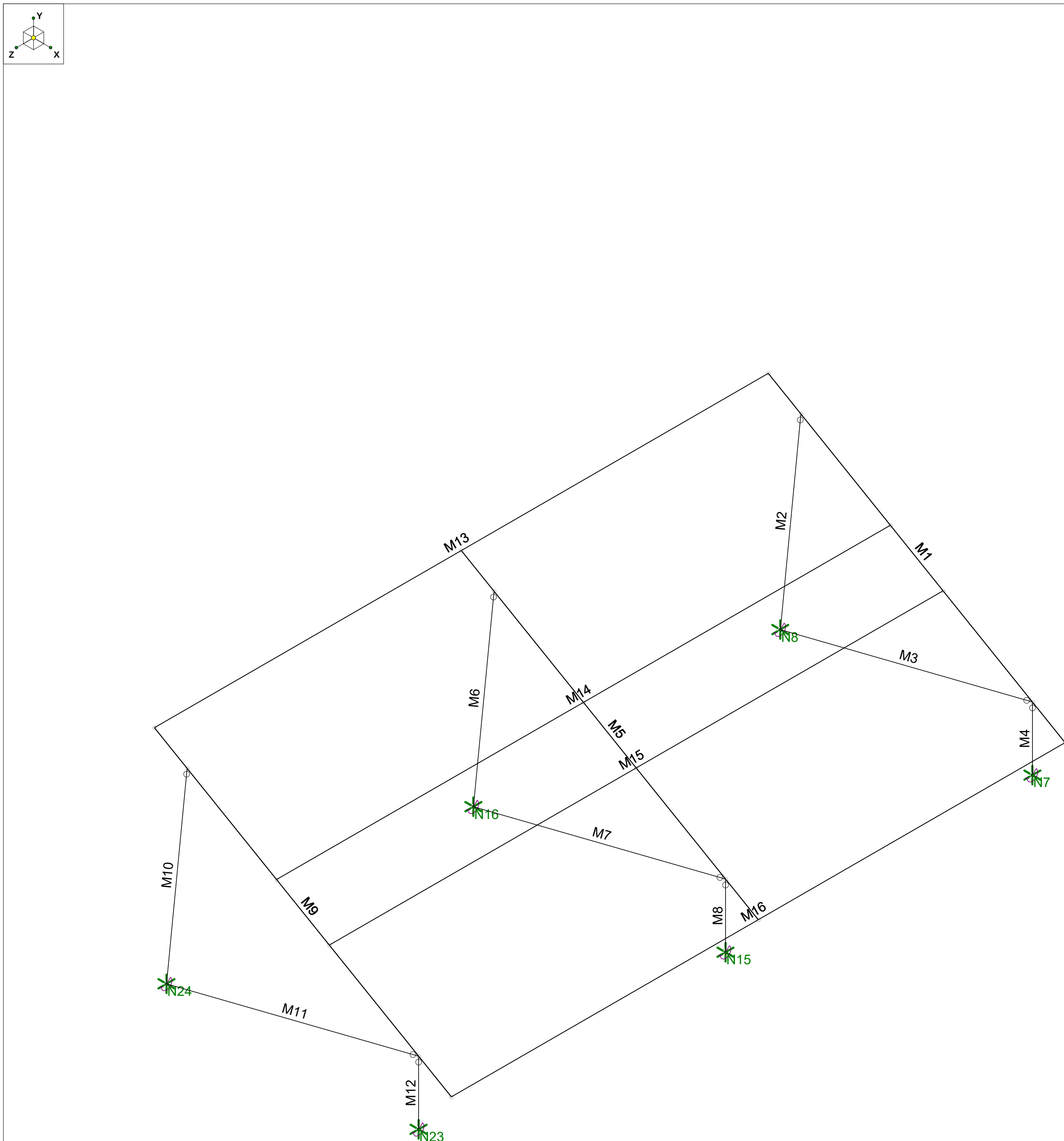


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

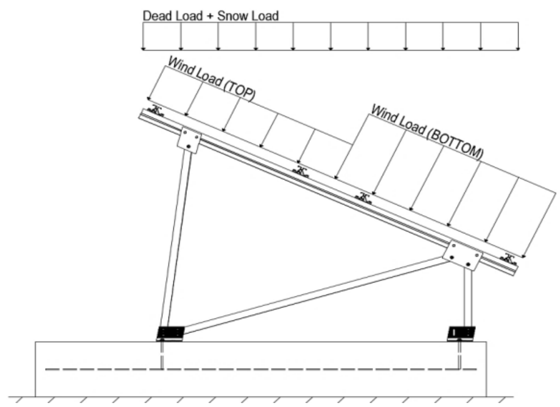
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 = 30°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 16.49 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 85 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1.150	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.850	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.600	
$Cf-_{TOP, INNER PURLIN}$	=	-2.000	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.100	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

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

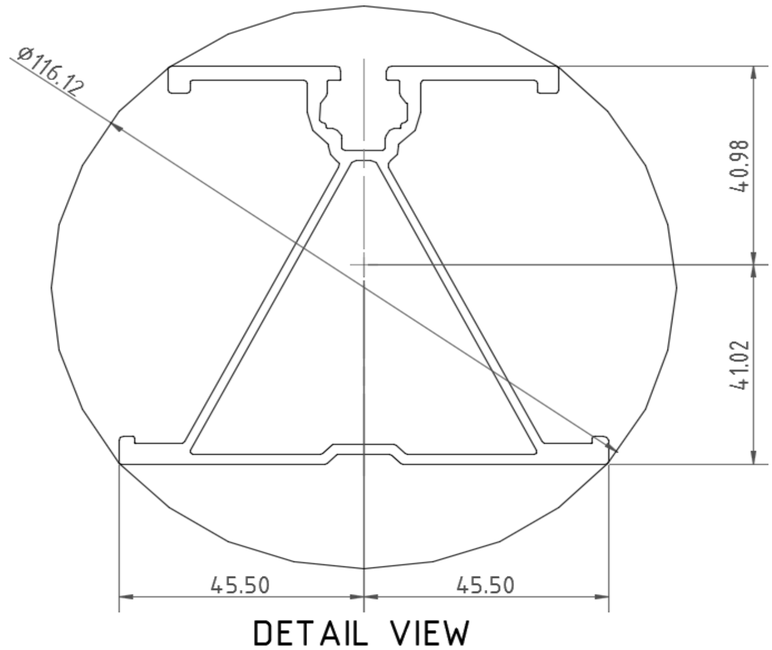
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

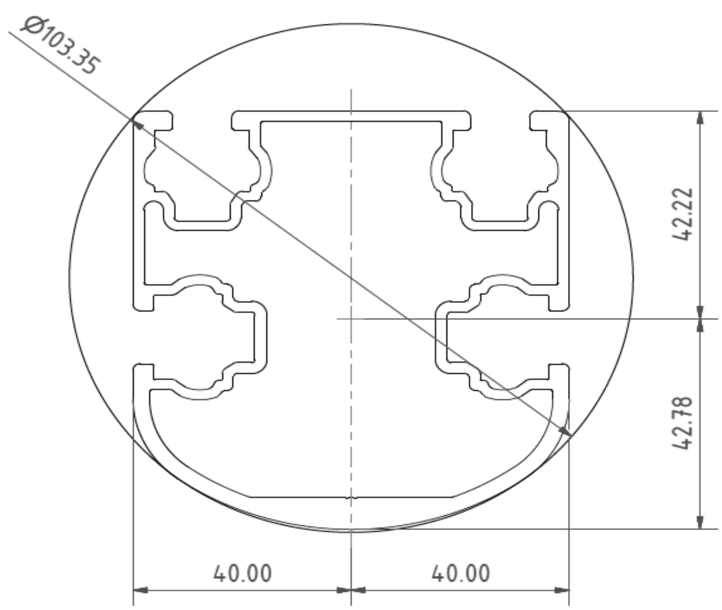
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	120	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.708	k-ft
M_z =	0.401	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	96%	



4.2 Girder Design

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

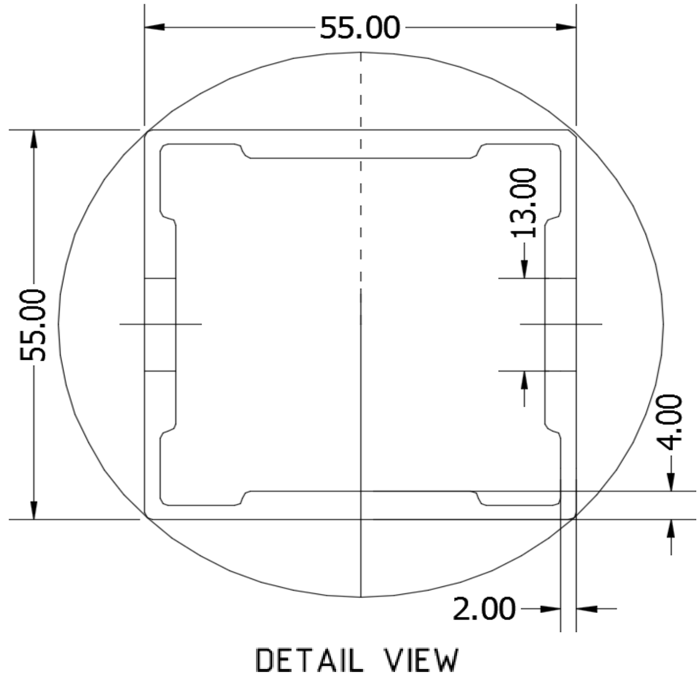
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.000	k-ft
M_z =	0.000	k-ft
P_n =	-0.772	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	89%	



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).

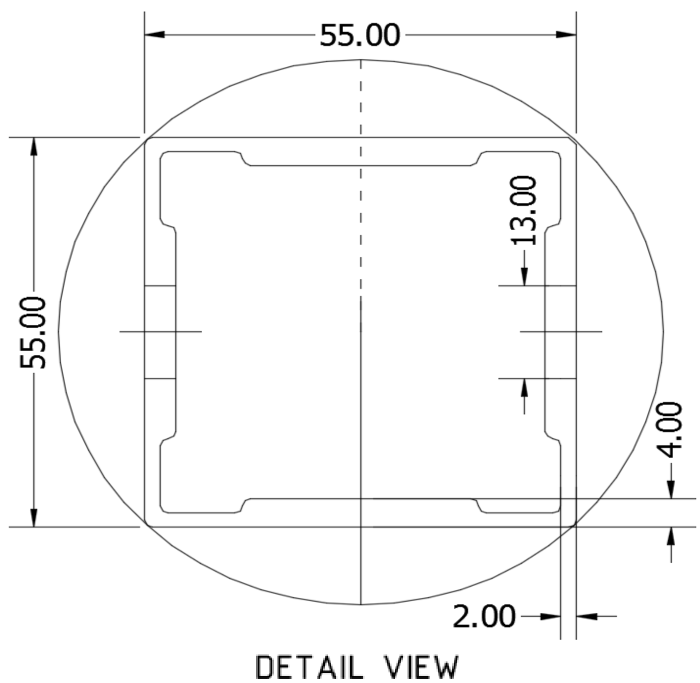
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.787	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	



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).

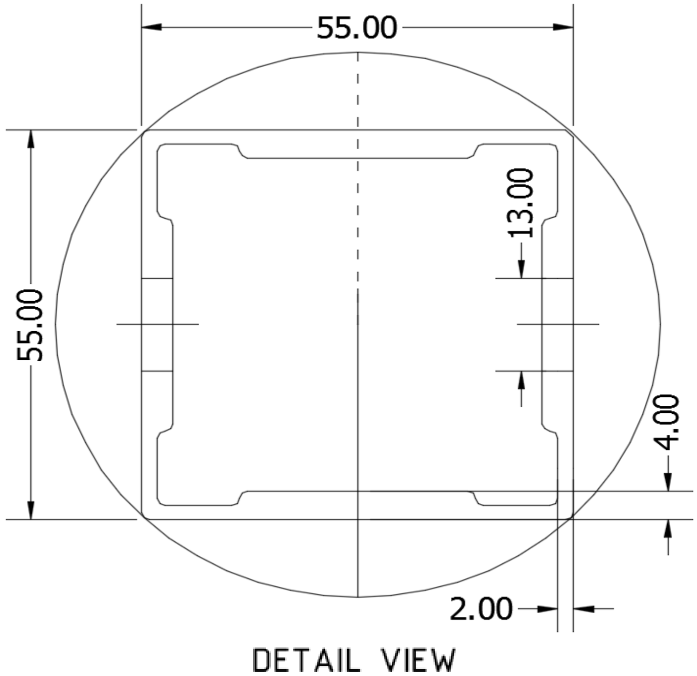
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.093	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	36%	



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M12 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.35	in
$\Phi F_{ty\ AXIAL}$ =	8.88	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 =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.089	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	36%	



5. FOUNDATION DESIGN CALCULATIONS

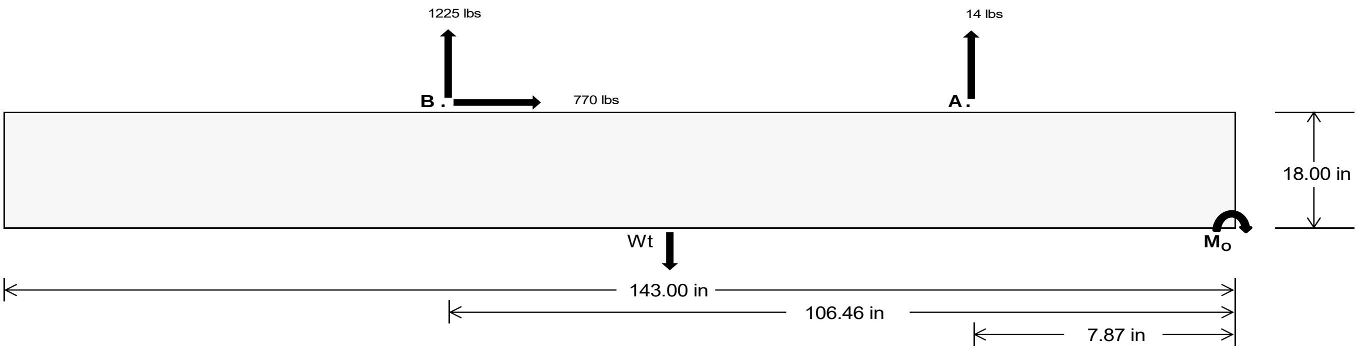
5.1 Helical Pile Foundations

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 =	74.01	5110.02	k
Compressive Load =	3623.45	4385.46	k
Lateral Load =	24.38	3204.06	k
Moment (Weak Axis) =	0.05	0.01	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (2) #5 rebar.

<u>Overturning Check</u>

M_O = 144397.0 in-lbs
Resisting Force Required = 2019.54 lbs
S.F. = 1.67
Weight Required = 3365.90 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.

<u>Sliding</u>

Force = 769.92 lbs
Friction = 0.4
Weight Required = 1924.80 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.

<u>Cohesion</u>

Sliding Force = 769.92 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.

<u>Shear Key</u>

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

Shear key is not required.

<u>Bearing Pressure</u>

	Ballast Width			
	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	1398 lbs	1398 lbs	1398 lbs	1398 lbs	1129 lbs	1129 lbs	1129 lbs	1129 lbs	1749 lbs	1749 lbs	1749 lbs	1749 lbs	-29 lbs	-29 lbs	-29 lbs	-29 lbs
F_B	1394 lbs	1394 lbs	1394 lbs	1394 lbs	1835 lbs	1835 lbs	1835 lbs	1835 lbs	2277 lbs	2277 lbs	2277 lbs	2277 lbs	-2450 lbs	-2450 lbs	-2450 lbs	-2450 lbs
F_V	207 lbs	207 lbs	207 lbs	207 lbs	1411 lbs	1411 lbs	1411 lbs	1411 lbs	1194 lbs	1194 lbs	1194 lbs	1194 lbs	-1540 lbs	-1540 lbs	-1540 lbs	-1540 lbs
P_{total}	10352 lbs	10568 lbs	10784 lbs	11000 lbs	10523 lbs	10739 lbs	10955 lbs	11171 lbs	11586 lbs	11802 lbs	12018 lbs	12234 lbs	2057 lbs	2187 lbs	2316 lbs	2446 lbs
M	3663 lbs-ft	3663 lbs-ft	3663 lbs-ft	3663 lbs-ft	2757 lbs-ft	2757 lbs-ft	2757 lbs-ft	2757 lbs-ft	4432 lbs-ft	4432 lbs-ft	4432 lbs-ft	4432 lbs-ft	4677 lbs-ft	4677 lbs-ft	4677 lbs-ft	4677 lbs-ft
e	0.35 ft	0.35 ft	0.34 ft	0.33 ft	0.26 ft	0.26 ft	0.25 ft	0.25 ft	0.38 ft	0.38 ft	0.37 ft	0.36 ft	2.27 ft	2.14 ft	2.02 ft	1.91 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}	244.8 psf	244.0 psf	243.3 psf	242.6 psf	262.8 psf	261.6 psf	260.4 psf	259.2 psf	269.1 psf	267.7 psf	266.4 psf	265.1 psf	0.0 psf	0.0 psf	0.0 psf	2.4 psf
f_{max}	350.9 psf	347.2 psf	343.7 psf	340.4 psf	342.7 psf	339.2 psf	335.9 psf	332.8 psf	397.5 psf	392.5 psf	387.8 psf	383.3 psf	127.6 psf	127.2 psf	127.1 psf	127.2 psf

Maximum Bearing Pressure = 398 psf
Allowable Bearing Pressure = 1500 psf

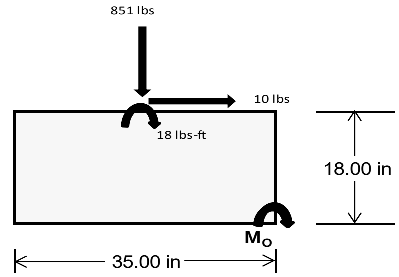
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1208.3 ft-lbs
Resisting Force Required = 828.53 lbs
S.F. = 1.67
Weight Required = 1380.88 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	288 lbs	720 lbs	288 lbs	851 lbs	2344 lbs	851 lbs	84 lbs	211 lbs	84 lbs
F_V	3 lbs	0 lbs	3 lbs	10 lbs	0 lbs	10 lbs	1 lbs	0 lbs	1 lbs
P_{total}	9647 lbs	7560 lbs	9647 lbs	9760 lbs	7560 lbs	9760 lbs	2821 lbs	7560 lbs	2821 lbs
M	10 lbs-ft	0 lbs-ft	10 lbs-ft	33 lbs-ft	0 lbs-ft	33 lbs-ft	3 lbs-ft	0 lbs-ft	3 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}	276.9 psf	217.5 psf	276.9 psf	278.9 psf	217.5 psf	278.9 psf	81.0 psf	217.5 psf	81.0 psf
f_{max}	278.2 psf	217.5 psf	278.2 psf	282.8 psf	217.5 psf	282.8 psf	81.4 psf	217.5 psf	81.4 psf

Maximum Bearing Pressure = 283 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 26in 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.

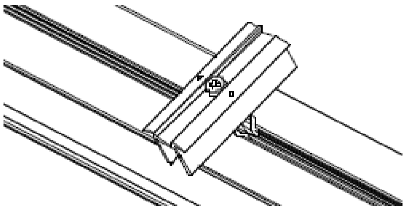
6. DESIGN OF JOINTS AND CONNECTIONS

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.

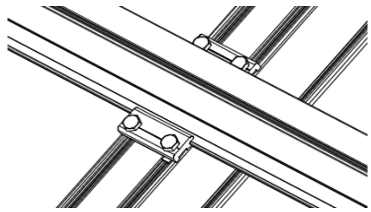
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.516	k
Allowable Uplift =	1.214	k
Utilization =	42%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.823	k
Allowable Uplift =	4.357	k
Utilization =	42%	



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 =	2.787	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	38%	

Rear Strut

Maximum Axial Load =	3.432	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	46%	

Diagonal Strut

Maximum Axial Load =	2.173	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	29%	

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.

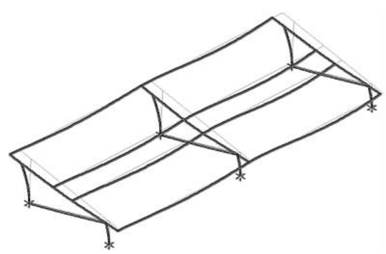
7. SEISMIC DESIGN

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} =	60.93	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.219	in
Max Drift, Δ_{MAX} =	0.066	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:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	120 in	L_b =	120
J =	0.432	J =	0.432
	331.976		211.117
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
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=	27.4 ksi	φF_L=	28.6
3.4.16		**3.4.16**	
b/t =	32.195	b/t =	37.0588
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$	
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=	25.1 ksi	φF_L=	23.1 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =		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 =	37.0588	h/t =	32.195
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	40.985	C_0 =	45.5
Cc =	41.015	Cc =	45.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.2	S2 =	77.3
φF_L=	φb[Bbr-mDbr*h/t]	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
$\varphi F_L St$=	25.1 ksi	$\varphi F_L Wk$=	23.1 ksi
Ix =	897074 mm^4	Iy =	446476 mm^4
	2.155 in^4		1.073 in^4
y =	41.015 mm	x =	45.5 mm
Sx =	1.335 in^3	Sy =	0.599 in^3
$M_{max}St$ =	2.788 k-ft	$M_{max}Wk$ =	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 in^3

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 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:		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 =	0.51461	S1 =	0.51461

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

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 =	12.2	S1 =	12.2

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

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 =	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 =	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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 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 = 78.35 in
J = 0.942
122.273

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8 ksi

3.4.16

b/t = 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 = 78.35
J = 0.942
122.273

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.8

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.8125

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83375

φF_L= (φccFcy)/(λ^2)

φF_L= 8.88278 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.88 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.14 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-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	-46.866	-46.866	0	0
2	M14	Y	-46.866	-46.866	0	0
3	M15	Y	-46.866	-46.866	0	0
4	M16	Y	-46.866	-46.866	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	-42.8	-42.8	0	0
2	M14	y	-42.8	-42.8	0	0
3	M15	y	-68.853	-68.853	0	0
4	M16	y	-68.853	-68.853	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	96.766	96.766	0	0
2	M14	y	74.435	74.435	0	0
3	M15	y	40.939	40.939	0	0
4	M16	y	40.939	40.939	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...
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	624.187	2	1050.763	2	.91	1	.004	1	0	1	0	1
2		min	-792.279	3	-1214.338	3	.05	15	0	15	0	1	0	1
3	N7	max	.046	9	1098.561	1	-.898	15	-.002	15	0	1	0	1
4		min	-.162	2	12.451	12	-18.752	1	-.036	1	0	1	0	1
5	N15	max	.01	9	2787.269	1	0	2	0	2	0	1	0	1
6		min	-1.784	2	-56.927	3	0	11	0	11	0	1	0	1
7	N16	max	2326.629	2	3373.432	2	0	3	0	3	0	1	0	1
8		min	-2464.662	3	-3930.782	3	0	14	0	14	0	1	0	1
9	N23	max	.046	9	1098.561	1	18.752	1	.036	1	0	1	0	1
10		min	-.162	2	12.451	12	.898	15	.002	15	0	1	0	1
11	N24	max	624.187	2	1050.763	2	-.05	15	0	15	0	1	0	1
12		min	-792.279	3	-1214.338	3	-.91	1	-.004	1	0	1	0	1
13	Totals:	max	3572.896	2	10349.007	1	0	2						
14		min	-4049.264	3	-6387.584	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	108.179	1	409.703	1	-9.83	15	0	3	.304	1	0	1
2			min	5.05	15	-560.594	3	-211.566	1	-.014	2	.014	15	0	3
3		2	max	108.179	1	286.401	1	-7.547	15	0	3	.096	1	.531	3
4			min	5.05	15	-394.592	3	-162.342	1	-.014	2	.005	15	-.387	1
5		3	max	108.179	1	163.099	1	-5.265	15	0	3	0	12	.877	3
6			min	5.05	15	-228.589	3	-113.119	1	-.014	2	-.057	1	-.636	1
7		4	max	108.179	1	39.797	1	-2.983	15	0	3	-.006	12	1.039	3
8			min	5.05	15	-62.587	3	-63.896	1	-.014	2	-.155	1	-.749	1
9		5	max	108.179	1	103.416	3	-.701	15	0	3	-.009	12	1.016	3
10			min	5.05	15	-83.505	1	-14.672	1	-.014	2	-.199	1	-.725	1
11		6	max	108.179	1	269.418	3	34.551	1	0	3	-.009	15	.809	3
12			min	5.05	15	-206.807	1	.861	12	-.014	2	-.188	1	-.564	1
13		7	max	108.179	1	435.421	3	83.775	1	0	3	-.006	15	.417	3
14			min	5.05	15	-330.109	1	3.18	12	-.014	2	-.122	1	-.265	1
15		8	max	108.179	1	601.423	3	132.998	1	0	3	.001	2	.17	1
16			min	5.05	15	-453.41	1	5.5	12	-.014	2	-.004	3	-.159	3
17		9	max	108.179	1	767.426	3	182.222	1	0	3	.173	1	.742	1
18			min	5.05	15	-576.712	1	7.819	12	-.014	2	.005	12	-.919	3
19		10	max	108.179	1	700.014	1	-10.138	12	0	12	.403	1	1.452	1
20			min	5.05	15	-933.428	3	-231.445	1	-.014	2	.015	12	-1.864	3
21		11	max	108.179	1	576.712	1	-7.819	12	.014	2	.173	1	.742	1
22			min	5.05	15	-767.426	3	-182.222	1	0	3	.005	12	-.919	3
23		12	max	108.179	1	453.41	1	-5.5	12	.014	2	.001	2	.17	1
24			min	5.05	15	-601.423	3	-132.998	1	0	3	-.004	3	-.159	3
25		13	max	108.179	1	330.109	1	-3.18	12	.014	2	-.006	15	.417	3
26			min	5.05	15	-435.421	3	-83.775	1	0	3	-.122	1	-.265	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	108.179	1	206.807	1	-.861	12	.014	2	-.009	15	.809	3
28			min	5.05	15	-269.418	3	-34.551	1	0	3	-.188	1	-.564	1
29		15	max	108.179	1	83.505	1	14.672	1	.014	2	-.009	12	1.016	3
30			min	5.05	15	-103.416	3	.701	15	0	3	-.199	1	-.725	1
31		16	max	108.179	1	62.587	3	63.896	1	.014	2	-.006	12	1.039	3
32			min	5.05	15	-39.797	1	2.983	15	0	3	-.155	1	-.749	1
33		17	max	108.179	1	228.589	3	113.119	1	.014	2	0	12	.877	3
34			min	5.05	15	-163.099	1	5.265	15	0	3	-.057	1	-.636	1
35		18	max	108.179	1	394.592	3	162.342	1	.014	2	.096	1	.531	3
36			min	5.05	15	-286.401	1	7.547	15	0	3	.005	15	-.387	1
37		19	max	108.179	1	560.594	3	211.566	1	.014	2	.304	1	0	1
38			min	5.05	15	-409.703	1	9.83	15	0	3	.014	15	0	3
39	M14	1	max	58.642	1	445.771	1	-10.181	15	.009	3	.354	1	0	1
40			min	2.746	15	-445.748	3	-219.134	1	-.012	1	.017	15	0	3
41		2	max	58.642	1	322.469	1	-7.899	15	.009	3	.138	1	.425	3
42			min	2.746	15	-319.445	3	-169.911	1	-.012	1	.006	15	-.427	1
43		3	max	58.642	1	199.167	1	-5.616	15	.009	3	.002	3	.71	3
44			min	2.746	15	-193.142	3	-120.687	1	-.012	1	-.023	1	-.717	1
45		4	max	58.642	1	75.865	1	-3.334	15	.009	3	-.005	12	.854	3
46			min	2.746	15	-66.839	3	-71.464	1	-.012	1	-.13	1	-.869	1
47		5	max	58.642	1	59.464	3	-1.052	15	.009	3	-.008	12	.858	3
48			min	2.746	15	-47.437	1	-22.24	1	-.012	1	-.182	1	-.885	1
49		6	max	58.642	1	185.767	3	26.983	1	.009	3	-.008	15	.722	3
50			min	2.746	15	-170.739	1	.509	12	-.012	1	-.18	1	-.764	1
51		7	max	58.642	1	312.07	3	76.207	1	.009	3	-.006	15	.446	3
52			min	2.746	15	-294.041	1	2.828	12	-.012	1	-.122	1	-.506	1
53		8	max	58.642	1	438.373	3	125.43	1	.009	3	0	10	.029	3
54			min	2.746	15	-417.343	1	5.148	12	-.012	1	-.01	1	-.118	2
55		9	max	58.642	1	564.676	3	174.653	1	.009	3	.157	1	.422	1
56			min	2.746	15	-540.644	1	7.467	12	-.012	1	.004	12	-.529	3
57		10	max	58.642	1	663.946	1	-9.787	12	.009	3	.378	1	1.091	1
58			min	2.746	15	-690.979	3	-223.877	1	-.012	1	.014	12	-1.226	3
59		11	max	58.642	1	540.644	1	-7.467	12	.012	1	.157	1	.422	1
60			min	2.746	15	-564.676	3	-174.653	1	-.009	3	.004	12	-.529	3
61		12	max	58.642	1	417.343	1	-5.148	12	.012	1	0	10	.029	3
62			min	2.746	15	-438.373	3	-125.43	1	-.009	3	-.01	1	-.118	2
63		13	max	58.642	1	294.041	1	-2.828	12	.012	1	-.006	15	.446	3
64			min	2.746	15	-312.07	3	-76.207	1	-.009	3	-.122	1	-.506	1
65		14	max	58.642	1	170.739	1	-.509	12	.012	1	-.008	15	.722	3
66			min	2.746	15	-185.767	3	-26.983	1	-.009	3	-.18	1	-.764	1
67		15	max	58.642	1	47.437	1	22.24	1	.012	1	-.008	12	.858	3
68			min	2.746	15	-59.464	3	1.052	15	-.009	3	-.182	1	-.885	1
69		16	max	58.642	1	66.839	3	71.464	1	.012	1	-.005	12	.854	3
70			min	2.746	15	-75.865	1	3.334	15	-.009	3	-.13	1	-.869	1
71		17	max	58.642	1	193.142	3	120.687	1	.012	1	.002	3	.71	3
72			min	2.746	15	-199.167	1	5.616	15	-.009	3	-.023	1	-.717	1
73		18	max	58.642	1	319.445	3	169.911	1	.012	1	.138	1	.425	3
74			min	2.746	15	-322.469	1	7.899	15	-.009	3	.006	15	-.427	1
75		19	max	58.642	1	445.748	3	219.134	1	.012	1	.354	1	0	1
76			min	2.746	15	-445.771	1	10.181	15	-.009	3	.017	15	0	3
77	M15	1	max	-2.947	15	562.59	2	-10.176	15	.013	1	.354	1	0	2
78			min	-62.925	1	-245.109	3	-219.056	1	-.008	3	.016	15	0	3
79		2	max	-2.947	15	404.534	2	-7.894	15	.013	1	.138	1	.235	3
80			min	-62.925	1	-178.354	3	-169.832	1	-.008	3	.006	15	-.537	2
81		3	max	-2.947	15	246.478	2	-5.611	15	.013	1	.001	3	.396	3
82			min	-62.925	1	-111.6	3	-120.609	1	-.008	3	-.024	1	-.899	2
83		4	max	-2.947	15	88.421	2	-3.329	15	.013	1	-.005	12	.483	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	-62.925	1	-44.845	3	-71.385	1	-.008	3	-.13	1	-1.085	2
85		5	max	-2.947	15	21.909	3	-1.047	15	.013	1	-.008	12	.496	3
86			min	-62.925	1	-69.635	2	-22.162	1	-.008	3	-.182	1	-1.095	2
87		6	max	-2.947	15	88.664	3	27.061	1	.013	1	-.008	15	.435	3
88			min	-62.925	1	-227.691	2	.577	12	-.008	3	-.18	1	-.93	2
89		7	max	-2.947	15	155.418	3	76.285	1	.013	1	-.006	15	.299	3
90			min	-62.925	1	-385.748	2	2.896	12	-.008	3	-.122	1	-.589	2
91		8	max	-2.947	15	222.173	3	125.508	1	.013	1	0	10	.089	3
92			min	-62.925	1	-543.804	2	5.216	12	-.008	3	-.01	1	-.088	1
93		9	max	-2.947	15	288.927	3	174.732	1	.013	1	.157	1	.619	2
94			min	-62.925	1	-701.86	2	7.535	12	-.008	3	.005	12	-.195	3
95		10	max	-2.947	15	859.917	2	-9.855	12	.013	1	.378	1	1.487	2
96			min	-62.925	1	-355.682	3	-223.955	1	-.008	3	.014	12	-.553	3
97		11	max	-2.947	15	701.86	2	-7.535	12	.008	3	.157	1	.619	2
98			min	-62.925	1	-288.927	3	-174.732	1	-.013	1	.005	12	-.195	3
99		12	max	-2.947	15	543.804	2	-5.216	12	.008	3	0	10	.089	3
100			min	-62.925	1	-222.173	3	-125.508	1	-.013	1	-.01	1	-.088	1
101		13	max	-2.947	15	385.748	2	-2.896	12	.008	3	-.006	15	.299	3
102			min	-62.925	1	-155.418	3	-76.285	1	-.013	1	-.122	1	-.589	2
103		14	max	-2.947	15	227.691	2	-.577	12	.008	3	-.008	15	.435	3
104			min	-62.925	1	-88.664	3	-27.061	1	-.013	1	-.18	1	-.93	2
105		15	max	-2.947	15	69.635	2	22.162	1	.008	3	-.008	12	.496	3
106			min	-62.925	1	-21.909	3	1.047	15	-.013	1	-.182	1	-1.095	2
107		16	max	-2.947	15	44.845	3	71.385	1	.008	3	-.005	12	.483	3
108			min	-62.925	1	-88.421	2	3.329	15	-.013	1	-.13	1	-1.085	2
109		17	max	-2.947	15	111.6	3	120.609	1	.008	3	.001	3	.396	3
110			min	-62.925	1	-246.478	2	5.611	15	-.013	1	-.024	1	-.899	2
111		18	max	-2.947	15	178.354	3	169.832	1	.008	3	.138	1	.235	3
112			min	-62.925	1	-404.534	2	7.894	15	-.013	1	.006	15	-.537	2
113		19	max	-2.947	15	245.109	3	219.056	1	.008	3	.354	1	0	2
114			min	-62.925	1	-562.59	2	10.176	15	-.013	1	.016	15	0	3
115	M16	1	max	-5.698	15	528.211	2	-9.847	15	.011	1	.307	1	0	2
116			min	-121.738	1	-219.944	3	-212.044	1	-.011	3	.014	15	0	3
117		2	max	-5.698	15	370.154	2	-7.565	15	.011	1	.099	1	.207	3
118			min	-121.738	1	-153.19	3	-162.82	1	-.011	3	.005	15	-.499	2
119		3	max	-5.698	15	212.098	2	-5.283	15	.011	1	-.001	12	.34	3
120			min	-121.738	1	-86.435	3	-113.597	1	-.011	3	-.055	1	-.823	2
121		4	max	-5.698	15	54.042	2	-3.001	15	.011	1	-.006	12	.399	3
122			min	-121.738	1	-19.681	3	-64.373	1	-.011	3	-.154	1	-.97	2
123		5	max	-5.698	15	47.074	3	-.719	15	.011	1	-.009	12	.384	3
124			min	-121.738	1	-104.015	2	-15.15	1	-.011	3	-.198	1	-.943	2
125		6	max	-5.698	15	113.828	3	34.074	1	.011	1	-.009	15	.295	3
126			min	-121.738	1	-262.071	2	1.06	12	-.011	3	-.188	1	-.739	2
127		7	max	-5.698	15	180.583	3	83.297	1	.011	1	-.006	15	.131	3
128			min	-121.738	1	-420.127	2	3.38	12	-.011	3	-.122	1	-.36	2
129		8	max	-5.698	15	247.337	3	132.52	1	.011	1	0	10	.194	2
130			min	-121.738	1	-578.183	2	5.699	12	-.011	3	-.003	3	-.107	3
131		9	max	-5.698	15	314.092	3	181.744	1	.011	1	.172	1	.925	2
132			min	-121.738	1	-736.24	2	8.019	12	-.011	3	.006	12	-.418	3
133		10	max	-5.698	15	894.296	2	-10.338	12	.011	1	.401	1	1.83	2
134			min	-121.738	1	-380.846	3	-230.967	1	-.011	3	.016	12	-.805	3
135		11	max	-5.698	15	736.24	2	-8.019	12	.011	3	.172	1	.925	2
136			min	-121.738	1	-314.092	3	-181.744	1	-.011	1	.006	12	-.418	3
137		12	max	-5.698	15	578.183	2	-5.699	12	.011	3	0	10	.194	2
138			min	-121.738	1	-247.337	3	-132.52	1	-.011	1	-.003	3	-.107	3
139		13	max	-5.698	15	420.127	2	-3.38	12	.011	3	-.006	15	.131	3
140			min	-121.738	1	-180.583	3	-83.297	1	-.011	1	-.122	1	-.36	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	-5.698	15	262.071	2	-1.06	12	.011	3	-.009	15	.295	3
142			min	-121.738	1	-113.828	3	-34.074	1	-.011	1	-.188	1	-.739	2
143		15	max	-5.698	15	104.015	2	15.15	1	.011	3	-.009	12	.384	3
144			min	-121.738	1	-47.074	3	.719	15	-.011	1	-.198	1	-.943	2
145		16	max	-5.698	15	19.681	3	64.373	1	.011	3	-.006	12	.399	3
146			min	-121.738	1	-54.042	2	3.001	15	-.011	1	-.154	1	-.97	2
147		17	max	-5.698	15	86.435	3	113.597	1	.011	3	-.001	12	.34	3
148			min	-121.738	1	-212.098	2	5.283	15	-.011	1	-.055	1	-.823	2
149		18	max	-5.698	15	153.19	3	162.82	1	.011	3	.099	1	.207	3
150			min	-121.738	1	-370.154	2	7.565	15	-.011	1	.005	15	-.499	2
151		19	max	-5.698	15	219.944	3	212.044	1	.011	3	.307	1	0	2
152			min	-121.738	1	-528.211	2	9.847	15	-.011	1	.014	15	0	3
153	M2	1	max	972.702	1	2.022	4	.605	1	0	5	0	3	0	1
154			min	-1060.602	3	.476	15	.028	15	0	1	0	1	0	1
155		2	max	973.232	1	1.951	4	.605	1	0	5	0	1	0	15
156			min	-1060.205	3	.459	15	.028	15	0	1	0	15	0	4
157		3	max	973.761	1	1.88	4	.605	1	0	5	0	1	0	15
158			min	-1059.808	3	.442	15	.028	15	0	1	0	15	-.001	4
159		4	max	974.29	1	1.809	4	.605	1	0	5	0	1	0	15
160			min	-1059.411	3	.426	15	.028	15	0	1	0	15	-.002	4
161		5	max	974.819	1	1.738	4	.605	1	0	5	0	1	0	15
162			min	-1059.014	3	.409	15	.028	15	0	1	0	15	-.003	4
163		6	max	975.349	1	1.667	4	.605	1	0	5	.001	1	0	15
164			min	-1058.617	3	.392	15	.028	15	0	1	0	15	-.003	4
165		7	max	975.878	1	1.596	4	.605	1	0	5	.001	1	0	15
166			min	-1058.221	3	.375	15	.028	15	0	1	0	15	-.004	4
167		8	max	976.407	1	1.525	4	.605	1	0	5	.002	1	-.001	15
168			min	-1057.824	3	.359	15	.028	15	0	1	0	15	-.004	4
169		9	max	976.937	1	1.454	4	.605	1	0	5	.002	1	-.001	15
170			min	-1057.427	3	.342	15	.028	15	0	1	0	15	-.005	4
171		10	max	977.466	1	1.383	4	.605	1	0	5	.002	1	-.001	15
172			min	-1057.03	3	.325	15	.028	15	0	1	0	15	-.005	4
173		11	max	977.995	1	1.312	4	.605	1	0	5	.002	1	-.001	15
174			min	-1056.633	3	.309	15	.028	15	0	1	0	15	-.006	4
175		12	max	978.524	1	1.241	4	.605	1	0	5	.002	1	-.002	15
176			min	-1056.236	3	.292	15	.028	15	0	1	0	15	-.006	4
177		13	max	979.054	1	1.17	4	.605	1	0	5	.003	1	-.002	15
178			min	-1055.839	3	.275	15	.028	15	0	1	0	15	-.007	4
179		14	max	979.583	1	1.099	4	.605	1	0	5	.003	1	-.002	15
180			min	-1055.442	3	.259	15	.028	15	0	1	0	15	-.007	4
181		15	max	980.112	1	1.028	4	.605	1	0	5	.003	1	-.002	15
182			min	-1055.045	3	.242	15	.028	15	0	1	0	15	-.008	4
183		16	max	980.642	1	.957	4	.605	1	0	5	.003	1	-.002	15
184			min	-1054.648	3	.225	15	.028	15	0	1	0	15	-.008	4
185		17	max	981.171	1	.886	4	.605	1	0	5	.003	1	-.002	15
186			min	-1054.251	3	.208	12	.028	15	0	1	0	15	-.008	4
187		18	max	981.7	1	.815	4	.605	1	0	5	.004	1	-.002	15
188			min	-1053.854	3	.18	12	.028	15	0	1	0	15	-.009	4
189		19	max	982.23	1	.743	4	.605	1	0	5	.004	1	-.002	15
190			min	-1053.457	3	.152	12	.028	15	0	1	0	15	-.009	4
191	M3	1	max	546.548	2	8.874	4	.472	1	0	15	0	1	.009	4
192			min	-702.761	3	2.086	15	.022	15	0	1	0	15	.002	15
193		2	max	546.378	2	8.005	4	.472	1	0	15	0	1	.005	4
194			min	-702.888	3	1.882	15	.022	15	0	1	0	15	.001	12
195		3	max	546.208	2	7.136	4	.472	1	0	15	0	1	.002	2
196			min	-703.016	3	1.678	15	.022	15	0	1	0	15	0	3
197		4	max	546.037	2	6.267	4	.472	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-703.144	3	1.473	15	.022	15	0	1	0	15	-.002	3
199		5	max	545.867	2	5.398	4	.472	1	0	15	.001	1	-.001	15
200			min	-703.272	3	1.269	15	.022	15	0	1	0	15	-.005	4
201		6	max	545.697	2	4.53	4	.472	1	0	15	.002	1	-.002	15
202			min	-703.4	3	1.065	15	.022	15	0	1	0	15	-.007	4
203		7	max	545.526	2	3.661	4	.472	1	0	15	.002	1	-.002	15
204			min	-703.527	3	.861	15	.022	15	0	1	0	15	-.009	4
205		8	max	545.356	2	2.792	4	.472	1	0	15	.002	1	-.002	15
206			min	-703.655	3	.656	15	.022	15	0	1	0	15	-.01	4
207		9	max	545.185	2	1.923	4	.472	1	0	15	.002	1	-.003	15
208			min	-703.783	3	.452	15	.022	15	0	1	0	15	-.011	4
209		10	max	545.015	2	1.054	4	.472	1	0	15	.002	1	-.003	15
210			min	-703.911	3	.248	15	.022	15	0	1	0	15	-.012	4
211		11	max	544.845	2	.266	2	.472	1	0	15	.003	1	-.003	15
212			min	-704.038	3	-.059	3	.022	15	0	1	0	15	-.012	4
213		12	max	544.674	2	-.16	15	.472	1	0	15	.003	1	-.003	15
214			min	-704.166	3	-.684	4	.022	15	0	1	0	15	-.012	4
215		13	max	544.504	2	-.365	15	.472	1	0	15	.003	1	-.003	15
216			min	-704.294	3	-1.553	4	.022	15	0	1	0	15	-.012	4
217		14	max	544.334	2	-.569	15	.472	1	0	15	.003	1	-.003	15
218			min	-704.422	3	-2.422	4	.022	15	0	1	0	15	-.011	4
219		15	max	544.163	2	-.773	15	.472	1	0	15	.004	1	-.002	15
220			min	-704.549	3	-3.29	4	.022	15	0	1	0	15	-.009	4
221		16	max	543.993	2	-.977	15	.472	1	0	15	.004	1	-.002	15
222			min	-704.677	3	-4.159	4	.022	15	0	1	0	15	-.008	4
223		17	max	543.823	2	-1.182	15	.472	1	0	15	.004	1	-.001	15
224			min	-704.805	3	-5.028	4	.022	15	0	1	0	15	-.006	4
225		18	max	543.652	2	-1.386	15	.472	1	0	15	.004	1	0	15
226			min	-704.933	3	-5.897	4	.022	15	0	1	0	15	-.003	4
227		19	max	543.482	2	-1.59	15	.472	1	0	15	.004	1	0	1
228			min	-705.06	3	-6.766	4	.022	15	0	1	0	15	0	1
229	M4	1	max	1095.495	1	0	1	-.899	15	0	1	.004	1	0	1
230			min	10.918	12	0	1	-19.333	1	0	1	0	15	0	1
231		2	max	1095.665	1	0	1	-.899	15	0	1	.001	1	0	1
232			min	11.003	12	0	1	-19.333	1	0	1	0	15	0	1
233		3	max	1095.835	1	0	1	-.899	15	0	1	0	15	0	1
234			min	11.088	12	0	1	-19.333	1	0	1	0	1	0	1
235		4	max	1096.006	1	0	1	-.899	15	0	1	0	15	0	1
236			min	11.173	12	0	1	-19.333	1	0	1	-.003	1	0	1
237		5	max	1096.176	1	0	1	-.899	15	0	1	0	15	0	1
238			min	11.259	12	0	1	-19.333	1	0	1	-.005	1	0	1
239		6	max	1096.346	1	0	1	-.899	15	0	1	0	15	0	1
240			min	11.344	12	0	1	-19.333	1	0	1	-.008	1	0	1
241		7	max	1096.517	1	0	1	-.899	15	0	1	0	15	0	1
242			min	11.429	12	0	1	-19.333	1	0	1	-.01	1	0	1
243		8	max	1096.687	1	0	1	-.899	15	0	1	0	15	0	1
244			min	11.514	12	0	1	-19.333	1	0	1	-.012	1	0	1
245		9	max	1096.858	1	0	1	-.899	15	0	1	0	15	0	1
246			min	11.599	12	0	1	-19.333	1	0	1	-.014	1	0	1
247		10	max	1097.028	1	0	1	-.899	15	0	1	0	15	0	1
248			min	11.684	12	0	1	-19.333	1	0	1	-.016	1	0	1
249		11	max	1097.198	1	0	1	-.899	15	0	1	0	15	0	1
250			min	11.77	12	0	1	-19.333	1	0	1	-.019	1	0	1
251		12	max	1097.369	1	0	1	-.899	15	0	1	0	15	0	1
252			min	11.855	12	0	1	-19.333	1	0	1	-.021	1	0	1
253		13	max	1097.539	1	0	1	-.899	15	0	1	-.001	15	0	1
254			min	11.94	12	0	1	-19.333	1	0	1	-.023	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	1097.709	1	0	1	-.899	15	0	1	-.001	15	0	1
256			min	12.025	12	0	1	-19.333	1	0	1	-.025	1	0	1
257		15	max	1097.88	1	0	1	-.899	15	0	1	-.001	15	0	1
258			min	12.11	12	0	1	-19.333	1	0	1	-.028	1	0	1
259		16	max	1098.05	1	0	1	-.899	15	0	1	-.001	15	0	1
260			min	12.196	12	0	1	-19.333	1	0	1	-.03	1	0	1
261		17	max	1098.22	1	0	1	-.899	15	0	1	-.001	15	0	1
262			min	12.281	12	0	1	-19.333	1	0	1	-.032	1	0	1
263		18	max	1098.391	1	0	1	-.899	15	0	1	-.002	15	0	1
264			min	12.366	12	0	1	-19.333	1	0	1	-.034	1	0	1
265		19	max	1098.561	1	0	1	-.899	15	0	1	-.002	15	0	1
266			min	12.451	12	0	1	-19.333	1	0	1	-.036	1	0	1
267	M6	1	max	3079.301	1	2.149	2	0	1	0	1	0	1	0	1
268			min	-3431.658	3	.354	12	0	1	0	1	0	1	0	1
269		2	max	3079.83	1	2.094	2	0	1	0	1	0	1	0	12
270			min	-3431.261	3	.327	12	0	1	0	1	0	1	0	2
271		3	max	3080.359	1	2.038	2	0	1	0	1	0	1	0	12
272			min	-3430.864	3	.299	12	0	1	0	1	0	1	-.002	2
273		4	max	3080.889	1	1.983	2	0	1	0	1	0	1	0	12
274			min	-3430.467	3	.271	12	0	1	0	1	0	1	-.002	2
275		5	max	3081.418	1	1.928	2	0	1	0	1	0	1	0	12
276			min	-3430.07	3	.244	12	0	1	0	1	0	1	-.003	2
277		6	max	3081.947	1	1.872	2	0	1	0	1	0	1	0	12
278			min	-3429.673	3	.216	12	0	1	0	1	0	1	-.004	2
279		7	max	3082.476	1	1.817	2	0	1	0	1	0	1	0	12
280			min	-3429.276	3	.188	12	0	1	0	1	0	1	-.004	2
281		8	max	3083.006	1	1.761	2	0	1	0	1	0	1	0	12
282			min	-3428.879	3	.161	12	0	1	0	1	0	1	-.005	2
283		9	max	3083.535	1	1.706	2	0	1	0	1	0	1	0	12
284			min	-3428.482	3	.133	12	0	1	0	1	0	1	-.006	2
285		10	max	3084.064	1	1.651	2	0	1	0	1	0	1	0	12
286			min	-3428.085	3	.105	12	0	1	0	1	0	1	-.006	2
287		11	max	3084.594	1	1.595	2	0	1	0	1	0	1	0	12
288			min	-3427.688	3	.073	3	0	1	0	1	0	1	-.007	2
289		12	max	3085.123	1	1.54	2	0	1	0	1	0	1	0	12
290			min	-3427.291	3	.031	3	0	1	0	1	0	1	-.007	2
291		13	max	3085.652	1	1.485	2	0	1	0	1	0	1	0	12
292			min	-3426.894	3	-.01	3	0	1	0	1	0	1	-.008	2
293		14	max	3086.181	1	1.429	2	0	1	0	1	0	1	0	12
294			min	-3426.497	3	-.052	3	0	1	0	1	0	1	-.008	2
295		15	max	3086.711	1	1.374	2	0	1	0	1	0	1	0	12
296			min	-3426.1	3	-.093	3	0	1	0	1	0	1	-.009	2
297		16	max	3087.24	1	1.319	2	0	1	0	1	0	1	0	12
298			min	-3425.703	3	-.135	3	0	1	0	1	0	1	-.009	2
299		17	max	3087.769	1	1.263	2	0	1	0	1	0	1	0	12
300			min	-3425.306	3	-.176	3	0	1	0	1	0	1	-.01	2
301		18	max	3088.299	1	1.208	2	0	1	0	1	0	1	0	12
302			min	-3424.909	3	-.218	3	0	1	0	1	0	1	-.01	2
303		19	max	3088.828	1	1.153	2	0	1	0	1	0	1	0	12
304			min	-3424.512	3	-.259	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2093.011	2	8.909	4	0	1	0	1	0	1	.011	2
306			min	-2170.883	3	2.091	15	0	1	0	1	0	1	0	12
307		2	max	2092.841	2	8.04	4	0	1	0	1	0	1	.007	2
308			min	-2171.011	3	1.887	15	0	1	0	1	0	1	-.001	3
309		3	max	2092.671	2	7.171	4	0	1	0	1	0	1	.004	2
310			min	-2171.138	3	1.683	15	0	1	0	1	0	1	-.003	3
311		4	max	2092.5	2	6.302	4	0	1	0	1	0	1	.002	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	-2171.266	3	1.479	15	0	1	0	1	0	1	-.005	3
313		5	max	2092.33	2	5.433	4	0	1	0	1	0	1	0	2
314			min	-2171.394	3	1.274	15	0	1	0	1	0	1	-.006	3
315		6	max	2092.159	2	4.564	4	0	1	0	1	0	1	-.002	15
316			min	-2171.522	3	1.07	15	0	1	0	1	0	1	-.007	3
317		7	max	2091.989	2	3.695	4	0	1	0	1	0	1	-.002	15
318			min	-2171.65	3	.866	15	0	1	0	1	0	1	-.009	4
319		8	max	2091.819	2	2.826	4	0	1	0	1	0	1	-.002	15
320			min	-2171.777	3	.662	15	0	1	0	1	0	1	-.01	4
321		9	max	2091.648	2	1.957	4	0	1	0	1	0	1	-.003	15
322			min	-2171.905	3	.419	12	0	1	0	1	0	1	-.011	4
323		10	max	2091.478	2	1.258	2	0	1	0	1	0	1	-.003	15
324			min	-2172.033	3	.08	12	0	1	0	1	0	1	-.012	4
325		11	max	2091.308	2	.581	2	0	1	0	1	0	1	-.003	15
326			min	-2172.161	3	-.421	3	0	1	0	1	0	1	-.012	4
327		12	max	2091.137	2	-.096	2	0	1	0	1	0	1	-.003	15
328			min	-2172.288	3	-.929	3	0	1	0	1	0	1	-.012	4
329		13	max	2090.967	2	-.359	15	0	1	0	1	0	1	-.003	15
330			min	-2172.416	3	-1.518	4	0	1	0	1	0	1	-.012	4
331		14	max	2090.797	2	-.564	15	0	1	0	1	0	1	-.003	15
332			min	-2172.544	3	-2.387	4	0	1	0	1	0	1	-.011	4
333		15	max	2090.626	2	-.768	15	0	1	0	1	0	1	-.002	15
334			min	-2172.672	3	-3.256	4	0	1	0	1	0	1	-.009	4
335		16	max	2090.456	2	-.972	15	0	1	0	1	0	1	-.002	15
336			min	-2172.799	3	-4.125	4	0	1	0	1	0	1	-.008	4
337		17	max	2090.286	2	-1.176	15	0	1	0	1	0	1	-.001	15
338			min	-2172.927	3	-4.994	4	0	1	0	1	0	1	-.006	4
339		18	max	2090.115	2	-1.381	15	0	1	0	1	0	1	0	15
340			min	-2173.055	3	-5.863	4	0	1	0	1	0	1	-.003	4
341		19	max	2089.945	2	-1.585	15	0	1	0	1	0	1	0	1
342			min	-2173.183	3	-6.732	4	0	1	0	1	0	1	0	1
343	M8	1	max	2784.202	1	0	1	0	1	0	1	0	1	0	1
344			min	-59.226	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2784.373	1	0	1	0	1	0	1	0	1	0	1
346			min	-59.099	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2784.543	1	0	1	0	1	0	1	0	1	0	1
348			min	-58.971	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2784.713	1	0	1	0	1	0	1	0	1	0	1
350			min	-58.843	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2784.884	1	0	1	0	1	0	1	0	1	0	1
352			min	-58.715	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2785.054	1	0	1	0	1	0	1	0	1	0	1
354			min	-58.588	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2785.224	1	0	1	0	1	0	1	0	1	0	1
356			min	-58.46	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2785.395	1	0	1	0	1	0	1	0	1	0	1
358			min	-58.332	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2785.565	1	0	1	0	1	0	1	0	1	0	1
360			min	-58.204	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2785.735	1	0	1	0	1	0	1	0	1	0	1
362			min	-58.077	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2785.906	1	0	1	0	1	0	1	0	1	0	1
364			min	-57.949	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2786.076	1	0	1	0	1	0	1	0	1	0	1
366			min	-57.821	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2786.247	1	0	1	0	1	0	1	0	1	0	1
368			min	-57.693	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	2786.417	1	0	1	0	1	0	1	0	1	0	1
370			min	-57.566	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2786.587	1	0	1	0	1	0	1	0	1	0	1
372			min	-57.438	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2786.758	1	0	1	0	1	0	1	0	1	0	1
374			min	-57.31	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2786.928	1	0	1	0	1	0	1	0	1	0	1
376			min	-57.182	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2787.098	1	0	1	0	1	0	1	0	1	0	1
378			min	-57.055	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2787.269	1	0	1	0	1	0	1	0	1	0	1
380			min	-56.927	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	972.702	1	2.022	4	-.028	15	0	1	0	1	0	1
382			min	-1060.602	3	.476	15	-.605	1	0	5	0	3	0	1
383		2	max	973.232	1	1.951	4	-.028	15	0	1	0	15	0	15
384			min	-1060.205	3	.459	15	-.605	1	0	5	0	1	0	4
385		3	max	973.761	1	1.88	4	-.028	15	0	1	0	15	0	15
386			min	-1059.808	3	.442	15	-.605	1	0	5	0	1	-.001	4
387		4	max	974.29	1	1.809	4	-.028	15	0	1	0	15	0	15
388			min	-1059.411	3	.426	15	-.605	1	0	5	0	1	-.002	4
389		5	max	974.819	1	1.738	4	-.028	15	0	1	0	15	0	15
390			min	-1059.014	3	.409	15	-.605	1	0	5	0	1	-.003	4
391		6	max	975.349	1	1.667	4	-.028	15	0	1	0	15	0	15
392			min	-1058.617	3	.392	15	-.605	1	0	5	-.001	1	-.003	4
393		7	max	975.878	1	1.596	4	-.028	15	0	1	0	15	0	15
394			min	-1058.221	3	.375	15	-.605	1	0	5	-.001	1	-.004	4
395		8	max	976.407	1	1.525	4	-.028	15	0	1	0	15	-.001	15
396			min	-1057.824	3	.359	15	-.605	1	0	5	-.002	1	-.004	4
397		9	max	976.937	1	1.454	4	-.028	15	0	1	0	15	-.001	15
398			min	-1057.427	3	.342	15	-.605	1	0	5	-.002	1	-.005	4
399		10	max	977.466	1	1.383	4	-.028	15	0	1	0	15	-.001	15
400			min	-1057.03	3	.325	15	-.605	1	0	5	-.002	1	-.005	4
401		11	max	977.995	1	1.312	4	-.028	15	0	1	0	15	-.001	15
402			min	-1056.633	3	.309	15	-.605	1	0	5	-.002	1	-.006	4
403		12	max	978.524	1	1.241	4	-.028	15	0	1	0	15	-.002	15
404			min	-1056.236	3	.292	15	-.605	1	0	5	-.002	1	-.006	4
405		13	max	979.054	1	1.17	4	-.028	15	0	1	0	15	-.002	15
406			min	-1055.839	3	.275	15	-.605	1	0	5	-.003	1	-.007	4
407		14	max	979.583	1	1.099	4	-.028	15	0	1	0	15	-.002	15
408			min	-1055.442	3	.259	15	-.605	1	0	5	-.003	1	-.007	4
409		15	max	980.112	1	1.028	4	-.028	15	0	1	0	15	-.002	15
410			min	-1055.045	3	.242	15	-.605	1	0	5	-.003	1	-.008	4
411		16	max	980.642	1	.957	4	-.028	15	0	1	0	15	-.002	15
412			min	-1054.648	3	.225	15	-.605	1	0	5	-.003	1	-.008	4
413		17	max	981.171	1	.886	4	-.028	15	0	1	0	15	-.002	15
414			min	-1054.251	3	.208	12	-.605	1	0	5	-.003	1	-.008	4
415		18	max	981.7	1	.815	4	-.028	15	0	1	0	15	-.002	15
416			min	-1053.854	3	.18	12	-.605	1	0	5	-.004	1	-.009	4
417		19	max	982.23	1	.743	4	-.028	15	0	1	0	15	-.002	15
418			min	-1053.457	3	.152	12	-.605	1	0	5	-.004	1	-.009	4
419	M11	1	max	546.548	2	8.874	4	-.022	15	0	1	0	15	.009	4
420			min	-702.761	3	2.086	15	-.472	1	0	15	0	1	.002	15
421		2	max	546.378	2	8.005	4	-.022	15	0	1	0	15	.005	4
422			min	-702.888	3	1.882	15	-.472	1	0	15	0	1	.001	12
423		3	max	546.208	2	7.136	4	-.022	15	0	1	0	15	.002	2
424			min	-703.016	3	1.678	15	-.472	1	0	15	0	1	0	3
425		4	max	546.037	2	6.267	4	-.022	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-703.144	3	1.473	15	-.472	1	0	15	-.001	1	-.002	3
427		5	max	545.867	2	5.398	4	-.022	15	0	1	0	15	-.001	15
428			min	-703.272	3	1.269	15	-.472	1	0	15	-.001	1	-.005	4
429		6	max	545.697	2	4.53	4	-.022	15	0	1	0	15	-.002	15
430			min	-703.4	3	1.065	15	-.472	1	0	15	-.002	1	-.007	4
431		7	max	545.526	2	3.661	4	-.022	15	0	1	0	15	-.002	15
432			min	-703.527	3	.861	15	-.472	1	0	15	-.002	1	-.009	4
433		8	max	545.356	2	2.792	4	-.022	15	0	1	0	15	-.002	15
434			min	-703.655	3	.656	15	-.472	1	0	15	-.002	1	-.01	4
435		9	max	545.185	2	1.923	4	-.022	15	0	1	0	15	-.003	15
436			min	-703.783	3	.452	15	-.472	1	0	15	-.002	1	-.011	4
437		10	max	545.015	2	1.054	4	-.022	15	0	1	0	15	-.003	15
438			min	-703.911	3	.248	15	-.472	1	0	15	-.002	1	-.012	4
439		11	max	544.845	2	.266	2	-.022	15	0	1	0	15	-.003	15
440			min	-704.038	3	-.059	3	-.472	1	0	15	-.003	1	-.012	4
441		12	max	544.674	2	-.16	15	-.022	15	0	1	0	15	-.003	15
442			min	-704.166	3	-.684	4	-.472	1	0	15	-.003	1	-.012	4
443		13	max	544.504	2	-.365	15	-.022	15	0	1	0	15	-.003	15
444			min	-704.294	3	-1.553	4	-.472	1	0	15	-.003	1	-.012	4
445		14	max	544.334	2	-.569	15	-.022	15	0	1	0	15	-.003	15
446			min	-704.422	3	-2.422	4	-.472	1	0	15	-.003	1	-.011	4
447		15	max	544.163	2	-.773	15	-.022	15	0	1	0	15	-.002	15
448			min	-704.549	3	-3.29	4	-.472	1	0	15	-.004	1	-.009	4
449		16	max	543.993	2	-.977	15	-.022	15	0	1	0	15	-.002	15
450			min	-704.677	3	-4.159	4	-.472	1	0	15	-.004	1	-.008	4
451		17	max	543.823	2	-1.182	15	-.022	15	0	1	0	15	-.001	15
452			min	-704.805	3	-5.028	4	-.472	1	0	15	-.004	1	-.006	4
453		18	max	543.652	2	-1.386	15	-.022	15	0	1	0	15	0	15
454			min	-704.933	3	-5.897	4	-.472	1	0	15	-.004	1	-.003	4
455		19	max	543.482	2	-1.59	15	-.022	15	0	1	0	15	0	1
456			min	-705.06	3	-6.766	4	-.472	1	0	15	-.004	1	0	1
457	M12	1	max	1095.495	1	0	1	19.333	1	0	1	0	15	0	1
458			min	10.918	12	0	1	.899	15	0	1	-.004	1	0	1
459		2	max	1095.665	1	0	1	19.333	1	0	1	0	15	0	1
460			min	11.003	12	0	1	.899	15	0	1	-.001	1	0	1
461		3	max	1095.835	1	0	1	19.333	1	0	1	0	1	0	1
462			min	11.088	12	0	1	.899	15	0	1	0	15	0	1
463		4	max	1096.006	1	0	1	19.333	1	0	1	.003	1	0	1
464			min	11.173	12	0	1	.899	15	0	1	0	15	0	1
465		5	max	1096.176	1	0	1	19.333	1	0	1	.005	1	0	1
466			min	11.259	12	0	1	.899	15	0	1	0	15	0	1
467		6	max	1096.346	1	0	1	19.333	1	0	1	.008	1	0	1
468			min	11.344	12	0	1	.899	15	0	1	0	15	0	1
469		7	max	1096.517	1	0	1	19.333	1	0	1	.01	1	0	1
470			min	11.429	12	0	1	.899	15	0	1	0	15	0	1
471		8	max	1096.687	1	0	1	19.333	1	0	1	.012	1	0	1
472			min	11.514	12	0	1	.899	15	0	1	0	15	0	1
473		9	max	1096.858	1	0	1	19.333	1	0	1	.014	1	0	1
474			min	11.599	12	0	1	.899	15	0	1	0	15	0	1
475		10	max	1097.028	1	0	1	19.333	1	0	1	.016	1	0	1
476			min	11.684	12	0	1	.899	15	0	1	0	15	0	1
477		11	max	1097.198	1	0	1	19.333	1	0	1	.019	1	0	1
478			min	11.77	12	0	1	.899	15	0	1	0	15	0	1
479		12	max	1097.369	1	0	1	19.333	1	0	1	.021	1	0	1
480			min	11.855	12	0	1	.899	15	0	1	0	15	0	1
481		13	max	1097.539	1	0	1	19.333	1	0	1	.023	1	0	1
482			min	11.94	12	0	1	.899	15	0	1	.001	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	1097.709	1	0	1	19.333	1	0	1	.025	1	0	1
484			min	12.025	12	0	1	.899	15	0	1	.001	15	0	1
485		15	max	1097.88	1	0	1	19.333	1	0	1	.028	1	0	1
486			min	12.11	12	0	1	.899	15	0	1	.001	15	0	1
487		16	max	1098.05	1	0	1	19.333	1	0	1	.03	1	0	1
488			min	12.196	12	0	1	.899	15	0	1	.001	15	0	1
489		17	max	1098.22	1	0	1	19.333	1	0	1	.032	1	0	1
490			min	12.281	12	0	1	.899	15	0	1	.001	15	0	1
491		18	max	1098.391	1	0	1	19.333	1	0	1	.034	1	0	1
492			min	12.366	12	0	1	.899	15	0	1	.002	15	0	1
493		19	max	1098.561	1	0	1	19.333	1	0	1	.036	1	0	1
494			min	12.451	12	0	1	.899	15	0	1	.002	15	0	1
495	M1	1	max	211.573	1	560.546	3	-5.05	15	0	1	.304	1	0	3
496			min	9.83	15	-407.43	1	-107.96	1	0	3	.014	15	-.014	2
497		2	max	212.416	1	559.452	3	-5.05	15	0	1	.237	1	.24	1
498			min	10.084	15	-408.889	1	-107.96	1	0	3	.011	15	-.348	3
499		3	max	450.049	3	474.072	1	-5.022	15	0	3	.17	1	.485	1
500			min	-278.026	2	-413.089	3	-107.687	1	0	1	.008	15	-.684	3
501		4	max	450.681	3	472.613	1	-5.022	15	0	3	.103	1	.191	1
502			min	-277.183	2	-414.183	3	-107.687	1	0	1	.005	15	-.427	3
503		5	max	451.313	3	471.154	1	-5.022	15	0	3	.036	1	-.005	15
504			min	-276.341	2	-415.278	3	-107.687	1	0	1	.002	15	-.17	3
505		6	max	451.945	3	469.695	1	-5.022	15	0	3	-.001	15	.088	3
506			min	-275.499	2	-416.372	3	-107.687	1	0	1	-.031	1	-.399	2
507		7	max	452.576	3	468.236	1	-5.022	15	0	3	-.005	15	.347	3
508			min	-274.656	2	-417.466	3	-107.687	1	0	1	-.097	1	-.685	1
509		8	max	453.208	3	466.777	1	-5.022	15	0	3	-.008	15	.606	3
510			min	-273.814	2	-418.561	3	-107.687	1	0	1	-.164	1	-.975	1
511		9	max	470.544	3	39.886	2	-7.768	15	0	9	.101	1	.709	3
512			min	-182.065	2	.446	15	-166.393	1	0	3	.005	15	-1.112	1
513		10	max	471.176	3	38.427	2	-7.768	15	0	9	0	15	.691	3
514			min	-181.222	2	.006	15	-166.393	1	0	3	-.002	1	-1.125	1
515		11	max	471.808	3	36.968	2	-7.768	15	0	9	-.005	15	.674	3
516			min	-180.38	2	-1.733	4	-166.393	1	0	3	-.105	1	-1.138	1
517		12	max	489.037	3	274.645	3	-4.822	15	0	2	.161	1	.588	3
518			min	-105.917	10	-526.187	2	-103.56	1	0	3	.007	15	-1.007	2
519		13	max	489.668	3	273.551	3	-4.822	15	0	2	.096	1	.418	3
520			min	-105.215	10	-527.646	2	-103.56	1	0	3	.004	15	-.688	1
521		14	max	490.3	3	272.456	3	-4.822	15	0	2	.032	1	.248	3
522			min	-104.513	10	-529.105	2	-103.56	1	0	3	.002	15	-.37	1
523		15	max	490.932	3	271.362	3	-4.822	15	0	2	-.001	15	.08	3
524			min	-103.811	10	-530.564	2	-103.56	1	0	3	-.032	1	-.052	1
525		16	max	491.564	3	270.268	3	-4.822	15	0	2	-.004	15	.306	2
526			min	-103.109	10	-532.023	2	-103.56	1	0	3	-.096	1	-.088	3
527		17	max	492.196	3	269.173	3	-4.822	15	0	2	-.007	15	.637	2
528			min	-102.407	10	-533.482	2	-103.56	1	0	3	-.161	1	-.256	3
529		18	max	-10.101	15	530.509	2	-5.698	15	0	3	-.011	15	.319	2
530			min	-212.88	1	-218.954	3	-121.944	1	0	2	-.231	1	-.126	3
531		19	max	-9.847	15	529.05	2	-5.698	15	0	3	-.014	15	.011	3
532			min	-212.038	1	-220.049	3	-121.944	1	0	2	-.307	1	-.011	1
533	M5	1	max	462.875	1	1866.72	3	0	1	0	1	0	1	.028	2
534			min	20.278	12	-1388.287	1	0	1	0	1	0	1	0	3
535		2	max	463.718	1	1865.626	3	0	1	0	1	0	1	.889	1
536			min	20.699	12	-1389.746	1	0	1	0	1	0	1	-1.158	3
537		3	max	1427.756	3	1385.797	1	0	1	0	1	0	1	1.721	1
538			min	-967.722	2	-1297.183	3	0	1	0	1	0	1	-2.281	3
539		4	max	1428.388	3	1384.338	1	0	1	0	1	0	1	.862	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	-966.88	2	-1298.277	3	0	1	0	1	0	1	-1.475	3
541		5	max	1429.02	3	1382.879	1	0	1	0	1	0	1	.024	9
542			min	-966.037	2	-1299.371	3	0	1	0	1	0	1	-.669	3
543		6	max	1429.652	3	1381.42	1	0	1	0	1	0	1	.138	3
544			min	-965.195	2	-1300.466	3	0	1	0	1	0	1	-.866	2
545		7	max	1430.283	3	1379.961	1	0	1	0	1	0	1	.945	3
546			min	-964.352	2	-1301.56	3	0	1	0	1	0	1	-1.712	1
547		8	max	1430.915	3	1378.501	1	0	1	0	1	0	1	1.753	3
548			min	-963.51	2	-1302.654	3	0	1	0	1	0	1	-2.568	1
549		9	max	1460.762	3	133.21	2	0	1	0	1	0	1	2.02	3
550			min	-773.985	2	.445	15	0	1	0	1	0	1	-2.914	1
551		10	max	1461.394	3	131.751	2	0	1	0	1	0	1	1.956	3
552			min	-773.143	2	.005	15	0	1	0	1	0	1	-2.958	1
553		11	max	1462.026	3	130.292	2	0	1	0	1	0	1	1.892	3
554			min	-772.3	2	-1.459	4	0	1	0	1	0	1	-3.002	1
555		12	max	1492.086	3	843.347	3	0	1	0	1	0	1	1.66	3
556			min	-582.789	2	-1572.713	2	0	1	0	1	0	1	-2.682	2
557		13	max	1492.718	3	842.252	3	0	1	0	1	0	1	1.137	3
558			min	-581.946	2	-1574.172	2	0	1	0	1	0	1	-1.729	1
559		14	max	1493.35	3	841.158	3	0	1	0	1	0	1	.614	3
560			min	-581.104	2	-1575.631	2	0	1	0	1	0	1	-.782	1
561		15	max	1493.982	3	840.064	3	0	1	0	1	0	1	.25	2
562			min	-580.261	2	-1577.09	2	0	1	0	1	0	1	0	13
563		16	max	1494.614	3	838.969	3	0	1	0	1	0	1	1.229	2
564			min	-579.419	2	-1578.549	2	0	1	0	1	0	1	-.428	3
565		17	max	1495.245	3	837.875	3	0	1	0	1	0	1	2.21	2
566			min	-578.577	2	-1580.008	2	0	1	0	1	0	1	-.949	3
567		18	max	-21.096	12	1794.164	2	0	1	0	1	0	1	1.132	2
568			min	-462.789	1	-761.169	3	0	1	0	1	0	1	-.494	3
569		19	max	-20.675	12	1792.705	2	0	1	0	1	0	1	.022	1
570			min	-461.947	1	-762.263	3	0	1	0	1	0	1	-.021	3
571	M9	1	max	211.573	1	560.546	3	107.96	1	0	3	-.014	15	0	3
572			min	9.83	15	-407.43	1	5.05	15	0	1	-.304	1	-.014	2
573		2	max	212.416	1	559.452	3	107.96	1	0	3	-.011	15	.24	1
574			min	10.084	15	-408.889	1	5.05	15	0	1	-.237	1	-.348	3
575		3	max	450.049	3	474.072	1	107.687	1	0	1	-.008	15	.485	1
576			min	-278.026	2	-413.089	3	5.022	15	0	3	-.17	1	-.684	3
577		4	max	450.681	3	472.613	1	107.687	1	0	1	-.005	15	.191	1
578			min	-277.183	2	-414.183	3	5.022	15	0	3	-.103	1	-.427	3
579		5	max	451.313	3	471.154	1	107.687	1	0	1	-.002	15	-.005	15
580			min	-276.341	2	-415.278	3	5.022	15	0	3	-.036	1	-.17	3
581		6	max	451.945	3	469.695	1	107.687	1	0	1	.031	1	.088	3
582			min	-275.499	2	-416.372	3	5.022	15	0	3	.001	15	-.399	2
583		7	max	452.576	3	468.236	1	107.687	1	0	1	.097	1	.347	3
584			min	-274.656	2	-417.466	3	5.022	15	0	3	.005	15	-.685	1
585		8	max	453.208	3	466.777	1	107.687	1	0	1	.164	1	.606	3
586			min	-273.814	2	-418.561	3	5.022	15	0	3	.008	15	-.975	1
587		9	max	470.544	3	39.886	2	166.393	1	0	3	-.005	15	.709	3
588			min	-182.065	2	.446	15	7.768	15	0	9	-.101	1	-1.112	1
589		10	max	471.176	3	38.427	2	166.393	1	0	3	.002	1	.691	3
590			min	-181.222	2	.006	15	7.768	15	0	9	0	15	-1.125	1
591		11	max	471.808	3	36.968	2	166.393	1	0	3	.105	1	.674	3
592			min	-180.38	2	-1.733	4	7.768	15	0	9	.005	15	-1.138	1
593		12	max	489.037	3	274.645	3	103.56	1	0	3	-.007	15	.588	3
594			min	-105.917	10	-526.187	2	4.822	15	0	2	-.161	1	-1.007	2
595		13	max	489.668	3	273.551	3	103.56	1	0	3	-.004	15	.418	3
596			min	-105.215	10	-527.646	2	4.822	15	0	2	-.096	1	-.688	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	490.3	3	272.456	3	103.56	1	0	3	-.002	15	.248	3
598			min	-104.513	10	-529.105	2	4.822	15	0	2	-.032	1	-.37	1
599		15	max	490.932	3	271.362	3	103.56	1	0	3	.032	1	.08	3
600			min	-103.811	10	-530.564	2	4.822	15	0	2	.001	15	-.052	1
601		16	max	491.564	3	270.268	3	103.56	1	0	3	.096	1	.306	2
602			min	-103.109	10	-532.023	2	4.822	15	0	2	.004	15	-.088	3
603		17	max	492.196	3	269.173	3	103.56	1	0	3	.161	1	.637	2
604			min	-102.407	10	-533.482	2	4.822	15	0	2	.007	15	-.256	3
605		18	max	-10.101	15	530.509	2	121.944	1	0	2	.231	1	.319	2
606			min	-212.88	1	-218.954	3	5.698	15	0	3	.011	15	-.126	3
607		19	max	-9.847	15	529.05	2	121.944	1	0	2	.307	1	.011	3
608			min	-212.038	1	-220.049	3	5.698	15	0	3	.014	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	.001	1	.162	2	.009	3	1.117e-2	2	NC	1	NC	1
2			min	0	15	-.03	3	-.004	2	-2.09e-3	3	NC	1	NC	1
3		2	max	0	1	.236	3	.052	1	1.253e-2	2	NC	5	NC	2
4			min	0	15	-.01	9	.003	15	-2.067e-3	3	902.356	3	4777.629	1
5		3	max	0	1	.452	3	.122	1	1.388e-2	2	NC	5	NC	3
6			min	0	15	-.138	1	.006	15	-2.045e-3	3	498.484	3	1995.089	1
7		4	max	0	1	.583	3	.182	1	1.524e-2	2	NC	5	NC	3
8			min	0	15	-.208	1	.009	15	-2.022e-3	3	391.805	3	1332.898	1
9		5	max	0	1	.614	3	.212	1	1.66e-2	2	NC	5	NC	3
10			min	0	15	-.206	1	.01	15	-1.999e-3	3	373.023	3	1141.955	1
11		6	max	0	1	.547	3	.204	1	1.795e-2	2	NC	5	NC	5
12			min	0	15	-.134	1	.01	15	-1.976e-3	3	416.515	3	1187.976	1
13		7	max	0	1	.402	3	.159	1	1.931e-2	2	NC	5	NC	5
14			min	0	15	-.016	9	.008	15	-1.954e-3	3	556.464	3	1520.835	1
15		8	max	0	1	.217	3	.092	1	2.066e-2	2	NC	1	NC	3
16			min	0	15	.005	15	.002	10	-1.931e-3	3	971.624	3	2653.183	1
17		9	max	0	1	.286	2	.029	3	2.202e-2	2	NC	4	NC	1
18			min	0	15	.009	15	-.008	10	-1.908e-3	3	1936.066	2	NC	1
19		10	max	0	1	.34	2	.027	3	2.337e-2	2	NC	3	NC	1
20			min	0	1	-.026	3	-.019	2	-1.885e-3	3	1347.314	2	NC	1
21		11	max	0	15	.286	2	.029	3	2.202e-2	2	NC	4	NC	1
22			min	0	1	.009	15	-.008	10	-1.908e-3	3	1936.066	2	NC	1
23		12	max	0	15	.217	3	.092	1	2.066e-2	2	NC	1	NC	3
24			min	0	1	.005	15	.002	10	-1.931e-3	3	971.624	3	2653.183	1
25		13	max	0	15	.402	3	.159	1	1.931e-2	2	NC	5	NC	5
26			min	0	1	-.016	9	.008	15	-1.954e-3	3	556.464	3	1520.835	1
27		14	max	0	15	.547	3	.204	1	1.795e-2	2	NC	5	NC	5
28			min	0	1	-.134	1	.01	15	-1.976e-3	3	416.515	3	1187.976	1
29		15	max	0	15	.614	3	.212	1	1.66e-2	2	NC	5	NC	3
30			min	0	1	-.206	1	.01	15	-1.999e-3	3	373.023	3	1141.955	1
31		16	max	0	15	.583	3	.182	1	1.524e-2	2	NC	5	NC	3
32			min	0	1	-.208	1	.009	15	-2.022e-3	3	391.805	3	1332.898	1
33		17	max	0	15	.452	3	.122	1	1.388e-2	2	NC	5	NC	3
34			min	0	1	-.138	1	.006	15	-2.045e-3	3	498.484	3	1995.089	1
35		18	max	0	15	.236	3	.052	1	1.253e-2	2	NC	5	NC	2
36			min	0	1	-.01	9	.003	15	-2.067e-3	3	902.356	3	4777.629	1
37		19	max	0	15	.162	2	.009	3	1.117e-2	2	NC	1	NC	1
38			min	-.001	1	-.03	3	-.004	2	-2.09e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.292	3	.008	3	6.588e-3	1	NC	1	NC	1
40			min	0	15	-.506	1	-.004	2	-4.437e-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	.579	3	.035	1	7.776e-3	1	NC	5	NC	2
42			min	0	15	-.832	1	0	10	-5.338e-3	3	734.796	1	7319.836	1
43		3	max	0	1	.825	3	.095	1	8.964e-3	1	NC	15	NC	3
44			min	0	15	-1.118	1	.005	15	-6.239e-3	3	391.806	1	2562.548	1
45		4	max	0	1	1.003	3	.153	1	1.015e-2	1	9324.703	15	NC	3
46			min	0	15	-1.335	1	.007	15	-7.14e-3	3	289.369	1	1591.224	1
47		5	max	0	1	1.099	3	.185	1	1.134e-2	1	8068.431	15	NC	3
48			min	0	15	-1.468	1	.009	15	-8.04e-3	3	249.434	1	1309.435	1
49		6	max	0	1	1.111	3	.183	1	1.253e-2	1	7732.466	15	NC	3
50			min	0	15	-1.515	1	.009	15	-8.941e-3	3	237.774	1	1327.561	1
51		7	max	0	1	1.054	3	.146	1	1.372e-2	1	7999.146	15	NC	3
52			min	0	15	-1.488	1	.007	15	-9.842e-3	3	244.196	1	1668.536	1
53		8	max	0	1	.954	3	.085	1	1.49e-2	1	8740.161	15	NC	3
54			min	0	15	-1.414	1	.002	10	-1.074e-2	3	264.362	1	2866.081	1
55		9	max	0	1	.853	3	.025	3	1.609e-2	1	9734.283	15	NC	1
56			min	0	15	-1.329	1	-.007	10	-1.164e-2	3	291.559	1	NC	1
57		10	max	0	1	.804	3	.024	3	1.728e-2	1	NC	15	NC	1
58			min	0	1	-1.287	1	-.017	2	-1.254e-2	3	307.336	1	NC	1
59		11	max	0	15	.853	3	.025	3	1.609e-2	1	9734.283	15	NC	1
60			min	0	1	-1.329	1	-.007	10	-1.164e-2	3	291.559	1	NC	1
61		12	max	0	15	.954	3	.085	1	1.49e-2	1	8740.161	15	NC	3
62			min	0	1	-1.414	1	.002	10	-1.074e-2	3	264.362	1	2866.081	1
63		13	max	0	15	1.054	3	.146	1	1.372e-2	1	7999.146	15	NC	3
64			min	0	1	-1.488	1	.007	15	-9.842e-3	3	244.196	1	1668.536	1
65		14	max	0	15	1.111	3	.183	1	1.253e-2	1	7732.466	15	NC	3
66			min	0	1	-1.515	1	.009	15	-8.941e-3	3	237.774	1	1327.561	1
67		15	max	0	15	1.099	3	.185	1	1.134e-2	1	8068.431	15	NC	3
68			min	0	1	-1.468	1	.009	15	-8.04e-3	3	249.434	1	1309.435	1
69		16	max	0	15	1.003	3	.153	1	1.015e-2	1	9324.703	15	NC	3
70			min	0	1	-1.335	1	.007	15	-7.14e-3	3	289.369	1	1591.224	1
71		17	max	0	15	.825	3	.095	1	8.964e-3	1	NC	15	NC	3
72			min	0	1	-1.118	1	.005	15	-6.239e-3	3	391.806	1	2562.548	1
73		18	max	0	15	.579	3	.035	1	7.776e-3	1	NC	5	NC	2
74			min	0	1	-.832	1	0	10	-5.338e-3	3	734.796	1	7319.836	1
75		19	max	0	15	.292	3	.008	3	6.588e-3	1	NC	1	NC	1
76			min	0	1	-.506	1	-.004	2	-4.437e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.299	3	.007	3	3.767e-3	3	NC	1	NC	1
78			min	0	1	-.505	1	-.004	2	-6.758e-3	1	NC	1	NC	1
79		2	max	0	15	.492	3	.035	1	4.533e-3	3	NC	5	NC	2
80			min	0	1	-.88	2	.001	10	-7.987e-3	1	631.745	2	7257.355	1
81		3	max	0	15	.663	3	.096	1	5.299e-3	3	NC	15	NC	3
82			min	0	1	-1.209	2	.005	15	-9.216e-3	1	338.697	2	2549.828	1
83		4	max	0	15	.796	3	.153	1	6.066e-3	3	9340.497	15	NC	3
84			min	0	1	-1.451	2	.007	15	-1.044e-2	1	252.457	2	1585.214	1
85		5	max	0	15	.882	3	.186	1	6.832e-3	3	8083.729	15	NC	3
86			min	0	1	-1.588	2	.009	15	-1.167e-2	1	220.618	2	1305.068	1
87		6	max	0	15	.92	3	.183	1	7.598e-3	3	7749.339	15	NC	3
88			min	0	1	-1.62	2	.009	15	-1.29e-2	1	214.445	2	1323.104	1
89		7	max	0	15	.916	3	.146	1	8.365e-3	3	8019.73	15	NC	3
90			min	0	1	-1.561	2	.007	15	-1.413e-2	1	226.25	2	1661.885	1
91		8	max	0	15	.883	3	.086	1	9.131e-3	3	8767.045	15	NC	3
92			min	0	1	-1.446	2	.002	10	-1.536e-2	1	253.682	2	2848.035	1
93		9	max	0	15	.843	3	.025	1	9.897e-3	3	9769.47	15	NC	1
94			min	0	1	-1.337	1	-.006	10	-1.659e-2	1	288.493	1	NC	1
95		10	max	0	1	.822	3	.022	3	1.066e-2	3	NC	15	NC	1
96			min	0	1	-1.284	1	-.016	2	-1.782e-2	1	308.065	1	NC	1
97		11	max	0	1	.843	3	.025	1	9.897e-3	3	9769.47	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	-1.337	1	-.006	10	-1.659e-2	1	288.493	1	NC	1
99		12	max	0	1	.883	3	.086	1	9.131e-3	3	8767.045	15	NC	3
100			min	0	15	-1.446	2	.002	10	-1.536e-2	1	253.682	2	2848.035	1
101		13	max	0	1	.916	3	.146	1	8.365e-3	3	8019.73	15	NC	3
102			min	0	15	-1.561	2	.007	15	-1.413e-2	1	226.25	2	1661.885	1
103		14	max	0	1	.92	3	.183	1	7.598e-3	3	7749.339	15	NC	3
104			min	0	15	-1.62	2	.009	15	-1.29e-2	1	214.445	2	1323.104	1
105		15	max	0	1	.882	3	.186	1	6.832e-3	3	8083.729	15	NC	3
106			min	0	15	-1.588	2	.009	15	-1.167e-2	1	220.618	2	1305.068	1
107		16	max	0	1	.796	3	.153	1	6.066e-3	3	9340.497	15	NC	3
108			min	0	15	-1.451	2	.007	15	-1.044e-2	1	252.457	2	1585.214	1
109		17	max	0	1	.663	3	.096	1	5.299e-3	3	NC	15	NC	3
110			min	0	15	-1.209	2	.005	15	-9.216e-3	1	338.697	2	2549.828	1
111		18	max	0	1	.492	3	.035	1	4.533e-3	3	NC	5	NC	2
112			min	0	15	-.88	2	.001	10	-7.987e-3	1	631.745	2	7257.355	1
113		19	max	0	1	.299	3	.007	3	3.767e-3	3	NC	1	NC	1
114			min	0	15	-.505	1	-.004	2	-6.758e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.156	1	.006	3	6.816e-3	3	NC	1	NC	1
116			min	-.001	1	-.101	3	-.003	2	-1.007e-2	1	NC	1	NC	1
117		2	max	0	15	.003	13	.051	1	7.858e-3	3	NC	5	NC	2
118			min	-.001	1	-.084	2	.003	15	-1.116e-2	1	1048.675	2	4843.17	1
119		3	max	0	15	.045	3	.121	1	8.9e-3	3	NC	5	NC	3
120			min	0	1	-.265	2	.006	15	-1.226e-2	1	584.996	2	2009.928	1
121		4	max	0	15	.075	3	.181	1	9.942e-3	3	NC	5	NC	3
122			min	0	1	-.367	2	.009	15	-1.336e-2	1	468.286	2	1338.32	1
123		5	max	0	15	.067	3	.211	1	1.098e-2	3	NC	5	NC	3
124			min	0	1	-.376	2	.01	15	-1.445e-2	1	460.547	2	1143.633	1
125		6	max	0	15	.022	3	.204	1	1.203e-2	3	NC	5	NC	3
126			min	0	1	-.294	2	.01	15	-1.555e-2	1	546.929	2	1186.386	1
127		7	max	0	15	.002	13	.16	1	1.307e-2	3	NC	5	NC	3
128			min	0	1	-.14	2	.008	15	-1.664e-2	1	840.579	2	1512.179	1
129		8	max	0	15	.093	1	.093	1	1.411e-2	3	NC	4	NC	3
130			min	0	1	-.137	3	.004	10	-1.774e-2	1	2440.025	2	2610.33	1
131		9	max	0	15	.249	1	.027	1	1.515e-2	3	NC	4	NC	2
132			min	0	1	-.212	3	-.005	10	-1.883e-2	1	2170.165	3	9378.594	1
133		10	max	0	1	.319	1	.019	3	1.619e-2	3	NC	5	NC	1
134			min	0	1	-.245	3	-.014	2	-1.993e-2	1	1472.43	1	NC	1
135		11	max	0	1	.249	1	.027	1	1.515e-2	3	NC	4	NC	2
136			min	0	15	-.212	3	-.005	10	-1.883e-2	1	2170.165	3	9378.594	1
137		12	max	0	1	.093	1	.093	1	1.411e-2	3	NC	4	NC	3
138			min	0	15	-.137	3	.004	10	-1.774e-2	1	2440.025	2	2610.33	1
139		13	max	0	1	.002	13	.16	1	1.307e-2	3	NC	5	NC	3
140			min	0	15	-.14	2	.008	15	-1.664e-2	1	840.579	2	1512.179	1
141		14	max	0	1	.022	3	.204	1	1.203e-2	3	NC	5	NC	3
142			min	0	15	-.294	2	.01	15	-1.555e-2	1	546.929	2	1186.386	1
143		15	max	0	1	.067	3	.211	1	1.098e-2	3	NC	5	NC	3
144			min	0	15	-.376	2	.01	15	-1.445e-2	1	460.547	2	1143.633	1
145		16	max	0	1	.075	3	.181	1	9.942e-3	3	NC	5	NC	3
146			min	0	15	-.367	2	.009	15	-1.336e-2	1	468.286	2	1338.32	1
147		17	max	0	1	.045	3	.121	1	8.9e-3	3	NC	5	NC	3
148			min	0	15	-.265	2	.006	15	-1.226e-2	1	584.996	2	2009.928	1
149		18	max	.001	1	.003	13	.051	1	7.858e-3	3	NC	5	NC	2
150			min	0	15	-.084	2	.003	15	-1.116e-2	1	1048.675	2	4843.17	1
151		19	max	.001	1	.156	1	.006	3	6.816e-3	3	NC	1	NC	1
152			min	0	15	-.101	3	-.003	2	-1.007e-2	1	NC	1	NC	1
153	M2	1	max	.007	1	.008	2	.014	1	-1.553e-5	15	NC	1	NC	2
154			min	-.008	3	-.013	3	0	15	-3.333e-4	1	9894.859	2	5465.163	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	.007	1	.006	2	.013	1	-1.474e-5	15	NC	1	NC	2
156			min	-.007	3	-.013	3	0	15	-3.164e-4	1	NC	1	5955.898	1
157		3	max	.006	1	.005	2	.012	1	-1.395e-5	15	NC	1	NC	2
158			min	-.007	3	-.013	3	0	15	-2.995e-4	1	NC	1	6539.749	1
159		4	max	.006	1	.004	2	.011	1	-1.317e-5	15	NC	1	NC	2
160			min	-.007	3	-.012	3	0	15	-2.825e-4	1	NC	1	7241.127	1
161		5	max	.006	1	.003	2	.01	1	-1.238e-5	15	NC	1	NC	2
162			min	-.006	3	-.012	3	0	15	-2.656e-4	1	NC	1	8093.244	1
163		6	max	.005	1	.001	2	.008	1	-1.159e-5	15	NC	1	NC	2
164			min	-.006	3	-.012	3	0	15	-2.487e-4	1	NC	1	9142.227	1
165		7	max	.005	1	0	2	.007	1	-1.08e-5	15	NC	1	NC	1
166			min	-.005	3	-.011	3	0	15	-2.317e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.006	1	-1.001e-5	15	NC	1	NC	1
168			min	-.005	3	-.011	3	0	15	-2.148e-4	1	NC	1	NC	1
169		9	max	.004	1	-.002	2	.005	1	-9.226e-6	15	NC	1	NC	1
170			min	-.004	3	-.01	3	0	15	-1.979e-4	1	NC	1	NC	1
171		10	max	.004	1	-.002	15	.005	1	-8.438e-6	15	NC	1	NC	1
172			min	-.004	3	-.01	3	0	15	-1.81e-4	1	NC	1	NC	1
173		11	max	.003	1	-.002	15	.004	1	-7.65e-6	15	NC	1	NC	1
174			min	-.004	3	-.009	3	0	15	-1.64e-4	1	NC	1	NC	1
175		12	max	.003	1	-.002	15	.003	1	-6.863e-6	15	NC	1	NC	1
176			min	-.003	3	-.008	3	0	15	-1.471e-4	1	NC	1	NC	1
177		13	max	.002	1	-.002	15	.002	1	-6.075e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-1.302e-4	1	NC	1	NC	1
179		14	max	.002	1	-.002	15	.002	1	-5.287e-6	15	NC	1	NC	1
180			min	-.002	3	-.007	4	0	15	-1.132e-4	1	NC	1	NC	1
181		15	max	.002	1	-.001	15	.001	1	-4.499e-6	15	NC	1	NC	1
182			min	-.002	3	-.006	4	0	15	-9.632e-5	1	NC	1	NC	1
183		16	max	.001	1	-.001	15	0	1	-3.711e-6	15	NC	1	NC	1
184			min	-.001	3	-.005	4	0	15	-7.939e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-2.923e-6	15	NC	1	NC	1
186			min	0	3	-.003	4	0	15	-6.246e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-2.135e-6	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-4.553e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-1.347e-6	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-2.86e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	5.421e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	2.561e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	4.18e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	1	1.947e-6	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	15	7.818e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	1	3.637e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	15	1.146e-4	1	NC	1	NC	1
198			min	0	2	-.009	4	0	1	5.328e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	15	1.509e-4	1	NC	1	NC	1
200			min	-.001	2	-.012	4	0	1	7.018e-6	15	8382.304	4	NC	1
201		6	max	.002	3	-.004	15	0	15	1.873e-4	1	NC	5	NC	1
202			min	-.001	2	-.015	4	0	1	8.709e-6	15	6802.371	4	NC	1
203		7	max	.002	3	-.004	15	0	15	2.237e-4	1	NC	5	NC	1
204			min	-.002	2	-.018	4	0	1	1.04e-5	15	5850.387	4	NC	1
205		8	max	.003	3	-.005	15	0	1	2.601e-4	1	NC	5	NC	1
206			min	-.002	2	-.02	4	0	12	1.209e-5	15	5263.42	4	NC	1
207		9	max	.003	3	-.005	15	0	1	2.965e-4	1	NC	5	NC	1
208			min	-.002	2	-.021	4	0	12	1.378e-5	15	4917.683	4	NC	1
209		10	max	.003	3	-.005	15	.001	1	3.328e-4	1	NC	5	NC	1
210			min	-.003	2	-.022	4	0	15	1.547e-5	15	4753.226	4	NC	1
211		11	max	.004	3	-.005	15	.002	1	3.692e-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	-.022	4	0	15	1.716e-5	15	4745.913	4	NC	1
213		12	max	.004	3	-.005	15	.002	1	4.056e-4	1	NC	5	NC	1
214			min	-.003	2	-.021	4	0	15	1.885e-5	15	4898.163	4	NC	1
215		13	max	.005	3	-.005	15	.003	1	4.42e-4	1	NC	5	NC	1
216			min	-.004	2	-.02	4	0	15	2.054e-5	15	5241.08	4	NC	1
217		14	max	.005	3	-.004	15	.004	1	4.784e-4	1	NC	5	NC	1
218			min	-.004	2	-.018	4	0	15	2.223e-5	15	5850.451	4	NC	1
219		15	max	.005	3	-.004	15	.006	1	5.147e-4	1	NC	3	NC	1
220			min	-.004	2	-.015	4	0	15	2.392e-5	15	6893.779	4	NC	1
221		16	max	.006	3	-.003	15	.007	1	5.511e-4	1	NC	1	NC	1
222			min	-.004	2	-.012	4	0	15	2.562e-5	15	8776.38	4	NC	1
223		17	max	.006	3	-.002	15	.009	1	5.875e-4	1	NC	1	NC	1
224			min	-.005	2	-.009	4	0	15	2.731e-5	15	NC	1	NC	1
225		18	max	.007	3	-.001	15	.011	1	6.239e-4	1	NC	1	NC	2
226			min	-.005	2	-.005	1	0	15	2.9e-5	15	NC	1	9279.418	1
227		19	max	.007	3	0	10	.013	1	6.603e-4	1	NC	1	NC	2
228			min	-.005	2	-.002	1	0	15	3.069e-5	15	NC	1	7741.692	1
229	M4	1	max	.003	1	.005	2	0	15	2.338e-4	1	NC	1	NC	3
230			min	0	12	-.007	3	-.013	1	1.09e-5	15	NC	1	1888.922	1
231		2	max	.002	1	.005	2	0	15	2.338e-4	1	NC	1	NC	3
232			min	0	12	-.007	3	-.012	1	1.09e-5	15	NC	1	2049.827	1
233		3	max	.002	1	.004	2	0	15	2.338e-4	1	NC	1	NC	3
234			min	0	12	-.006	3	-.011	1	1.09e-5	15	NC	1	2241.594	1
235		4	max	.002	1	.004	2	0	15	2.338e-4	1	NC	1	NC	3
236			min	0	12	-.006	3	-.01	1	1.09e-5	15	NC	1	2472.193	1
237		5	max	.002	1	.004	2	0	15	2.338e-4	1	NC	1	NC	3
238			min	0	12	-.006	3	-.009	1	1.09e-5	15	NC	1	2752.46	1
239		6	max	.002	1	.004	2	0	15	2.338e-4	1	NC	1	NC	3
240			min	0	12	-.005	3	-.008	1	1.09e-5	15	NC	1	3097.42	1
241		7	max	.002	1	.003	2	0	15	2.338e-4	1	NC	1	NC	3
242			min	0	12	-.005	3	-.007	1	1.09e-5	15	NC	1	3528.403	1
243		8	max	.002	1	.003	2	0	15	2.338e-4	1	NC	1	NC	3
244			min	0	12	-.004	3	-.006	1	1.09e-5	15	NC	1	4076.513	1
245		9	max	.001	1	.003	2	0	15	2.338e-4	1	NC	1	NC	2
246			min	0	12	-.004	3	-.005	1	1.09e-5	15	NC	1	4788.566	1
247		10	max	.001	1	.003	2	0	15	2.338e-4	1	NC	1	NC	2
248			min	0	12	-.004	3	-.004	1	1.09e-5	15	NC	1	5737.727	1
249		11	max	.001	1	.002	2	0	15	2.338e-4	1	NC	1	NC	2
250			min	0	12	-.003	3	-.004	1	1.09e-5	15	NC	1	7043.652	1
251		12	max	.001	1	.002	2	0	15	2.338e-4	1	NC	1	NC	2
252			min	0	12	-.003	3	-.003	1	1.09e-5	15	NC	1	8913.257	1
253		13	max	0	1	.002	2	0	15	2.338e-4	1	NC	1	NC	1
254			min	0	12	-.002	3	-.002	1	1.09e-5	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	2.338e-4	1	NC	1	NC	1
256			min	0	12	-.002	3	-.002	1	1.09e-5	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	2.338e-4	1	NC	1	NC	1
258			min	0	12	-.002	3	-.001	1	1.09e-5	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	2.338e-4	1	NC	1	NC	1
260			min	0	12	-.001	3	0	1	1.09e-5	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	2.338e-4	1	NC	1	NC	1
262			min	0	12	0	3	0	1	1.09e-5	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	2.338e-4	1	NC	1	NC	1
264			min	0	12	0	3	0	1	1.09e-5	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.338e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	1.09e-5	15	NC	1	NC	1
267	M6	1	max	.023	1	.03	2	0	1	0	1	NC	3	NC	1
268			min	-.026	3	-.041	3	0	1	0	1	2584.591	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	.022	1	.027	2	0	1	0	1	NC	3	NC	1
270			min	-.024	3	-.039	3	0	1	0	1	2858.291	2	NC	1
271		3	max	.02	1	.024	2	0	1	0	1	NC	3	NC	1
272			min	-.023	3	-.037	3	0	1	0	1	3193.536	2	NC	1
273		4	max	.019	1	.021	2	0	1	0	1	NC	3	NC	1
274			min	-.021	3	-.035	3	0	1	0	1	3609.563	2	NC	1
275		5	max	.018	1	.019	2	0	1	0	1	NC	3	NC	1
276			min	-.02	3	-.032	3	0	1	0	1	4134.052	2	NC	1
277		6	max	.017	1	.016	2	0	1	0	1	NC	3	NC	1
278			min	-.018	3	-.03	3	0	1	0	1	4808.046	2	NC	1
279		7	max	.015	1	.014	2	0	1	0	1	NC	1	NC	1
280			min	-.017	3	-.028	3	0	1	0	1	5694.61	2	NC	1
281		8	max	.014	1	.011	2	0	1	0	1	NC	1	NC	1
282			min	-.016	3	-.026	3	0	1	0	1	6894.937	2	NC	1
283		9	max	.013	1	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.014	3	-.024	3	0	1	0	1	8580.393	2	NC	1
285		10	max	.011	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.013	3	-.022	3	0	1	0	1	NC	1	NC	1
287		11	max	.01	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.011	3	-.019	3	0	1	0	1	NC	1	NC	1
289		12	max	.009	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.01	3	-.017	3	0	1	0	1	NC	1	NC	1
291		13	max	.008	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.009	3	-.015	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	1	.001	2	0	1	0	1	NC	1	NC	1
294			min	-.007	3	-.012	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.01	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	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	-.003	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	.004	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	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.012	3	0	1	0	1	8575.994	4	NC	1
315		6	max	.006	3	-.004	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.015	4	0	1	0	1	6945.511	4	NC	1
317		7	max	.007	3	-.004	15	0	1	0	1	NC	2	NC	1
318			min	-.007	2	-.018	4	0	1	0	1	5963.699	4	NC	1
319		8	max	.008	3	-.005	15	0	1	0	1	NC	5	NC	1
320			min	-.008	2	-.02	4	0	1	0	1	5358.107	4	NC	1
321		9	max	.009	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.009	2	-.021	4	0	1	0	1	5000.504	4	NC	1
323		10	max	.011	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.01	2	-.022	4	0	1	0	1	4828.698	4	NC	1
325		11	max	.012	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	-.011	2	-.022	4	0	1	0	1	4817.415	4	NC	1
327		12	max	.013	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.013	2	-.021	4	0	1	0	1	4968.602	4	NC	1
329		13	max	.014	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.014	2	-.02	4	0	1	0	1	5313.433	4	NC	1
331		14	max	.015	3	-.004	15	0	1	0	1	NC	5	NC	1
332			min	-.015	2	-.018	4	0	1	0	1	5928.415	4	NC	1
333		15	max	.017	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.016	2	-.016	4	0	1	0	1	6982.951	4	NC	1
335		16	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.017	2	-.013	3	0	1	0	1	8887.204	4	NC	1
337		17	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.018	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.02	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.019	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.021	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.02	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.02	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.022	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.019	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.021	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.018	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.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	.001	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	1	.008	2	0	15	3.333e-4	1	NC	1	NC	2
382			min	-.008	3	-.013	3	-.014	1	1.553e-5	15	9894.859	2	5465.163	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	.007	1	.006	2	0	15	3.164e-4	1	NC	1	NC	2
384			min	-.007	3	-.013	3	-.013	1	1.474e-5	15	NC	1	5955.898	1
385		3	max	.006	1	.005	2	0	15	2.995e-4	1	NC	1	NC	2
386			min	-.007	3	-.013	3	-.012	1	1.395e-5	15	NC	1	6539.749	1
387		4	max	.006	1	.004	2	0	15	2.825e-4	1	NC	1	NC	2
388			min	-.007	3	-.012	3	-.011	1	1.317e-5	15	NC	1	7241.127	1
389		5	max	.006	1	.003	2	0	15	2.656e-4	1	NC	1	NC	2
390			min	-.006	3	-.012	3	-.01	1	1.238e-5	15	NC	1	8093.244	1
391		6	max	.005	1	.001	2	0	15	2.487e-4	1	NC	1	NC	2
392			min	-.006	3	-.012	3	-.008	1	1.159e-5	15	NC	1	9142.227	1
393		7	max	.005	1	0	2	0	15	2.317e-4	1	NC	1	NC	1
394			min	-.005	3	-.011	3	-.007	1	1.08e-5	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	2.148e-4	1	NC	1	NC	1
396			min	-.005	3	-.011	3	-.006	1	1.001e-5	15	NC	1	NC	1
397		9	max	.004	1	-.002	2	0	15	1.979e-4	1	NC	1	NC	1
398			min	-.004	3	-.01	3	-.005	1	9.226e-6	15	NC	1	NC	1
399		10	max	.004	1	-.002	15	0	15	1.81e-4	1	NC	1	NC	1
400			min	-.004	3	-.01	3	-.005	1	8.438e-6	15	NC	1	NC	1
401		11	max	.003	1	-.002	15	0	15	1.64e-4	1	NC	1	NC	1
402			min	-.004	3	-.009	3	-.004	1	7.65e-6	15	NC	1	NC	1
403		12	max	.003	1	-.002	15	0	15	1.471e-4	1	NC	1	NC	1
404			min	-.003	3	-.008	3	-.003	1	6.863e-6	15	NC	1	NC	1
405		13	max	.002	1	-.002	15	0	15	1.302e-4	1	NC	1	NC	1
406			min	-.003	3	-.007	3	-.002	1	6.075e-6	15	NC	1	NC	1
407		14	max	.002	1	-.002	15	0	15	1.132e-4	1	NC	1	NC	1
408			min	-.002	3	-.007	4	-.002	1	5.287e-6	15	NC	1	NC	1
409		15	max	.002	1	-.001	15	0	15	9.632e-5	1	NC	1	NC	1
410			min	-.002	3	-.006	4	-.001	1	4.499e-6	15	NC	1	NC	1
411		16	max	.001	1	-.001	15	0	15	7.939e-5	1	NC	1	NC	1
412			min	-.001	3	-.005	4	0	1	3.711e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	6.246e-5	1	NC	1	NC	1
414			min	0	3	-.003	4	0	1	2.923e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	4.553e-5	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	2.135e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	2.86e-5	1	NC	1	NC	1
418			min	0	1	0	1	0	1	1.347e-6	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-2.561e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-5.421e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.947e-6	15	NC	1	NC	1
422			min	0	2	-.003	4	0	15	-4.18e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	1	-3.637e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	15	-7.818e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	1	-5.328e-6	15	NC	1	NC	1
426			min	0	2	-.009	4	0	15	-1.146e-4	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	1	-7.018e-6	15	NC	1	NC	1
428			min	-.001	2	-.012	4	0	15	-1.509e-4	1	8382.304	4	NC	1
429		6	max	.002	3	-.004	15	0	1	-8.709e-6	15	NC	5	NC	1
430			min	-.001	2	-.015	4	0	15	-1.873e-4	1	6802.371	4	NC	1
431		7	max	.002	3	-.004	15	0	1	-1.04e-5	15	NC	5	NC	1
432			min	-.002	2	-.018	4	0	15	-2.237e-4	1	5850.387	4	NC	1
433		8	max	.003	3	-.005	15	0	12	-1.209e-5	15	NC	5	NC	1
434			min	-.002	2	-.02	4	0	1	-2.601e-4	1	5263.42	4	NC	1
435		9	max	.003	3	-.005	15	0	12	-1.378e-5	15	NC	5	NC	1
436			min	-.002	2	-.021	4	0	1	-2.965e-4	1	4917.683	4	NC	1
437		10	max	.003	3	-.005	15	0	15	-1.547e-5	15	NC	5	NC	1
438			min	-.003	2	-.022	4	-.001	1	-3.328e-4	1	4753.226	4	NC	1
439		11	max	.004	3	-.005	15	0	15	-1.716e-5	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	-.022	4	-.002	1	-3.692e-4	1	4745.913	4	NC	1
441		12	max	.004	3	-.005	15	0	15	-1.885e-5	15	NC	5	NC	1
442			min	-.003	2	-.021	4	-.002	1	-4.056e-4	1	4898.163	4	NC	1
443		13	max	.005	3	-.005	15	0	15	-2.054e-5	15	NC	5	NC	1
444			min	-.004	2	-.02	4	-.003	1	-4.42e-4	1	5241.08	4	NC	1
445		14	max	.005	3	-.004	15	0	15	-2.223e-5	15	NC	5	NC	1
446			min	-.004	2	-.018	4	-.004	1	-4.784e-4	1	5850.451	4	NC	1
447		15	max	.005	3	-.004	15	0	15	-2.392e-5	15	NC	3	NC	1
448			min	-.004	2	-.015	4	-.006	1	-5.147e-4	1	6893.779	4	NC	1
449		16	max	.006	3	-.003	15	0	15	-2.562e-5	15	NC	1	NC	1
450			min	-.004	2	-.012	4	-.007	1	-5.511e-4	1	8776.38	4	NC	1
451		17	max	.006	3	-.002	15	0	15	-2.731e-5	15	NC	1	NC	1
452			min	-.005	2	-.009	4	-.009	1	-5.875e-4	1	NC	1	NC	1
453		18	max	.007	3	-.001	15	0	15	-2.9e-5	15	NC	1	NC	2
454			min	-.005	2	-.005	1	-.011	1	-6.239e-4	1	NC	1	9279.418	1
455		19	max	.007	3	0	10	0	15	-3.069e-5	15	NC	1	NC	2
456			min	-.005	2	-.002	1	-.013	1	-6.603e-4	1	NC	1	7741.692	1
457	M12	1	max	.003	1	.005	2	.013	1	-1.09e-5	15	NC	1	NC	3
458			min	0	12	-.007	3	0	15	-2.338e-4	1	NC	1	1888.922	1
459		2	max	.002	1	.005	2	.012	1	-1.09e-5	15	NC	1	NC	3
460			min	0	12	-.007	3	0	15	-2.338e-4	1	NC	1	2049.827	1
461		3	max	.002	1	.004	2	.011	1	-1.09e-5	15	NC	1	NC	3
462			min	0	12	-.006	3	0	15	-2.338e-4	1	NC	1	2241.594	1
463		4	max	.002	1	.004	2	.01	1	-1.09e-5	15	NC	1	NC	3
464			min	0	12	-.006	3	0	15	-2.338e-4	1	NC	1	2472.193	1
465		5	max	.002	1	.004	2	.009	1	-1.09e-5	15	NC	1	NC	3
466			min	0	12	-.006	3	0	15	-2.338e-4	1	NC	1	2752.46	1
467		6	max	.002	1	.004	2	.008	1	-1.09e-5	15	NC	1	NC	3
468			min	0	12	-.005	3	0	15	-2.338e-4	1	NC	1	3097.42	1
469		7	max	.002	1	.003	2	.007	1	-1.09e-5	15	NC	1	NC	3
470			min	0	12	-.005	3	0	15	-2.338e-4	1	NC	1	3528.403	1
471		8	max	.002	1	.003	2	.006	1	-1.09e-5	15	NC	1	NC	3
472			min	0	12	-.004	3	0	15	-2.338e-4	1	NC	1	4076.513	1
473		9	max	.001	1	.003	2	.005	1	-1.09e-5	15	NC	1	NC	2
474			min	0	12	-.004	3	0	15	-2.338e-4	1	NC	1	4788.566	1
475		10	max	.001	1	.003	2	.004	1	-1.09e-5	15	NC	1	NC	2
476			min	0	12	-.004	3	0	15	-2.338e-4	1	NC	1	5737.727	1
477		11	max	.001	1	.002	2	.004	1	-1.09e-5	15	NC	1	NC	2
478			min	0	12	-.003	3	0	15	-2.338e-4	1	NC	1	7043.652	1
479		12	max	.001	1	.002	2	.003	1	-1.09e-5	15	NC	1	NC	2
480			min	0	12	-.003	3	0	15	-2.338e-4	1	NC	1	8913.257	1
481		13	max	0	1	.002	2	.002	1	-1.09e-5	15	NC	1	NC	1
482			min	0	12	-.002	3	0	15	-2.338e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.002	1	-1.09e-5	15	NC	1	NC	1
484			min	0	12	-.002	3	0	15	-2.338e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	.001	1	-1.09e-5	15	NC	1	NC	1
486			min	0	12	-.002	3	0	15	-2.338e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
488			min	0	12	-.001	3	0	15	-2.338e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
490			min	0	12	0	3	0	15	-2.338e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-1.09e-5	15	NC	1	NC	1
492			min	0	12	0	3	0	15	-2.338e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-1.09e-5	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.338e-4	1	NC	1	NC	1
495	M1	1	max	.009	3	.162	2	.001	1	1.316e-2	1	NC	1	NC	1
496			min	-.004	2	-.03	3	0	15	-2.069e-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	.08	1	0	15	6.327e-3	1	NC	5	NC	1
498			min	-.004	2	-.013	3	-.01	1	-1.027e-2	3	1620.276	2	NC	1
499		3	max	.009	3	.013	3	0	15	-4.781e-6	10	NC	5	NC	2
500			min	-.004	2	-.011	2	-.014	1	-3.008e-4	1	781.847	2	8946.945	1
501		4	max	.009	3	.057	3	0	15	4.399e-3	1	NC	15	NC	2
502			min	-.004	2	-.111	2	-.013	1	-4.179e-3	3	494.893	2	9634.472	1
503		5	max	.008	3	.112	3	0	15	9.099e-3	1	9864.306	15	NC	1
504			min	-.004	2	-.216	2	-.009	1	-8.251e-3	3	357.006	1	NC	1
505		6	max	.008	3	.172	3	0	15	1.38e-2	1	7783.457	15	NC	1
506			min	-.004	2	-.318	1	-.004	1	-1.232e-2	3	280.38	1	NC	1
507		7	max	.008	3	.229	3	0	1	1.85e-2	1	6556.288	15	NC	1
508			min	-.004	2	-.41	1	0	3	-1.64e-2	3	235.246	1	NC	1
509		8	max	.008	3	.277	3	.001	1	2.32e-2	1	5830.806	15	NC	1
510			min	-.004	2	-.483	1	0	15	-2.047e-2	3	208.596	1	NC	1
511		9	max	.008	3	.309	3	0	15	2.562e-2	1	5451.695	15	NC	1
512			min	-.004	2	-.53	1	0	1	-2.074e-2	3	194.718	1	NC	1
513		10	max	.008	3	.32	3	0	1	2.651e-2	1	5335.936	15	NC	1
514			min	-.004	2	-.545	1	0	15	-1.846e-2	3	190.566	1	NC	1
515		11	max	.007	3	.312	3	0	1	2.816e-2	2	5451.455	15	NC	1
516			min	-.004	2	-.529	1	0	15	-1.619e-2	3	195.027	1	NC	1
517		12	max	.007	3	.286	3	0	15	2.71e-2	2	5830.307	15	NC	1
518			min	-.004	2	-.482	1	-.001	1	-1.373e-2	3	209.545	1	NC	1
519		13	max	.007	3	.244	3	0	15	2.176e-2	2	6555.428	15	NC	1
520			min	-.004	2	-.407	1	0	1	-1.098e-2	3	237.565	1	NC	1
521		14	max	.007	3	.189	3	.003	1	1.642e-2	2	7782.018	15	NC	1
522			min	-.003	2	-.313	1	0	15	-8.23e-3	3	285.333	1	NC	1
523		15	max	.007	3	.128	3	.008	1	1.108e-2	2	9861.841	15	NC	1
524			min	-.003	2	-.208	1	0	15	-5.482e-3	3	367.161	1	NC	1
525		16	max	.006	3	.065	3	.012	1	5.863e-3	1	NC	15	NC	1
526			min	-.003	2	-.102	1	0	15	-2.734e-3	3	517.633	1	NC	1
527		17	max	.006	3	.005	3	.013	1	8.458e-4	1	NC	5	NC	2
528			min	-.003	2	-.006	2	0	15	1.187e-5	12	836.561	1	9533.673	1
529		18	max	.006	3	.08	1	.009	1	9.011e-3	2	NC	5	NC	1
530			min	-.003	2	-.05	3	0	15	-3.193e-3	3	1762.642	1	NC	1
531		19	max	.006	3	.156	1	0	15	1.787e-2	2	NC	1	NC	1
532			min	-.003	2	-.101	3	-.001	1	-6.507e-3	3	NC	1	NC	1
533	M5	1	max	.027	3	.34	2	0	1	0	1	NC	1	NC	1
534			min	-.019	2	-.026	3	0	1	0	1	NC	1	NC	1
535		2	max	.027	3	.164	1	0	1	0	1	NC	5	NC	1
536			min	-.019	2	-.008	3	0	1	0	1	771.115	2	NC	1
537		3	max	.027	3	.041	3	0	1	0	1	NC	15	NC	1
538			min	-.019	2	-.036	2	0	1	0	1	362.086	2	NC	1
539		4	max	.026	3	.149	3	0	1	0	1	6861.773	15	NC	1
540			min	-.018	2	-.274	2	0	1	0	1	221.334	2	NC	1
541		5	max	.026	3	.296	3	0	1	0	1	4786.935	15	NC	1
542			min	-.018	2	-.534	1	0	1	0	1	154.84	1	NC	1
543		6	max	.025	3	.463	3	0	1	0	1	3676.468	15	NC	1
544			min	-.018	2	-.797	1	0	1	0	1	118.871	1	NC	1
545		7	max	.025	3	.625	3	0	1	0	1	3036.617	15	NC	1
546			min	-.017	2	-1.036	1	0	1	0	1	98.131	1	NC	1
547		8	max	.024	3	.762	3	0	1	0	1	2665.339	15	NC	1
548			min	-.017	2	-1.228	1	0	1	0	1	86.091	1	NC	1
549		9	max	.024	3	.85	3	0	1	0	1	2474.999	15	NC	1
550			min	-.016	2	-1.349	1	0	1	0	1	79.919	1	NC	1
551		10	max	.023	3	.882	3	0	1	0	1	2417.612	15	NC	1
552			min	-.016	2	-1.39	1	0	1	0	1	78.087	1	NC	1
553		11	max	.022	3	.86	3	0	1	0	1	2475.1	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	-.016	2	-1.348	1	0	1	0	1	80.064	1	NC	1
555		12	max	.022	3	.785	3	0	1	0	1	2665.584	15	NC	1
556			min	-.016	2	-1.223	1	0	1	0	1	86.568	1	NC	1
557		13	max	.021	3	.665	3	0	1	0	1	3037.129	15	NC	1
558			min	-.015	2	-1.025	1	0	1	0	1	99.373	1	NC	1
559		14	max	.021	3	.513	3	0	1	0	1	3677.486	15	NC	1
560			min	-.015	2	-.778	1	0	1	0	1	121.681	1	NC	1
561		15	max	.02	3	.344	3	0	1	0	1	4788.972	15	NC	1
562			min	-.015	2	-.51	1	0	1	0	1	160.979	1	NC	1
563		16	max	.019	3	.173	3	0	1	0	1	6866.079	15	NC	1
564			min	-.015	2	-.247	1	0	1	0	1	235.861	1	NC	1
565		17	max	.019	3	.014	3	0	1	0	1	NC	15	NC	1
566			min	-.014	2	-.018	2	0	1	0	1	400.456	1	NC	1
567		18	max	.019	3	.167	1	0	1	0	1	NC	5	NC	1
568			min	-.014	2	-.122	3	0	1	0	1	877.891	1	NC	1
569		19	max	.019	3	.319	1	0	1	0	1	NC	1	NC	1
570			min	-.014	2	-.245	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.009	3	.162	2	0	15	2.069e-2	3	NC	1	NC	1
572			min	-.004	2	-.03	3	-.001	1	-1.316e-2	1	NC	1	NC	1
573		2	max	.009	3	.08	1	.01	1	1.027e-2	3	NC	5	NC	1
574			min	-.004	2	-.013	3	0	15	-6.327e-3	1	1620.276	2	NC	1
575		3	max	.009	3	.013	3	.014	1	3.008e-4	1	NC	5	NC	2
576			min	-.004	2	-.011	2	0	15	4.781e-6	10	781.847	2	8946.945	1
577		4	max	.009	3	.057	3	.013	1	4.179e-3	3	NC	15	NC	2
578			min	-.004	2	-.111	2	0	15	-4.399e-3	1	494.893	2	9634.472	1
579		5	max	.008	3	.112	3	.009	1	8.251e-3	3	9864.306	15	NC	1
580			min	-.004	2	-.216	2	0	15	-9.099e-3	1	357.006	1	NC	1
581		6	max	.008	3	.172	3	.004	1	1.232e-2	3	7783.457	15	NC	1
582			min	-.004	2	-.318	1	0	15	-1.38e-2	1	280.38	1	NC	1
583		7	max	.008	3	.229	3	0	3	1.64e-2	3	6556.288	15	NC	1
584			min	-.004	2	-.41	1	0	1	-1.85e-2	1	235.246	1	NC	1
585		8	max	.008	3	.277	3	0	15	2.047e-2	3	5830.806	15	NC	1
586			min	-.004	2	-.483	1	-.001	1	-2.32e-2	1	208.596	1	NC	1
587		9	max	.008	3	.309	3	0	1	2.074e-2	3	5451.695	15	NC	1
588			min	-.004	2	-.53	1	0	15	-2.562e-2	1	194.718	1	NC	1
589		10	max	.008	3	.32	3	0	15	1.846e-2	3	5335.936	15	NC	1
590			min	-.004	2	-.545	1	0	1	-2.651e-2	1	190.566	1	NC	1
591		11	max	.007	3	.312	3	0	15	1.619e-2	3	5451.455	15	NC	1
592			min	-.004	2	-.529	1	0	1	-2.816e-2	2	195.027	1	NC	1
593		12	max	.007	3	.286	3	.001	1	1.373e-2	3	5830.307	15	NC	1
594			min	-.004	2	-.482	1	0	15	-2.71e-2	2	209.545	1	NC	1
595		13	max	.007	3	.244	3	0	1	1.098e-2	3	6555.428	15	NC	1
596			min	-.004	2	-.407	1	0	15	-2.176e-2	2	237.565	1	NC	1
597		14	max	.007	3	.189	3	0	15	8.23e-3	3	7782.018	15	NC	1
598			min	-.003	2	-.313	1	-.003	1	-1.642e-2	2	285.333	1	NC	1
599		15	max	.007	3	.128	3	0	15	5.482e-3	3	9861.841	15	NC	1
600			min	-.003	2	-.208	1	-.008	1	-1.108e-2	2	367.161	1	NC	1
601		16	max	.006	3	.065	3	0	15	2.734e-3	3	NC	15	NC	1
602			min	-.003	2	-.102	1	-.012	1	-5.863e-3	1	517.633	1	NC	1
603		17	max	.006	3	.005	3	0	15	-1.187e-5	12	NC	5	NC	2
604			min	-.003	2	-.006	2	-.013	1	-8.458e-4	1	836.561	1	9533.673	1
605		18	max	.006	3	.08	1	0	15	3.193e-3	3	NC	5	NC	1
606			min	-.003	2	-.05	3	-.009	1	-9.011e-3	2	1762.642	1	NC	1
607		19	max	.006	3	.156	1	.001	1	6.507e-3	3	NC	1	NC	1
608			min	-.003	2	-.101	3	0	15	-1.787e-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

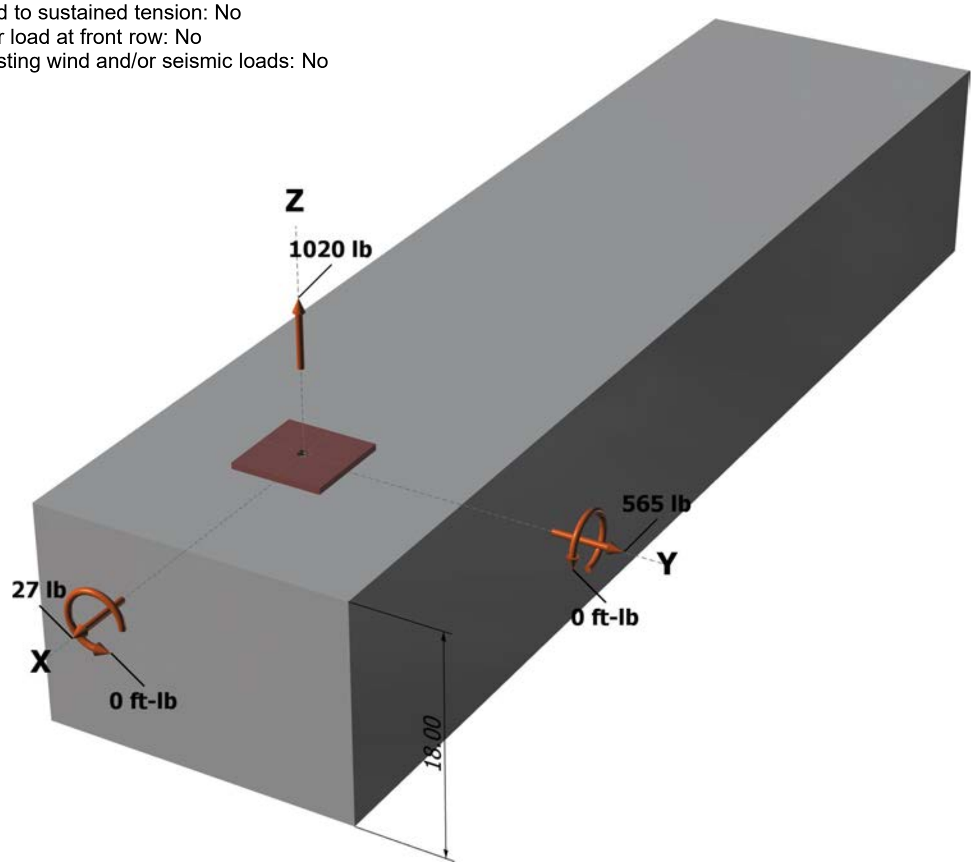
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

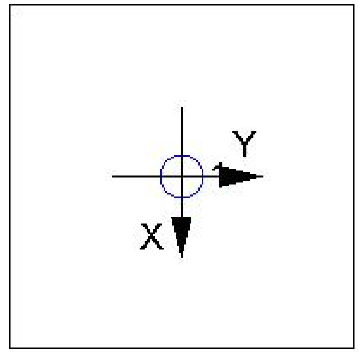
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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)

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
192.89	220.50	0.925	1.000	1.000	6947	0.70	3934

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
165.27	278.72	0.878	1.000	1.000	8282	0.70	3018

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	7.00	6947

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
192.89	220.50	1.000	1.000	1.000	6947	0.70	8508

Shear parallel to edge in y-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
165.27	278.72	1.000	1.000	1.000	8282	0.70	6875

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
220.36	247.75	0.967	1.000	1.000	10215	8785	0.70	12298

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	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, 21-31 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

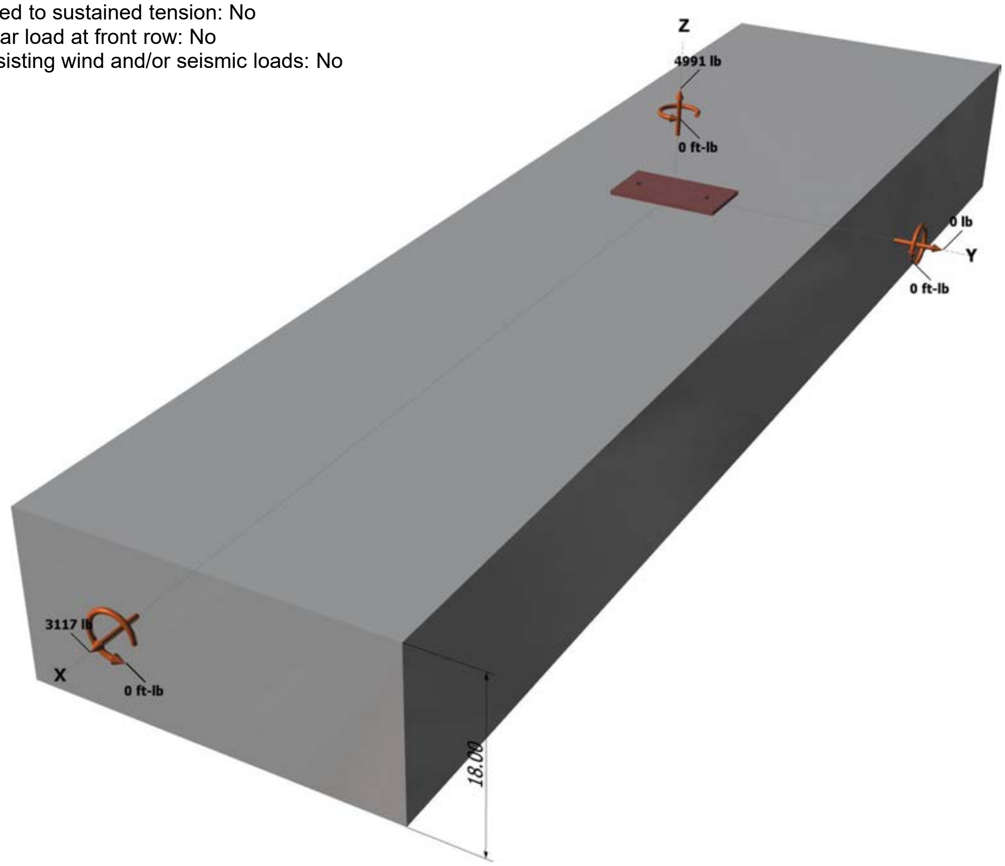
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

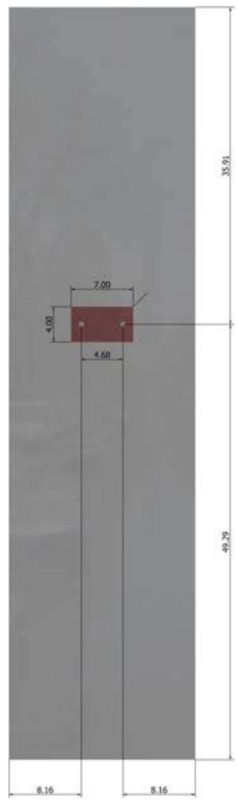
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



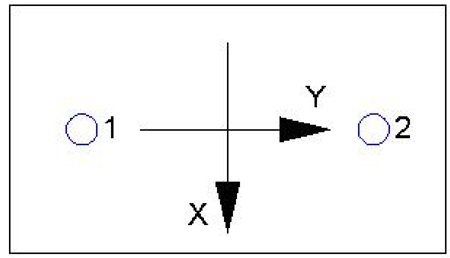
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
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)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.16	8744

$\phi V_{cbx} = \phi\, (2)(A_{Vc} / A_{Vco})\, \Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

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	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	1559	3156	0.49	Pass
T Concrete breakout x+	**3117**	**5323**	**0.59**	**Pass (Governs)**

|| Concrete breakout y-	**1559**	**12241**	**0.13**	**Pass (Governs)**
Pryout	3117	19833	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	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.