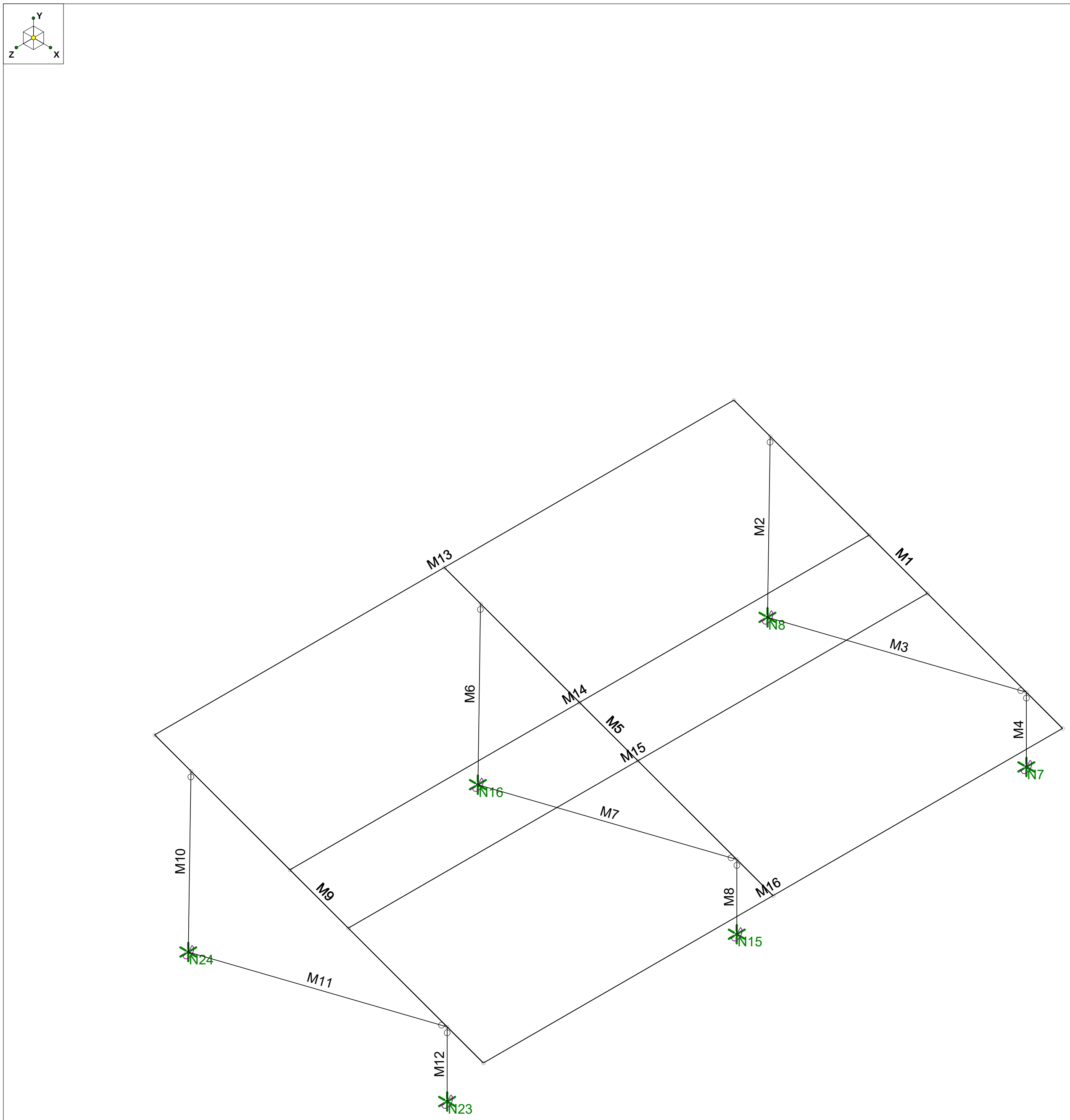


Schletter, Inc.		20° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

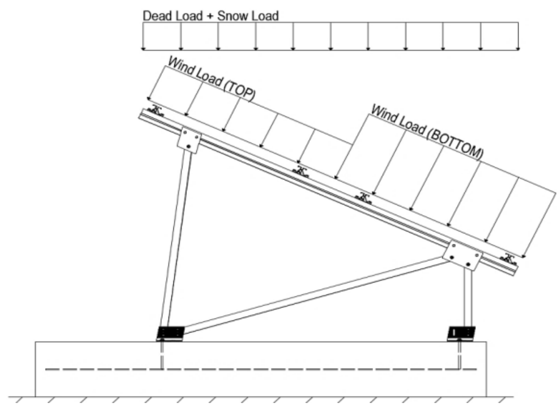
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 =	2000 mm	Height =	1900 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

Modules Per Row =	2
Module Tilt =	20°
Maximum Height Above Grade =	3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	20.62 psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00	
C_s =	0.91	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V =	110 mph	Exposure Category = C
Height <	15 ft	Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.650	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.400	
$Cf-_{TOP, INNER PURLIN}$	=	-1.840	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M14	Mid-Top
M15	Mid-Bottom
M16	Bottom

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

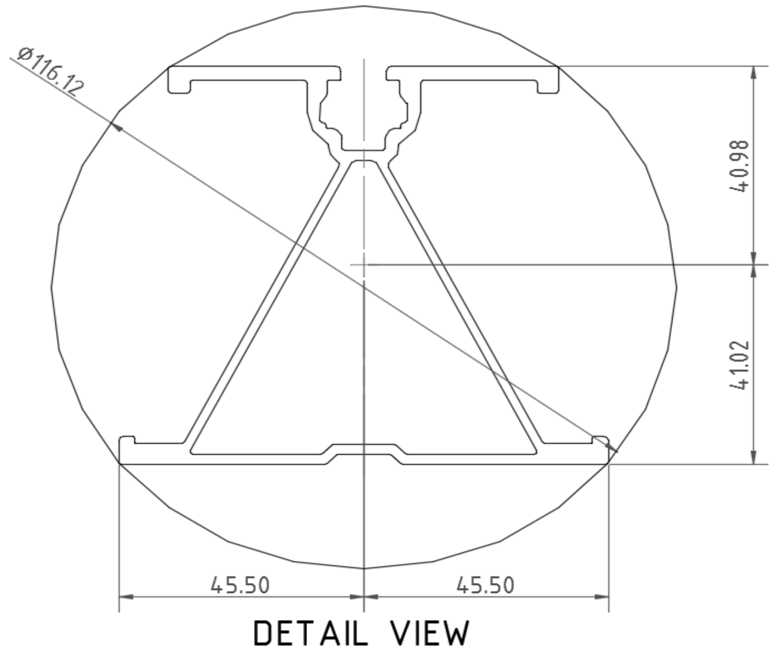
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

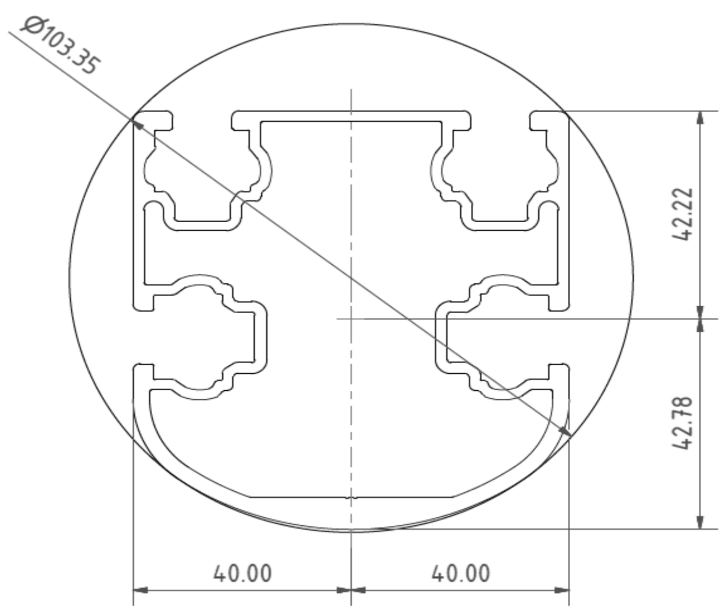
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.601	k-ft
M_z =	0.234	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	78%	



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).

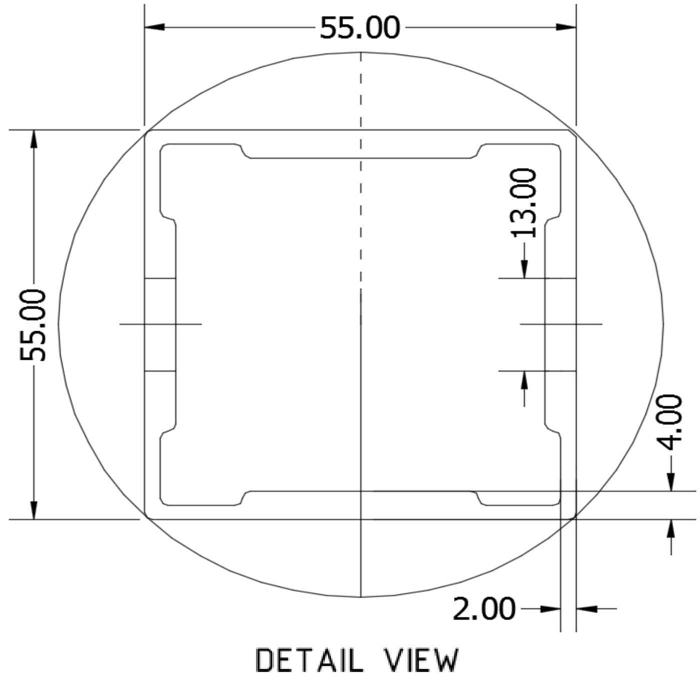
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.344	k-ft
M_z =	0.000	k-ft
P_n =	-0.775	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M12 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

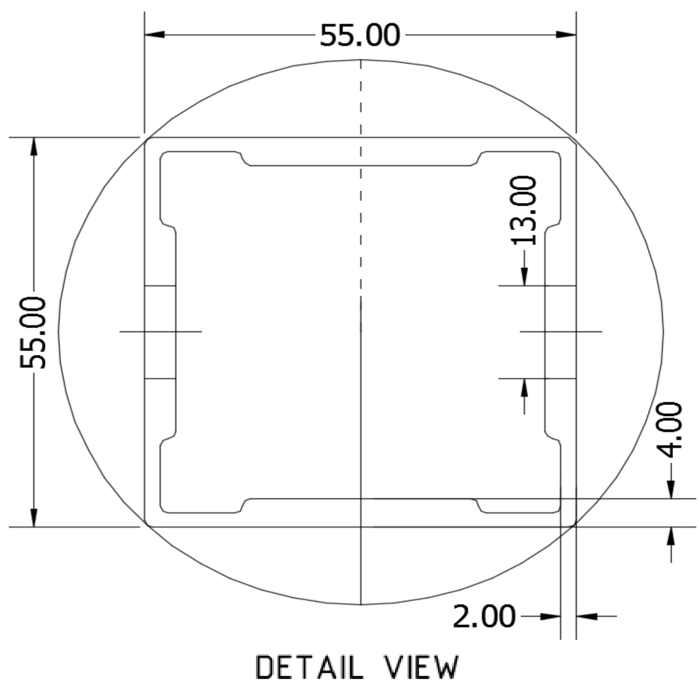
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.247	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	12%	



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).

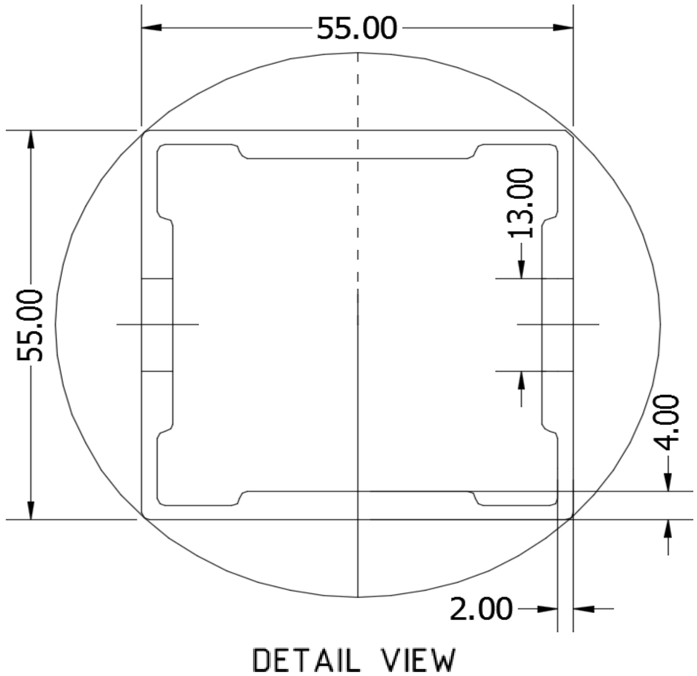
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.013	k-ft
M_z =	0.000	k-ft
P_n =	1.875	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	32%	



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 =	61.10	in
$\Phi F_{ty\ AXIAL}$ =	13.63	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.410	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	13.386	k
Utilization =	26%	



5. FOUNDATION DESIGN CALCULATIONS

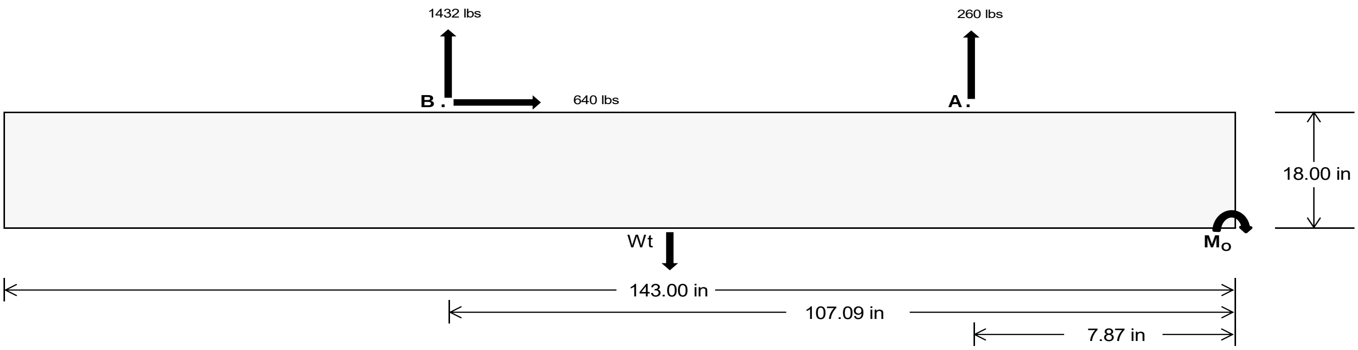
5.1 Helical Pile Foundations

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 =	1091.14	5965.85	k
Compressive Load =	4220.72	4784.73	k
Lateral Load =	12.30	2662.66	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement
Use fiber reinforcing with (2) #5 rebar.

Overturning Check
M_O = 166868.8 in-lbs
Resisting Force Required = 2333.83 lbs
S.F. = 1.67
Weight Required = 3889.72 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

Sliding
Force = 640.10 lbs
Friction = 0.4
Weight Required = 1600.24 lbs
Resisting Weight = 7559.64 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion
Sliding Force = 640.10 lbs
Cohesion = 130 psf
Area = 34.76 ft^2
Resisting = 3779.82 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1404 lbs	1404 lbs	1404 lbs	1404 lbs	1600 lbs	1600 lbs	1600 lbs	1600 lbs	2137 lbs	2137 lbs	2137 lbs	2137 lbs	-519 lbs	-519 lbs	-519 lbs	-519 lbs
F_B	1504 lbs	1504 lbs	1504 lbs	1504 lbs	1959 lbs	1959 lbs	1959 lbs	1959 lbs	2474 lbs	2474 lbs	2474 lbs	2474 lbs	-2863 lbs	-2863 lbs	-2863 lbs	-2863 lbs
F_V	142 lbs	142 lbs	142 lbs	142 lbs	1136 lbs	1136 lbs	1136 lbs	1136 lbs	948 lbs	948 lbs	948 lbs	948 lbs	-1280 lbs	-1280 lbs	-1280 lbs	-1280 lbs
P_{total}	10468 lbs	10684 lbs	10900 lbs	11116 lbs	11118 lbs	11334 lbs	11550 lbs	11766 lbs	12171 lbs	12387 lbs	12603 lbs	12819 lbs	1153 lbs	1283 lbs	1413 lbs	1542 lbs
M	3199 lbs-ft	3199 lbs-ft	3199 lbs-ft	3199 lbs-ft	4378 lbs-ft	4378 lbs-ft	4378 lbs-ft	4378 lbs-ft	5417 lbs-ft	5417 lbs-ft	5417 lbs-ft	5417 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft	3818 lbs-ft
e	0.31 ft	0.30 ft	0.29 ft	0.29 ft	0.39 ft	0.39 ft	0.38 ft	0.37 ft	0.45 ft	0.44 ft	0.43 ft	0.42 ft	3.31 ft	2.98 ft	2.70 ft	2.48 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	254.8 psf	253.8 psf	252.8 psf	251.9 psf	256.5 psf	255.4 psf	254.4 psf	253.4 psf	271.7 psf	270.2 psf	268.8 psf	267.4 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	347.5 psf	343.9 psf	340.5 psf	337.2 psf	383.3 psf	378.7 psf	374.3 psf	370.2 psf	428.6 psf	422.8 psf	417.2 psf	412.0 psf	99.6 psf	95.6 psf	93.8 psf	93.2 psf

Maximum Bearing Pressure = 429 psf
Allowable Bearing Pressure = 1500 psf

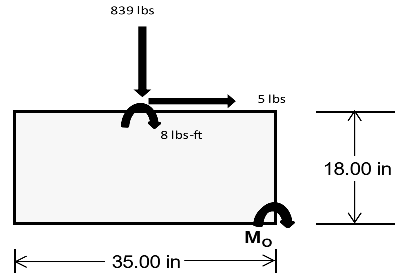
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1208.9 ft-lbs
Resisting Force Required = 828.98 lbs
S.F. = 1.67
Weight Required = 1381.63 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	236 lbs	592 lbs	236 lbs	839 lbs	2386 lbs	839 lbs	69 lbs	173 lbs	69 lbs
F_V	1 lbs	0 lbs	1 lbs	5 lbs	0 lbs	5 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9595 lbs	7560 lbs	9595 lbs	9748 lbs	7560 lbs	9748 lbs	2806 lbs	7560 lbs	2806 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	15 lbs-ft	0 lbs-ft	15 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	275.8 psf	217.5 psf	275.8 psf	279.6 psf	217.5 psf	279.6 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.3 psf	217.5 psf	276.3 psf	281.4 psf	217.5 psf	281.4 psf	80.8 psf	217.5 psf	80.8 psf

Maximum Bearing Pressure = 281 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 32in 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.

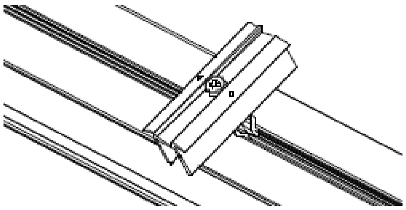
6. DESIGN OF JOINTS AND CONNECTIONS

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.

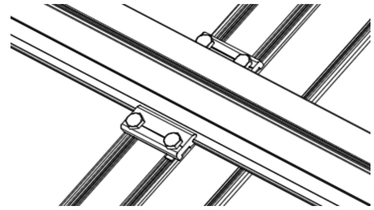
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.807 k
Allowable Uplift =	1.214 k
Utilization =	66%



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.296 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 =	3.247 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	44%

Rear Strut

Maximum Axial Load =	4.105 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	55%

Diagonal Strut

Maximum Axial Load =	2.041 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	28%

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)

Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

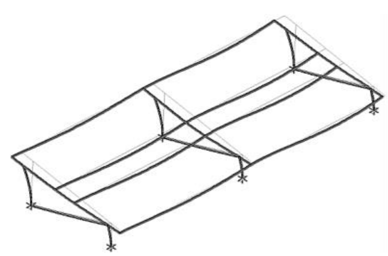
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	51.89 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	1.038 in
Max Drift, Δ_{MAX} =	0.022 in
N/A	

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 96 in
J = 0.432
265.581

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

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= 28.0 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 in³
M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 96
J = 0.432
168.894

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

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= 29.1

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 in³
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 = 104.56 in
J = 1.08
179.85

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

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= 29.0 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 = 104.56
J = 1.08
190.335

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

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= 28.9

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= 29.0 ksi
Ix = 984962 mm^4
2.366 in^4
y = 43.717 mm
Sx = 1.375 in³
M_{max}St = 3.323 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 in³
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:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	24.8 in	L_b =	24.8
J =	0.942	J =	0.942
	38.7028		38.7028
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	31.4 ksi	φF_L=	31.4
3.4.16		**3.4.16**	
b/t =	24.5	b/t =	24.5
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$	
S1 =	12.2	S1 =	12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$		$S2 = \frac{k_1 Bp}{1.6Dp}$	
S2 =	46.7	S2 =	46.7
φF_L=	φb[Bp-1.6Dp*b/t]	φF_L=	φb[Bp-1.6Dp*b/t]
φF_L=	28.2 ksi	φF_L=	28.2 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =	0.0	N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L=	1.17φyFcy		
φF_L=	38.9 ksi		
3.4.18		**3.4.18**	
h/t =	24.5	h/t =	24.5
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	27.5	C_0 =	27.5
Cc =	27.5	Cc =	27.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	28.2 ksi	φF_LWk=	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 = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

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

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

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

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

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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 in³

M_{max}St = 1.460 k-ft

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 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 = 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 61.10 in
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 61.1
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

<u>Compression</u>

3.4.7

λ = 1.41345

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77788

φF_L= (φccFcy)/(λ²)

φF_L= 13.6277 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

$\varphi F_L =$ 13.63 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 14.03 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	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	-63.565	-63.565	0	0
2	M14	Y	-63.565	-63.565	0	0
3	M15	Y	-63.565	-63.565	0	0
4	M16	Y	-63.565	-63.565	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	-65.446	-65.446	0	0
2	M14	y	-65.446	-65.446	0	0
3	M15	y	-102.844	-102.844	0	0
4	M16	y	-102.844	-102.844	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	149.592	149.592	0	0
2	M14	y	114.687	114.687	0	0
3	M15	y	62.33	62.33	0	0
4	M16	y	62.33	62.33	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	539.487	2	1189.047	2	.732	1	.003	1	0	1	0	1
2		min	-678.21	3	-1456.531	3	.031	15	0	15	0	1	0	1
3	N7	max	.025	9	1167.962	1	-.353	15	0	15	0	1	0	1
4		min	-.201	2	-246.821	3	-9.464	1	-.019	1	0	1	0	1
5	N15	max	0	15	3246.706	1	0	10	0	2	0	1	0	1
6		min	-2.114	2	-839.336	3	0	3	0	11	0	1	0	1
7	N16	max	1870.54	2	3680.56	1	0	3	0	3	0	1	0	1
8		min	-2048.2	3	-4589.116	3	0	11	0	11	0	1	0	1
9	N23	max	.025	9	1167.962	1	9.464	1	.019	1	0	1	0	1
10		min	-.201	2	-246.821	3	.353	15	0	15	0	1	0	1
11	N24	max	539.487	2	1189.047	2	-.031	15	0	15	0	1	0	1
12		min	-678.21	3	-1456.531	3	-.732	1	-.003	1	0	1	0	1
13	Totals:	max	2946.999	2	11589.487	1	0	2						
14		min	-3405.439	3	-8835.155	3	0	11						

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	58.854	1	471.354	1	-5.328	15	0	15	.164	1	0	1
2			min	2.134	15	-703.019	3	-148.801	1	-.015	2	.006	15	0	3
3		2	max	58.854	1	328.489	1	-4.079	15	0	15	.047	1	.533	3
4			min	2.134	15	-495.497	3	-113.742	1	-.015	2	.002	15	-.355	1
5		3	max	58.854	1	185.625	1	-2.83	15	0	15	.002	3	.881	3
6			min	2.134	15	-287.975	3	-78.682	1	-.015	2	-.038	1	-.584	1
7		4	max	58.854	1	42.76	1	-1.581	15	0	15	-.002	12	1.045	3
8			min	2.134	15	-80.452	3	-43.623	1	-.015	2	-.093	1	-.685	1
9		5	max	58.854	1	127.07	3	.029	10	0	15	-.004	12	1.024	3
10			min	2.134	15	-100.105	1	-8.563	1	-.015	2	-.116	1	-.66	1
11		6	max	58.854	1	334.592	3	26.496	1	0	15	-.004	15	.819	3
12			min	2.134	15	-242.969	1	-.749	3	-.015	2	-.108	1	-.508	1
13		7	max	58.854	1	542.114	3	61.556	1	0	15	-.002	15	.429	3
14			min	2.134	15	-385.834	1	.858	12	-.015	2	-.069	1	-.228	1
15		8	max	58.854	1	749.637	3	96.615	1	0	15	.004	2	.178	1
16			min	2.134	15	-528.698	1	2.127	12	-.015	2	-.005	3	-.145	3
17		9	max	58.854	1	957.159	3	131.675	1	0	15	.103	1	.712	1
18			min	2.134	15	-671.563	1	3.396	12	-.015	2	-.002	3	-.904	3
19		10	max	58.854	1	814.428	1	4.665	12	.004	3	.236	1	1.372	1
20			min	2.134	15	-1164.681	3	-166.734	1	-.015	2	.003	12	-1.847	3
21		11	max	58.854	1	671.563	1	-3.396	12	.015	2	.103	1	.712	1
22			min	2.134	15	-957.159	3	-131.675	1	0	15	-.002	3	-.904	3
23		12	max	58.854	1	528.698	1	-2.127	12	.015	2	.004	2	.178	1
24			min	2.134	15	-749.637	3	-96.615	1	0	15	-.005	3	-.145	3
25		13	max	58.854	1	385.834	1	-.858	12	.015	2	-.002	15	.429	3
26			min	2.134	15	-542.114	3	-61.556	1	0	15	-.069	1	-.228	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
27		14	max	58.854	1	242.969	1	.749	3	.015	2	-.004	15	.819	3
28			min	2.134	15	-334.592	3	-26.496	1	0	15	-.108	1	-.508	1
29		15	max	58.854	1	100.105	1	8.563	1	.015	2	-.004	12	1.024	3
30			min	2.134	15	-127.07	3	-.029	10	0	15	-.116	1	-.66	1
31		16	max	58.854	1	80.452	3	43.623	1	.015	2	-.002	12	1.045	3
32			min	2.134	15	-42.76	1	1.581	15	0	15	-.093	1	-.685	1
33		17	max	58.854	1	287.975	3	78.682	1	.015	2	.002	3	.881	3
34			min	2.134	15	-185.625	1	2.83	15	0	15	-.038	1	-.584	1
35		18	max	58.854	1	495.497	3	113.742	1	.015	2	.047	1	.533	3
36			min	2.134	15	-328.489	1	4.079	15	0	15	.002	15	-.355	1
37		19	max	58.854	1	703.019	3	148.801	1	.015	2	.164	1	0	1
38			min	2.134	15	-471.354	1	5.328	15	0	15	.006	15	0	3
39	M14	1	max	36.801	1	539.398	1	-5.554	15	.013	3	.198	1	0	1
40			min	1.333	15	-573.172	3	-155.124	1	-.016	1	.007	15	0	3
41		2	max	36.801	1	396.533	1	-4.305	15	.013	3	.075	1	.439	3
42			min	1.333	15	-415.292	3	-120.065	1	-.016	1	.003	15	-.416	1
43		3	max	36.801	1	253.669	1	-3.056	15	.013	3	.004	3	.738	3
44			min	1.333	15	-257.412	3	-85.005	1	-.016	1	-.016	1	-.705	1
45		4	max	36.801	1	110.804	1	-1.807	15	.013	3	0	12	.897	3
46			min	1.333	15	-99.533	3	-49.946	1	-.016	1	-.076	1	-.867	1
47		5	max	36.801	1	58.347	3	-.551	10	.013	3	-.003	12	.915	3
48			min	1.333	15	-32.061	1	-14.886	1	-.016	1	-.105	1	-.902	1
49		6	max	36.801	1	216.226	3	20.173	1	.013	3	-.004	15	.793	3
50			min	1.333	15	-174.925	1	-1.133	3	-.016	1	-.102	1	-.81	1
51		7	max	36.801	1	374.106	3	55.233	1	.013	3	-.002	15	.531	3
52			min	1.333	15	-317.79	1	.603	12	-.016	1	-.069	1	-.591	1
53		8	max	36.801	1	531.985	3	90.292	1	.013	3	.002	10	.128	3
54			min	1.333	15	-460.655	1	1.872	12	-.016	1	-.005	3	-.253	2
55		9	max	36.801	1	689.865	3	125.352	1	.013	3	.092	1	.228	1
56			min	1.333	15	-603.519	1	3.141	12	-.016	1	-.002	3	-.415	3
57		10	max	36.801	1	746.384	1	19.443	13	.013	3	.219	1	.828	1
58			min	1.333	15	-847.745	3	-160.412	1	-.016	1	.002	12	-1.098	3
59		11	max	36.801	1	603.519	1	-3.141	12	.016	1	.092	1	.228	1
60			min	1.333	15	-689.865	3	-125.352	1	-.013	3	-.002	3	-.415	3
61		12	max	36.801	1	460.655	1	-1.872	12	.016	1	.002	10	.128	3
62			min	1.333	15	-531.985	3	-90.292	1	-.013	3	-.005	3	-.253	2
63		13	max	36.801	1	317.79	1	-.603	12	.016	1	-.002	15	.531	3
64			min	1.333	15	-374.106	3	-55.233	1	-.013	3	-.069	1	-.591	1
65		14	max	36.801	1	174.925	1	1.133	3	.016	1	-.004	15	.793	3
66			min	1.333	15	-216.226	3	-20.173	1	-.013	3	-.102	1	-.81	1
67		15	max	36.801	1	32.061	1	14.886	1	.016	1	-.003	12	.915	3
68			min	1.333	15	-58.347	3	.551	10	-.013	3	-.105	1	-.902	1
69		16	max	36.801	1	99.533	3	49.946	1	.016	1	0	12	.897	3
70			min	1.333	15	-110.804	1	1.807	15	-.013	3	-.076	1	-.867	1
71		17	max	36.801	1	257.412	3	85.005	1	.016	1	.004	3	.738	3
72			min	1.333	15	-253.669	1	3.056	15	-.013	3	-.016	1	-.705	1
73		18	max	36.801	1	415.292	3	120.065	1	.016	1	.075	1	.439	3
74			min	1.333	15	-396.533	1	4.305	15	-.013	3	.003	15	-.416	1
75		19	max	36.801	1	573.172	3	155.124	1	.016	1	.198	1	0	1
76			min	1.333	15	-539.398	1	5.554	15	-.013	3	.007	15	0	3
77	M15	1	max	-1.413	15	678.818	2	-5.552	15	.016	2	.197	1	0	2
78			min	-38.831	1	-322.724	3	-155.111	1	-.011	3	.007	15	0	3
79		2	max	-1.413	15	494.63	2	-4.303	15	.016	2	.075	1	.25	3
80			min	-38.831	1	-239.308	3	-120.052	1	-.011	3	.003	15	-.522	2
81		3	max	-1.413	15	310.442	2	-3.054	15	.016	2	.004	3	.425	3
82			min	-38.831	1	-155.891	3	-84.992	1	-.011	3	-.016	1	-.879	2
83		4	max	-1.413	15	126.254	2	-1.805	15	.016	2	-.001	12	.527	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-38.831	1	-72.475	3	-49.933	1	-.011	3	-.076	1	-1.073	2
85		5	max	-1.413	15	10.941	3	-.556	15	.016	2	-.003	12	.554	3
86			min	-38.831	1	-57.934	2	-14.873	1	-.011	3	-.105	1	-1.104	2
87		6	max	-1.413	15	94.357	3	20.186	1	.016	2	-.004	15	.507	3
88			min	-38.831	1	-242.122	2	-.946	3	-.011	3	-.102	1	-.97	2
89		7	max	-1.413	15	177.774	3	55.246	1	.016	2	-.002	15	.387	3
90			min	-38.831	1	-426.31	2	.72	12	-.011	3	-.069	1	-.673	2
91		8	max	-1.413	15	261.19	3	90.305	1	.016	2	.002	10	.191	3
92			min	-38.831	1	-610.499	2	1.989	12	-.011	3	-.005	3	-.224	1
93		9	max	-1.413	15	344.606	3	125.365	1	.016	2	.092	1	.412	2
94			min	-38.831	1	-794.687	2	3.259	12	-.011	3	-.001	3	-.078	3
95		10	max	-1.413	15	978.875	2	19.451	13	.016	2	.219	1	1.2	2
96			min	-38.831	1	-266.908	12	-160.424	1	-.011	3	.003	12	-.421	3
97		11	max	-1.413	15	794.687	2	-3.259	12	.011	3	.092	1	.412	2
98			min	-38.831	1	-344.606	3	-125.365	1	-.016	2	-.001	3	-.078	3
99		12	max	-1.413	15	610.499	2	-1.989	12	.011	3	.002	10	.191	3
100			min	-38.831	1	-261.19	3	-90.305	1	-.016	2	-.005	3	-.224	1
101		13	max	-1.413	15	426.31	2	-.72	12	.011	3	-.002	15	.387	3
102			min	-38.831	1	-177.774	3	-55.246	1	-.016	2	-.069	1	-.673	2
103		14	max	-1.413	15	242.122	2	.946	3	.011	3	-.004	15	.507	3
104			min	-38.831	1	-94.357	3	-20.186	1	-.016	2	-.102	1	-.97	2
105		15	max	-1.413	15	57.934	2	14.873	1	.011	3	-.003	12	.554	3
106			min	-38.831	1	-10.941	3	.556	15	-.016	2	-.105	1	-1.104	2
107		16	max	-1.413	15	72.475	3	49.933	1	.011	3	-.001	12	.527	3
108			min	-38.831	1	-126.254	2	1.805	15	-.016	2	-.076	1	-1.073	2
109		17	max	-1.413	15	155.891	3	84.992	1	.011	3	.004	3	.425	3
110			min	-38.831	1	-310.442	2	3.054	15	-.016	2	-.016	1	-.879	2
111		18	max	-1.413	15	239.308	3	120.052	1	.011	3	.075	1	.25	3
112			min	-38.831	1	-494.63	2	4.303	15	-.016	2	.003	15	-.522	2
113		19	max	-1.413	15	322.724	3	155.111	1	.011	3	.197	1	0	2
114			min	-38.831	1	-678.818	2	5.552	15	-.016	2	.007	15	0	3
115	M16	1	max	-2.376	15	613.433	2	-5.34	15	.011	1	.166	1	0	2
116			min	-65.556	1	-271.422	3	-149.326	1	-.012	3	.006	15	0	3
117		2	max	-2.376	15	429.245	2	-4.092	15	.011	1	.049	1	.204	3
118			min	-65.556	1	-188.005	3	-114.267	1	-.012	3	.002	15	-.463	2
119		3	max	-2.376	15	245.057	2	-2.843	15	.011	1	.001	3	.334	3
120			min	-65.556	1	-104.589	3	-79.207	1	-.012	3	-.037	1	-.763	2
121		4	max	-2.376	15	60.869	2	-1.594	15	.011	1	-.002	12	.39	3
122			min	-65.556	1	-21.173	3	-44.147	1	-.012	3	-.092	1	-.899	2
123		5	max	-2.376	15	62.243	3	-.21	10	.011	1	-.004	12	.372	3
124			min	-65.556	1	-123.319	2	-9.088	1	-.012	3	-.115	1	-.871	2
125		6	max	-2.376	15	145.66	3	25.972	1	.011	1	-.004	15	.279	3
126			min	-65.556	1	-307.507	2	-.158	3	-.012	3	-.108	1	-.68	2
127		7	max	-2.376	15	229.076	3	61.031	1	.011	1	-.002	15	.113	3
128			min	-65.556	1	-491.695	2	1.226	12	-.012	3	-.069	1	-.325	2
129		8	max	-2.376	15	312.492	3	96.091	1	.011	1	.003	2	.194	2
130			min	-65.556	1	-675.883	2	2.495	12	-.012	3	-.004	3	-.128	3
131		9	max	-2.376	15	395.909	3	131.15	1	.011	1	.102	1	.877	2
132			min	-65.556	1	-860.072	2	3.765	12	-.012	3	0	3	-.443	3
133		10	max	-2.376	15	1044.26	2	20.173	13	.011	1	.234	1	1.723	2
134			min	-65.556	1	-479.325	3	-166.21	1	-.012	3	.004	12	-.832	3
135		11	max	-2.376	15	860.072	2	-3.765	12	.012	3	.102	1	.877	2
136			min	-65.556	1	-395.909	3	-131.15	1	-.011	1	0	3	-.443	3
137		12	max	-2.376	15	675.883	2	-2.495	12	.012	3	.003	2	.194	2
138			min	-65.556	1	-312.492	3	-96.091	1	-.011	1	-.004	3	-.128	3
139		13	max	-2.376	15	491.695	2	-1.226	12	.012	3	-.002	15	.113	3
140			min	-65.556	1	-229.076	3	-61.031	1	-.011	1	-.069	1	-.325	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-2.376	15	307.507	2	.158	3	.012	3	-.004	15	.279	3
142			min	-65.556	1	-145.66	3	-25.972	1	-.011	1	-.108	1	-.68	2
143		15	max	-2.376	15	123.319	2	9.088	1	.012	3	-.004	12	.372	3
144			min	-65.556	1	-62.243	3	.21	10	-.011	1	-.115	1	-.871	2
145		16	max	-2.376	15	21.173	3	44.147	1	.012	3	-.002	12	.39	3
146			min	-65.556	1	-60.869	2	1.594	15	-.011	1	-.092	1	-.899	2
147		17	max	-2.376	15	104.589	3	79.207	1	.012	3	.001	3	.334	3
148			min	-65.556	1	-245.057	2	2.843	15	-.011	1	-.037	1	-.763	2
149		18	max	-2.376	15	188.005	3	114.267	1	.012	3	.049	1	.204	3
150			min	-65.556	1	-429.245	2	4.092	15	-.011	1	.002	15	-.463	2
151		19	max	-2.376	15	271.422	3	149.326	1	.012	3	.166	1	0	2
152			min	-65.556	1	-613.433	2	5.34	15	-.011	1	.006	15	0	3
153	M2	1	max	1108.012	1	2.157	4	.693	1	0	3	0	3	0	1
154			min	-1303.178	3	.507	15	.025	15	0	1	0	1	0	1
155		2	max	1108.428	1	2.148	4	.693	1	0	3	0	1	0	15
156			min	-1302.866	3	.505	15	.025	15	0	1	0	15	0	4
157		3	max	1108.843	1	2.14	4	.693	1	0	3	0	1	0	15
158			min	-1302.554	3	.503	15	.025	15	0	1	0	15	-.001	4
159		4	max	1109.259	1	2.131	4	.693	1	0	3	0	1	0	15
160			min	-1302.242	3	.501	15	.025	15	0	1	0	15	-.002	4
161		5	max	1109.675	1	2.122	4	.693	1	0	3	0	1	0	15
162			min	-1301.93	3	.499	15	.025	15	0	1	0	15	-.002	4
163		6	max	1110.091	1	2.114	4	.693	1	0	3	0	1	0	15
164			min	-1301.618	3	.497	15	.025	15	0	1	0	15	-.003	4
165		7	max	1110.507	1	2.105	4	.693	1	0	3	.001	1	0	15
166			min	-1301.306	3	.495	15	.025	15	0	1	0	15	-.004	4
167		8	max	1110.923	1	2.096	4	.693	1	0	3	.001	1	0	15
168			min	-1300.994	3	.493	15	.025	15	0	1	0	15	-.004	4
169		9	max	1111.339	1	2.087	4	.693	1	0	3	.002	1	-.001	15
170			min	-1300.682	3	.491	15	.025	15	0	1	0	15	-.005	4
171		10	max	1111.755	1	2.079	4	.693	1	0	3	.002	1	-.001	15
172			min	-1300.371	3	.489	15	.025	15	0	1	0	15	-.005	4
173		11	max	1112.17	1	2.07	4	.693	1	0	3	.002	1	-.001	15
174			min	-1300.059	3	.487	15	.025	15	0	1	0	15	-.006	4
175		12	max	1112.586	1	2.061	4	.693	1	0	3	.002	1	-.002	15
176			min	-1299.747	3	.485	15	.025	15	0	1	0	15	-.007	4
177		13	max	1113.002	1	2.053	4	.693	1	0	3	.002	1	-.002	15
178			min	-1299.435	3	.483	15	.025	15	0	1	0	15	-.007	4
179		14	max	1113.418	1	2.044	4	.693	1	0	3	.003	1	-.002	15
180			min	-1299.123	3	.48	15	.025	15	0	1	0	15	-.008	4
181		15	max	1113.834	1	2.035	4	.693	1	0	3	.003	1	-.002	15
182			min	-1298.811	3	.478	15	.025	15	0	1	0	15	-.008	4
183		16	max	1114.25	1	2.026	4	.693	1	0	3	.003	1	-.002	15
184			min	-1298.499	3	.476	15	.025	15	0	1	0	15	-.009	4
185		17	max	1114.666	1	2.018	4	.693	1	0	3	.003	1	-.002	15
186			min	-1298.187	3	.474	15	.025	15	0	1	0	15	-.009	4
187		18	max	1115.082	1	2.009	4	.693	1	0	3	.003	1	-.002	15
188			min	-1297.875	3	.472	15	.025	15	0	1	0	15	-.01	4
189		19	max	1115.497	1	2	4	.693	1	0	3	.003	1	-.002	15
190			min	-1297.563	3	.47	15	.025	15	0	1	0	15	-.01	4
191	M3	1	max	538.447	2	9.101	4	.167	1	0	3	0	1	.01	4
192			min	-676.527	3	2.139	15	.006	15	0	1	0	15	.002	15
193		2	max	538.277	2	8.227	4	.167	1	0	3	0	1	.006	4
194			min	-676.655	3	1.934	15	.006	15	0	1	0	15	.001	12
195		3	max	538.106	2	7.352	4	.167	1	0	3	0	1	.003	2
196			min	-676.782	3	1.728	15	.006	15	0	1	0	15	0	3
197		4	max	537.936	2	6.478	4	.167	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-676.91	3	1.523	15	.006	15	0	1	0	15	-.002	3
199		5	max	537.766	2	5.603	4	.167	1	0	3	0	1	0	15
200			min	-677.038	3	1.317	15	.006	15	0	1	0	15	-.003	3
201		6	max	537.595	2	4.729	4	.167	1	0	3	0	1	-.001	15
202			min	-677.166	3	1.112	15	.006	15	0	1	0	15	-.006	4
203		7	max	537.425	2	3.854	4	.167	1	0	3	0	1	-.002	15
204			min	-677.293	3	.906	15	.006	15	0	1	0	15	-.008	4
205		8	max	537.255	2	2.98	4	.167	1	0	3	0	1	-.002	15
206			min	-677.421	3	.7	15	.006	15	0	1	0	15	-.01	4
207		9	max	537.084	2	2.105	4	.167	1	0	3	0	1	-.003	15
208			min	-677.549	3	.495	15	.006	15	0	1	0	15	-.011	4
209		10	max	536.914	2	1.231	4	.167	1	0	3	0	1	-.003	15
210			min	-677.677	3	.289	15	.006	15	0	1	0	15	-.012	4
211		11	max	536.744	2	.439	2	.167	1	0	3	0	1	-.003	15
212			min	-677.804	3	-.015	3	.006	15	0	1	0	15	-.012	4
213		12	max	536.573	2	-.122	15	.167	1	0	3	0	1	-.003	15
214			min	-677.932	3	-.526	3	.006	15	0	1	0	15	-.012	4
215		13	max	536.403	2	-.327	15	.167	1	0	3	.001	1	-.003	15
216			min	-678.06	3	-1.392	4	.006	15	0	1	0	15	-.011	4
217		14	max	536.233	2	-.533	15	.167	1	0	3	.001	1	-.002	15
218			min	-678.188	3	-2.267	4	.006	15	0	1	0	15	-.011	4
219		15	max	536.062	2	-.738	15	.167	1	0	3	.001	1	-.002	15
220			min	-678.315	3	-3.141	4	.006	15	0	1	0	15	-.009	4
221		16	max	535.892	2	-.944	15	.167	1	0	3	.001	1	-.002	15
222			min	-678.443	3	-4.016	4	.006	15	0	1	0	15	-.008	4
223		17	max	535.722	2	-1.149	15	.167	1	0	3	.001	1	-.001	15
224			min	-678.571	3	-4.89	4	.006	15	0	1	0	15	-.005	4
225		18	max	535.551	2	-1.355	15	.167	1	0	3	.001	1	0	15
226			min	-678.699	3	-5.765	4	.006	15	0	1	0	15	-.003	4
227		19	max	535.381	2	-1.561	15	.167	1	0	3	.001	1	0	1
228			min	-678.826	3	-6.639	4	.006	15	0	1	0	15	0	1
229	M4	1	max	1164.896	1	0	1	-.353	15	0	1	0	1	0	1
230			min	-249.12	3	0	1	-9.801	1	0	1	0	15	0	1
231		2	max	1165.066	1	0	1	-.353	15	0	1	0	12	0	1
232			min	-248.993	3	0	1	-9.801	1	0	1	0	1	0	1
233		3	max	1165.236	1	0	1	-.353	15	0	1	0	15	0	1
234			min	-248.865	3	0	1	-9.801	1	0	1	-.001	1	0	1
235		4	max	1165.407	1	0	1	-.353	15	0	1	0	15	0	1
236			min	-248.737	3	0	1	-9.801	1	0	1	-.003	1	0	1
237		5	max	1165.577	1	0	1	-.353	15	0	1	0	15	0	1
238			min	-248.609	3	0	1	-9.801	1	0	1	-.004	1	0	1
239		6	max	1165.747	1	0	1	-.353	15	0	1	0	15	0	1
240			min	-248.482	3	0	1	-9.801	1	0	1	-.005	1	0	1
241		7	max	1165.918	1	0	1	-.353	15	0	1	0	15	0	1
242			min	-248.354	3	0	1	-9.801	1	0	1	-.006	1	0	1
243		8	max	1166.088	1	0	1	-.353	15	0	1	0	15	0	1
244			min	-248.226	3	0	1	-9.801	1	0	1	-.007	1	0	1
245		9	max	1166.258	1	0	1	-.353	15	0	1	0	15	0	1
246			min	-248.098	3	0	1	-9.801	1	0	1	-.008	1	0	1
247		10	max	1166.429	1	0	1	-.353	15	0	1	0	15	0	1
248			min	-247.971	3	0	1	-9.801	1	0	1	-.009	1	0	1
249		11	max	1166.599	1	0	1	-.353	15	0	1	0	15	0	1
250			min	-247.843	3	0	1	-9.801	1	0	1	-.01	1	0	1
251		12	max	1166.769	1	0	1	-.353	15	0	1	0	15	0	1
252			min	-247.715	3	0	1	-9.801	1	0	1	-.012	1	0	1
253		13	max	1166.94	1	0	1	-.353	15	0	1	0	15	0	1
254			min	-247.587	3	0	1	-9.801	1	0	1	-.013	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1167.11	1	0	1	-.353	15	0	1	0	15	0	1
256			min	-247.459	3	0	1	-9.801	1	0	1	-.014	1	0	1
257		15	max	1167.28	1	0	1	-.353	15	0	1	0	15	0	1
258			min	-247.332	3	0	1	-9.801	1	0	1	-.015	1	0	1
259		16	max	1167.451	1	0	1	-.353	15	0	1	0	15	0	1
260			min	-247.204	3	0	1	-9.801	1	0	1	-.016	1	0	1
261		17	max	1167.621	1	0	1	-.353	15	0	1	0	15	0	1
262			min	-247.076	3	0	1	-9.801	1	0	1	-.017	1	0	1
263		18	max	1167.791	1	0	1	-.353	15	0	1	0	15	0	1
264			min	-246.948	3	0	1	-9.801	1	0	1	-.018	1	0	1
265		19	max	1167.962	1	0	1	-.353	15	0	1	0	15	0	1
266			min	-246.821	3	0	1	-9.801	1	0	1	-.019	1	0	1
267	M6	1	max	3402.266	1	2.602	2	0	1	0	1	0	1	0	1
268			min	-4105.44	3	.112	3	0	1	0	1	0	1	0	1
269		2	max	3402.682	1	2.595	2	0	1	0	1	0	1	0	3
270			min	-4105.128	3	.107	3	0	1	0	1	0	1	0	2
271		3	max	3403.098	1	2.588	2	0	1	0	1	0	1	0	3
272			min	-4104.816	3	.102	3	0	1	0	1	0	1	-.001	2
273		4	max	3403.514	1	2.581	2	0	1	0	1	0	1	0	3
274			min	-4104.505	3	.097	3	0	1	0	1	0	1	-.002	2
275		5	max	3403.93	1	2.575	2	0	1	0	1	0	1	0	3
276			min	-4104.193	3	.091	3	0	1	0	1	0	1	-.003	2
277		6	max	3404.346	1	2.568	2	0	1	0	1	0	1	0	3
278			min	-4103.881	3	.086	3	0	1	0	1	0	1	-.004	2
279		7	max	3404.761	1	2.561	2	0	1	0	1	0	1	0	3
280			min	-4103.569	3	.081	3	0	1	0	1	0	1	-.004	2
281		8	max	3405.177	1	2.554	2	0	1	0	1	0	1	0	3
282			min	-4103.257	3	.076	3	0	1	0	1	0	1	-.005	2
283		9	max	3405.593	1	2.547	2	0	1	0	1	0	1	0	3
284			min	-4102.945	3	.071	3	0	1	0	1	0	1	-.006	2
285		10	max	3406.009	1	2.541	2	0	1	0	1	0	1	0	3
286			min	-4102.633	3	.066	3	0	1	0	1	0	1	-.006	2
287		11	max	3406.425	1	2.534	2	0	1	0	1	0	1	0	3
288			min	-4102.321	3	.061	3	0	1	0	1	0	1	-.007	2
289		12	max	3406.841	1	2.527	2	0	1	0	1	0	1	0	3
290			min	-4102.009	3	.056	3	0	1	0	1	0	1	-.008	2
291		13	max	3407.257	1	2.52	2	0	1	0	1	0	1	0	3
292			min	-4101.697	3	.051	3	0	1	0	1	0	1	-.009	2
293		14	max	3407.673	1	2.514	2	0	1	0	1	0	1	0	3
294			min	-4101.385	3	.046	3	0	1	0	1	0	1	-.009	2
295		15	max	3408.088	1	2.507	2	0	1	0	1	0	1	0	3
296			min	-4101.074	3	.041	3	0	1	0	1	0	1	-.01	2
297		16	max	3408.504	1	2.5	2	0	1	0	1	0	1	0	3
298			min	-4100.762	3	.035	3	0	1	0	1	0	1	-.011	2
299		17	max	3408.92	1	2.493	2	0	1	0	1	0	1	0	3
300			min	-4100.45	3	.03	3	0	1	0	1	0	1	-.011	2
301		18	max	3409.336	1	2.486	2	0	1	0	1	0	1	0	3
302			min	-4100.138	3	.025	3	0	1	0	1	0	1	-.012	2
303		19	max	3409.752	1	2.48	2	0	1	0	1	0	1	0	3
304			min	-4099.826	3	.02	3	0	1	0	1	0	1	-.013	2
305	M7	1	max	1874.908	2	9.136	4	0	1	0	1	0	1	.013	2
306			min	-2038.599	3	2.144	15	0	1	0	1	0	1	0	3
307		2	max	1874.737	2	8.261	4	0	1	0	1	0	1	.009	2
308			min	-2038.727	3	1.939	15	0	1	0	1	0	1	-.002	3
309		3	max	1874.567	2	7.387	4	0	1	0	1	0	1	.006	2
310			min	-2038.855	3	1.733	15	0	1	0	1	0	1	-.004	3
311		4	max	1874.397	2	6.512	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2038.983	3	1.527	15	0	1	0	1	0	1	-.005	3
313		5	max	1874.226	2	5.638	4	0	1	0	1	0	1	0	2
314			min	-2039.11	3	1.322	15	0	1	0	1	0	1	-.007	3
315		6	max	1874.056	2	4.764	4	0	1	0	1	0	1	-.001	2
316			min	-2039.238	3	1.116	15	0	1	0	1	0	1	-.008	3
317		7	max	1873.886	2	3.889	4	0	1	0	1	0	1	-.002	15
318			min	-2039.366	3	.911	15	0	1	0	1	0	1	-.008	3
319		8	max	1873.715	2	3.015	4	0	1	0	1	0	1	-.002	15
320			min	-2039.494	3	.705	15	0	1	0	1	0	1	-.009	4
321		9	max	1873.545	2	2.186	2	0	1	0	1	0	1	-.003	15
322			min	-2039.621	3	.395	12	0	1	0	1	0	1	-.011	4
323		10	max	1873.375	2	1.505	2	0	1	0	1	0	1	-.003	15
324			min	-2039.749	3	.039	3	0	1	0	1	0	1	-.011	4
325		11	max	1873.204	2	.823	2	0	1	0	1	0	1	-.003	15
326			min	-2039.877	3	-.472	3	0	1	0	1	0	1	-.012	4
327		12	max	1873.034	2	.142	2	0	1	0	1	0	1	-.003	15
328			min	-2040.005	3	-.983	3	0	1	0	1	0	1	-.012	4
329		13	max	1872.864	2	-.323	15	0	1	0	1	0	1	-.003	15
330			min	-2040.132	3	-1.494	3	0	1	0	1	0	1	-.011	4
331		14	max	1872.693	2	-.528	15	0	1	0	1	0	1	-.002	15
332			min	-2040.26	3	-2.232	4	0	1	0	1	0	1	-.01	4
333		15	max	1872.523	2	-.734	15	0	1	0	1	0	1	-.002	15
334			min	-2040.388	3	-3.106	4	0	1	0	1	0	1	-.009	4
335		16	max	1872.353	2	-.939	15	0	1	0	1	0	1	-.002	15
336			min	-2040.516	3	-3.981	4	0	1	0	1	0	1	-.008	4
337		17	max	1872.182	2	-1.145	15	0	1	0	1	0	1	-.001	15
338			min	-2040.644	3	-4.855	4	0	1	0	1	0	1	-.005	4
339		18	max	1872.012	2	-1.35	15	0	1	0	1	0	1	0	15
340			min	-2040.771	3	-5.73	4	0	1	0	1	0	1	-.003	4
341		19	max	1871.841	2	-1.556	15	0	1	0	1	0	1	0	1
342			min	-2040.899	3	-6.604	4	0	1	0	1	0	1	0	1
343	M8	1	max	3243.64	1	0	1	0	1	0	1	0	1	0	1
344			min	-841.636	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3243.81	1	0	1	0	1	0	1	0	1	0	1
346			min	-841.508	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3243.981	1	0	1	0	1	0	1	0	1	0	1
348			min	-841.38	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3244.151	1	0	1	0	1	0	1	0	1	0	1
350			min	-841.253	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3244.321	1	0	1	0	1	0	1	0	1	0	1
352			min	-841.125	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3244.492	1	0	1	0	1	0	1	0	1	0	1
354			min	-840.997	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3244.662	1	0	1	0	1	0	1	0	1	0	1
356			min	-840.869	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3244.832	1	0	1	0	1	0	1	0	1	0	1
358			min	-840.742	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3245.003	1	0	1	0	1	0	1	0	1	0	1
360			min	-840.614	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3245.173	1	0	1	0	1	0	1	0	1	0	1
362			min	-840.486	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3245.343	1	0	1	0	1	0	1	0	1	0	1
364			min	-840.358	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3245.514	1	0	1	0	1	0	1	0	1	0	1
366			min	-840.23	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3245.684	1	0	1	0	1	0	1	0	1	0	1
368			min	-840.103	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3245.854	1	0	1	0	1	0	1	0	1	0	1
370			min	-839.975	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3246.025	1	0	1	0	1	0	1	0	1	0	1
372			min	-839.847	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3246.195	1	0	1	0	1	0	1	0	1	0	1
374			min	-839.719	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3246.365	1	0	1	0	1	0	1	0	1	0	1
376			min	-839.592	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3246.536	1	0	1	0	1	0	1	0	1	0	1
378			min	-839.464	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3246.706	1	0	1	0	1	0	1	0	1	0	1
380			min	-839.336	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1108.012	1	2.157	4	-.025	15	0	1	0	1	0	1
382			min	-1303.178	3	.507	15	-.693	1	0	3	0	3	0	1
383		2	max	1108.428	1	2.148	4	-.025	15	0	1	0	15	0	15
384			min	-1302.866	3	.505	15	-.693	1	0	3	0	1	0	4
385		3	max	1108.843	1	2.14	4	-.025	15	0	1	0	15	0	15
386			min	-1302.554	3	.503	15	-.693	1	0	3	0	1	-.001	4
387		4	max	1109.259	1	2.131	4	-.025	15	0	1	0	15	0	15
388			min	-1302.242	3	.501	15	-.693	1	0	3	0	1	-.002	4
389		5	max	1109.675	1	2.122	4	-.025	15	0	1	0	15	0	15
390			min	-1301.93	3	.499	15	-.693	1	0	3	0	1	-.002	4
391		6	max	1110.091	1	2.114	4	-.025	15	0	1	0	15	0	15
392			min	-1301.618	3	.497	15	-.693	1	0	3	0	1	-.003	4
393		7	max	1110.507	1	2.105	4	-.025	15	0	1	0	15	0	15
394			min	-1301.306	3	.495	15	-.693	1	0	3	-.001	1	-.004	4
395		8	max	1110.923	1	2.096	4	-.025	15	0	1	0	15	0	15
396			min	-1300.994	3	.493	15	-.693	1	0	3	-.001	1	-.004	4
397		9	max	1111.339	1	2.087	4	-.025	15	0	1	0	15	-.001	15
398			min	-1300.682	3	.491	15	-.693	1	0	3	-.002	1	-.005	4
399		10	max	1111.755	1	2.079	4	-.025	15	0	1	0	15	-.001	15
400			min	-1300.371	3	.489	15	-.693	1	0	3	-.002	1	-.005	4
401		11	max	1112.17	1	2.07	4	-.025	15	0	1	0	15	-.001	15
402			min	-1300.059	3	.487	15	-.693	1	0	3	-.002	1	-.006	4
403		12	max	1112.586	1	2.061	4	-.025	15	0	1	0	15	-.002	15
404			min	-1299.747	3	.485	15	-.693	1	0	3	-.002	1	-.007	4
405		13	max	1113.002	1	2.053	4	-.025	15	0	1	0	15	-.002	15
406			min	-1299.435	3	.483	15	-.693	1	0	3	-.002	1	-.007	4
407		14	max	1113.418	1	2.044	4	-.025	15	0	1	0	15	-.002	15
408			min	-1299.123	3	.48	15	-.693	1	0	3	-.003	1	-.008	4
409		15	max	1113.834	1	2.035	4	-.025	15	0	1	0	15	-.002	15
410			min	-1298.811	3	.478	15	-.693	1	0	3	-.003	1	-.008	4
411		16	max	1114.25	1	2.026	4	-.025	15	0	1	0	15	-.002	15
412			min	-1298.499	3	.476	15	-.693	1	0	3	-.003	1	-.009	4
413		17	max	1114.666	1	2.018	4	-.025	15	0	1	0	15	-.002	15
414			min	-1298.187	3	.474	15	-.693	1	0	3	-.003	1	-.009	4
415		18	max	1115.082	1	2.009	4	-.025	15	0	1	0	15	-.002	15
416			min	-1297.875	3	.472	15	-.693	1	0	3	-.003	1	-.01	4
417		19	max	1115.497	1	2	4	-.025	15	0	1	0	15	-.002	15
418			min	-1297.563	3	.47	15	-.693	1	0	3	-.003	1	-.01	4
419	M11	1	max	538.447	2	9.101	4	-.006	15	0	1	0	15	.01	4
420			min	-676.527	3	2.139	15	-.167	1	0	3	0	1	.002	15
421		2	max	538.277	2	8.227	4	-.006	15	0	1	0	15	.006	4
422			min	-676.655	3	1.934	15	-.167	1	0	3	0	1	.001	12
423		3	max	538.106	2	7.352	4	-.006	15	0	1	0	15	.003	2
424			min	-676.782	3	1.728	15	-.167	1	0	3	0	1	0	3
425		4	max	537.936	2	6.478	4	-.006	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-676.91	3	1.523	15	-.167	1	0	3	0	1	-.002	3
427		5	max	537.766	2	5.603	4	-.006	15	0	1	0	15	0	15
428			min	-677.038	3	1.317	15	-.167	1	0	3	0	1	-.003	3
429		6	max	537.595	2	4.729	4	-.006	15	0	1	0	15	-.001	15
430			min	-677.166	3	1.112	15	-.167	1	0	3	0	1	-.006	4
431		7	max	537.425	2	3.854	4	-.006	15	0	1	0	15	-.002	15
432			min	-677.293	3	.906	15	-.167	1	0	3	0	1	-.008	4
433		8	max	537.255	2	2.98	4	-.006	15	0	1	0	15	-.002	15
434			min	-677.421	3	.7	15	-.167	1	0	3	0	1	-.01	4
435		9	max	537.084	2	2.105	4	-.006	15	0	1	0	15	-.003	15
436			min	-677.549	3	.495	15	-.167	1	0	3	0	1	-.011	4
437		10	max	536.914	2	1.231	4	-.006	15	0	1	0	15	-.003	15
438			min	-677.677	3	.289	15	-.167	1	0	3	0	1	-.012	4
439		11	max	536.744	2	.439	2	-.006	15	0	1	0	15	-.003	15
440			min	-677.804	3	-.015	3	-.167	1	0	3	0	1	-.012	4
441		12	max	536.573	2	-.122	15	-.006	15	0	1	0	15	-.003	15
442			min	-677.932	3	-.526	3	-.167	1	0	3	0	1	-.012	4
443		13	max	536.403	2	-.327	15	-.006	15	0	1	0	15	-.003	15
444			min	-678.06	3	-1.392	4	-.167	1	0	3	-.001	1	-.011	4
445		14	max	536.233	2	-.533	15	-.006	15	0	1	0	15	-.002	15
446			min	-678.188	3	-2.267	4	-.167	1	0	3	-.001	1	-.011	4
447		15	max	536.062	2	-.738	15	-.006	15	0	1	0	15	-.002	15
448			min	-678.315	3	-3.141	4	-.167	1	0	3	-.001	1	-.009	4
449		16	max	535.892	2	-.944	15	-.006	15	0	1	0	15	-.002	15
450			min	-678.443	3	-4.016	4	-.167	1	0	3	-.001	1	-.008	4
451		17	max	535.722	2	-1.149	15	-.006	15	0	1	0	15	-.001	15
452			min	-678.571	3	-4.89	4	-.167	1	0	3	-.001	1	-.005	4
453		18	max	535.551	2	-1.355	15	-.006	15	0	1	0	15	0	15
454			min	-678.699	3	-5.765	4	-.167	1	0	3	-.001	1	-.003	4
455		19	max	535.381	2	-1.561	15	-.006	15	0	1	0	15	0	1
456			min	-678.826	3	-6.639	4	-.167	1	0	3	-.001	1	0	1
457	M12	1	max	1164.896	1	0	1	9.801	1	0	1	0	15	0	1
458			min	-249.12	3	0	1	.353	15	0	1	0	1	0	1
459		2	max	1165.066	1	0	1	9.801	1	0	1	0	1	0	1
460			min	-248.993	3	0	1	.353	15	0	1	0	12	0	1
461		3	max	1165.236	1	0	1	9.801	1	0	1	.001	1	0	1
462			min	-248.865	3	0	1	.353	15	0	1	0	15	0	1
463		4	max	1165.407	1	0	1	9.801	1	0	1	.003	1	0	1
464			min	-248.737	3	0	1	.353	15	0	1	0	15	0	1
465		5	max	1165.577	1	0	1	9.801	1	0	1	.004	1	0	1
466			min	-248.609	3	0	1	.353	15	0	1	0	15	0	1
467		6	max	1165.747	1	0	1	9.801	1	0	1	.005	1	0	1
468			min	-248.482	3	0	1	.353	15	0	1	0	15	0	1
469		7	max	1165.918	1	0	1	9.801	1	0	1	.006	1	0	1
470			min	-248.354	3	0	1	.353	15	0	1	0	15	0	1
471		8	max	1166.088	1	0	1	9.801	1	0	1	.007	1	0	1
472			min	-248.226	3	0	1	.353	15	0	1	0	15	0	1
473		9	max	1166.258	1	0	1	9.801	1	0	1	.008	1	0	1
474			min	-248.098	3	0	1	.353	15	0	1	0	15	0	1
475		10	max	1166.429	1	0	1	9.801	1	0	1	.009	1	0	1
476			min	-247.971	3	0	1	.353	15	0	1	0	15	0	1
477		11	max	1166.599	1	0	1	9.801	1	0	1	.01	1	0	1
478			min	-247.843	3	0	1	.353	15	0	1	0	15	0	1
479		12	max	1166.769	1	0	1	9.801	1	0	1	.012	1	0	1
480			min	-247.715	3	0	1	.353	15	0	1	0	15	0	1
481		13	max	1166.94	1	0	1	9.801	1	0	1	.013	1	0	1
482			min	-247.587	3	0	1	.353	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1167.11	1	0	1	9.801	1	0	1	.014	1	0	1
484			min	-247.459	3	0	1	.353	15	0	1	0	15	0	1
485		15	max	1167.28	1	0	1	9.801	1	0	1	.015	1	0	1
486			min	-247.332	3	0	1	.353	15	0	1	0	15	0	1
487		16	max	1167.451	1	0	1	9.801	1	0	1	.016	1	0	1
488			min	-247.204	3	0	1	.353	15	0	1	0	15	0	1
489		17	max	1167.621	1	0	1	9.801	1	0	1	.017	1	0	1
490			min	-247.076	3	0	1	.353	15	0	1	0	15	0	1
491		18	max	1167.791	1	0	1	9.801	1	0	1	.018	1	0	1
492			min	-246.948	3	0	1	.353	15	0	1	0	15	0	1
493		19	max	1167.962	1	0	1	9.801	1	0	1	.019	1	0	1
494			min	-246.821	3	0	1	.353	15	0	1	0	15	0	1
495	M1	1	max	148.806	1	702.97	3	-2.134	15	0	1	.164	1	0	15
496			min	5.328	15	-469.288	1	-58.773	1	0	3	.006	15	-.015	2
497		2	max	149.382	1	701.782	3	-2.134	15	0	1	.128	1	.278	1
498			min	5.501	15	-470.871	1	-58.773	1	0	3	.005	15	-.44	3
499		3	max	437.388	3	570.023	1	-2.109	15	0	3	.091	1	.559	1
500			min	-280.795	2	-534.974	3	-58.26	1	0	1	.003	15	-.861	3
501		4	max	437.82	3	568.44	1	-2.109	15	0	3	.055	1	.206	1
502			min	-280.219	2	-536.162	3	-58.26	1	0	1	.002	15	-.529	3
503		5	max	438.253	3	566.856	1	-2.109	15	0	3	.019	1	-.005	15
504			min	-279.643	2	-537.349	3	-58.26	1	0	1	0	15	-.196	3
505		6	max	438.685	3	565.273	1	-2.109	15	0	3	0	15	.138	3
506			min	-279.066	2	-538.537	3	-58.26	1	0	1	-.017	1	-.509	2
507		7	max	439.117	3	563.69	1	-2.109	15	0	3	-.002	15	.473	3
508			min	-278.49	2	-539.724	3	-58.26	1	0	1	-.054	1	-.848	1
509		8	max	439.549	3	562.107	1	-2.109	15	0	3	-.003	15	.808	3
510			min	-277.914	2	-540.911	3	-58.26	1	0	1	-.09	1	-1.197	1
511		9	max	450.633	3	45.104	2	-3.442	15	0	9	.058	1	.942	3
512			min	-217.545	2	.482	15	-95.104	1	0	3	.002	15	-1.362	1
513		10	max	451.065	3	43.521	2	-3.442	15	0	9	0	15	.921	3
514			min	-216.968	2	.004	15	-95.104	1	0	3	0	1	-1.377	2
515		11	max	451.497	3	41.937	2	-3.442	15	0	9	-.002	15	.9	3
516			min	-216.392	2	-1.938	4	-95.104	1	0	3	-.06	1	-1.404	2
517		12	max	462.395	3	358.921	3	-2.03	15	0	2	.088	1	.788	3
518			min	-155.951	2	-636.22	2	-56.291	1	0	3	.003	15	-1.245	2
519		13	max	462.827	3	357.734	3	-2.03	15	0	2	.053	1	.566	3
520			min	-155.375	2	-637.803	2	-56.291	1	0	3	.002	15	-.85	1
521		14	max	463.26	3	356.547	3	-2.03	15	0	2	.018	1	.344	3
522			min	-154.798	2	-639.386	2	-56.291	1	0	3	0	15	-.469	1
523		15	max	463.692	3	355.359	3	-2.03	15	0	2	0	15	.123	3
524			min	-154.222	2	-640.97	2	-56.291	1	0	3	-.017	1	-.088	1
525		16	max	464.124	3	354.172	3	-2.03	15	0	2	-.002	15	.342	2
526			min	-153.646	2	-642.553	2	-56.291	1	0	3	-.052	1	-.097	3
527		17	max	464.556	3	352.985	3	-2.03	15	0	2	-.003	15	.742	2
528			min	-153.07	2	-644.136	2	-56.291	1	0	3	-.087	1	-.316	3
529		18	max	-5.514	15	615.747	2	-2.377	15	0	3	-.005	15	.373	2
530			min	-149.898	1	-270.324	3	-65.634	1	0	2	-.126	1	-.156	3
531		19	max	-5.34	15	614.164	2	-2.377	15	0	3	-.006	15	.012	3
532			min	-149.322	1	-271.512	3	-65.634	1	0	2	-.166	1	-.011	1
533	M5	1	max	333.459	1	2329.311	3	0	1	0	1	0	1	.03	2
534			min	9.332	12	-1620.071	1	0	1	0	1	0	1	0	15
535		2	max	334.035	1	2328.124	3	0	1	0	1	0	1	1.033	1
536			min	9.62	12	-1621.655	1	0	1	0	1	0	1	-1.438	3
537		3	max	1353.395	3	1557.998	1	0	1	0	1	0	1	2.005	1
538			min	-908.06	2	-1584.215	3	0	1	0	1	0	1	-2.839	3
539		4	max	1353.827	3	1556.415	1	0	1	0	1	0	1	1.039	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
540			min	-907.484	2	-1585.402	3	0	1	0	1	0	1	-1.856	3
541		5	max	1354.26	3	1554.832	1	0	1	0	1	0	1	.073	1
542			min	-906.908	2	-1586.589	3	0	1	0	1	0	1	-.871	3
543		6	max	1354.692	3	1553.249	1	0	1	0	1	0	1	.114	3
544			min	-906.332	2	-1587.777	3	0	1	0	1	0	1	-.919	2
545		7	max	1355.124	3	1551.665	1	0	1	0	1	0	1	1.099	3
546			min	-905.755	2	-1588.964	3	0	1	0	1	0	1	-1.855	1
547		8	max	1355.556	3	1550.082	1	0	1	0	1	0	1	2.086	3
548			min	-905.179	2	-1590.151	3	0	1	0	1	0	1	-2.817	1
549		9	max	1368.954	3	152.402	2	0	1	0	1	0	1	2.406	3
550			min	-775.751	2	.478	15	0	1	0	1	0	1	-3.202	1
551		10	max	1369.387	3	150.819	2	0	1	0	1	0	1	2.324	3
552			min	-775.175	2	0	15	0	1	0	1	0	1	-3.252	1
553		11	max	1369.819	3	149.236	2	0	1	0	1	0	1	2.242	3
554			min	-774.598	2	-1.803	4	0	1	0	1	0	1	-3.344	2
555		12	max	1383.589	3	1019.334	3	0	1	0	1	0	1	1.962	3
556			min	-645.314	2	-1787.869	2	0	1	0	1	0	1	-2.987	2
557		13	max	1384.021	3	1018.146	3	0	1	0	1	0	1	1.33	3
558			min	-644.738	2	-1789.452	2	0	1	0	1	0	1	-1.877	2
559		14	max	1384.453	3	1016.959	3	0	1	0	1	0	1	.698	3
560			min	-644.162	2	-1791.035	2	0	1	0	1	0	1	-.812	1
561		15	max	1384.885	3	1015.771	3	0	1	0	1	0	1	.346	2
562			min	-643.585	2	-1792.618	2	0	1	0	1	0	1	0	15
563		16	max	1385.317	3	1014.584	3	0	1	0	1	0	1	1.459	2
564			min	-643.009	2	-1794.201	2	0	1	0	1	0	1	-.563	3
565		17	max	1385.749	3	1013.397	3	0	1	0	1	0	1	2.573	2
566			min	-642.433	2	-1795.784	2	0	1	0	1	0	1	-1.192	3
567		18	max	-10.355	12	2093.016	2	0	1	0	1	0	1	1.316	2
568			min	-333.003	1	-957.78	3	0	1	0	1	0	1	-.62	3
569		19	max	-10.067	12	2091.433	2	0	1	0	1	0	1	.021	1
570			min	-332.427	1	-958.967	3	0	1	0	1	0	1	-.025	3
571	M9	1	max	148.806	1	702.97	3	58.773	1	0	3	-.006	15	0	15
572			min	5.328	15	-469.288	1	2.134	15	0	1	-.164	1	-.015	2
573		2	max	149.382	1	701.782	3	58.773	1	0	3	-.005	15	.278	1
574			min	5.501	15	-470.871	1	2.134	15	0	1	-.128	1	-.44	3
575		3	max	437.388	3	570.023	1	58.26	1	0	1	-.003	15	.559	1
576			min	-280.795	2	-534.974	3	2.109	15	0	3	-.091	1	-.861	3
577		4	max	437.82	3	568.44	1	58.26	1	0	1	-.002	15	.206	1
578			min	-280.219	2	-536.162	3	2.109	15	0	3	-.055	1	-.529	3
579		5	max	438.253	3	566.856	1	58.26	1	0	1	0	15	-.005	15
580			min	-279.643	2	-537.349	3	2.109	15	0	3	-.019	1	-.196	3
581		6	max	438.685	3	565.273	1	58.26	1	0	1	.017	1	.138	3
582			min	-279.066	2	-538.537	3	2.109	15	0	3	0	15	-.509	2
583		7	max	439.117	3	563.69	1	58.26	1	0	1	.054	1	.473	3
584			min	-278.49	2	-539.724	3	2.109	15	0	3	.002	15	-.848	1
585		8	max	439.549	3	562.107	1	58.26	1	0	1	.09	1	.808	3
586			min	-277.914	2	-540.911	3	2.109	15	0	3	.003	15	-1.197	1
587		9	max	450.633	3	45.104	2	95.104	1	0	3	-.002	15	.942	3
588			min	-217.545	2	.482	15	3.442	15	0	9	-.058	1	-1.362	1
589		10	max	451.065	3	43.521	2	95.104	1	0	3	0	1	.921	3
590			min	-216.968	2	.004	15	3.442	15	0	9	0	15	-1.377	2
591		11	max	451.497	3	41.937	2	95.104	1	0	3	.06	1	.9	3
592			min	-216.392	2	-1.938	4	3.442	15	0	9	.002	15	-1.404	2
593		12	max	462.395	3	358.921	3	56.291	1	0	3	-.003	15	.788	3
594			min	-155.951	2	-636.22	2	2.03	15	0	2	-.088	1	-1.245	2
595		13	max	462.827	3	357.734	3	56.291	1	0	3	-.002	15	.566	3
596			min	-155.375	2	-637.803	2	2.03	15	0	2	-.053	1	-.85	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
597		14	max	463.26	3	356.547	3	56.291	1	0	3	0	15	.344	3
598			min	-154.798	2	-639.386	2	2.03	15	0	2	-.018	1	-.469	1
599		15	max	463.692	3	355.359	3	56.291	1	0	3	.017	1	.123	3
600			min	-154.222	2	-640.97	2	2.03	15	0	2	0	15	-.088	1
601		16	max	464.124	3	354.172	3	56.291	1	0	3	.052	1	.342	2
602			min	-153.646	2	-642.553	2	2.03	15	0	2	.002	15	-.097	3
603		17	max	464.556	3	352.985	3	56.291	1	0	3	.087	1	.742	2
604			min	-153.07	2	-644.136	2	2.03	15	0	2	.003	15	-.316	3
605		18	max	-5.514	15	615.747	2	65.634	1	0	2	.126	1	.373	2
606			min	-149.898	1	-270.324	3	2.377	15	0	3	.005	15	-.156	3
607		19	max	-5.34	15	614.164	2	65.634	1	0	2	.166	1	.012	3
608			min	-149.322	1	-271.512	3	2.377	15	0	3	.006	15	-.011	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.211	2	.009	3	1.43e-2	2	NC	1	NC	1
2			min	0	15	-.054	3	-.005	2	-3.449e-3	3	NC	1	NC	1
3		2	max	0	1	.13	2	.019	1	1.546e-2	2	NC	4	NC	2
4			min	0	15	.004	15	-.002	10	-3.148e-3	3	1096.985	3	9832.153	1
5		3	max	0	1	.263	3	.045	1	1.661e-2	2	NC	5	NC	2
6			min	0	15	.002	15	0	10	-2.848e-3	3	604.503	3	4233.635	1
7		4	max	0	1	.352	3	.067	1	1.777e-2	2	NC	5	NC	3
8			min	0	15	-.007	9	0	10	-2.547e-3	3	472.976	3	2878.751	1
9		5	max	0	1	.375	3	.077	1	1.892e-2	2	NC	5	NC	3
10			min	0	15	-.005	9	0	10	-2.247e-3	3	446.793	3	2502.836	1
11		6	max	0	1	.336	3	.072	1	2.008e-2	2	NC	5	NC	3
12			min	0	15	.002	15	0	10	-1.946e-3	3	491.949	3	2648.96	1
13		7	max	0	1	.246	3	.055	1	2.124e-2	2	NC	4	NC	2
14			min	0	15	.004	15	-.003	10	-1.646e-3	3	639	3	3490.619	1
15		8	max	0	1	.261	2	.029	1	2.239e-2	2	NC	4	NC	2
16			min	0	15	.006	15	-.007	10	-1.345e-3	3	1039.437	3	6572.367	1
17		9	max	0	1	.337	2	.026	3	2.355e-2	2	NC	4	NC	1
18			min	0	15	.008	15	-.013	2	-1.044e-3	3	1521.558	2	NC	1
19		10	max	0	1	.371	2	.026	3	2.471e-2	2	NC	5	NC	1
20			min	0	1	-.023	3	-.018	2	-7.439e-4	3	1201.829	2	NC	1
21		11	max	0	15	.337	2	.026	3	2.355e-2	2	NC	4	NC	1
22			min	0	1	.008	15	-.013	2	-1.044e-3	3	1521.558	2	NC	1
23		12	max	0	15	.261	2	.029	1	2.239e-2	2	NC	4	NC	2
24			min	0	1	.006	15	-.007	10	-1.345e-3	3	1039.437	3	6572.367	1
25		13	max	0	15	.246	3	.055	1	2.124e-2	2	NC	4	NC	2
26			min	0	1	.004	15	-.003	10	-1.646e-3	3	639	3	3490.619	1
27		14	max	0	15	.336	3	.072	1	2.008e-2	2	NC	5	NC	3
28			min	0	1	.002	15	0	10	-1.946e-3	3	491.949	3	2648.96	1
29		15	max	0	15	.375	3	.077	1	1.892e-2	2	NC	5	NC	3
30			min	0	1	-.005	9	0	10	-2.247e-3	3	446.793	3	2502.836	1
31		16	max	0	15	.352	3	.067	1	1.777e-2	2	NC	5	NC	3
32			min	0	1	-.007	9	0	10	-2.547e-3	3	472.976	3	2878.751	1
33		17	max	0	15	.263	3	.045	1	1.661e-2	2	NC	5	NC	2
34			min	0	1	.002	15	0	10	-2.848e-3	3	604.503	3	4233.635	1
35		18	max	0	15	.13	2	.019	1	1.546e-2	2	NC	4	NC	2
36			min	0	1	.004	15	-.002	10	-3.148e-3	3	1096.985	3	9832.153	1
37		19	max	0	15	.211	2	.009	3	1.43e-2	2	NC	1	NC	1
38			min	0	1	-.054	3	-.005	2	-3.449e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.39	3	.008	3	8.08e-3	1	NC	1	NC	1
40			min	0	15	-.623	2	-.004	2	-5.934e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.61	3	.012	1	9.299e-3	1	NC	5	NC	1
42			min	0	15	-.867	1	-.002	10	-6.944e-3	3	783.054	1	NC	1
43		3	max	0	1	.802	3	.034	1	1.052e-2	1	NC	5	NC	2
44			min	0	15	-1.087	1	0	10	-7.955e-3	3	412.93	1	5617.22	1
45		4	max	0	1	.949	3	.055	1	1.174e-2	1	NC	15	NC	2
46			min	0	15	-1.263	1	0	10	-8.965e-3	3	299.434	1	3522.416	1
47		5	max	0	1	1.041	3	.066	1	1.296e-2	1	NC	15	NC	3
48			min	0	15	-1.386	1	0	10	-9.976e-3	3	251.389	1	2926.394	1
49		6	max	0	1	1.076	3	.064	1	1.418e-2	1	NC	15	NC	3
50			min	0	15	-1.453	1	0	10	-1.099e-2	3	231.21	1	3006.784	1
51		7	max	0	1	1.062	3	.05	1	1.54e-2	1	9953.275	15	NC	2
52			min	0	15	-1.469	1	-.003	10	-1.2e-2	3	226.695	1	3875.526	1
53		8	max	0	1	1.015	3	.027	1	1.662e-2	1	NC	15	NC	2
54			min	0	15	-1.449	1	-.006	10	-1.301e-2	3	232.135	1	7140.159	1
55		9	max	0	1	.961	3	.023	3	1.783e-2	1	NC	15	NC	1
56			min	0	15	-1.415	1	-.011	2	-1.402e-2	3	242.254	1	NC	1
57		10	max	0	1	.934	3	.023	3	1.905e-2	1	NC	15	NC	1
58			min	0	1	-1.395	1	-.016	2	-1.503e-2	3	248.393	1	NC	1
59		11	max	0	15	.961	3	.023	3	1.783e-2	1	NC	15	NC	1
60			min	0	1	-1.415	1	-.011	2	-1.402e-2	3	242.254	1	NC	1
61		12	max	0	15	1.015	3	.027	1	1.662e-2	1	NC	15	NC	2
62			min	0	1	-1.449	1	-.006	10	-1.301e-2	3	232.135	1	7140.159	1
63		13	max	0	15	1.062	3	.05	1	1.54e-2	1	9953.275	15	NC	2
64			min	0	1	-1.469	1	-.003	10	-1.2e-2	3	226.695	1	3875.526	1
65		14	max	0	15	1.076	3	.064	1	1.418e-2	1	NC	15	NC	3
66			min	0	1	-1.453	1	0	10	-1.099e-2	3	231.21	1	3006.784	1
67		15	max	0	15	1.041	3	.066	1	1.296e-2	1	NC	15	NC	3
68			min	0	1	-1.386	1	0	10	-9.976e-3	3	251.389	1	2926.394	1
69		16	max	0	15	.949	3	.055	1	1.174e-2	1	NC	15	NC	2
70			min	0	1	-1.263	1	0	10	-8.965e-3	3	299.434	1	3522.416	1
71		17	max	0	15	.802	3	.034	1	1.052e-2	1	NC	5	NC	2
72			min	0	1	-1.087	1	0	10	-7.955e-3	3	412.93	1	5617.22	1
73		18	max	0	15	.61	3	.012	1	9.299e-3	1	NC	5	NC	1
74			min	0	1	-.867	1	-.002	10	-6.944e-3	3	783.054	1	NC	1
75		19	max	0	15	.39	3	.008	3	8.08e-3	1	NC	1	NC	1
76			min	0	1	-.623	2	-.004	2	-5.934e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.4	3	.007	3	4.997e-3	3	NC	1	NC	1
78			min	0	1	-.622	2	-.004	2	-8.304e-3	2	NC	1	NC	1
79		2	max	0	15	.56	3	.013	1	5.837e-3	3	NC	5	NC	1
80			min	0	1	-.901	2	-.002	10	-9.562e-3	2	688.76	2	NC	1
81		3	max	0	15	.706	3	.035	1	6.676e-3	3	NC	5	NC	2
82			min	0	1	-1.148	2	0	10	-1.082e-2	2	365.242	2	5581.144	1
83		4	max	0	15	.825	3	.055	1	7.515e-3	3	NC	15	NC	3
84			min	0	1	-1.34	2	0	10	-1.208e-2	2	267.291	2	3502.905	1
85		5	max	0	15	.911	3	.066	1	8.354e-3	3	NC	15	NC	3
86			min	0	1	-1.466	2	0	10	-1.334e-2	2	227.351	2	2910	1
87		6	max	0	15	.964	3	.065	1	9.193e-3	3	NC	15	NC	3
88			min	0	1	-1.524	2	0	10	-1.459e-2	2	212.779	2	2987.116	1
89		7	max	0	15	.984	3	.05	1	1.003e-2	3	9976.485	15	NC	2
90			min	0	1	-1.522	2	-.003	10	-1.585e-2	2	213.287	2	3840.067	1
91		8	max	0	15	.981	3	.028	1	1.087e-2	3	NC	15	NC	2
92			min	0	1	-1.479	2	-.006	10	-1.711e-2	2	224.121	2	7014.388	1
93		9	max	0	15	.966	3	.021	3	1.171e-2	3	NC	15	NC	1
94			min	0	1	-1.423	2	-.01	2	-1.837e-2	2	239.793	2	NC	1
95		10	max	0	1	.957	3	.021	3	1.255e-2	3	NC	15	NC	1
96			min	0	1	-1.394	1	-.015	2	-1.963e-2	2	248.646	1	NC	1
97		11	max	0	1	.966	3	.021	3	1.171e-2	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.423	2	-.01	2	-1.837e-2	2	239.793	2	NC	1
99		12	max	0	1	.981	3	.028	1	1.087e-2	3	NC	15	NC	2
100			min	0	15	-1.479	2	-.006	10	-1.711e-2	2	224.121	2	7014.388	1
101		13	max	0	1	.984	3	.05	1	1.003e-2	3	9976.485	15	NC	2
102			min	0	15	-1.522	2	-.003	10	-1.585e-2	2	213.287	2	3840.067	1
103		14	max	0	1	.964	3	.065	1	9.193e-3	3	NC	15	NC	3
104			min	0	15	-1.524	2	0	10	-1.459e-2	2	212.779	2	2987.116	1
105		15	max	0	1	.911	3	.066	1	8.354e-3	3	NC	15	NC	3
106			min	0	15	-1.466	2	0	10	-1.334e-2	2	227.351	2	2910	1
107		16	max	0	1	.825	3	.055	1	7.515e-3	3	NC	15	NC	3
108			min	0	15	-1.34	2	0	10	-1.208e-2	2	267.291	2	3502.905	1
109		17	max	0	1	.706	3	.035	1	6.676e-3	3	NC	5	NC	2
110			min	0	15	-1.148	2	0	10	-1.082e-2	2	365.242	2	5581.144	1
111		18	max	0	1	.56	3	.013	1	5.837e-3	3	NC	5	NC	1
112			min	0	15	-.901	2	-.002	10	-9.562e-3	2	688.76	2	NC	1
113		19	max	0	1	.4	3	.007	3	4.997e-3	3	NC	1	NC	1
114			min	0	15	-.622	2	-.004	2	-8.304e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.197	1	.006	3	9.43e-3	3	NC	1	NC	1
116			min	0	1	-.141	3	-.004	2	-1.282e-2	1	NC	1	NC	1
117		2	max	0	15	.08	1	.019	1	1.04e-2	3	NC	4	NC	2
118			min	0	1	-.096	3	-.001	10	-1.365e-2	1	1458.58	2	9917.294	1
119		3	max	0	15	.013	9	.045	1	1.137e-2	3	NC	5	NC	2
120			min	0	1	-.063	3	0	10	-1.449e-2	1	816.779	2	4242.55	1
121		4	max	0	15	.004	13	.067	1	1.234e-2	3	NC	5	NC	3
122			min	0	1	-.103	2	.002	10	-1.532e-2	1	658.631	2	2871.936	1
123		5	max	0	15	.005	4	.077	1	1.331e-2	3	NC	5	NC	3
124			min	0	1	-.104	2	.002	10	-1.615e-2	1	656.541	2	2485.525	1
125		6	max	0	15	.021	9	.074	1	1.429e-2	3	NC	5	NC	3
126			min	0	1	-.097	3	.001	10	-1.699e-2	1	801.355	2	2613.839	1
127		7	max	0	15	.086	1	.057	1	1.526e-2	3	NC	3	NC	2
128			min	0	1	-.149	3	-.001	10	-1.782e-2	1	1324.349	2	3402.866	1
129		8	max	0	15	.193	1	.031	1	1.623e-2	3	NC	1	NC	2
130			min	0	1	-.208	3	-.004	10	-1.865e-2	1	2875.288	3	6189.095	1
131		9	max	0	15	.288	1	.019	3	1.72e-2	3	NC	4	NC	1
132			min	0	1	-.258	3	-.009	2	-1.949e-2	1	1641.557	3	NC	1
133		10	max	0	1	.33	1	.018	3	1.817e-2	3	NC	5	NC	1
134			min	0	1	-.28	3	-.014	2	-2.032e-2	1	1381.211	3	NC	1
135		11	max	0	1	.288	1	.019	3	1.72e-2	3	NC	4	NC	1
136			min	0	15	-.258	3	-.009	2	-1.949e-2	1	1641.557	3	NC	1
137		12	max	0	1	.193	1	.031	1	1.623e-2	3	NC	1	NC	2
138			min	0	15	-.208	3	-.004	10	-1.865e-2	1	2875.288	3	6189.095	1
139		13	max	0	1	.086	1	.057	1	1.526e-2	3	NC	3	NC	2
140			min	0	15	-.149	3	-.001	10	-1.782e-2	1	1324.349	2	3402.866	1
141		14	max	0	1	.021	9	.074	1	1.429e-2	3	NC	5	NC	3
142			min	0	15	-.097	3	.001	10	-1.699e-2	1	801.355	2	2613.839	1
143		15	max	0	1	.005	4	.077	1	1.331e-2	3	NC	5	NC	3
144			min	0	15	-.104	2	.002	10	-1.615e-2	1	656.541	2	2485.525	1
145		16	max	0	1	.004	13	.067	1	1.234e-2	3	NC	5	NC	3
146			min	0	15	-.103	2	.002	10	-1.532e-2	1	658.631	2	2871.936	1
147		17	max	0	1	.013	9	.045	1	1.137e-2	3	NC	5	NC	2
148			min	0	15	-.063	3	0	10	-1.449e-2	1	816.779	2	4242.55	1
149		18	max	0	1	.08	1	.019	1	1.04e-2	3	NC	4	NC	2
150			min	0	15	-.096	3	-.001	10	-1.365e-2	1	1458.58	2	9917.294	1
151		19	max	0	1	.197	1	.006	3	9.43e-3	3	NC	1	NC	1
152			min	0	15	-.141	3	-.004	2	-1.282e-2	1	NC	1	NC	1
153	M2	1	max	.006	1	.007	2	.008	1	-6.096e-6	15	NC	1	NC	2
154			min	-.008	3	-.012	3	0	15	-1.683e-4	1	8314.684	2	7932.595	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.006	2	.007	1	-5.712e-6	15	NC	1	NC	2
156			min	-.007	3	-.011	3	0	15	-1.577e-4	1	9618.018	2	8649.14	1
157		3	max	.006	1	.005	2	.006	1	-5.328e-6	15	NC	1	NC	2
158			min	-.007	3	-.011	3	0	15	-1.471e-4	1	NC	1	9502.462	1
159		4	max	.005	1	.004	2	.006	1	-4.945e-6	15	NC	1	NC	1
160			min	-.006	3	-.011	3	0	15	-1.365e-4	1	NC	1	NC	1
161		5	max	.005	1	.003	2	.005	1	-4.561e-6	15	NC	1	NC	1
162			min	-.006	3	-.01	3	0	15	-1.259e-4	1	NC	1	NC	1
163		6	max	.005	1	.003	2	.005	1	-4.177e-6	15	NC	1	NC	1
164			min	-.005	3	-.01	3	0	15	-1.152e-4	1	NC	1	NC	1
165		7	max	.004	1	.002	2	.004	1	-3.793e-6	15	NC	1	NC	1
166			min	-.005	3	-.009	3	0	15	-1.046e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.003	1	-3.409e-6	15	NC	1	NC	1
168			min	-.005	3	-.009	3	0	15	-9.399e-5	1	NC	1	NC	1
169		9	max	.004	1	0	2	.003	1	-3.026e-6	15	NC	1	NC	1
170			min	-.004	3	-.008	3	0	15	-8.337e-5	1	NC	1	NC	1
171		10	max	.003	1	0	2	.002	1	-2.642e-6	15	NC	1	NC	1
172			min	-.004	3	-.008	3	0	15	-7.275e-5	1	NC	1	NC	1
173		11	max	.003	1	0	2	.002	1	-2.258e-6	15	NC	1	NC	1
174			min	-.003	3	-.007	3	0	15	-6.213e-5	1	NC	1	NC	1
175		12	max	.003	1	-.001	15	.002	1	-1.874e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-5.15e-5	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.001	1	-1.491e-6	15	NC	1	NC	1
178			min	-.003	3	-.006	3	0	15	-4.088e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-1.107e-6	15	NC	1	NC	1
180			min	-.002	3	-.005	3	0	15	-3.026e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-7.23e-7	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-1.964e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-3.392e-7	15	NC	1	NC	1
184			min	-.001	3	-.003	3	0	15	-9.018e-6	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	1.603e-6	1	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-7.129e-7	3	NC	1	NC	1
187		18	max	0	1	0	15	0	1	1.222e-5	1	NC	1	NC	1
188			min	0	3	-.001	4	0	15	2.936e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.285e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	8.121e-7	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.514e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-7.045e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.491e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	5.384e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	3.687e-5	1	NC	1	NC	1
196			min	0	2	-.005	4	0	15	1.328e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	1	5.883e-5	1	NC	1	NC	1
198			min	0	2	-.008	4	0	15	2.118e-6	15	NC	1	NC	1
199		5	max	.001	3	-.003	15	0	1	8.079e-5	1	NC	1	NC	1
200			min	-.001	2	-.011	4	0	15	2.908e-6	15	9256.277	4	NC	1
201		6	max	.002	3	-.003	15	0	1	1.028e-4	1	NC	1	NC	1
202			min	-.001	2	-.014	4	0	15	3.697e-6	15	7430.527	4	NC	1
203		7	max	.002	3	-.004	15	0	1	1.247e-4	1	NC	5	NC	1
204			min	-.002	2	-.016	4	0	15	4.487e-6	15	6334.963	4	NC	1
205		8	max	.003	3	-.004	15	.001	1	1.467e-4	1	NC	5	NC	1
206			min	-.002	2	-.018	4	0	15	5.277e-6	15	5658.669	4	NC	1
207		9	max	.003	3	-.005	15	.001	1	1.686e-4	1	NC	5	NC	1
208			min	-.002	2	-.02	4	0	15	6.067e-6	15	5255.632	4	NC	1
209		10	max	.003	3	-.005	15	.002	1	1.906e-4	1	NC	5	NC	1
210			min	-.003	2	-.021	4	0	15	6.857e-6	15	5054.679	4	NC	1
211		11	max	.004	3	-.005	15	.002	1	2.125e-4	1	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
212			min	-.003	2	-.021	4	0	15	7.646e-6	15	5025.851	4	NC	1
213		12	max	.004	3	-.005	15	.003	1	2.345e-4	1	NC	5	NC	1
214			min	-.003	2	-.02	4	0	15	8.436e-6	15	5168.868	4	NC	1
215		13	max	.004	3	-.004	15	.003	1	2.565e-4	1	NC	5	NC	1
216			min	-.004	2	-.019	4	0	15	9.226e-6	15	5514.444	4	NC	1
217		14	max	.005	3	-.004	15	.004	1	2.784e-4	1	NC	5	NC	1
218			min	-.004	2	-.017	4	0	15	1.002e-5	15	6140.532	4	NC	1
219		15	max	.005	3	-.003	15	.004	1	3.004e-4	1	NC	2	NC	1
220			min	-.004	2	-.015	4	0	15	1.081e-5	15	7221.157	4	NC	1
221		16	max	.006	3	-.003	15	.005	1	3.223e-4	1	NC	1	NC	1
222			min	-.004	2	-.012	4	0	15	1.16e-5	15	9178.741	4	NC	1
223		17	max	.006	3	-.002	15	.005	1	3.443e-4	1	NC	1	NC	1
224			min	-.005	2	-.008	4	0	15	1.239e-5	15	NC	1	NC	1
225		18	max	.006	3	-.001	15	.006	1	3.663e-4	1	NC	1	NC	1
226			min	-.005	2	-.005	1	0	15	1.317e-5	15	NC	1	NC	1
227		19	max	.007	3	0	15	.007	1	3.882e-4	1	NC	1	NC	1
228			min	-.005	2	-.002	1	0	15	1.396e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.005	2	0	15	6.258e-5	1	NC	1	NC	3
230			min	0	3	-.007	3	-.007	1	2.273e-6	15	NC	1	3460.072	1
231		2	max	.003	1	.005	2	0	15	6.258e-5	1	NC	1	NC	2
232			min	0	3	-.006	3	-.007	1	2.273e-6	15	NC	1	3763.117	1
233		3	max	.002	1	.004	2	0	15	6.258e-5	1	NC	1	NC	2
234			min	0	3	-.006	3	-.006	1	2.273e-6	15	NC	1	4123.756	1
235		4	max	.002	1	.004	2	0	15	6.258e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.005	1	2.273e-6	15	NC	1	4556.956	1
237		5	max	.002	1	.004	2	0	15	6.258e-5	1	NC	1	NC	2
238			min	0	3	-.005	3	-.005	1	2.273e-6	15	NC	1	5083.057	1
239		6	max	.002	1	.003	2	0	15	6.258e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.004	1	2.273e-6	15	NC	1	5730.267	1
241		7	max	.002	1	.003	2	0	15	6.258e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.004	1	2.273e-6	15	NC	1	6538.624	1
243		8	max	.002	1	.003	2	0	15	6.258e-5	1	NC	1	NC	2
244			min	0	3	-.004	3	-.003	1	2.273e-6	15	NC	1	7566.526	1
245		9	max	.002	1	.003	2	0	15	6.258e-5	1	NC	1	NC	2
246			min	0	3	-.004	3	-.003	1	2.273e-6	15	NC	1	8901.886	1
247		10	max	.001	1	.002	2	0	15	6.258e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.002	1	2.273e-6	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	6.258e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	2.273e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	6.258e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	2.273e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	6.258e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.273e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	6.258e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.273e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	6.258e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	2.273e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	6.258e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.273e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	6.258e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.273e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	6.258e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.273e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.258e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.273e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.025	2	0	1	0	1	NC	3	NC	1
268			min	-.024	3	-.036	3	0	1	0	1	2384.47	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
269		2	max	.019	1	.023	2	0	1	0	1	NC	3	NC	1
270			min	-.023	3	-.034	3	0	1	0	1	2609.481	2	NC	1
271		3	max	.018	1	.021	2	0	1	0	1	NC	3	NC	1
272			min	-.021	3	-.032	3	0	1	0	1	2879.38	2	NC	1
273		4	max	.017	1	.019	2	0	1	0	1	NC	3	NC	1
274			min	-.02	3	-.03	3	0	1	0	1	3206.586	2	NC	1
275		5	max	.015	1	.017	2	0	1	0	1	NC	3	NC	1
276			min	-.019	3	-.028	3	0	1	0	1	3608.26	2	NC	1
277		6	max	.014	1	.015	2	0	1	0	1	NC	3	NC	1
278			min	-.017	3	-.026	3	0	1	0	1	4108.67	2	NC	1
279		7	max	.013	1	.013	2	0	1	0	1	NC	3	NC	1
280			min	-.016	3	-.024	3	0	1	0	1	4743.053	2	NC	1
281		8	max	.012	1	.011	2	0	1	0	1	NC	1	NC	1
282			min	-.015	3	-.022	3	0	1	0	1	5564.181	2	NC	1
283		9	max	.011	1	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.013	3	-.02	3	0	1	0	1	6654.054	2	NC	1
285		10	max	.01	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.018	3	0	1	0	1	8145.853	2	NC	1
287		11	max	.009	1	.006	2	0	1	0	1	NC	1	NC	1
288			min	-.011	3	-.016	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.01	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	.001	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.01	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.013	3	0	1	0	1	8548.098	3	NC	1
315		6	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.015	3	0	1	0	1	7183.938	3	NC	1
317		7	max	.007	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.017	3	0	1	0	1	6363.011	3	NC	1
319		8	max	.008	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.007	2	-.019	3	0	1	0	1	5770.698	4	NC	1
321		9	max	.009	3	-.005	15	0	1	0	1	NC	2	NC	1
322			min	-.008	2	-.02	4	0	1	0	1	5352.443	4	NC	1
323		10	max	.01	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.009	2	-.021	4	0	1	0	1	5142.011	4	NC	1
325		11	max	.011	3	-.005	15	0	1	0	1	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
326			min	-.01	2	-.021	4	0	1	0	1	5107.889	4	NC	1
327		12	max	.012	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.011	2	-.02	4	0	1	0	1	5249.112	4	NC	1
329		13	max	.013	3	-.004	15	0	1	0	1	NC	2	NC	1
330			min	-.012	2	-.019	4	0	1	0	1	5596.376	4	NC	1
331		14	max	.014	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.013	2	-.017	4	0	1	0	1	6228.378	4	NC	1
333		15	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.015	4	0	1	0	1	7321.226	4	NC	1
335		16	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.012	4	0	1	0	1	9302.713	4	NC	1
337		17	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.016	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.019	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.017	2	-.008	1	0	1	0	1	NC	1	NC	1
341		19	max	.02	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.018	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.017	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.02	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.019	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.018	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.017	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.016	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.015	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.007	2	0	15	1.683e-4	1	NC	1	NC	2
382			min	-.008	3	-.012	3	-.008	1	6.096e-6	15	8314.684	2	7932.595	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.006	2	0	15	1.577e-4	1	NC	1	NC	2
384			min	-.007	3	-.011	3	-.007	1	5.712e-6	15	9618.018	2	8649.14	1
385		3	max	.006	1	.005	2	0	15	1.471e-4	1	NC	1	NC	2
386			min	-.007	3	-.011	3	-.006	1	5.328e-6	15	NC	1	9502.462	1
387		4	max	.005	1	.004	2	0	15	1.365e-4	1	NC	1	NC	1
388			min	-.006	3	-.011	3	-.006	1	4.945e-6	15	NC	1	NC	1
389		5	max	.005	1	.003	2	0	15	1.259e-4	1	NC	1	NC	1
390			min	-.006	3	-.01	3	-.005	1	4.561e-6	15	NC	1	NC	1
391		6	max	.005	1	.003	2	0	15	1.152e-4	1	NC	1	NC	1
392			min	-.005	3	-.01	3	-.005	1	4.177e-6	15	NC	1	NC	1
393		7	max	.004	1	.002	2	0	15	1.046e-4	1	NC	1	NC	1
394			min	-.005	3	-.009	3	-.004	1	3.793e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	9.399e-5	1	NC	1	NC	1
396			min	-.005	3	-.009	3	-.003	1	3.409e-6	15	NC	1	NC	1
397		9	max	.004	1	0	2	0	15	8.337e-5	1	NC	1	NC	1
398			min	-.004	3	-.008	3	-.003	1	3.026e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	7.275e-5	1	NC	1	NC	1
400			min	-.004	3	-.008	3	-.002	1	2.642e-6	15	NC	1	NC	1
401		11	max	.003	1	0	2	0	15	6.213e-5	1	NC	1	NC	1
402			min	-.003	3	-.007	3	-.002	1	2.258e-6	15	NC	1	NC	1
403		12	max	.003	1	-.001	15	0	15	5.15e-5	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	1.874e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	4.088e-5	1	NC	1	NC	1
406			min	-.003	3	-.006	3	-.001	1	1.491e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	3.026e-5	1	NC	1	NC	1
408			min	-.002	3	-.005	3	0	1	1.107e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	1.964e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	7.23e-7	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	9.018e-6	1	NC	1	NC	1
412			min	-.001	3	-.003	3	0	1	3.392e-7	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	7.129e-7	3	NC	1	NC	1
414			min	0	3	-.002	4	0	1	-1.603e-6	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-2.936e-7	12	NC	1	NC	1
416			min	0	3	-.001	4	0	1	-1.222e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-8.121e-7	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.285e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	7.045e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.514e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-5.384e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.491e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	15	-1.328e-6	15	NC	1	NC	1
424			min	0	2	-.005	4	0	1	-3.687e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	15	-2.118e-6	15	NC	1	NC	1
426			min	0	2	-.008	4	0	1	-5.883e-5	1	NC	1	NC	1
427		5	max	.001	3	-.003	15	0	15	-2.908e-6	15	NC	1	NC	1
428			min	-.001	2	-.011	4	0	1	-8.079e-5	1	9256.277	4	NC	1
429		6	max	.002	3	-.003	15	0	15	-3.697e-6	15	NC	1	NC	1
430			min	-.001	2	-.014	4	0	1	-1.028e-4	1	7430.527	4	NC	1
431		7	max	.002	3	-.004	15	0	15	-4.487e-6	15	NC	5	NC	1
432			min	-.002	2	-.016	4	0	1	-1.247e-4	1	6334.963	4	NC	1
433		8	max	.003	3	-.004	15	0	15	-5.277e-6	15	NC	5	NC	1
434			min	-.002	2	-.018	4	-.001	1	-1.467e-4	1	5658.669	4	NC	1
435		9	max	.003	3	-.005	15	0	15	-6.067e-6	15	NC	5	NC	1
436			min	-.002	2	-.02	4	-.001	1	-1.686e-4	1	5255.632	4	NC	1
437		10	max	.003	3	-.005	15	0	15	-6.857e-6	15	NC	5	NC	1
438			min	-.003	2	-.021	4	-.002	1	-1.906e-4	1	5054.679	4	NC	1
439		11	max	.004	3	-.005	15	0	15	-7.646e-6	15	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
440			min	-.003	2	-.021	4	-.002	1	-2.125e-4	1	5025.851	4	NC	1
441		12	max	.004	3	-.005	15	0	15	-8.436e-6	15	NC	5	NC	1
442			min	-.003	2	-.02	4	-.003	1	-2.345e-4	1	5168.868	4	NC	1
443		13	max	.004	3	-.004	15	0	15	-9.226e-6	15	NC	5	NC	1
444			min	-.004	2	-.019	4	-.003	1	-2.565e-4	1	5514.444	4	NC	1
445		14	max	.005	3	-.004	15	0	15	-1.002e-5	15	NC	5	NC	1
446			min	-.004	2	-.017	4	-.004	1	-2.784e-4	1	6140.532	4	NC	1
447		15	max	.005	3	-.003	15	0	15	-1.081e-5	15	NC	2	NC	1
448			min	-.004	2	-.015	4	-.004	1	-3.004e-4	1	7221.157	4	NC	1
449		16	max	.006	3	-.003	15	0	15	-1.16e-5	15	NC	1	NC	1
450			min	-.004	2	-.012	4	-.005	1	-3.223e-4	1	9178.741	4	NC	1
451		17	max	.006	3	-.002	15	0	15	-1.239e-5	15	NC	1	NC	1
452			min	-.005	2	-.008	4	-.005	1	-3.443e-4	1	NC	1	NC	1
453		18	max	.006	3	-.001	15	0	15	-1.317e-5	15	NC	1	NC	1
454			min	-.005	2	-.005	1	-.006	1	-3.663e-4	1	NC	1	NC	1
455		19	max	.007	3	0	15	0	15	-1.396e-5	15	NC	1	NC	1
456			min	-.005	2	-.002	1	-.007	1	-3.882e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.005	2	.007	1	-2.273e-6	15	NC	1	NC	3
458			min	0	3	-.007	3	0	15	-6.258e-5	1	NC	1	3460.072	1
459		2	max	.003	1	.005	2	.007	1	-2.273e-6	15	NC	1	NC	2
460			min	0	3	-.006	3	0	15	-6.258e-5	1	NC	1	3763.117	1
461		3	max	.002	1	.004	2	.006	1	-2.273e-6	15	NC	1	NC	2
462			min	0	3	-.006	3	0	15	-6.258e-5	1	NC	1	4123.756	1
463		4	max	.002	1	.004	2	.005	1	-2.273e-6	15	NC	1	NC	2
464			min	0	3	-.006	3	0	15	-6.258e-5	1	NC	1	4556.956	1
465		5	max	.002	1	.004	2	.005	1	-2.273e-6	15	NC	1	NC	2
466			min	0	3	-.005	3	0	15	-6.258e-5	1	NC	1	5083.057	1
467		6	max	.002	1	.003	2	.004	1	-2.273e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-6.258e-5	1	NC	1	5730.267	1
469		7	max	.002	1	.003	2	.004	1	-2.273e-6	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-6.258e-5	1	NC	1	6538.624	1
471		8	max	.002	1	.003	2	.003	1	-2.273e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-6.258e-5	1	NC	1	7566.526	1
473		9	max	.002	1	.003	2	.003	1	-2.273e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-6.258e-5	1	NC	1	8901.886	1
475		10	max	.001	1	.002	2	.002	1	-2.273e-6	15	NC	1	NC	1
476			min	0	3	-.003	3	0	15	-6.258e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.002	1	-2.273e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-6.258e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-2.273e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-6.258e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-2.273e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-6.258e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-2.273e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-6.258e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-2.273e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-6.258e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.273e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-6.258e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.273e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-6.258e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.273e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-6.258e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.273e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.258e-5	1	NC	1	NC	1
495	M1	1	max	.009	3	.211	2	0	1	9.048e-3	1	NC	1	NC	1
496			min	-.005	2	-.054	3	0	15	-1.702e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.009	3	.104	2	0	15	4.367e-3	1	NC	5	NC	1
498			min	-.005	2	-.027	3	-.005	1	-8.449e-3	3	1266.902	2	NC	1
499		3	max	.009	3	.012	3	0	15	2.093e-5	10	NC	5	NC	1
500			min	-.005	2	-.01	2	-.008	1	-1.556e-4	1	613.171	2	NC	1
501		4	max	.008	3	.073	3	0	15	4.215e-3	1	NC	15	NC	1
502			min	-.005	2	-.137	2	-.007	1	-3.976e-3	3	389.855	2	NC	1
503		5	max	.008	3	.148	3	0	15	8.585e-3	1	NC	15	NC	1
504			min	-.005	2	-.268	2	-.005	1	-7.859e-3	3	282.95	2	NC	1
505		6	max	.008	3	.229	3	0	15	1.295e-2	1	7988.212	15	NC	1
506			min	-.005	2	-.394	2	-.002	1	-1.174e-2	3	223.8	2	NC	1
507		7	max	.008	3	.306	3	0	1	1.733e-2	1	6751.509	15	NC	1
508			min	-.004	2	-.507	2	0	3	-1.562e-2	3	188.768	2	NC	1
509		8	max	.008	3	.37	3	0	1	2.17e-2	1	6018.639	15	NC	1
510			min	-.004	2	-.596	2	0	15	-1.951e-2	3	168.001	2	NC	1
511		9	max	.008	3	.412	3	0	15	2.384e-2	1	5634.698	15	NC	1
512			min	-.004	2	-.652	2	0	1	-1.999e-2	3	157.014	1	NC	1
513		10	max	.007	3	.428	3	0	1	2.459e-2	2	5517.22	15	NC	1
514			min	-.004	2	-.671	2	0	15	-1.82e-2	3	153.711	1	NC	1
515		11	max	.007	3	.418	3	0	1	2.592e-2	2	5634.445	15	NC	1
516			min	-.004	2	-.652	2	0	15	-1.641e-2	3	157.263	1	NC	1
517		12	max	.007	3	.383	3	0	15	2.475e-2	2	6018.096	15	NC	1
518			min	-.004	2	-.594	2	0	1	-1.42e-2	3	168.795	1	NC	1
519		13	max	.007	3	.326	3	0	15	1.985e-2	2	6750.549	15	NC	1
520			min	-.004	2	-.502	1	0	1	-1.136e-2	3	190.99	1	NC	1
521		14	max	.007	3	.254	3	.002	1	1.495e-2	2	7986.58	15	NC	1
522			min	-.004	2	-.386	1	0	15	-8.525e-3	3	228.722	1	NC	1
523		15	max	.006	3	.172	3	.004	1	1.004e-2	2	NC	15	NC	1
524			min	-.004	2	-.258	1	0	15	-5.688e-3	3	293.117	1	NC	1
525		16	max	.006	3	.087	3	.007	1	5.142e-3	2	NC	15	NC	1
526			min	-.004	2	-.127	1	0	15	-2.851e-3	3	411.011	1	NC	1
527		17	max	.006	3	.004	3	.007	1	4.939e-4	1	NC	5	NC	1
528			min	-.004	2	-.006	2	0	15	-1.391e-5	3	659.93	1	NC	1
529		18	max	.006	3	.101	1	.005	1	6.46e-3	2	NC	5	NC	1
530			min	-.004	2	-.071	3	0	15	-2.202e-3	3	1384.091	1	NC	1
531		19	max	.006	3	.197	1	0	15	1.288e-2	2	NC	1	NC	1
532			min	-.004	2	-.141	3	0	1	-4.48e-3	3	NC	1	NC	1
533	M5	1	max	.026	3	.371	2	0	1	0	1	NC	1	NC	1
534			min	-.018	2	-.023	3	0	1	0	1	NC	1	NC	1
535		2	max	.026	3	.183	2	0	1	0	1	NC	5	NC	1
536			min	-.018	2	-.014	3	0	1	0	1	730.944	2	NC	1
537		3	max	.026	3	.036	3	0	1	0	1	NC	15	NC	1
538			min	-.018	2	-.03	2	0	1	0	1	340.839	2	NC	1
539		4	max	.025	3	.157	3	0	1	0	1	8301.035	15	NC	1
540			min	-.018	2	-.29	2	0	1	0	1	206.451	2	NC	1
541		5	max	.025	3	.33	3	0	1	0	1	5766.521	15	NC	1
542			min	-.017	2	-.575	2	0	1	0	1	143.992	2	NC	1
543		6	max	.024	3	.526	3	0	1	0	1	4415.68	15	NC	1
544			min	-.017	2	-.861	2	0	1	0	1	110.538	2	NC	1
545		7	max	.024	3	.72	3	0	1	0	1	3639.864	15	NC	1
546			min	-.016	2	-1.121	2	0	1	0	1	91.25	2	NC	1
547		8	max	.023	3	.883	3	0	1	0	1	3190.767	15	NC	1
548			min	-.016	2	-1.331	1	0	1	0	1	79.948	1	NC	1
549		9	max	.023	3	.989	3	0	1	0	1	2960.93	15	NC	1
550			min	-.016	2	-1.464	1	0	1	0	1	74.105	1	NC	1
551		10	max	.022	3	1.027	3	0	1	0	1	2891.692	15	NC	1
552			min	-.016	2	-1.509	1	0	1	0	1	72.373	1	NC	1
553		11	max	.022	3	1.002	3	0	1	0	1	2961.07	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.015	2	-1.464	1	0	1	0	1	74.239	1	NC	1
555		12	max	.021	3	.914	3	0	1	0	1	3191.095	15	NC	1
556			min	-.015	2	-1.327	1	0	1	0	1	80.396	1	NC	1
557		13	max	.02	3	.772	3	0	1	0	1	3640.518	15	NC	1
558			min	-.015	2	-1.11	1	0	1	0	1	92.567	1	NC	1
559		14	max	.02	3	.594	3	0	1	0	1	4416.935	15	NC	1
560			min	-.014	2	-.84	1	0	1	0	1	113.881	1	NC	1
561		15	max	.019	3	.396	3	0	1	0	1	5768.975	15	NC	1
562			min	-.014	2	-.548	1	0	1	0	1	151.701	1	NC	1
563		16	max	.019	3	.196	3	0	1	0	1	8306.154	15	NC	1
564			min	-.014	2	-.263	1	0	1	0	1	224.485	1	NC	1
565		17	max	.018	3	.012	3	0	1	0	1	NC	15	NC	1
566			min	-.014	2	-.016	2	0	1	0	1	386.251	1	NC	1
567		18	max	.018	3	.175	1	0	1	0	1	NC	5	NC	1
568			min	-.014	2	-.143	3	0	1	0	1	855.974	1	NC	1
569		19	max	.018	3	.33	1	0	1	0	1	NC	1	NC	1
570			min	-.014	2	-.28	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.009	3	.211	2	0	15	1.702e-2	3	NC	1	NC	1
572			min	-.005	2	-.054	3	0	1	-9.048e-3	1	NC	1	NC	1
573		2	max	.009	3	.104	2	.005	1	8.449e-3	3	NC	5	NC	1
574			min	-.005	2	-.027	3	0	15	-4.367e-3	1	1266.902	2	NC	1
575		3	max	.009	3	.012	3	.008	1	1.556e-4	1	NC	5	NC	1
576			min	-.005	2	-.01	2	0	15	-2.093e-5	10	613.171	2	NC	1
577		4	max	.008	3	.073	3	.007	1	3.976e-3	3	NC	15	NC	1
578			min	-.005	2	-.137	2	0	15	-4.215e-3	1	389.855	2	NC	1
579		5	max	.008	3	.148	3	.005	1	7.859e-3	3	NC	15	NC	1
580			min	-.005	2	-.268	2	0	15	-8.585e-3	1	282.95	2	NC	1
581		6	max	.008	3	.229	3	.002	1	1.174e-2	3	7988.212	15	NC	1
582			min	-.005	2	-.394	2	0	15	-1.295e-2	1	223.8	2	NC	1
583		7	max	.008	3	.306	3	0	3	1.562e-2	3	6751.509	15	NC	1
584			min	-.004	2	-.507	2	0	1	-1.733e-2	1	188.768	2	NC	1
585		8	max	.008	3	.37	3	0	15	1.951e-2	3	6018.639	15	NC	1
586			min	-.004	2	-.596	2	0	1	-2.17e-2	1	168.001	2	NC	1
587		9	max	.008	3	.412	3	0	1	1.999e-2	3	5634.698	15	NC	1
588			min	-.004	2	-.652	2	0	15	-2.384e-2	1	157.014	1	NC	1
589		10	max	.007	3	.428	3	0	15	1.82e-2	3	5517.22	15	NC	1
590			min	-.004	2	-.671	2	0	1	-2.459e-2	2	153.711	1	NC	1
591		11	max	.007	3	.418	3	0	15	1.641e-2	3	5634.445	15	NC	1
592			min	-.004	2	-.652	2	0	1	-2.592e-2	2	157.263	1	NC	1
593		12	max	.007	3	.383	3	0	1	1.42e-2	3	6018.096	15	NC	1
594			min	-.004	2	-.594	2	0	15	-2.475e-2	2	168.795	1	NC	1
595		13	max	.007	3	.326	3	0	1	1.136e-2	3	6750.549	15	NC	1
596			min	-.004	2	-.502	1	0	15	-1.985e-2	2	190.99	1	NC	1
597		14	max	.007	3	.254	3	0	15	8.525e-3	3	7986.58	15	NC	1
598			min	-.004	2	-.386	1	-.002	1	-1.495e-2	2	228.722	1	NC	1
599		15	max	.006	3	.172	3	0	15	5.688e-3	3	NC	15	NC	1
600			min	-.004	2	-.258	1	-.004	1	-1.004e-2	2	293.117	1	NC	1
601		16	max	.006	3	.087	3	0	15	2.851e-3	3	NC	15	NC	1
602			min	-.004	2	-.127	1	-.007	1	-5.142e-3	2	411.011	1	NC	1
603		17	max	.006	3	.004	3	0	15	1.391e-5	3	NC	5	NC	1
604			min	-.004	2	-.006	2	-.007	1	-4.939e-4	1	659.93	1	NC	1
605		18	max	.006	3	.101	1	0	15	2.202e-3	3	NC	5	NC	1
606			min	-.004	2	-.071	3	-.005	1	-6.46e-3	2	1384.091	1	NC	1
607		19	max	.006	3	.197	1	0	1	4.48e-3	3	NC	1	NC	1
608			min	-.004	2	-.141	3	0	15	-1.288e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-40 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

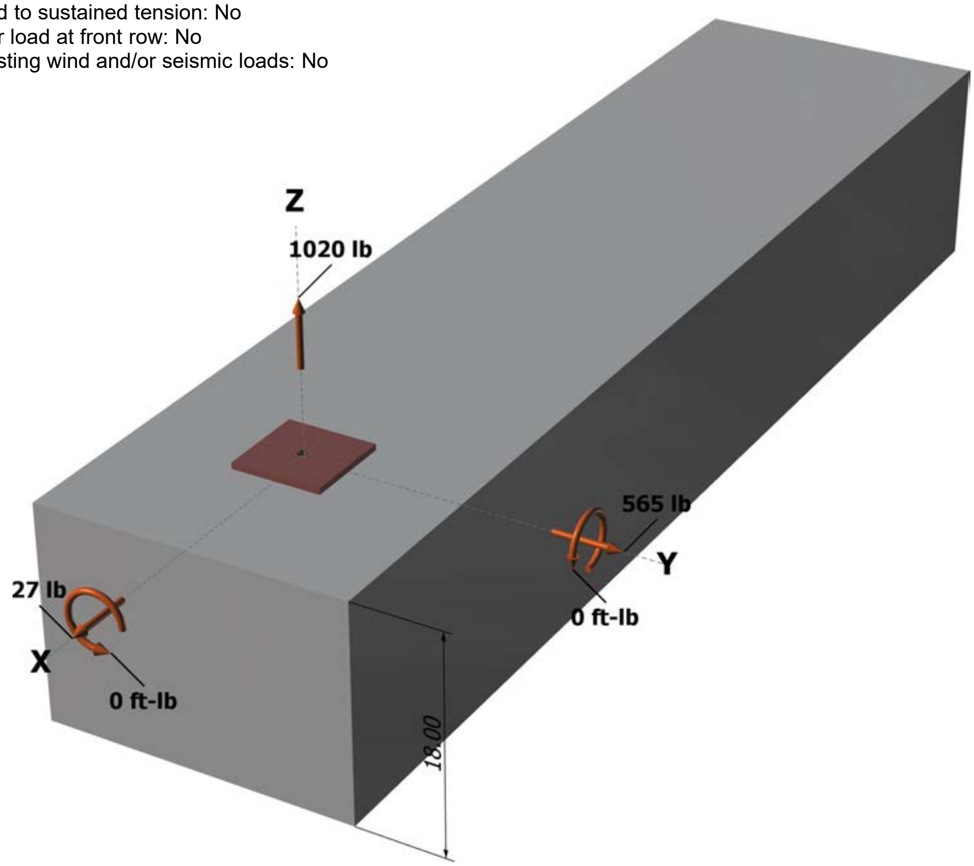
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

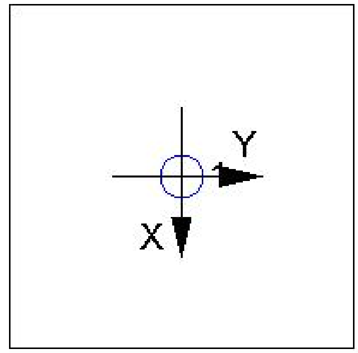
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
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)

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	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 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 32-40 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

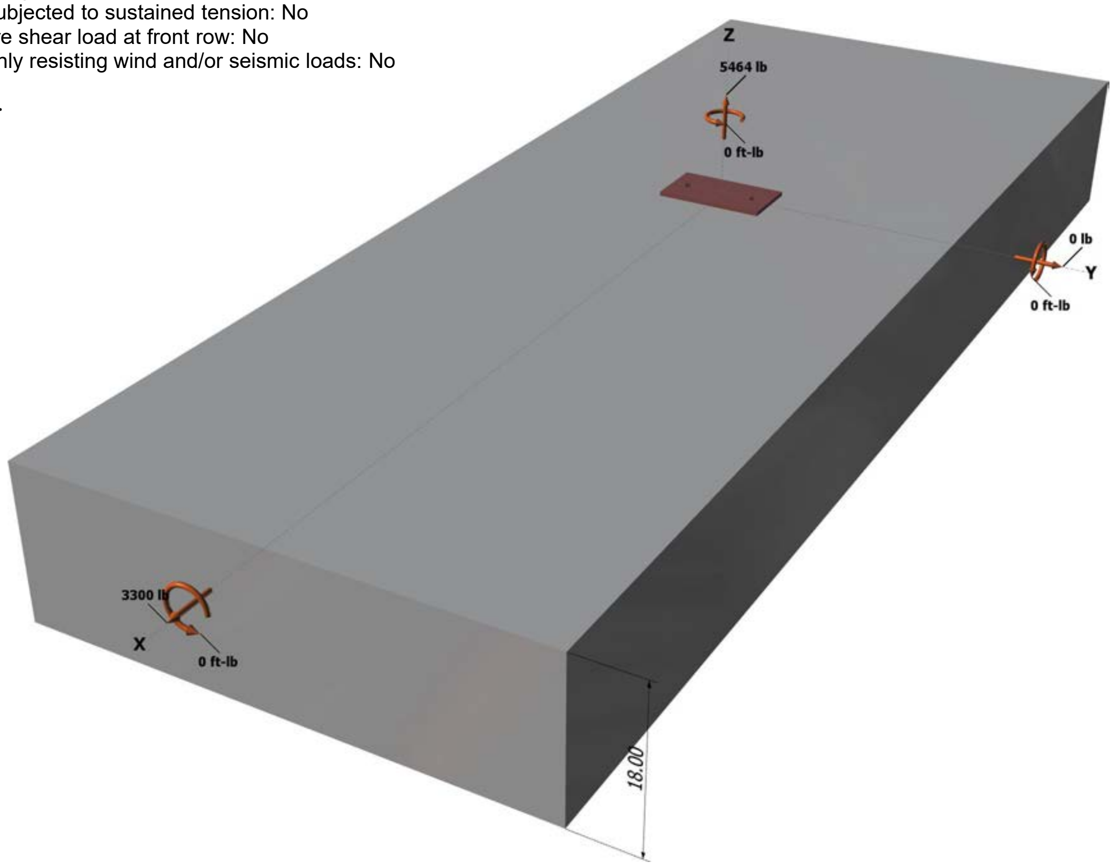
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

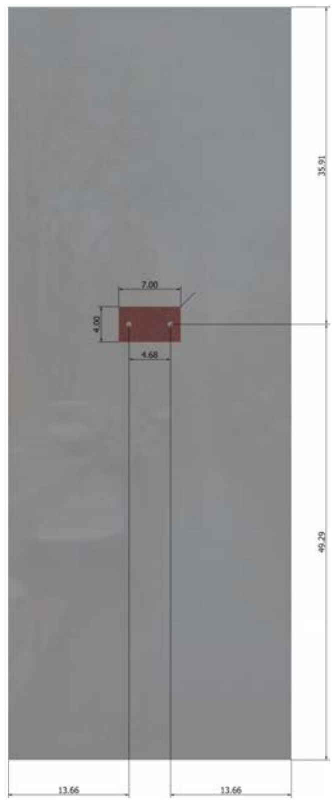
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



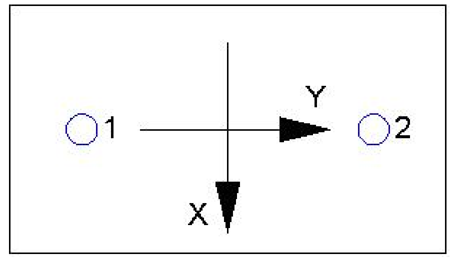
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
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)
576.00	648.00	1.000	0.928	1.000	1.000	15593	0.70	9001

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	13.66	18939

$\phi V_{cbx} = \phi\ (2)(A_{Vc} / A_{Vco})\ \Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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, $øN_n$ (lb)	Ratio	Status
Steel	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1650**	**3156**	**0.52**	**Pass (Governs)**
T Concrete breakout x+	3300	9001	0.37	Pass

|| Concrete breakout y-	1650	23292	0.07	Pass
Pryout	3300	20601	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	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.