
238			min	-86.034	5	0	1	-201.172	4	0	1	-.045	4	0	1
239		6	max	658.629	1	0	1	-.452	10	0	1	0	10	0	1
240			min	-85.955	5	0	1	-201.32	4	0	1	-.068	4	0	1
241		7	max	658.799	1	0	1	-.452	10	0	1	0	10	0	1
242			min	-85.875	5	0	1	-201.468	4	0	1	-.091	4	0	1
243		8	max	658.97	1	0	1	-.452	10	0	1	0	10	0	1
244			min	-85.796	5	0	1	-201.615	4	0	1	-.114	4	0	1
245		9	max	659.14	1	0	1	-.452	10	0	1	0	10	0	1
246			min	-85.716	5	0	1	-201.763	4	0	1	-.138	4	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
247		10	max	659.31	1	0	1	-.452	10	0	1	0	10	0	1
248			min	-85.637	5	0	1	-201.911	4	0	1	-.161	4	0	1
249		11	max	659.481	1	0	1	-.452	10	0	1	0	10	0	1
250			min	-85.557	5	0	1	-202.058	4	0	1	-.184	4	0	1
251		12	max	659.651	1	0	1	-.452	10	0	1	0	10	0	1
252			min	-85.478	5	0	1	-202.206	4	0	1	-.207	4	0	1
253		13	max	659.821	1	0	1	-.452	10	0	1	0	10	0	1
254			min	-85.398	5	0	1	-202.354	4	0	1	-.23	4	0	1
255		14	max	659.992	1	0	1	-.452	10	0	1	0	10	0	1
256			min	-85.319	5	0	1	-202.501	4	0	1	-.254	4	0	1
257		15	max	660.162	1	0	1	-.452	10	0	1	0	10	0	1
258			min	-85.239	5	0	1	-202.649	4	0	1	-.277	4	0	1
259		16	max	660.332	1	0	1	-.452	10	0	1	0	10	0	1
260			min	-85.16	5	0	1	-202.796	4	0	1	-.3	4	0	1
261		17	max	660.503	1	0	1	-.452	10	0	1	0	10	0	1
262			min	-85.08	5	0	1	-202.944	4	0	1	-.324	4	0	1
263		18	max	660.673	1	0	1	-.452	10	0	1	0	10	0	1
264			min	-85.001	5	0	1	-203.092	4	0	1	-.347	4	0	1
265		19	max	660.843	1	0	1	-.452	10	0	1	0	10	0	1
266			min	-84.921	5	0	1	-203.239	4	0	1	-.37	4	0	1
267	M6	1	max	2805.059	2	2.212	2	0	1	0	1	0	4	0	1
268			min	-4276.497	3	.283	12	-12.009	4	0	4	0	1	0	1
269		2	max	2805.58	2	2.12	2	0	1	0	1	0	1	0	12
270			min	-4276.106	3	.237	12	-12.467	4	0	4	-.004	4	0	2
271		3	max	2806.101	2	2.027	2	0	1	0	1	0	1	0	12
272			min	-4275.716	3	.191	12	-12.925	4	0	4	-.009	4	-.002	2
273		4	max	2806.621	2	1.934	2	0	1	0	1	0	1	0	12
274			min	-4275.325	3	.133	3	-13.384	4	0	4	-.014	4	-.002	2
275		5	max	2807.142	2	1.842	2	0	1	0	1	0	1	0	12
276			min	-4274.935	3	.063	3	-13.842	4	0	4	-.018	4	-.003	2
277		6	max	2807.663	2	1.749	2	0	1	0	1	0	1	0	3
278			min	-4274.544	3	-.006	3	-14.3	4	0	4	-.023	4	-.004	2
279		7	max	2808.183	2	1.657	2	0	1	0	1	0	1	0	3
280			min	-4274.154	3	-.076	3	-14.759	4	0	4	-.029	4	-.004	2
281		8	max	2808.704	2	1.564	2	0	1	0	1	0	1	0	3
282			min	-4273.763	3	-.145	3	-15.217	4	0	4	-.034	4	-.005	2
283		9	max	2809.225	2	1.471	2	0	1	0	1	0	1	0	3
284			min	-4273.372	3	-.214	3	-15.675	4	0	4	-.039	4	-.005	2
285		10	max	2809.745	2	1.379	2	0	1	0	1	0	1	0	3
286			min	-4272.982	3	-.284	3	-16.134	4	0	4	-.045	4	-.006	2
287		11	max	2810.266	2	1.286	2	0	1	0	1	0	1	0	3
288			min	-4272.591	3	-.353	3	-16.592	4	0	4	-.051	4	-.006	2
289		12	max	2810.787	2	1.193	2	0	1	0	1	0	1	0	3
290			min	-4272.201	3	-.423	3	-17.05	4	0	4	-.057	4	-.007	2
291		13	max	2811.308	2	1.101	2	0	1	0	1	0	1	0	3
292			min	-4271.81	3	-.492	3	-17.509	4	0	4	-.063	4	-.007	2
293		14	max	2811.828	2	1.008	2	0	1	0	1	0	1	0	3
294			min	-4271.42	3	-.562	3	-17.967	4	0	4	-.069	4	-.007	2
295		15	max	2812.349	2	.916	2	0	1	0	1	0	1	0	3
296			min	-4271.029	3	-.631	3	-18.425	4	0	4	-.076	4	-.008	2
297		16	max	2812.87	2	.823	2	0	1	0	1	0	1	0	3
298			min	-4270.639	3	-.701	3	-18.884	4	0	4	-.083	4	-.008	2
299		17	max	2813.39	2	.73	2	0	1	0	1	0	1	.001	3
300			min	-4270.248	3	-.77	3	-19.342	4	0	4	-.089	4	-.008	2
301		18	max	2813.911	2	.638	2	0	1	0	1	0	1	.002	3
302			min	-4269.858	3	-.84	3	-19.8	4	0	4	-.096	4	-.009	2
303		19	max	2814.432	2	.545	2	0	1	0	1	0	1	.002	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
304			min	-4269.467	3	-.909	3	-20.259	4	0	4	-.104	4	-.009	2
305	M7	1	max	2755.044	2	7.679	6	4.058	4	0	1	0	1	.009	2
306			min	-2811.984	3	1.804	15	0	1	0	4	-.019	4	-.002	3
307		2	max	2754.874	2	6.918	6	4.593	4	0	1	0	1	.006	2
308			min	-2812.111	3	1.625	15	0	1	0	4	-.017	4	-.003	3
309		3	max	2754.703	2	6.157	6	5.127	4	0	1	0	1	.004	2
310			min	-2812.239	3	1.446	15	0	1	0	4	-.015	4	-.005	3
311		4	max	2754.533	2	5.396	6	5.662	4	0	1	0	1	.002	2
312			min	-2812.367	3	1.267	15	0	1	0	4	-.013	4	-.006	3
313		5	max	2754.363	2	4.635	6	6.197	4	0	1	0	1	0	2
314			min	-2812.495	3	1.089	15	0	1	0	4	-.01	4	-.007	3
315		6	max	2754.192	2	3.874	6	6.731	4	0	1	0	1	-.001	15
316			min	-2812.622	3	.91	15	0	1	0	4	-.008	4	-.007	3
317		7	max	2754.022	2	3.113	6	7.266	4	0	1	0	1	-.002	15
318			min	-2812.75	3	.731	15	0	1	0	4	-.005	5	-.008	3
319		8	max	2753.852	2	2.368	2	7.801	4	0	1	0	1	-.002	15
320			min	-2812.878	3	.479	12	0	1	0	4	-.002	5	-.008	4
321		9	max	2753.681	2	1.775	2	8.335	4	0	1	.002	4	-.002	15
322			min	-2813.006	3	.182	12	0	1	0	4	0	1	-.009	4
323		10	max	2753.511	2	1.182	2	8.87	4	0	1	.005	4	-.002	15
324			min	-2813.133	3	-.243	3	0	1	0	4	0	1	-.01	4
325		11	max	2753.34	2	.589	2	9.405	4	0	1	.009	4	-.002	15
326			min	-2813.261	3	-.688	3	0	1	0	4	0	1	-.01	4
327		12	max	2753.17	2	-.004	2	9.939	4	0	1	.013	4	-.002	15
328			min	-2813.389	3	-1.133	3	0	1	0	4	0	1	-.01	4
329		13	max	2753	2	-.342	15	10.474	4	0	1	.017	4	-.002	15
330			min	-2813.517	3	-1.578	3	0	1	0	4	0	1	-.009	4
331		14	max	2752.829	2	-.521	15	11.009	4	0	1	.022	4	-.002	15
332			min	-2813.644	3	-2.214	4	0	1	0	4	0	1	-.009	4
333		15	max	2752.659	2	-.7	15	11.544	4	0	1	.027	4	-.002	15
334			min	-2813.772	3	-2.975	4	0	1	0	4	0	1	-.007	4
335		16	max	2752.489	2	-.879	15	12.078	4	0	1	.031	4	-.001	15
336			min	-2813.9	3	-3.736	4	0	1	0	4	0	1	-.006	4
337		17	max	2752.318	2	-1.058	15	12.613	4	0	1	.037	4	-.001	15
338			min	-2814.028	3	-4.497	4	0	1	0	4	0	1	-.004	4
339		18	max	2752.148	2	-1.237	15	13.148	4	0	1	.042	4	0	15
340			min	-2814.156	3	-5.258	4	0	1	0	4	0	1	-.002	4
341		19	max	2751.978	2	-1.416	15	13.682	4	0	1	.048	4	0	1
342			min	-2814.283	3	-6.019	4	0	1	0	4	0	1	0	1
343	M8	1	max	1769.834	2	0	1	0	1	0	1	.045	4	0	1
344			min	61.498	15	0	1	-194.062	4	0	1	0	1	0	1
345		2	max	1770.005	2	0	1	0	1	0	1	.023	4	0	1
346			min	61.549	15	0	1	-194.209	4	0	1	0	1	0	1
347		3	max	1770.175	2	0	1	0	1	0	1	0	5	0	1
348			min	61.601	15	0	1	-194.357	4	0	1	0	1	0	1
349		4	max	1770.345	2	0	1	0	1	0	1	0	1	0	1
350			min	61.652	15	0	1	-194.505	4	0	1	-.022	4	0	1
351		5	max	1770.516	2	0	1	0	1	0	1	0	1	0	1
352			min	61.703	15	0	1	-194.652	4	0	1	-.044	4	0	1
353		6	max	1770.686	2	0	1	0	1	0	1	0	1	0	1
354			min	61.755	15	0	1	-194.8	4	0	1	-.067	4	0	1
355		7	max	1770.856	2	0	1	0	1	0	1	0	1	0	1
356			min	61.806	15	0	1	-194.948	4	0	1	-.089	4	0	1
357		8	max	1771.027	2	0	1	0	1	0	1	0	1	0	1
358			min	61.858	15	0	1	-195.095	4	0	1	-.111	4	0	1
359		9	max	1771.197	2	0	1	0	1	0	1	0	1	0	1
360			min	61.909	15	0	1	-195.243	4	0	1	-.134	4	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
361		10	max	1771.367	2	0	1	0	1	0	1	0	1	0	1
362			min	61.96	15	0	1	-195.39	4	0	1	-.156	4	0	1
363		11	max	1771.538	2	0	1	0	1	0	1	0	1	0	1
364			min	62.012	15	0	1	-195.538	4	0	1	-.179	4	0	1
365		12	max	1771.708	2	0	1	0	1	0	1	0	1	0	1
366			min	62.063	15	0	1	-195.686	4	0	1	-.201	4	0	1
367		13	max	1771.878	2	0	1	0	1	0	1	0	1	0	1
368			min	62.114	15	0	1	-195.833	4	0	1	-.224	4	0	1
369		14	max	1772.049	2	0	1	0	1	0	1	0	1	0	1
370			min	62.166	15	0	1	-195.981	4	0	1	-.246	4	0	1
371		15	max	1772.219	2	0	1	0	1	0	1	0	1	0	1
372			min	62.217	15	0	1	-196.129	4	0	1	-.269	4	0	1
373		16	max	1772.389	2	0	1	0	1	0	1	0	1	0	1
374			min	62.269	15	0	1	-196.276	4	0	1	-.291	4	0	1
375		17	max	1772.56	2	0	1	0	1	0	1	0	1	0	1
376			min	62.32	15	0	1	-196.424	4	0	1	-.314	4	0	1
377		18	max	1772.73	2	0	1	0	1	0	1	0	1	0	1
378			min	62.371	15	0	1	-196.572	4	0	1	-.336	4	0	1
379		19	max	1772.9	2	0	1	0	1	0	1	0	1	0	1
380			min	62.423	15	0	1	-196.719	4	0	1	-.359	4	0	1
381	M10	1	max	940.173	2	1.996	6	-.012	10	0	1	0	4	0	1
382			min	-1391.054	3	.458	15	-11.976	4	0	5	0	3	0	1
383		2	max	940.694	2	1.877	6	-.012	10	0	1	0	10	0	15
384			min	-1390.664	3	.43	15	-12.434	4	0	5	-.004	4	0	6
385		3	max	941.215	2	1.758	6	-.012	10	0	1	0	10	0	15
386			min	-1390.273	3	.402	15	-12.893	4	0	5	-.009	4	-.001	6
387		4	max	941.735	2	1.639	6	-.012	10	0	1	0	10	0	15
388			min	-1389.883	3	.374	15	-13.351	4	0	5	-.014	4	-.002	6
389		5	max	942.256	2	1.52	6	-.012	10	0	1	0	10	0	15
390			min	-1389.492	3	.346	15	-13.809	4	0	5	-.018	4	-.003	6
391		6	max	942.777	2	1.402	6	-.012	10	0	1	0	10	0	15
392			min	-1389.102	3	.318	15	-14.268	4	0	5	-.023	4	-.003	6
393		7	max	943.298	2	1.283	6	-.012	10	0	1	0	10	0	15
394			min	-1388.711	3	.291	15	-14.726	4	0	5	-.029	4	-.004	6
395		8	max	943.818	2	1.164	6	-.012	10	0	1	0	10	0	15
396			min	-1388.321	3	.263	15	-15.184	4	0	5	-.034	4	-.004	6
397		9	max	944.339	2	1.045	6	-.012	10	0	1	0	10	0	15
398			min	-1387.93	3	.235	15	-15.643	4	0	5	-.039	4	-.004	6
399		10	max	944.86	2	.947	2	-.012	10	0	1	0	10	-.001	15
400			min	-1387.54	3	.202	12	-16.101	4	0	5	-.045	4	-.005	6
401		11	max	945.38	2	.854	2	-.012	10	0	1	0	10	-.001	15
402			min	-1387.149	3	.156	12	-16.559	4	0	5	-.051	4	-.005	6
403		12	max	945.901	2	.762	2	-.012	10	0	1	0	10	-.001	15
404			min	-1386.758	3	.109	12	-17.018	4	0	5	-.057	4	-.005	6
405		13	max	946.422	2	.669	2	-.012	10	0	1	0	10	-.001	15
406			min	-1386.368	3	.063	12	-17.476	4	0	5	-.063	4	-.005	6
407		14	max	946.942	2	.576	2	-.012	10	0	1	0	10	-.001	15
408			min	-1385.977	3	-.003	3	-17.934	4	0	5	-.069	4	-.006	6
409		15	max	947.463	2	.484	2	-.012	10	0	1	0	10	-.001	15
410			min	-1385.587	3	-.073	3	-18.393	4	0	5	-.076	4	-.006	6
411		16	max	947.984	2	.391	2	-.012	10	0	1	0	10	-.001	15
412			min	-1385.196	3	-.142	3	-18.851	4	0	5	-.082	4	-.006	6
413		17	max	948.504	2	.299	2	-.012	10	0	1	0	10	-.001	15
414			min	-1384.806	3	-.211	3	-19.309	4	0	5	-.089	4	-.006	6
415		18	max	949.025	2	.206	2	-.012	10	0	1	0	10	-.001	15
416			min	-1384.415	3	-.281	3	-19.768	4	0	5	-.096	4	-.006	2
417		19	max	949.546	2	.113	2	-.012	10	0	1	0	10	-.001	12

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-1384.025	3	-.35	3	-20.226	4	0	5	-.103	4	-.006	2
419	M11	1	max	872.918	2	7.643	6	4.233	4	0	1	0	10	.006	2
420			min	-958.898	3	1.787	15	-.134	1	0	4	-.019	4	.001	12
421		2	max	872.747	2	6.882	6	4.767	4	0	1	0	10	.004	2
422			min	-959.025	3	1.608	15	-.134	1	0	4	-.017	4	0	3
423		3	max	872.577	2	6.121	6	5.302	4	0	1	0	10	.001	2
424			min	-959.153	3	1.429	15	-.134	1	0	4	-.015	4	-.001	3
425		4	max	872.407	2	5.36	6	5.837	4	0	1	0	10	0	2
426			min	-959.281	3	1.25	15	-.134	1	0	4	-.013	4	-.003	3
427		5	max	872.236	2	4.599	6	6.371	4	0	1	0	10	-.001	15
428			min	-959.409	3	1.072	15	-.134	1	0	4	-.01	4	-.004	4
429		6	max	872.066	2	3.838	6	6.906	4	0	1	0	10	-.001	15
430			min	-959.536	3	.893	15	-.134	1	0	4	-.007	4	-.006	4
431		7	max	871.895	2	3.077	6	7.441	4	0	1	0	10	-.002	15
432			min	-959.664	3	.714	15	-.134	1	0	4	-.004	4	-.007	4
433		8	max	871.725	2	2.316	6	7.975	4	0	1	0	10	-.002	15
434			min	-959.792	3	.535	15	-.134	1	0	4	-.001	4	-.009	4
435		9	max	871.555	2	1.555	6	8.51	4	0	1	.002	5	-.002	15
436			min	-959.92	3	.356	15	-.134	1	0	4	0	1	-.009	4
437		10	max	871.384	2	.812	2	9.045	4	0	1	.006	5	-.002	15
438			min	-960.047	3	.173	12	-.134	1	0	4	0	1	-.01	4
439		11	max	871.214	2	.219	2	9.579	4	0	1	.01	5	-.002	15
440			min	-960.175	3	-.209	3	-.134	1	0	4	0	1	-.01	4
441		12	max	871.044	2	-.181	15	10.114	4	0	1	.014	5	-.002	15
442			min	-960.303	3	-.729	4	-.134	1	0	4	0	1	-.01	4
443		13	max	870.873	2	-.359	15	10.649	4	0	1	.018	5	-.002	15
444			min	-960.431	3	-1.49	4	-.134	1	0	4	0	1	-.009	4
445		14	max	870.703	2	-.538	15	11.184	4	0	1	.023	5	-.002	15
446			min	-960.558	3	-2.251	4	-.134	1	0	4	0	1	-.009	4
447		15	max	870.533	2	-.717	15	11.718	4	0	1	.028	5	-.002	15
448			min	-960.686	3	-3.012	4	-.134	1	0	4	0	1	-.008	4
449		16	max	870.362	2	-.896	15	12.253	4	0	1	.033	4	-.001	15
450			min	-960.814	3	-3.773	4	-.134	1	0	4	0	1	-.006	4
451		17	max	870.192	2	-1.075	15	12.788	4	0	1	.038	4	-.001	15
452			min	-960.942	3	-4.534	4	-.134	1	0	4	-.001	1	-.004	4
453		18	max	870.022	2	-1.254	15	13.322	4	0	1	.043	4	0	15
454			min	-961.069	3	-5.295	4	-.134	1	0	4	-.001	1	-.002	4
455		19	max	869.851	2	-1.433	15	13.857	4	0	1	.049	4	0	1
456			min	-961.197	3	-6.056	4	-.134	1	0	4	-.001	1	0	1
457	M12	1	max	657.777	1	0	1	4.416	1	0	1	.046	4	0	1
458			min	57.526	12	0	1	-197.46	4	0	1	-.001	1	0	1
459		2	max	657.948	1	0	1	4.416	1	0	1	.024	4	0	1
460			min	57.611	12	0	1	-197.607	4	0	1	0	1	0	1
461		3	max	658.118	1	0	1	4.416	1	0	1	.001	5	0	1
462			min	57.696	12	0	1	-197.755	4	0	1	0	1	0	1
463		4	max	658.288	1	0	1	4.416	1	0	1	0	1	0	1
464			min	57.781	12	0	1	-197.902	4	0	1	-.022	4	0	1
465		5	max	658.459	1	0	1	4.416	1	0	1	0	1	0	1
466			min	57.867	12	0	1	-198.05	4	0	1	-.044	4	0	1
467		6	max	658.629	1	0	1	4.416	1	0	1	.001	1	0	1
468			min	57.952	12	0	1	-198.198	4	0	1	-.067	4	0	1
469		7	max	658.799	1	0	1	4.416	1	0	1	.002	1	0	1
470			min	58.037	12	0	1	-198.345	4	0	1	-.09	4	0	1
471		8	max	658.97	1	0	1	4.416	1	0	1	.002	1	0	1
472			min	58.122	12	0	1	-198.493	4	0	1	-.113	4	0	1
473		9	max	659.14	1	0	1	4.416	1	0	1	.003	1	0	1
474			min	58.207	12	0	1	-198.641	4	0	1	-.136	4	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
475		10	max	659.31	1	0	1	4.416	1	0	1	.003	1	0	1
476			min	58.292	12	0	1	-198.788	4	0	1	-.158	4	0	1
477		11	max	659.481	1	0	1	4.416	1	0	1	.004	1	0	1
478			min	58.378	12	0	1	-198.936	4	0	1	-.181	4	0	1
479		12	max	659.651	1	0	1	4.416	1	0	1	.004	1	0	1
480			min	58.463	12	0	1	-199.083	4	0	1	-.204	4	0	1
481		13	max	659.821	1	0	1	4.416	1	0	1	.005	1	0	1
482			min	58.548	12	0	1	-199.231	4	0	1	-.227	4	0	1
483		14	max	659.992	1	0	1	4.416	1	0	1	.006	1	0	1
484			min	58.633	12	0	1	-199.379	4	0	1	-.25	4	0	1
485		15	max	660.162	1	0	1	4.416	1	0	1	.006	1	0	1
486			min	58.718	12	0	1	-199.526	4	0	1	-.273	4	0	1
487		16	max	660.332	1	0	1	4.416	1	0	1	.007	1	0	1
488			min	58.804	12	0	1	-199.674	4	0	1	-.296	4	0	1
489		17	max	660.503	1	0	1	4.416	1	0	1	.007	1	0	1
490			min	58.889	12	0	1	-199.822	4	0	1	-.319	4	0	1
491		18	max	660.673	1	0	1	4.416	1	0	1	.008	1	0	1
492			min	58.974	12	0	1	-199.969	4	0	1	-.342	4	0	1
493		19	max	660.843	1	0	1	4.416	1	0	1	.008	1	0	1
494			min	59.059	12	0	1	-200.117	4	0	1	-.364	4	0	1
495	M1	1	max	107.753	1	705.885	3	29.487	5	0	2	.089	1	0	15
496			min	-15.928	5	-359.341	2	-37.678	1	0	3	-.075	5	-.011	2
497		2	max	108.574	1	705.005	3	30.728	5	0	2	.069	1	.179	2
498			min	-15.544	5	-360.515	2	-37.678	1	0	3	-.059	5	-.376	3
499		3	max	601.832	3	487.714	2	20.287	5	0	3	.05	1	.359	2
500			min	-348.628	2	-561.708	3	-37.59	1	0	2	-.043	5	-.733	3
501		4	max	602.448	3	486.541	2	21.528	5	0	3	.03	1	.102	2
502			min	-347.806	2	-562.588	3	-37.59	1	0	2	-.032	5	-.436	3
503		5	max	603.065	3	485.368	2	22.77	5	0	3	.01	1	-.003	15
504			min	-346.985	2	-563.468	3	-37.59	1	0	2	-.02	5	-.154	2
505		6	max	603.681	3	484.194	2	24.011	5	0	3	0	10	.159	3
506			min	-346.163	2	-564.348	3	-37.59	1	0	2	-.01	4	-.41	2
507		7	max	604.297	3	483.021	2	25.252	5	0	3	.005	5	.457	3
508			min	-345.341	2	-565.228	3	-37.59	1	0	2	-.03	1	-.665	2
509		8	max	604.913	3	481.847	2	26.494	5	0	3	.019	5	.755	3
510			min	-344.52	2	-566.108	3	-37.59	1	0	2	-.05	1	-.92	2
511		9	max	620.13	3	51.767	2	44.82	5	0	9	.032	1	.875	3
512			min	-297.497	2	.354	15	-61.378	1	0	3	-.086	5	-1.05	2
513		10	max	620.746	3	50.593	2	46.061	5	0	9	0	10	.859	3
514			min	-296.676	2	-.001	5	-61.378	1	0	3	-.062	4	-1.077	2
515		11	max	621.362	3	49.42	2	47.303	5	0	9	-.003	10	.843	3
516			min	-295.854	2	-1.481	4	-61.378	1	0	3	-.046	4	-1.103	2
517		12	max	636.155	3	393.096	3	111.654	5	0	2	.049	1	.74	3
518			min	-248.623	2	-592.063	2	-37.156	1	0	3	-.169	5	-.981	2
519		13	max	636.772	3	392.216	3	112.895	5	0	2	.03	1	.533	3
520			min	-247.802	2	-593.236	2	-37.156	1	0	3	-.11	5	-.669	2
521		14	max	637.388	3	391.336	3	114.137	5	0	2	.01	1	.326	3
522			min	-246.98	2	-594.41	2	-37.156	1	0	3	-.05	5	-.355	2
523		15	max	638.004	3	390.456	3	115.378	5	0	2	.011	5	.12	3
524			min	-246.159	2	-595.583	2	-37.156	1	0	3	-.009	1	-.045	1
525		16	max	638.62	3	389.576	3	116.62	5	0	2	.072	5	.273	2
526			min	-245.337	2	-596.757	2	-37.156	1	0	3	-.029	1	-.086	3
527		17	max	639.236	3	388.696	3	117.861	5	0	2	.134	5	.588	2
528			min	-244.515	2	-597.93	2	-37.156	1	0	3	-.049	1	-.291	3
529		18	max	30.757	5	575.738	2	-4.164	10	0	5	.159	5	.299	2
530			min	-109.073	1	-293.393	3	-76.111	4	0	2	-.069	1	-.145	3
531		19	max	31.14	5	574.565	2	-4.164	10	0	5	.125	5	.01	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
532			min	-108.252	1	-294.274	3	-74.869	4	0	2	-.091	1	-.005	2
533	M5	1	max	247.63	1	2316.266	3	62.566	5	0	1	0	1	.022	2
534			min	7.528	12	-1249.863	2	0	1	0	4	-.151	4	0	15
535		2	max	248.451	1	2315.386	3	63.807	5	0	1	0	1	.682	2
536			min	7.939	12	-1251.036	2	0	1	0	4	-.118	4	-1.214	3
537		3	max	1810.984	3	1267.63	2	54.279	4	0	4	0	1	1.312	2
538			min	-1064.561	2	-1594.901	3	0	1	0	1	-.084	4	-2.389	3
539		4	max	1811.6	3	1266.457	2	55.521	4	0	4	0	1	.643	2
540			min	-1063.74	2	-1595.781	3	0	1	0	1	-.055	4	-1.547	3
541		5	max	1812.216	3	1265.283	2	56.762	4	0	4	0	1	.017	9
542			min	-1062.918	2	-1596.661	3	0	1	0	1	-.025	4	-.705	3
543		6	max	1812.832	3	1264.11	2	58.004	4	0	4	.005	4	.138	3
544			min	-1062.096	2	-1597.541	3	0	1	0	1	0	1	-.692	2
545		7	max	1813.448	3	1262.937	2	59.245	4	0	4	.036	4	.981	3
546			min	-1061.275	2	-1598.421	3	0	1	0	1	0	1	-1.359	2
547		8	max	1814.065	3	1261.763	2	60.487	4	0	4	.068	4	1.825	3
548			min	-1060.453	2	-1599.301	3	0	1	0	1	0	1	-2.025	2
549		9	max	1823.901	3	176.742	2	152.048	4	0	1	0	1	2.099	3
550			min	-948.921	2	.349	15	0	1	0	1	-.135	4	-2.323	2
551		10	max	1824.517	3	175.569	2	153.289	4	0	1	0	1	2.031	3
552			min	-948.1	2	-.005	7	0	1	0	1	-.054	4	-2.416	2
553		11	max	1825.133	3	174.396	2	154.53	4	0	1	.027	4	1.965	3
554			min	-947.278	2	-1.459	6	0	1	0	1	0	1	-2.508	2
555		12	max	1835.816	3	1067.583	3	162.222	4	0	1	0	1	1.721	3
556			min	-836.163	2	-1615.427	2	0	1	0	4	-.242	4	-2.248	2
557		13	max	1836.432	3	1066.703	3	163.463	4	0	1	0	1	1.158	3
558			min	-835.341	2	-1616.601	2	0	1	0	4	-.156	4	-1.396	2
559		14	max	1837.048	3	1065.823	3	164.705	4	0	1	0	1	.595	3
560			min	-834.52	2	-1617.774	2	0	1	0	4	-.07	4	-.542	2
561		15	max	1837.665	3	1064.942	3	165.946	4	0	1	.017	4	.312	2
562			min	-833.698	2	-1618.947	2	0	1	0	4	0	1	0	15
563		16	max	1838.281	3	1064.062	3	167.188	4	0	1	.105	4	1.166	2
564			min	-832.877	2	-1620.121	2	0	1	0	4	0	1	-.529	3
565		17	max	1838.897	3	1063.182	3	168.429	4	0	1	.194	4	2.021	2
566			min	-832.055	2	-1621.294	2	0	1	0	4	0	1	-1.09	3
567		18	max	-9.6	12	1946.633	2	0	1	0	4	.246	4	1.037	2
568			min	-247.454	1	-1037.473	3	-9.881	5	0	1	0	1	-.568	3
569		19	max	-9.189	12	1945.459	2	0	1	0	4	.242	4	.01	2
570			min	-246.632	1	-1038.353	3	-8.64	5	0	1	0	1	-.021	3
571	M9	1	max	107.753	1	705.885	3	46.512	4	0	3	-.008	10	0	15
572			min	9.043	12	-359.341	2	3.346	10	0	4	-.116	4	-.011	2
573		2	max	108.574	1	705.005	3	47.754	4	0	3	-.006	10	.179	2
574			min	9.454	12	-360.515	2	3.346	10	0	4	-.091	4	-.376	3
575		3	max	601.832	3	487.714	2	37.59	1	0	2	-.004	10	.359	2
576			min	-348.628	2	-561.708	3	3.335	10	0	3	-.066	4	-.733	3
577		4	max	602.448	3	486.541	2	38.771	4	0	2	-.003	10	.102	2
578			min	-347.806	2	-562.588	3	3.335	10	0	3	-.046	4	-.436	3
579		5	max	603.065	3	485.368	2	40.012	4	0	2	0	10	-.003	15
580			min	-346.985	2	-563.468	3	3.335	10	0	3	-.025	4	-.154	2
581		6	max	603.681	3	484.194	2	41.253	4	0	2	.01	1	.159	3
582			min	-346.163	2	-564.348	3	3.335	10	0	3	-.006	5	-.41	2
583		7	max	604.297	3	483.021	2	42.495	4	0	2	.03	1	.457	3
584			min	-345.341	2	-565.228	3	3.335	10	0	3	.003	10	-.665	2
585		8	max	604.913	3	481.847	2	43.736	4	0	2	.05	1	.755	3
586			min	-344.52	2	-566.108	3	3.335	10	0	3	.004	10	-.92	2
587		9	max	620.13	3	51.767	2	72.55	4	0	3	-.003	10	.875	3
588			min	-297.497	2	.363	15	5.826	10	0	9	-.1	4	-1.05	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
589		10	max	620.746	3	50.593	2	73.791	4	0	3	0	1	.859	3
590			min	-296.676	2	.009	15	5.826	10	0	9	-.062	4	-1.077	2
591		11	max	621.362	3	49.42	2	75.033	4	0	3	.033	1	.843	3
592			min	-295.854	2	-1.428	6	5.826	10	0	9	-.031	5	-1.103	2
593		12	max	636.155	3	393.096	3	128.902	4	0	3	-.005	10	.74	3
594			min	-248.623	2	-592.063	2	3.73	10	0	2	-.192	4	-.981	2
595		13	max	636.772	3	392.216	3	130.143	4	0	3	-.003	10	.533	3
596			min	-247.802	2	-593.236	2	3.73	10	0	2	-.124	4	-.669	2
597		14	max	637.388	3	391.336	3	131.385	4	0	3	0	10	.326	3
598			min	-246.98	2	-594.41	2	3.73	10	0	2	-.055	4	-.355	2
599		15	max	638.004	3	390.456	3	132.626	4	0	3	.015	4	.12	3
600			min	-246.159	2	-595.583	2	3.73	10	0	2	.001	10	-.045	1
601		16	max	638.62	3	389.576	3	133.868	4	0	3	.085	4	.273	2
602			min	-245.337	2	-596.757	2	3.73	10	0	2	.003	10	-.086	3
603		17	max	639.236	3	388.696	3	135.109	4	0	3	.156	4	.588	2
604			min	-244.515	2	-597.93	2	3.73	10	0	2	.005	10	-.291	3
605		18	max	-8.623	12	575.738	2	41.374	1	0	2	.191	4	.299	2
606			min	-109.073	1	-293.393	3	-57.431	5	0	3	.007	10	-.145	3
607		19	max	-8.212	12	574.565	2	41.374	1	0	2	.166	4	.01	3
608			min	-108.252	1	-294.274	3	-56.189	5	0	3	.009	10	-.005	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	.116	2	.01	3	9.83e-3	2	NC	1	NC	1
2			min	-.383	4	-.035	3	-.007	2	-3.403e-3	3	NC	1	NC	1
3		2	max	0	1	.084	2	.012	3	1.05e-2	2	NC	4	NC	1
4			min	-.383	4	.002	15	-.005	5	-3.163e-3	3	1709.54	3	NC	1
5		3	max	0	1	.125	3	.015	3	1.118e-2	2	NC	4	NC	2
6			min	-.383	4	.002	15	-.007	5	-2.923e-3	3	937.877	3	9676.171	1
7		4	max	0	1	.171	3	.021	1	1.185e-2	2	NC	4	NC	2
8			min	-.383	4	.001	15	-.006	5	-2.682e-3	3	727.894	3	6686.093	1
9		5	max	0	1	.186	3	.024	1	1.253e-2	2	NC	4	NC	2
10			min	-.383	4	.001	15	-.004	10	-2.442e-3	3	678.249	3	5935.452	1
11		6	max	0	1	.171	3	.024	3	1.32e-2	2	NC	4	NC	2
12			min	-.383	4	.001	15	-.005	10	-2.202e-3	3	729.249	3	6502.281	1
13		7	max	0	1	.131	3	.027	3	1.388e-2	2	NC	1	NC	2
14			min	-.383	4	.002	15	-.008	2	-1.962e-3	3	905.344	3	9021.538	3
15		8	max	0	1	.138	2	.028	3	1.455e-2	2	NC	1	NC	1
16			min	-.383	4	.002	15	-.014	2	-1.722e-3	3	1331.603	3	8219.385	3
17		9	max	0	1	.168	2	.029	3	1.523e-2	2	NC	4	NC	1
18			min	-.383	4	.003	15	-.019	2	-1.482e-3	3	2358.54	3	7837.657	3
19		10	max	0	1	.182	2	.03	3	1.59e-2	2	NC	4	NC	1
20			min	-.384	4	.003	15	-.021	2	-1.242e-3	3	2280.81	2	7732.882	3
21		11	max	0	10	.168	2	.029	3	1.523e-2	2	NC	4	NC	1
22			min	-.384	4	.003	15	-.019	2	-1.482e-3	3	2358.54	3	7837.657	3
23		12	max	0	10	.138	2	.028	3	1.455e-2	2	NC	1	NC	1
24			min	-.384	4	.002	15	-.014	2	-1.722e-3	3	1331.603	3	8219.385	3
25		13	max	0	10	.131	3	.027	3	1.388e-2	2	NC	1	NC	2
26			min	-.384	4	.002	15	-.008	2	-1.962e-3	3	905.344	3	9021.538	3
27		14	max	0	10	.171	3	.024	3	1.32e-2	2	NC	4	NC	2
28			min	-.384	4	0	15	-.005	10	-2.202e-3	3	729.249	3	6502.281	1
29		15	max	0	10	.186	3	.024	1	1.253e-2	2	NC	4	NC	2
30			min	-.384	4	0	15	-.004	10	-2.442e-3	3	678.249	3	5935.452	1
31		16	max	0	10	.171	3	.021	1	1.185e-2	2	NC	4	NC	2
32			min	-.384	4	0	15	-.003	10	-2.682e-3	3	727.894	3	6686.093	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
33		17	max	0	10	.125	3	.015	4	1.118e-2	2	NC	4	NC	2
34			min	-.384	4	0	15	-.003	10	-2.923e-3	3	937.877	3	9431.414	4
35		18	max	0	10	.084	2	.012	3	1.05e-2	2	NC	4	NC	1
36			min	-.384	4	.001	15	-.004	2	-3.163e-3	3	1709.54	3	NC	1
37		19	max	0	10	.116	2	.01	3	9.83e-3	2	NC	1	NC	1
38			min	-.384	4	-.035	3	-.007	2	-3.403e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.275	3	.009	3	5.297e-3	2	NC	1	NC	1
40			min	-.296	4	-.36	2	-.006	2	-4.589e-3	3	NC	1	NC	1
41		2	max	0	1	.394	3	.01	3	6.024e-3	2	NC	4	NC	1
42			min	-.296	4	-.469	2	-.009	5	-5.284e-3	3	1257.594	3	NC	1
43		3	max	0	1	.5	3	.012	3	6.752e-3	2	NC	5	NC	1
44			min	-.296	4	-.57	2	-.012	5	-5.98e-3	3	665.965	3	NC	1
45		4	max	0	1	.583	3	.017	1	7.48e-3	2	NC	5	NC	2
46			min	-.296	4	-.653	2	-.008	5	-6.676e-3	3	486.258	3	8239.933	1
47		5	max	0	1	.639	3	.02	1	8.208e-3	2	NC	5	NC	2
48			min	-.296	4	-.715	2	-.004	10	-7.371e-3	3	412.25	3	6983.862	1
49		6	max	0	1	.665	3	.021	3	8.936e-3	2	NC	5	NC	2
50			min	-.296	4	-.755	2	-.005	10	-8.067e-3	3	379.693	2	7422.654	1
51		7	max	0	1	.666	3	.023	3	9.663e-3	2	NC	5	NC	1
52			min	-.296	4	-.773	2	-.008	2	-8.763e-3	3	362.446	2	9539.91	4
53		8	max	0	1	.65	3	.025	3	1.039e-2	2	NC	5	NC	1
54			min	-.296	4	-.776	2	-.013	2	-9.459e-3	3	360.295	2	9107.406	4
55		9	max	0	1	.628	3	.026	3	1.112e-2	2	NC	5	NC	1
56			min	-.296	4	-.769	2	-.017	2	-1.015e-2	3	365.948	2	8852.003	3
57		10	max	0	1	.616	3	.026	3	1.185e-2	2	NC	5	NC	1
58			min	-.296	4	-.764	2	-.019	2	-1.085e-2	3	370.464	2	8712.086	3
59		11	max	0	10	.628	3	.026	3	1.112e-2	2	NC	5	NC	1
60			min	-.296	4	-.769	2	-.017	2	-1.015e-2	3	365.948	2	8852.003	3
61		12	max	0	10	.65	3	.025	3	1.039e-2	2	NC	5	NC	1
62			min	-.296	4	-.776	2	-.013	2	-9.459e-3	3	360.295	2	9351.993	3
63		13	max	0	10	.666	3	.023	3	9.663e-3	2	NC	5	NC	1
64			min	-.296	4	-.773	2	-.008	5	-8.763e-3	3	362.446	2	NC	1
65		14	max	0	10	.665	3	.021	3	8.936e-3	2	NC	5	NC	2
66			min	-.296	4	-.755	2	-.005	10	-8.067e-3	3	379.693	2	7422.654	1
67		15	max	0	10	.639	3	.02	1	8.208e-3	2	NC	5	NC	2
68			min	-.296	4	-.715	2	-.004	10	-7.371e-3	3	412.25	3	6983.862	1
69		16	max	0	10	.583	3	.018	4	7.48e-3	2	NC	5	NC	2
70			min	-.296	4	-.653	2	-.003	10	-6.676e-3	3	486.258	3	8239.933	1
71		17	max	0	10	.5	3	.018	4	6.752e-3	2	NC	5	NC	1
72			min	-.296	4	-.57	2	-.003	10	-5.98e-3	3	665.965	3	8133.802	4
73		18	max	0	10	.394	3	.012	4	6.024e-3	2	NC	4	NC	1
74			min	-.296	4	-.469	2	-.005	2	-5.284e-3	3	1257.594	3	NC	1
75		19	max	0	10	.275	3	.009	3	5.297e-3	2	NC	1	NC	1
76			min	-.296	4	-.36	2	-.006	2	-4.589e-3	3	NC	1	NC	1
77	M15	1	max	0	10	.279	3	.008	3	4.088e-3	3	NC	1	NC	1
78			min	-.248	4	-.358	2	-.006	2	-5.575e-3	2	NC	1	NC	1
79		2	max	0	10	.371	3	.009	3	4.708e-3	3	NC	4	NC	1
80			min	-.248	4	-.493	2	-.013	5	-6.35e-3	2	1117.52	2	NC	1
81		3	max	0	10	.456	3	.012	3	5.328e-3	3	NC	5	NC	1
82			min	-.248	4	-.612	2	-.017	5	-7.125e-3	2	590.475	2	8307.502	5
83		4	max	0	10	.526	3	.017	1	5.949e-3	3	NC	5	NC	2
84			min	-.248	4	-.708	2	-.013	5	-7.9e-3	2	429.57	2	8185.068	1
85		5	max	0	10	.579	3	.021	1	6.569e-3	3	NC	5	NC	2
86			min	-.248	4	-.772	2	-.004	5	-8.675e-3	2	362.302	2	6927.857	1
87		6	max	0	10	.613	3	.02	3	7.189e-3	3	NC	5	NC	2
88			min	-.248	4	-.806	2	-.005	10	-9.449e-3	2	335.25	2	7341.142	1
89		7	max	0	10	.63	3	.022	3	7.81e-3	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
90			min	-.248	4	-.811	2	-.007	2	-1.022e-2	2	331.217	2	8093.168	4
91		8	max	0	10	.633	3	.023	3	8.43e-3	3	NC	5	NC	1
92			min	-.248	4	-.797	2	-.012	2	-1.1e-2	2	342.161	2	7331.167	4
93		9	max	0	10	.628	3	.024	3	9.051e-3	3	NC	5	NC	1
94			min	-.248	4	-.775	2	-.016	2	-1.177e-2	2	360.085	2	9548.801	3
95		10	max	0	1	.624	3	.024	3	9.671e-3	3	NC	5	NC	1
96			min	-.248	4	-.763	2	-.018	2	-1.255e-2	2	370.767	2	9413.766	3
97		11	max	0	1	.628	3	.024	3	9.051e-3	3	NC	5	NC	1
98			min	-.248	4	-.775	2	-.016	2	-1.177e-2	2	360.085	2	9548.801	3
99		12	max	0	1	.633	3	.023	3	8.43e-3	3	NC	5	NC	1
100			min	-.248	4	-.797	2	-.015	5	-1.1e-2	2	342.161	2	9840.343	5
101		13	max	0	1	.63	3	.022	3	7.81e-3	3	NC	5	NC	1
102			min	-.248	4	-.811	2	-.01	5	-1.022e-2	2	331.217	2	NC	1
103		14	max	0	1	.613	3	.02	3	7.189e-3	3	NC	5	NC	2
104			min	-.248	4	-.806	2	-.005	10	-9.449e-3	2	335.25	2	7341.142	1
105		15	max	0	1	.579	3	.021	1	6.569e-3	3	NC	5	NC	2
106			min	-.248	4	-.772	2	-.003	10	-8.675e-3	2	362.302	2	6927.857	1
107		16	max	0	1	.526	3	.022	4	5.949e-3	3	NC	5	NC	2
108			min	-.248	4	-.708	2	-.003	10	-7.9e-3	2	429.57	2	6703.373	4
109		17	max	0	1	.456	3	.023	4	5.328e-3	3	NC	5	NC	1
110			min	-.248	4	-.612	2	-.003	10	-7.125e-3	2	590.475	2	6383.442	4
111		18	max	0	1	.371	3	.016	4	4.708e-3	3	NC	4	NC	1
112			min	-.248	4	-.493	2	-.004	2	-6.35e-3	2	1117.52	2	9035.093	4
113		19	max	0	1	.279	3	.008	3	4.088e-3	3	NC	1	NC	1
114			min	-.248	4	-.358	2	-.006	2	-5.575e-3	2	NC	1	NC	1
115	M16	1	max	0	10	.103	2	.007	3	7.685e-3	3	NC	1	NC	1
116			min	-.098	4	-.094	3	-.005	2	-8.124e-3	2	NC	1	NC	1
117		2	max	0	10	.042	2	.009	3	8.314e-3	3	NC	4	NC	1
118			min	-.098	4	-.071	3	-.01	5	-8.428e-3	2	2476.606	2	NC	1
119		3	max	0	10	.009	9	.015	1	8.944e-3	3	NC	4	NC	2
120			min	-.098	4	-.054	3	-.014	5	-8.732e-3	2	1382.007	2	9582.223	1
121		4	max	0	10	.007	9	.022	1	9.573e-3	3	NC	4	NC	2
122			min	-.098	4	-.048	3	-.011	5	-9.037e-3	2	1106.991	2	6583.971	1
123		5	max	0	10	.007	9	.025	1	1.02e-2	3	NC	4	NC	2
124			min	-.098	4	-.054	3	-.005	5	-9.341e-3	2	1089.992	2	5800.497	1
125		6	max	0	10	.011	9	.023	1	1.083e-2	3	NC	4	NC	2
126			min	-.098	4	-.072	3	-.003	10	-9.645e-3	2	1297.601	2	6272.516	1
127		7	max	0	10	.035	1	.02	3	1.146e-2	3	NC	3	NC	2
128			min	-.098	4	-.098	3	-.005	10	-9.95e-3	2	2007.078	2	8647.21	1
129		8	max	0	10	.078	2	.021	3	1.209e-2	3	NC	1	NC	1
130			min	-.098	4	-.129	3	-.01	2	-1.025e-2	2	4402.048	3	NC	1
131		9	max	0	10	.122	2	.021	3	1.272e-2	3	NC	4	NC	1
132			min	-.098	4	-.154	3	-.015	2	-1.056e-2	2	2499.053	3	NC	1
133		10	max	0	1	.142	2	.021	3	1.335e-2	3	NC	4	NC	1
134			min	-.098	4	-.166	3	-.017	2	-1.086e-2	2	2098.813	3	NC	1
135		11	max	0	1	.122	2	.021	3	1.272e-2	3	NC	4	NC	1
136			min	-.098	4	-.154	3	-.015	2	-1.056e-2	2	2499.053	3	NC	1
137		12	max	0	1	.078	2	.021	3	1.209e-2	3	NC	1	NC	1
138			min	-.098	4	-.129	3	-.01	2	-1.025e-2	2	4402.048	3	NC	1
139		13	max	0	1	.035	1	.02	3	1.146e-2	3	NC	3	NC	2
140			min	-.098	4	-.098	3	-.005	10	-9.95e-3	2	2007.078	2	8647.21	1
141		14	max	0	1	.011	9	.023	1	1.083e-2	3	NC	4	NC	2
142			min	-.098	4	-.072	3	-.003	10	-9.645e-3	2	1297.601	2	6272.516	1
143		15	max	0	1	.007	9	.025	1	1.02e-2	3	NC	4	NC	2
144			min	-.098	4	-.054	3	-.002	10	-9.341e-3	2	1089.992	2	5800.497	1
145		16	max	0	1	.007	9	.023	4	9.573e-3	3	NC	4	NC	2
146			min	-.098	4	-.048	3	-.002	10	-9.037e-3	2	1106.991	2	6583.971	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
147		17	max	0	1	.009	9	.022	4	8.944e-3	3	NC	4	NC	2
148			min	-.098	4	-.054	3	-.002	10	-8.732e-3	2	1382.007	2	6838.881	4
149		18	max	0	1	.042	2	.014	4	8.314e-3	3	NC	4	NC	1
150			min	-.098	4	-.071	3	-.003	2	-8.428e-3	2	2476.606	2	NC	1
151		19	max	0	1	.103	2	.007	3	7.685e-3	3	NC	1	NC	1
152			min	-.098	4	-.094	3	-.005	2	-8.124e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.011	2	.003	1	1.196e-3	5	NC	1	NC	1
154			min	-.01	3	-.016	3	-.363	4	-7.671e-5	1	7301.202	2	212.149	4
155		2	max	.007	2	.009	2	.003	1	1.22e-3	5	NC	1	NC	1
156			min	-.01	3	-.015	3	-.334	4	-7.282e-5	1	8450.626	2	230.471	4
157		3	max	.006	2	.008	2	.002	1	1.244e-3	5	NC	1	NC	1
158			min	-.009	3	-.015	3	-.305	4	-6.893e-5	1	NC	1	252.141	4
159		4	max	.006	2	.006	2	.002	1	1.268e-3	5	NC	1	NC	1
160			min	-.009	3	-.014	3	-.277	4	-6.504e-5	1	NC	1	278.021	4
161		5	max	.005	2	.005	2	.002	1	1.292e-3	5	NC	1	NC	1
162			min	-.008	3	-.014	3	-.249	4	-6.115e-5	1	NC	1	309.278	4
163		6	max	.005	2	.004	2	.002	1	1.316e-3	5	NC	1	NC	1
164			min	-.007	3	-.013	3	-.222	4	-5.726e-5	1	NC	1	347.522	4
165		7	max	.005	2	.003	2	.002	1	1.34e-3	5	NC	1	NC	1
166			min	-.007	3	-.013	3	-.195	4	-5.337e-5	1	NC	1	395.023	4
167		8	max	.004	2	.002	2	.001	1	1.364e-3	5	NC	1	NC	1
168			min	-.006	3	-.012	3	-.169	4	-4.949e-5	1	NC	1	455.077	4
169		9	max	.004	2	0	2	.001	1	1.388e-3	5	NC	1	NC	1
170			min	-.006	3	-.011	3	-.145	4	-4.56e-5	1	NC	1	532.607	4
171		10	max	.004	2	0	2	0	1	1.412e-3	5	NC	1	NC	1
172			min	-.005	3	-.01	3	-.121	4	-4.171e-5	1	NC	1	635.252	4
173		11	max	.003	2	0	2	0	1	1.436e-3	5	NC	1	NC	1
174			min	-.005	3	-.009	3	-.099	4	-3.782e-5	1	NC	1	775.394	4
175		12	max	.003	2	-.001	15	0	1	1.46e-3	5	NC	1	NC	1
176			min	-.004	3	-.008	3	-.079	4	-3.393e-5	1	NC	1	974.223	4
177		13	max	.002	2	-.001	15	0	1	1.484e-3	5	NC	1	NC	1
178			min	-.003	3	-.007	3	-.061	4	-3.004e-5	1	NC	1	1270.541	4
179		14	max	.002	2	0	15	0	1	1.509e-3	4	NC	1	NC	1
180			min	-.003	3	-.006	3	-.044	4	-2.615e-5	1	NC	1	1741.96	4
181		15	max	.002	2	0	15	0	1	1.534e-3	4	NC	1	NC	1
182			min	-.002	3	-.005	3	-.03	4	-2.226e-5	1	NC	1	2563.411	4
183		16	max	.001	2	0	15	0	1	1.56e-3	4	NC	1	NC	1
184			min	-.002	3	-.004	3	-.018	4	-1.837e-5	1	NC	1	4203.459	4
185		17	max	0	2	0	15	0	1	1.585e-3	4	NC	1	NC	1
186			min	-.001	3	-.003	3	-.009	4	-1.448e-5	1	NC	1	8317.201	4
187		18	max	0	2	0	15	0	1	1.61e-3	4	NC	1	NC	1
188			min	0	3	-.001	3	-.003	4	-1.06e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.635e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-6.706e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.574e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.193e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.008	4	8.988e-6	1	NC	1	NC	1
194			min	0	2	-.002	6	0	1	-2.999e-5	5	NC	1	NC	1
195		3	max	0	3	0	15	.015	4	3.655e-4	4	NC	1	NC	1
196			min	0	2	-.004	6	0	1	1.666e-6	10	NC	1	6170.567	4
197		4	max	.001	3	-.001	15	.021	4	7.578e-4	4	NC	1	NC	1
198			min	-.001	2	-.006	6	0	1	2.45e-6	10	NC	1	4314.885	4
199		5	max	.002	3	-.002	15	.027	4	1.15e-3	4	NC	1	NC	1
200			min	-.002	2	-.008	6	0	1	3.234e-6	10	NC	1	3385.193	4
201		6	max	.002	3	-.002	15	.032	4	1.543e-3	4	NC	1	NC	1
202			min	-.002	2	-.01	6	0	1	4.018e-6	10	9384.56	6	2822.689	4
203		7	max	.003	3	-.002	15	.037	4	1.935e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
204			min	-.003	2	-.011	6	0	3	4.802e-6	10	8106.946	6	2440.593	4
205		8	max	.003	3	-.003	15	.042	4	2.327e-3	4	NC	2	NC	1
206			min	-.003	2	-.012	6	0	3	5.586e-6	10	7320.352	6	2158.506	4
207		9	max	.004	3	-.003	15	.046	4	2.72e-3	4	NC	5	NC	1
208			min	-.003	2	-.013	6	0	12	6.369e-6	10	6860.524	6	1936.076	4
209		10	max	.004	3	-.003	15	.051	4	3.112e-3	4	NC	5	NC	1
210			min	-.004	2	-.013	6	0	12	7.153e-6	10	6648.28	6	1750.955	4
211		11	max	.005	3	-.003	15	.056	4	3.505e-3	4	NC	5	NC	1
212			min	-.004	2	-.013	6	0	12	7.937e-6	10	6652.609	6	1590.022	4
213		12	max	.005	3	-.003	15	.062	4	3.897e-3	4	NC	5	NC	1
214			min	-.005	2	-.013	6	0	12	8.721e-6	10	6878.772	6	1445.403	4
215		13	max	.006	3	-.003	15	.068	4	4.289e-3	4	NC	2	NC	1
216			min	-.005	2	-.012	6	0	12	9.505e-6	10	7371.865	6	1312.46	4
217		14	max	.006	3	-.002	15	.076	4	4.682e-3	4	NC	1	NC	1
218			min	-.005	2	-.011	6	0	10	1.029e-5	10	8239.717	6	1188.632	4
219		15	max	.006	3	-.002	15	.084	4	5.074e-3	4	NC	1	NC	1
220			min	-.006	2	-.009	6	0	10	1.107e-5	10	9719.486	6	1072.701	4
221		16	max	.007	3	-.001	15	.093	4	5.466e-3	4	NC	1	NC	1
222			min	-.006	2	-.007	6	0	10	1.186e-5	10	NC	1	964.268	4
223		17	max	.007	3	0	15	.104	4	5.859e-3	4	NC	1	NC	1
224			min	-.007	2	-.006	3	0	10	1.264e-5	10	NC	1	863.36	4
225		18	max	.008	3	0	15	.117	4	6.251e-3	4	NC	1	NC	1
226			min	-.007	2	-.004	3	0	10	1.342e-5	10	NC	1	770.16	4
227		19	max	.008	3	0	2	.131	4	6.644e-3	4	NC	1	NC	1
228			min	-.008	2	-.003	3	0	10	1.421e-5	10	NC	1	684.817	4
229	M4	1	max	.002	1	.007	2	0	10	1.171e-3	4	NC	1	NC	2
230			min	0	5	-.009	3	-.131	4	5.44e-6	10	NC	1	189.085	4
231		2	max	.001	1	.007	2	0	10	1.171e-3	4	NC	1	NC	2
232			min	0	5	-.008	3	-.121	4	5.44e-6	10	NC	1	204.902	4
233		3	max	.001	1	.007	2	0	10	1.171e-3	4	NC	1	NC	1
234			min	0	5	-.008	3	-.111	4	5.44e-6	10	NC	1	223.772	4
235		4	max	.001	1	.006	2	0	10	1.171e-3	4	NC	1	NC	1
236			min	0	5	-.007	3	-.101	4	5.44e-6	10	NC	1	246.478	4
237		5	max	.001	1	.006	2	0	10	1.171e-3	4	NC	1	NC	1
238			min	0	5	-.007	3	-.09	4	5.44e-6	10	NC	1	274.088	4
239		6	max	.001	1	.005	2	0	10	1.171e-3	4	NC	1	NC	1
240			min	0	5	-.006	3	-.081	4	5.44e-6	10	NC	1	308.081	4
241		7	max	.001	1	.005	2	0	10	1.171e-3	4	NC	1	NC	1
242			min	0	5	-.006	3	-.071	4	5.44e-6	10	NC	1	350.56	4
243		8	max	0	1	.005	2	0	10	1.171e-3	4	NC	1	NC	1
244			min	0	5	-.005	3	-.061	4	5.44e-6	10	NC	1	404.586	4
245		9	max	0	1	.004	2	0	10	1.171e-3	4	NC	1	NC	1
246			min	0	5	-.005	3	-.052	4	5.44e-6	10	NC	1	474.769	4
247		10	max	0	1	.004	2	0	10	1.171e-3	4	NC	1	NC	1
248			min	0	5	-.004	3	-.044	4	5.44e-6	10	NC	1	568.313	4
249		11	max	0	1	.003	2	0	10	1.171e-3	4	NC	1	NC	1
250			min	0	5	-.004	3	-.036	4	5.44e-6	10	NC	1	696.995	4
251		12	max	0	1	.003	2	0	10	1.171e-3	4	NC	1	NC	1
252			min	0	5	-.003	3	-.028	4	5.44e-6	10	NC	1	881.178	4
253		13	max	0	1	.002	2	0	10	1.171e-3	4	NC	1	NC	1
254			min	0	5	-.003	3	-.021	4	5.44e-6	10	NC	1	1158.63	4
255		14	max	0	1	.002	2	0	10	1.171e-3	4	NC	1	NC	1
256			min	0	5	-.002	3	-.015	4	5.44e-6	10	NC	1	1606.132	4
257		15	max	0	1	.002	2	0	10	1.171e-3	4	NC	1	NC	1
258			min	0	5	-.002	3	-.01	4	5.44e-6	10	NC	1	2400.514	4
259		16	max	0	1	.001	2	0	10	1.171e-3	4	NC	1	NC	1
260			min	0	5	-.001	3	-.006	4	5.44e-6	10	NC	1	4030.038	4

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
261		17	max	0	1	0	2	0	10	1.171e-3	4	NC	1	NC	1
262			min	0	5	0	3	-.003	4	5.44e-6	10	NC	1	8302.102	4
263		18	max	0	1	0	2	0	10	1.171e-3	4	NC	1	NC	1
264			min	0	5	0	3	0	4	5.44e-6	10	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.171e-3	4	NC	1	NC	1
266			min	0	1	0	1	0	1	5.44e-6	10	NC	1	NC	1
267	M6	1	max	.021	2	.033	2	0	1	1.239e-3	4	NC	4	NC	1
268			min	-.032	3	-.047	3	-.366	4	0	1	1628.432	3	210.365	4
269		2	max	.02	2	.03	2	0	1	1.262e-3	4	NC	4	NC	1
270			min	-.03	3	-.045	3	-.337	4	0	1	1723.556	3	228.534	4
271		3	max	.019	2	.027	2	0	1	1.285e-3	4	NC	4	NC	1
272			min	-.028	3	-.042	3	-.308	4	0	1	1830.633	3	250.024	4
273		4	max	.017	2	.024	2	0	1	1.308e-3	4	NC	4	NC	1
274			min	-.026	3	-.039	3	-.279	4	0	1	1952.204	3	275.689	4
275		5	max	.016	2	.022	2	0	1	1.332e-3	4	NC	4	NC	1
276			min	-.025	3	-.037	3	-.251	4	0	1	2091.534	3	306.687	4
277		6	max	.015	2	.019	2	0	1	1.355e-3	4	NC	4	NC	1
278			min	-.023	3	-.034	3	-.223	4	0	1	2252.893	3	344.612	4
279		7	max	.014	2	.016	2	0	1	1.378e-3	4	NC	1	NC	1
280			min	-.021	3	-.032	3	-.197	4	0	1	2441.977	3	391.719	4
281		8	max	.013	2	.014	2	0	1	1.401e-3	4	NC	1	NC	1
282			min	-.019	3	-.029	3	-.171	4	0	1	2666.552	3	451.272	4
283		9	max	.012	2	.011	2	0	1	1.424e-3	4	NC	1	NC	1
284			min	-.018	3	-.026	3	-.146	4	0	1	2937.5	3	528.153	4
285		10	max	.01	2	.009	2	0	1	1.448e-3	4	NC	1	NC	1
286			min	-.016	3	-.024	3	-.122	4	0	1	3270.543	3	629.937	4
287		11	max	.009	2	.007	2	0	1	1.471e-3	4	NC	1	NC	1
288			min	-.014	3	-.021	3	-.1	4	0	1	3689.276	3	768.898	4
289		12	max	.008	2	.006	2	0	1	1.494e-3	4	NC	1	NC	1
290			min	-.012	3	-.018	3	-.08	4	0	1	4230.796	3	966.039	4
291		13	max	.007	2	.004	2	0	1	1.517e-3	4	NC	1	NC	1
292			min	-.011	3	-.016	3	-.061	4	0	1	4956.956	3	1259.82	4
293		14	max	.006	2	.003	2	0	1	1.54e-3	4	NC	1	NC	1
294			min	-.009	3	-.013	3	-.045	4	0	1	5979.131	3	1727.154	4
295		15	max	.005	2	.002	2	0	1	1.564e-3	4	NC	1	NC	1
296			min	-.007	3	-.01	3	-.03	4	0	1	7520.136	3	2541.366	4
297		16	max	.003	2	0	2	0	1	1.587e-3	4	NC	1	NC	1
298			min	-.005	3	-.008	3	-.018	4	0	1	NC	1	4166.597	4
299		17	max	.002	2	0	2	0	1	1.61e-3	4	NC	1	NC	1
300			min	-.004	3	-.005	3	-.009	4	0	1	NC	1	8241.659	4
301		18	max	.001	2	0	2	0	1	1.633e-3	4	NC	1	NC	1
302			min	-.002	3	-.002	3	-.003	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	1.656e-3	4	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	-4.25e-4	4	NC	1	NC	1
307		2	max	.001	3	0	2	.008	4	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	-4.25e-5	5	NC	1	NC	1
309		3	max	.003	3	0	15	.015	4	3.412e-4	4	NC	1	NC	1
310			min	-.003	2	-.006	3	0	1	0	1	NC	1	6090.635	4
311		4	max	.004	3	-.001	15	.021	4	7.243e-4	4	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	4260.714	4
313		5	max	.005	3	-.002	15	.027	4	1.107e-3	4	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	3345.215	4
315		6	max	.007	3	-.002	15	.032	4	1.49e-3	4	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8887.592	3	2792.556	4
317		7	max	.008	3	-.003	15	.037	4	1.874e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
318			min	-.008	2	-.014	3	0	1	0	1	7939.913	3	2418.348	4
319		8	max	.009	3	-.003	15	.042	4	2.257e-3	4	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7298.588	4	2143.177	4
321		9	max	.011	3	-.003	15	.047	4	2.64e-3	4	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6841.345	4	1927.115	4
323		10	max	.012	3	-.003	15	.051	4	3.023e-3	4	NC	1	NC	1
324			min	-.012	2	-.016	3	0	1	0	1	6630.692	4	1747.962	4
325		11	max	.014	3	-.003	15	.056	4	3.406e-3	4	NC	1	NC	1
326			min	-.013	2	-.017	3	0	1	0	1	6635.858	4	1592.586	4
327		12	max	.015	3	-.003	15	.062	4	3.789e-3	4	NC	1	NC	1
328			min	-.015	2	-.016	3	0	1	0	1	6862.196	4	1453.018	4
329		13	max	.016	3	-.003	15	.068	4	4.172e-3	4	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7354.774	4	1324.482	4
331		14	max	.018	3	-.003	15	.075	4	4.555e-3	4	NC	1	NC	1
332			min	-.017	2	-.015	3	0	1	0	1	8221.242	4	1204.289	4
333		15	max	.019	3	-.002	15	.082	4	4.938e-3	4	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9698.301	4	1091.134	4
335		16	max	.02	3	-.002	15	.091	4	5.321e-3	4	NC	1	NC	1
336			min	-.02	2	-.012	3	0	1	0	1	NC	1	984.586	4
337		17	max	.022	3	0	2	.102	4	5.704e-3	4	NC	1	NC	1
338			min	-.021	2	-.011	3	0	1	0	1	NC	1	884.711	4
339		18	max	.023	3	0	2	.113	4	6.087e-3	4	NC	1	NC	1
340			min	-.022	2	-.009	3	0	1	0	1	NC	1	791.781	4
341		19	max	.024	3	.002	2	.127	4	6.471e-3	4	NC	1	NC	1
342			min	-.024	2	-.007	3	0	1	0	1	NC	1	706.077	4
343	M8	1	max	.004	2	.024	2	0	1	1.062e-3	4	NC	1	NC	1
344			min	0	15	-.025	3	-.127	4	0	1	NC	1	194.955	4
345		2	max	.004	2	.022	2	0	1	1.062e-3	4	NC	1	NC	1
346			min	0	15	-.024	3	-.117	4	0	1	NC	1	211.279	4
347		3	max	.004	2	.021	2	0	1	1.062e-3	4	NC	1	NC	1
348			min	0	15	-.023	3	-.107	4	0	1	NC	1	230.751	4
349		4	max	.004	2	.02	2	0	1	1.062e-3	4	NC	1	NC	1
350			min	0	15	-.021	3	-.098	4	0	1	NC	1	254.181	4
351		5	max	.003	2	.018	2	0	1	1.062e-3	4	NC	1	NC	1
352			min	0	15	-.02	3	-.088	4	0	1	NC	1	282.671	4
353		6	max	.003	2	.017	2	0	1	1.062e-3	4	NC	1	NC	1
354			min	0	15	-.018	3	-.078	4	0	1	NC	1	317.747	4
355		7	max	.003	2	.016	2	0	1	1.062e-3	4	NC	1	NC	1
356			min	0	15	-.017	3	-.069	4	0	1	NC	1	361.577	4
357		8	max	.003	2	.014	2	0	1	1.062e-3	4	NC	1	NC	1
358			min	0	15	-.016	3	-.059	4	0	1	NC	1	417.322	4
359		9	max	.002	2	.013	2	0	1	1.062e-3	4	NC	1	NC	1
360			min	0	15	-.014	3	-.051	4	0	1	NC	1	489.737	4
361		10	max	.002	2	.012	2	0	1	1.062e-3	4	NC	1	NC	1
362			min	0	15	-.013	3	-.042	4	0	1	NC	1	586.257	4
363		11	max	.002	2	.01	2	0	1	1.062e-3	4	NC	1	NC	1
364			min	0	15	-.011	3	-.034	4	0	1	NC	1	719.032	4
365		12	max	.002	2	.009	2	0	1	1.062e-3	4	NC	1	NC	1
366			min	0	15	-.01	3	-.027	4	0	1	NC	1	909.076	4
367		13	max	.001	2	.008	2	0	1	1.062e-3	4	NC	1	NC	1
368			min	0	15	-.008	3	-.021	4	0	1	NC	1	1195.36	4
369		14	max	.001	2	.007	2	0	1	1.062e-3	4	NC	1	NC	1
370			min	0	15	-.007	3	-.015	4	0	1	NC	1	1657.112	4
371		15	max	0	2	.005	2	0	1	1.062e-3	4	NC	1	NC	1
372			min	0	15	-.006	3	-.01	4	0	1	NC	1	2476.806	4
373		16	max	0	2	.004	2	0	1	1.062e-3	4	NC	1	NC	1
374			min	0	15	-.004	3	-.006	4	0	1	NC	1	4158.29	4

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
375		17	max	0	2	.003	2	0	1	1.062e-3	4	NC	1	NC	1
376			min	0	15	-.003	3	-.003	4	0	1	NC	1	8566.717	4
377		18	max	0	2	.001	2	0	1	1.062e-3	4	NC	1	NC	1
378			min	0	15	-.001	3	0	4	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	1.062e-3	4	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.011	2	0	10	1.238e-3	4	NC	1	NC	1
382			min	-.01	3	-.016	3	-.365	4	6.068e-6	10	7301.202	2	210.925	4
383		2	max	.007	2	.009	2	0	10	1.26e-3	4	NC	1	NC	1
384			min	-.01	3	-.015	3	-.336	4	5.755e-6	10	8450.626	2	229.144	4
385		3	max	.006	2	.008	2	0	10	1.282e-3	4	NC	1	NC	1
386			min	-.009	3	-.015	3	-.307	4	5.443e-6	10	NC	1	250.694	4
387		4	max	.006	2	.006	2	0	10	1.305e-3	4	NC	1	NC	1
388			min	-.009	3	-.014	3	-.279	4	5.131e-6	10	NC	1	276.431	4
389		5	max	.005	2	.005	2	0	10	1.327e-3	4	NC	1	NC	1
390			min	-.008	3	-.014	3	-.25	4	4.819e-6	10	NC	1	307.516	4
391		6	max	.005	2	.004	2	0	10	1.349e-3	4	NC	1	NC	1
392			min	-.007	3	-.013	3	-.223	4	4.507e-6	10	NC	1	345.55	4
393		7	max	.005	2	.003	2	0	10	1.372e-3	4	NC	1	NC	1
394			min	-.007	3	-.013	3	-.196	4	4.194e-6	10	NC	1	392.794	4
395		8	max	.004	2	.002	2	0	10	1.394e-3	4	NC	1	NC	1
396			min	-.006	3	-.012	3	-.17	4	3.882e-6	10	NC	1	452.522	4
397		9	max	.004	2	0	2	0	10	1.416e-3	4	NC	1	NC	1
398			min	-.006	3	-.011	3	-.145	4	3.57e-6	10	NC	1	529.635	4
399		10	max	.004	2	0	2	0	10	1.439e-3	4	NC	1	NC	1
400			min	-.005	3	-.01	3	-.122	4	3.258e-6	10	NC	1	631.731	4
401		11	max	.003	2	0	2	0	10	1.461e-3	4	NC	1	NC	1
402			min	-.005	3	-.009	3	-.1	4	2.946e-6	10	NC	1	771.129	4
403		12	max	.003	2	-.001	2	0	10	1.483e-3	4	NC	1	NC	1
404			min	-.004	3	-.008	3	-.079	4	2.633e-6	10	NC	1	968.911	4
405		13	max	.002	2	-.002	15	0	10	1.506e-3	4	NC	1	NC	1
406			min	-.003	3	-.007	3	-.061	4	2.321e-6	10	NC	1	1263.685	4
407		14	max	.002	2	-.002	15	0	10	1.528e-3	4	NC	1	NC	1
408			min	-.003	3	-.006	3	-.044	4	2.009e-6	10	NC	1	1732.68	4
409		15	max	.002	2	-.001	15	0	10	1.551e-3	4	NC	1	NC	1
410			min	-.002	3	-.005	3	-.03	4	1.697e-6	10	NC	1	2549.982	4
411		16	max	.001	2	-.001	15	0	10	1.573e-3	4	NC	1	NC	1
412			min	-.002	3	-.004	3	-.018	4	1.385e-6	10	NC	1	4181.954	4
413		17	max	0	2	0	15	0	10	1.595e-3	4	NC	1	NC	1
414			min	-.001	3	-.003	4	-.009	4	1.072e-6	10	NC	1	8276.248	4
415		18	max	0	2	0	15	0	10	1.618e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.003	4	7.602e-7	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	1.64e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	4.48e-7	10	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-9.875e-8	10	NC	1	NC	1
420			min	0	1	0	1	0	1	-4.205e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.008	4	-8.826e-7	10	NC	1	NC	1
422			min	0	2	-.002	4	0	10	-3.331e-5	4	NC	1	NC	1
423		3	max	0	3	-.001	15	.015	4	3.547e-4	5	NC	1	NC	1
424			min	0	2	-.004	4	0	10	-1.64e-5	1	NC	1	6154.747	4
425		4	max	.001	3	-.002	15	.021	4	7.41e-4	5	NC	1	NC	1
426			min	-.001	2	-.006	4	0	10	-2.382e-5	1	NC	1	4305.62	4
427		5	max	.002	3	-.002	15	.027	4	1.128e-3	4	NC	1	NC	1
428			min	-.002	2	-.008	4	0	10	-3.123e-5	1	NC	1	3379.806	4
429		6	max	.002	3	-.003	15	.032	4	1.515e-3	4	NC	1	NC	1
430			min	-.002	2	-.01	4	0	10	-3.864e-5	1	9134.96	4	2820.193	4
431		7	max	.003	3	-.003	15	.037	4	1.902e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
432			min	-.003	2	-.012	4	0	2	-4.606e-5	1	7906.884	4	2440.549	4
433		8	max	.003	3	-.003	15	.042	4	2.29e-3	4	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-5.347e-5	1	7151.44	4	2160.684	4
435		9	max	.004	3	-.003	15	.046	4	2.677e-3	4	NC	5	NC	1
436			min	-.003	2	-.014	4	0	1	-6.089e-5	1	6711.494	4	1940.318	4
437		10	max	.004	3	-.004	15	.051	4	3.064e-3	4	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-6.83e-5	1	6511.48	4	1757.104	4
439		11	max	.005	3	-.004	15	.056	4	3.451e-3	4	NC	5	NC	1
440			min	-.004	2	-.014	4	0	1	-7.571e-5	1	6522.203	4	1597.883	4
441		12	max	.005	3	-.004	15	.062	4	3.838e-3	4	NC	5	NC	1
442			min	-.005	2	-.014	4	0	1	-8.313e-5	1	6749.629	4	1454.732	4
443		13	max	.006	3	-.003	15	.068	4	4.225e-3	4	NC	2	NC	1
444			min	-.005	2	-.013	4	0	1	-9.054e-5	1	7238.628	4	1322.954	4
445		14	max	.006	3	-.003	15	.075	4	4.613e-3	4	NC	1	NC	1
446			min	-.005	2	-.012	4	-.001	1	-9.796e-5	1	8095.621	4	1199.951	4
447		15	max	.006	3	-.003	15	.083	4	5.e-3	4	NC	1	NC	1
448			min	-.006	2	-.01	4	-.001	1	-1.054e-4	1	9554.177	4	1084.489	4
449		16	max	.007	3	-.002	15	.092	4	5.387e-3	4	NC	1	NC	1
450			min	-.006	2	-.008	4	-.002	1	-1.128e-4	1	NC	1	976.178	4
451		17	max	.007	3	-.002	15	.103	4	5.774e-3	4	NC	1	NC	1
452			min	-.007	2	-.006	4	-.002	1	-1.202e-4	1	NC	1	875.083	4
453		18	max	.008	3	-.001	10	.115	4	6.161e-3	4	NC	1	NC	1
454			min	-.007	2	-.004	3	-.002	1	-1.276e-4	1	NC	1	781.44	4
455		19	max	.008	3	0	2	.129	4	6.548e-3	4	NC	1	NC	1
456			min	-.008	2	-.003	3	-.003	1	-1.35e-4	1	NC	1	695.462	4
457	M12	1	max	.002	1	.007	2	.003	1	1.134e-3	5	NC	1	NC	2
458			min	0	12	-.009	3	-.129	4	-5.573e-5	1	NC	1	192.024	4
459		2	max	.001	1	.007	2	.003	1	1.134e-3	5	NC	1	NC	2
460			min	0	12	-.008	3	-.119	4	-5.573e-5	1	NC	1	208.088	4
461		3	max	.001	1	.007	2	.002	1	1.134e-3	5	NC	1	NC	1
462			min	0	12	-.008	3	-.109	4	-5.573e-5	1	NC	1	227.252	4
463		4	max	.001	1	.006	2	.002	1	1.134e-3	5	NC	1	NC	1
464			min	0	12	-.007	3	-.099	4	-5.573e-5	1	NC	1	250.313	4
465		5	max	.001	1	.006	2	.002	1	1.134e-3	5	NC	1	NC	1
466			min	0	12	-.007	3	-.089	4	-5.573e-5	1	NC	1	278.353	4
467		6	max	.001	1	.005	2	.002	1	1.134e-3	5	NC	1	NC	1
468			min	0	12	-.006	3	-.079	4	-5.573e-5	1	NC	1	312.877	4
469		7	max	.001	1	.005	2	.002	1	1.134e-3	5	NC	1	NC	1
470			min	0	12	-.006	3	-.07	4	-5.573e-5	1	NC	1	356.017	4
471		8	max	0	1	.005	2	.001	1	1.134e-3	5	NC	1	NC	1
472			min	0	12	-.005	3	-.06	4	-5.573e-5	1	NC	1	410.886	4
473		9	max	0	1	.004	2	.001	1	1.134e-3	5	NC	1	NC	1
474			min	0	12	-.005	3	-.051	4	-5.573e-5	1	NC	1	482.163	4
475		10	max	0	1	.004	2	0	1	1.134e-3	5	NC	1	NC	1
476			min	0	12	-.004	3	-.043	4	-5.573e-5	1	NC	1	577.165	4
477		11	max	0	1	.003	2	0	1	1.134e-3	5	NC	1	NC	1
478			min	0	12	-.004	3	-.035	4	-5.573e-5	1	NC	1	707.853	4
479		12	max	0	1	.003	2	0	1	1.134e-3	5	NC	1	NC	1
480			min	0	12	-.003	3	-.028	4	-5.573e-5	1	NC	1	894.907	4
481		13	max	0	1	.002	2	0	1	1.134e-3	5	NC	1	NC	1
482			min	0	12	-.003	3	-.021	4	-5.573e-5	1	NC	1	1176.684	4
483		14	max	0	1	.002	2	0	1	1.134e-3	5	NC	1	NC	1
484			min	0	12	-.002	3	-.015	4	-5.573e-5	1	NC	1	1631.161	4
485		15	max	0	1	.002	2	0	1	1.134e-3	5	NC	1	NC	1
486			min	0	12	-.002	3	-.01	4	-5.573e-5	1	NC	1	2437.926	4
487		16	max	0	1	.001	2	0	1	1.134e-3	5	NC	1	NC	1
488			min	0	12	-.001	3	-.006	4	-5.573e-5	1	NC	1	4092.853	4

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
489		17	max	0	1	0	2	0	1	1.134e-3	5	NC	1	NC	1
490			min	0	12	0	3	-.003	4	-5.573e-5	1	NC	1	8431.524	4
491		18	max	0	1	0	2	0	1	1.134e-3	5	NC	1	NC	1
492			min	0	12	0	3	0	4	-5.573e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.134e-3	5	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.573e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.116	2	.384	4	4.031e-3	2	NC	1	NC	1
496			min	-.007	2	-.035	3	0	10	-1.092e-2	3	NC	1	NC	1
497		2	max	.01	3	.054	2	.374	4	3.592e-3	4	NC	4	NC	1
498			min	-.007	2	-.013	3	-.002	1	-5.411e-3	3	1846.93	2	NC	1
499		3	max	.01	3	.017	3	.363	4	6.594e-3	4	NC	5	NC	1
500			min	-.007	2	-.012	2	-.003	1	-8.404e-5	3	897.337	2	9773.59	5
501		4	max	.01	3	.06	3	.351	4	5.618e-3	4	NC	5	NC	1
502			min	-.006	2	-.085	2	-.003	1	-2.779e-3	3	573.229	2	7158.128	5
503		5	max	.01	3	.112	3	.339	4	4.99e-3	2	NC	5	NC	1
504			min	-.006	2	-.16	2	-.002	1	-5.474e-3	3	417.969	2	5844.953	5
505		6	max	.01	3	.167	3	.327	4	7.471e-3	2	NC	5	NC	1
506			min	-.006	2	-.231	2	0	1	-8.169e-3	3	331.837	2	5033.102	5
507		7	max	.009	3	.219	3	.314	4	9.951e-3	2	NC	15	NC	1
508			min	-.006	2	-.294	2	0	3	-1.086e-2	3	280.689	2	4429.17	4
509		8	max	.009	3	.262	3	.301	4	1.243e-2	2	NC	15	NC	1
510			min	-.006	2	-.344	2	0	10	-1.356e-2	3	250.299	2	3943.451	4
511		9	max	.009	3	.289	3	.288	4	1.399e-2	2	NC	15	NC	1
512			min	-.006	2	-.376	2	0	1	-1.401e-2	3	234.427	2	3581.42	4
513		10	max	.009	3	.299	3	.274	4	1.494e-2	2	NC	15	NC	1
514			min	-.006	2	-.386	2	0	10	-1.296e-2	3	229.807	2	3428.87	4
515		11	max	.009	3	.291	3	.258	4	1.588e-2	2	NC	15	NC	1
516			min	-.006	2	-.375	2	0	10	-1.192e-2	3	235.375	2	3420.271	4
517		12	max	.008	3	.267	3	.241	4	1.525e-2	2	NC	15	NC	1
518			min	-.006	2	-.342	2	0	1	-1.046e-2	3	253.097	2	3544.049	4
519		13	max	.008	3	.228	3	.221	4	1.222e-2	2	NC	15	NC	1
520			min	-.006	2	-.289	2	0	1	-8.371e-3	3	287.32	2	4045.751	4
521		14	max	.008	3	.178	3	.199	4	9.199e-3	2	NC	5	NC	1
522			min	-.005	2	-.223	2	0	12	-6.282e-3	3	345.703	2	5184.436	4
523		15	max	.008	3	.122	3	.176	4	6.175e-3	2	NC	5	NC	1
524			min	-.005	2	-.15	2	0	10	-4.194e-3	3	445.909	2	7711.28	4
525		16	max	.007	3	.063	3	.153	4	5.611e-3	4	NC	5	NC	1
526			min	-.005	2	-.076	2	0	10	-2.105e-3	3	630.784	2	NC	1
527		17	max	.007	3	.006	3	.132	4	6.587e-3	4	NC	5	NC	1
528			min	-.005	2	-.007	2	0	10	-1.612e-5	3	1024.606	2	NC	1
529		18	max	.007	3	.051	2	.113	4	3.782e-3	2	NC	4	NC	1
530			min	-.005	2	-.046	3	0	10	-1.458e-3	3	2165.864	2	NC	1
531		19	max	.007	3	.103	2	.098	4	7.592e-3	2	NC	1	NC	1
532			min	-.005	2	-.094	3	0	1	-2.983e-3	3	NC	1	NC	1
533	M5	1	max	.03	3	.182	2	.384	4	0	1	NC	1	NC	1
534			min	-.021	2	.003	15	0	1	-1.115e-5	4	NC	1	NC	1
535		2	max	.03	3	.08	2	.376	4	3.379e-3	4	NC	4	NC	1
536			min	-.021	2	.001	15	0	1	0	1	1142.05	2	NC	1
537		3	max	.03	3	.05	3	.366	4	6.665e-3	4	NC	5	NC	1
538			min	-.021	2	-.036	2	0	1	0	1	534.396	2	8132.358	4
539		4	max	.029	3	.129	3	.354	4	5.429e-3	4	NC	5	NC	1
540			min	-.021	2	-.176	2	0	1	0	1	324.719	2	6348.395	4
541		5	max	.028	3	.238	3	.341	4	4.193e-3	4	NC	15	NC	1
542			min	-.021	2	-.328	2	0	1	0	1	227.234	2	5501.522	4
543		6	max	.028	3	.362	3	.327	4	2.957e-3	4	NC	15	NC	1
544			min	-.02	2	-.481	2	0	1	0	1	174.898	2	4967.693	4
545		7	max	.027	3	.483	3	.314	4	1.721e-3	4	8436.906	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
546			min	-.02	2	-.619	2	0	1	0	1	144.651	2	4508.219	4
547		8	max	.027	3	.585	3	.301	4	4.851e-4	4	7398.842	15	NC	1
548			min	-.02	2	-.731	2	0	1	0	1	127.053	2	4013.717	4
549		9	max	.026	3	.649	3	.289	4	0	1	6868.105	15	NC	1
550			min	-.019	2	-.801	2	0	1	-8.466e-6	5	118.023	2	3569.741	4
551		10	max	.025	3	.672	3	.274	4	0	1	6708.594	15	NC	1
552			min	-.019	2	-.825	2	0	1	-8.235e-6	5	115.402	2	3454.819	4
553		11	max	.025	3	.654	3	.258	4	0	1	6868.995	15	NC	1
554			min	-.019	2	-.801	2	0	1	-8.003e-6	5	118.562	2	3466.029	4
555		12	max	.024	3	.596	3	.242	4	4.624e-4	4	7400.872	15	NC	1
556			min	-.018	2	-.727	2	0	1	0	1	128.871	2	3480.791	4
557		13	max	.023	3	.504	3	.222	4	1.639e-3	4	8440.812	15	NC	1
558			min	-.018	2	-.607	2	0	1	0	1	149.486	2	3961.736	4
559		14	max	.023	3	.389	3	.199	4	2.816e-3	4	NC	15	NC	1
560			min	-.018	2	-.459	2	0	1	0	1	186.05	2	5316.832	4
561		15	max	.022	3	.262	3	.174	4	3.993e-3	4	NC	15	NC	1
562			min	-.017	2	-.301	2	0	1	0	1	252.196	2	9041.194	4
563		16	max	.022	3	.134	3	.15	4	5.17e-3	4	NC	5	NC	1
564			min	-.017	2	-.148	2	0	1	0	1	383.146	2	NC	1
565		17	max	.021	3	.017	3	.128	4	6.347e-3	4	NC	5	NC	1
566			min	-.017	2	-.02	2	0	1	0	1	685.252	2	NC	1
567		18	max	.021	3	.072	2	.11	4	3.22e-3	4	NC	4	NC	1
568			min	-.017	2	-.08	3	0	1	0	1	1497.936	3	NC	1
569		19	max	.021	3	.142	2	.098	4	0	1	NC	1	NC	1
570			min	-.017	2	-.166	3	0	1	-6.907e-6	4	NC	1	NC	1
571	M9	1	max	.01	3	.116	2	.383	4	1.092e-2	3	NC	1	NC	1
572			min	-.007	2	-.035	3	0	1	-4.031e-3	2	NC	1	NC	1
573		2	max	.01	3	.054	2	.375	4	5.411e-3	3	NC	4	NC	1
574			min	-.007	2	-.013	3	0	10	-1.978e-3	2	1846.93	2	NC	1
575		3	max	.01	3	.017	3	.365	4	6.643e-3	4	NC	5	NC	1
576			min	-.007	2	-.012	2	0	10	-2.887e-5	2	897.337	2	8680.885	4
577		4	max	.01	3	.06	3	.353	4	5.293e-3	5	NC	5	NC	1
578			min	-.006	2	-.085	2	0	10	-2.51e-3	2	573.229	2	6590.605	4
579		5	max	.01	3	.112	3	.34	4	5.474e-3	3	NC	5	NC	1
580			min	-.006	2	-.16	2	0	10	-4.99e-3	2	417.969	2	5565.383	4
581		6	max	.01	3	.167	3	.327	4	8.169e-3	3	NC	5	NC	1
582			min	-.006	2	-.231	2	0	10	-7.471e-3	2	331.837	2	4926.738	4
583		7	max	.009	3	.219	3	.314	4	1.086e-2	3	NC	15	NC	1
584			min	-.006	2	-.294	2	0	1	-9.951e-3	2	280.689	2	4431.822	4
585		8	max	.009	3	.262	3	.301	4	1.356e-2	3	NC	15	NC	1
586			min	-.006	2	-.344	2	0	1	-1.243e-2	2	250.299	2	3970.682	4
587		9	max	.009	3	.289	3	.288	4	1.401e-2	3	NC	15	NC	1
588			min	-.006	2	-.376	2	0	10	-1.399e-2	2	234.427	2	3572.856	4
589		10	max	.009	3	.299	3	.274	4	1.296e-2	3	NC	15	NC	1
590			min	-.006	2	-.386	2	0	1	-1.494e-2	2	229.807	2	3429.886	4
591		11	max	.009	3	.291	3	.258	4	1.192e-2	3	NC	15	NC	1
592			min	-.006	2	-.375	2	0	1	-1.588e-2	2	235.375	2	3429.653	4
593		12	max	.008	3	.267	3	.241	4	1.046e-2	3	NC	15	NC	1
594			min	-.006	2	-.342	2	0	10	-1.525e-2	2	253.097	2	3522.348	4
595		13	max	.008	3	.228	3	.221	4	8.371e-3	3	NC	15	NC	1
596			min	-.006	2	-.289	2	0	10	-1.222e-2	2	287.32	2	4040.11	4
597		14	max	.008	3	.178	3	.199	4	6.282e-3	3	NC	5	NC	1
598			min	-.005	2	-.223	2	0	1	-9.199e-3	2	345.703	2	5292.621	5
599		15	max	.008	3	.122	3	.175	4	4.194e-3	3	NC	5	NC	1
600			min	-.005	2	-.15	2	-.002	1	-6.175e-3	2	445.909	2	8206.347	5
601		16	max	.007	3	.063	3	.151	4	5.199e-3	5	NC	5	NC	1
602			min	-.005	2	-.076	2	-.003	1	-3.151e-3	2	630.784	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
603		17	max	.007	3	.006	3	.13	4	6.463e-3	4	NC	5	NC	1
604			min	-.005	2	-.007	2	-.003	1	-2.071e-4	1	1024.606	2	NC	1
605		18	max	.007	3	.051	2	.112	4	3.218e-3	5	NC	4	NC	1
606			min	-.005	2	-.046	3	-.002	1	-3.782e-3	2	2165.864	2	NC	1
607		19	max	.007	3	.103	2	.098	4	2.983e-3	3	NC	1	NC	1
608			min	-.005	2	-.094	3	0	10	-7.592e-3	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

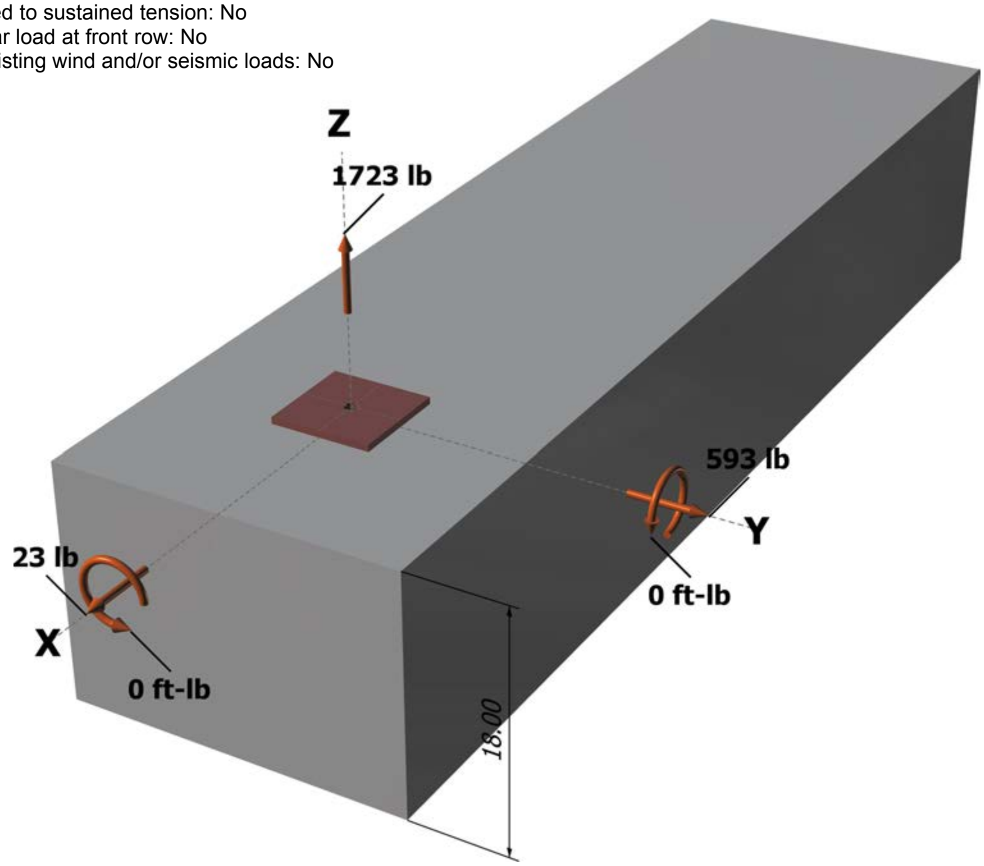
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

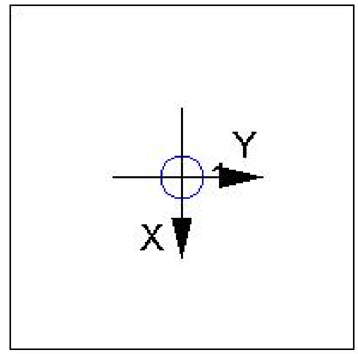
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, 31-33 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

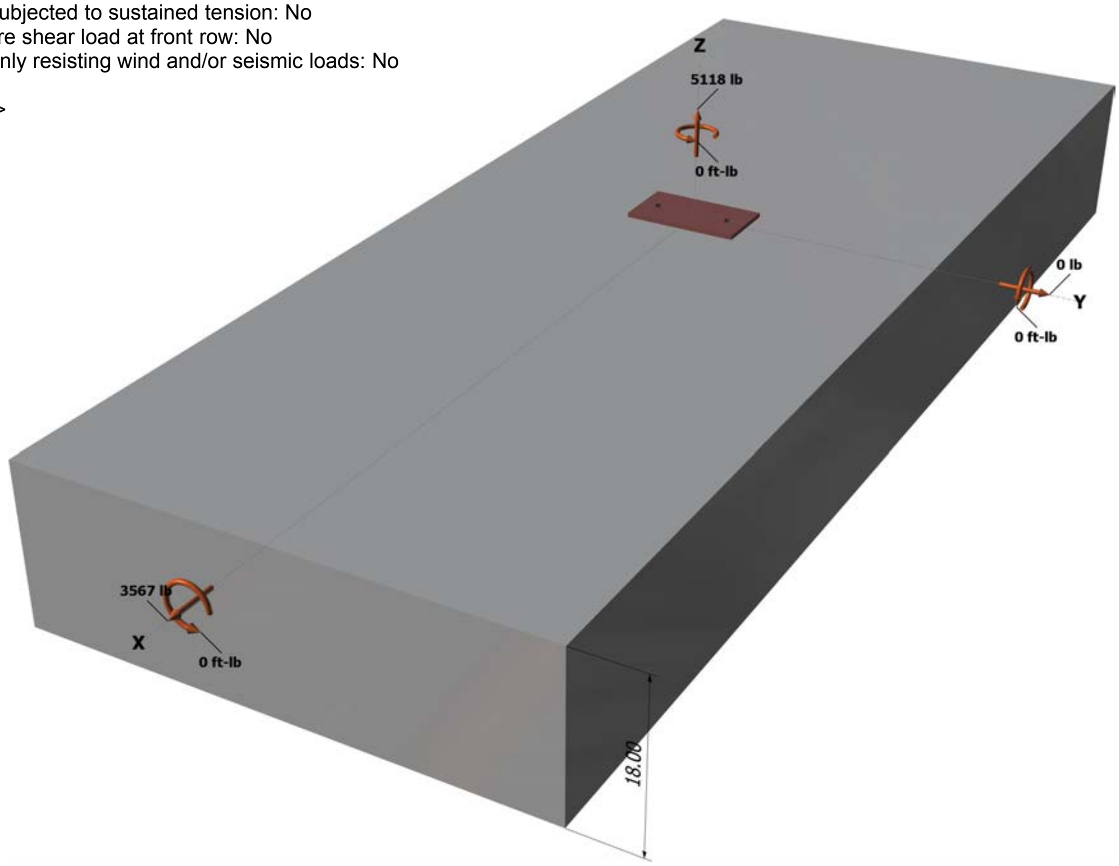
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

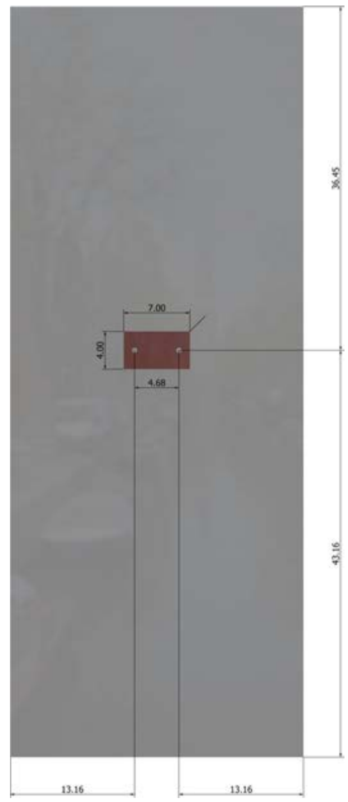
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



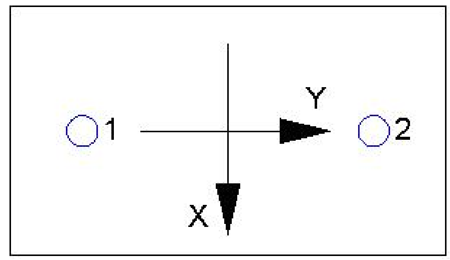
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
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)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

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	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	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.