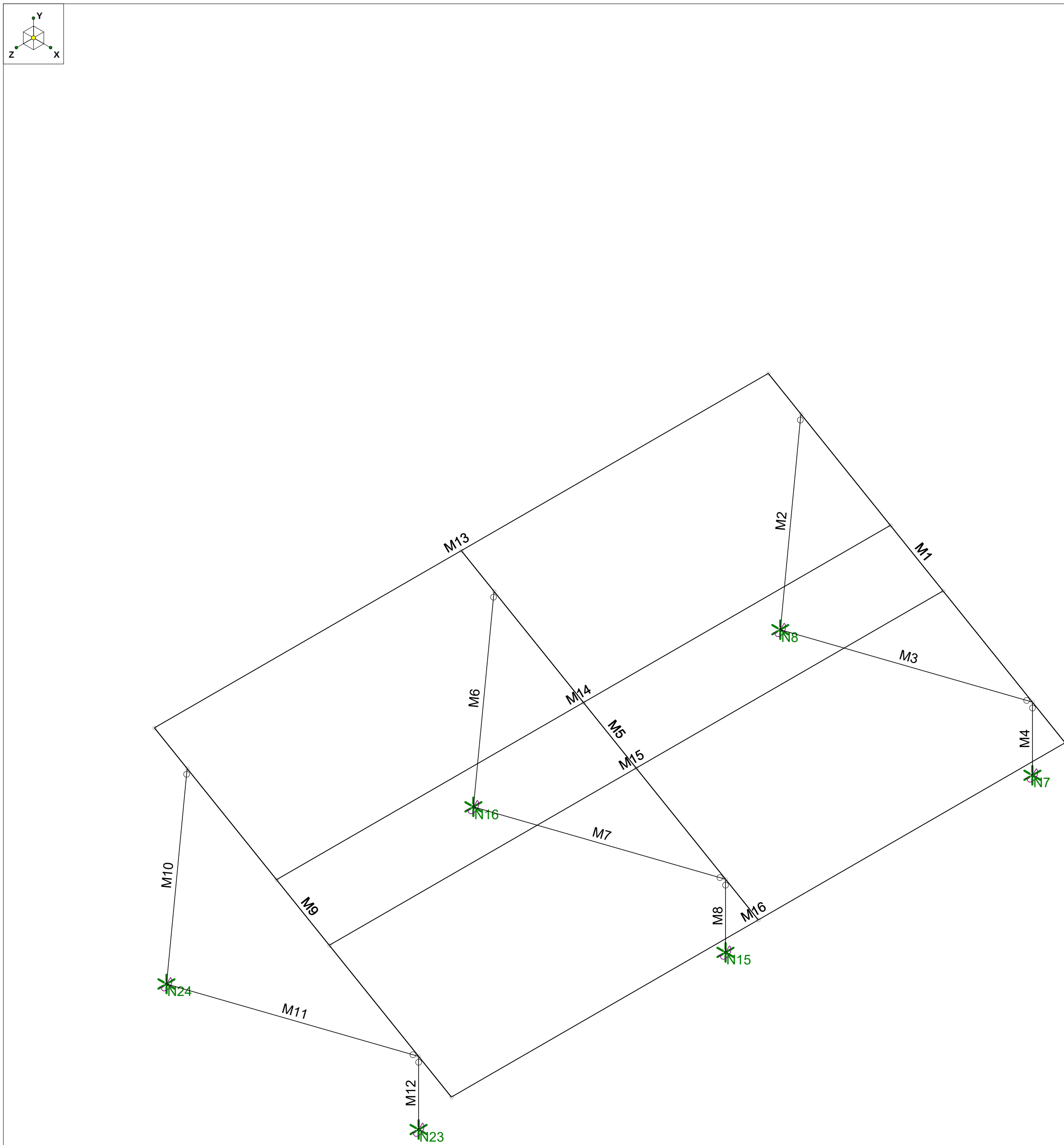


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

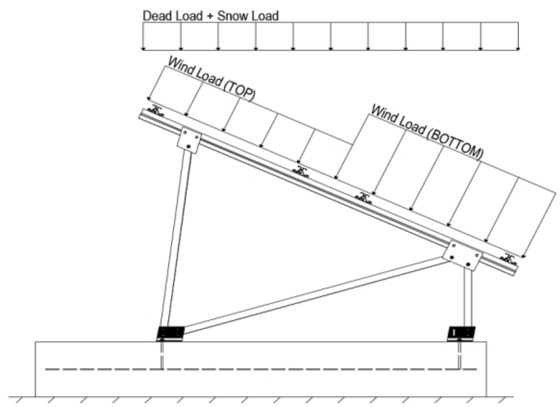
1.2 Construction

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 = 130 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 26.53 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

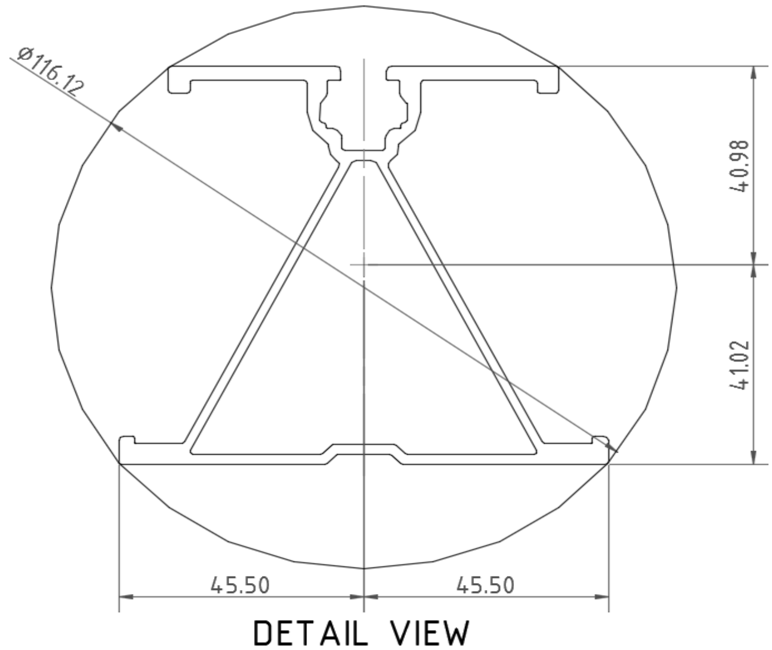
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

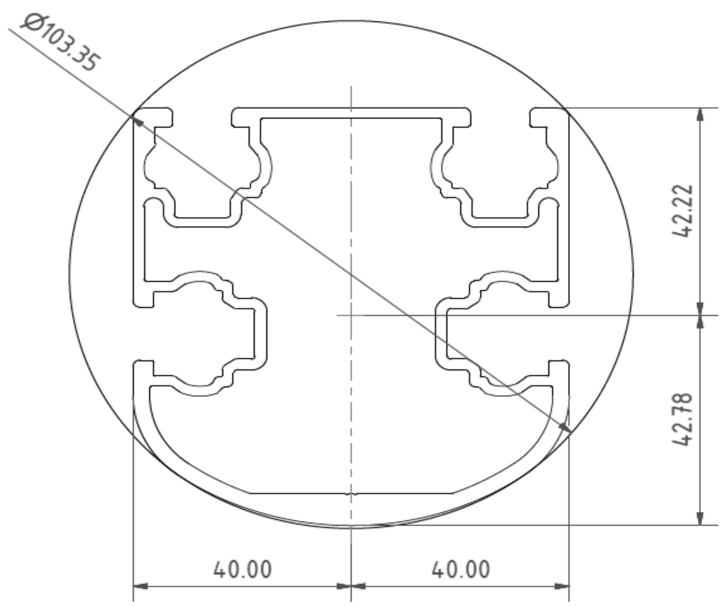
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	72	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.496	k-ft
M_z =	-0.010	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	55%	



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).

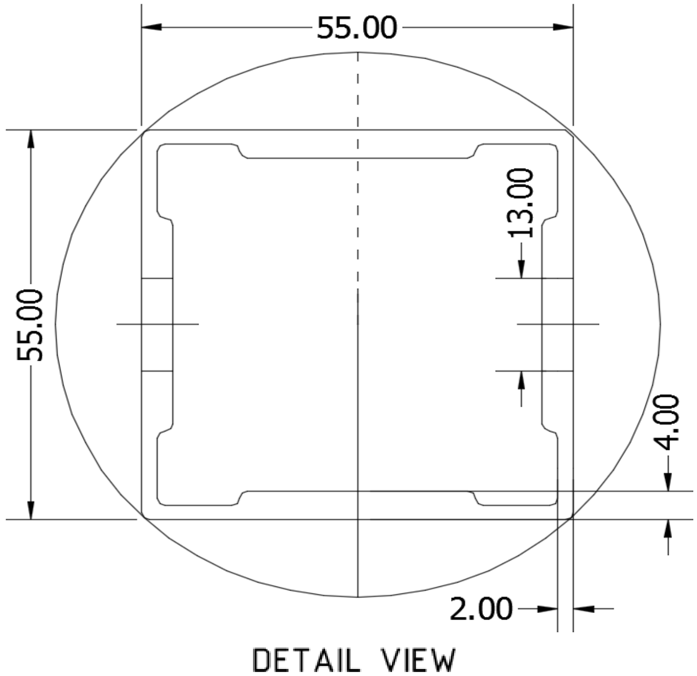
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.201	k-ft
M_z =	0.000	k-ft
P_n =	1.945	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	97%	



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).

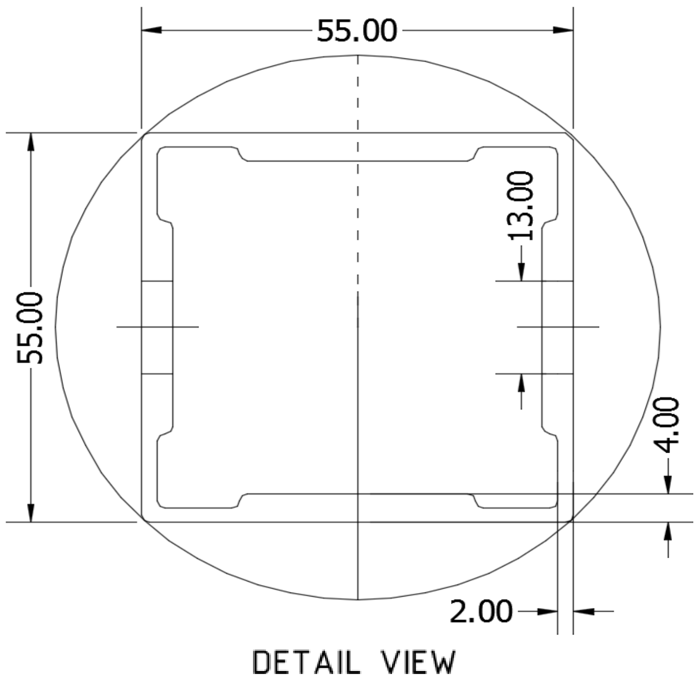
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.391	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	9%	



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).

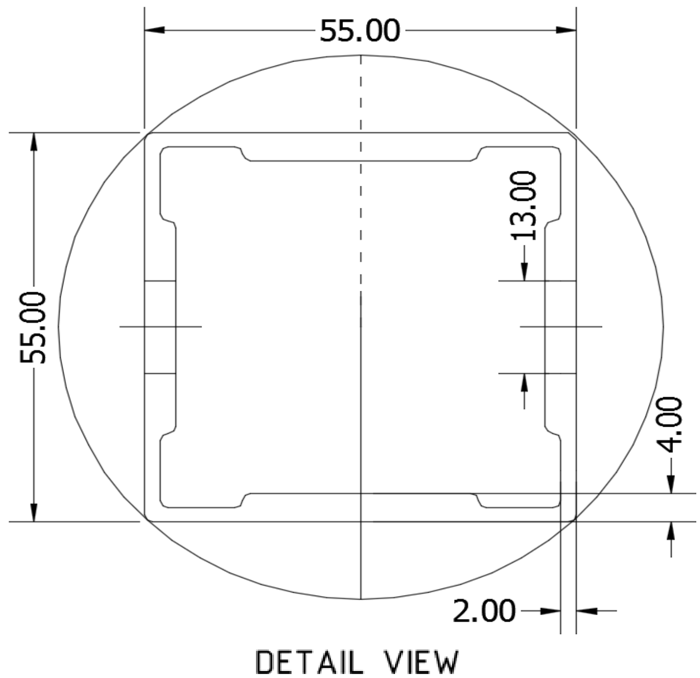
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.750	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	47%	



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 =	-0.012	k-ft
M_z =	0.000	k-ft
P_n =	3.186	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	37%	



5. FOUNDATION DESIGN CALCULATIONS

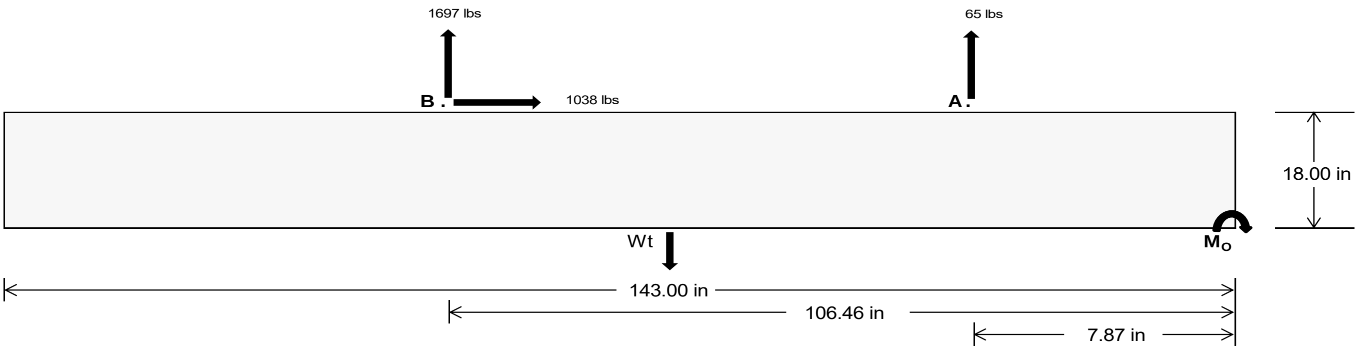
5.1 Helical Pile Foundations

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 =	279.52	7064.99	k
Compressive Load =	3108.19	5001.26	k
Lateral Load =	7.77	4316.75	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



<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 (3) #5 rebar.

<u>Overturning Check</u>

M_O = 199893.4 in-lbs
Resisting Force Required = 2795.71 lbs
S.F. = 1.67
Weight Required = 4659.52 lbs
Minimum Width = <u>36 in</u> in
Weight Provided = 7775.63 lbs

A minimum 143in long x 36in wide x 18in tall ballast foundation is required to resist overturning.

<u>Sliding</u>

Force = 1038.25 lbs
Friction = 0.4
Weight Required = 2595.62 lbs
Resisting Weight = 7775.63 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 36in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

<u>Cohesion</u>

Sliding Force = 1038.25 lbs
Cohesion = 130 psf
Area = 35.75 ft^2
Resisting = 3887.81 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 36in 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			
	<u>36 in</u>	<u>37 in</u>	<u>38 in</u>	<u>39 in</u>
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(3 ft) =	<u>7776 lbs</u>	<u>7992 lbs</u>	<u>8208 lbs</u>	<u>8424 lbs</u>

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in
F_A	843 lbs	843 lbs	843 lbs	843 lbs	1334 lbs	1334 lbs	1334 lbs	1334 lbs	1541 lbs	1541 lbs	1541 lbs	1541 lbs	-130 lbs	-130 lbs	-130 lbs	-130 lbs
F_B	806 lbs	806 lbs	806 lbs	806 lbs	2249 lbs	2249 lbs	2249 lbs	2249 lbs	2204 lbs	2204 lbs	2204 lbs	2204 lbs	-3395 lbs	-3395 lbs	-3395 lbs	-3395 lbs
F_V	89 lbs	89 lbs	89 lbs	89 lbs	1853 lbs	1853 lbs	1853 lbs	1853 lbs	1448 lbs	1448 lbs	1448 lbs	1448 lbs	-2076 lbs	-2076 lbs	-2076 lbs	-2076 lbs
P_{total}	9425 lbs	9641 lbs	9857 lbs	10073 lbs	11359 lbs	11575 lbs	11791 lbs	12007 lbs	11521 lbs	11737 lbs	11953 lbs	12169 lbs	1141 lbs	1270 lbs	1400 lbs	1529 lbs
M	2254 lbs-ft	2254 lbs-ft	2254 lbs-ft	2254 lbs-ft	3301 lbs-ft	3301 lbs-ft	3301 lbs-ft	3301 lbs-ft	3922 lbs-ft	3922 lbs-ft	3922 lbs-ft	3922 lbs-ft	6084 lbs-ft	6084 lbs-ft	6084 lbs-ft	6084 lbs-ft
e	0.24 ft	0.23 ft	0.23 ft	0.22 ft	0.29 ft	0.29 ft	0.28 ft	0.27 ft	0.34 ft	0.33 ft	0.33 ft	0.32 ft	5.33 ft	4.79 ft	4.35 ft	3.98 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}	231.9 psf	231.5 psf	231.1 psf	230.8 psf	271.2 psf	269.8 psf	268.4 psf	267.1 psf	267.0 psf	265.7 psf	264.4 psf	263.2 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	295.4 psf	293.3 psf	291.3 psf	289.4 psf	364.2 psf	360.3 psf	356.5 psf	352.9 psf	377.5 psf	373.2 psf	369.1 psf	365.2 psf	406.2 psf	235.1 psf	182.8 psf	158.4 psf

Maximum Bearing Pressure = 406 psf
Allowable Bearing Pressure = 1500 psf

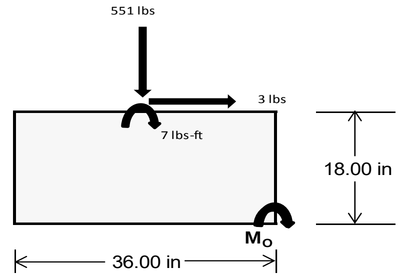
Use a 143in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

<u>Overturning Check</u>

M_O = 814.7 ft-lbs
Resisting Force Required = 543.12 lbs
S.F. = 1.67
Weight Required = 905.21 lbs
Minimum Width = 36 in in
Weight Provided = 7775.63 lbs

A minimum 143in long x 36in wide x 18in tall ballast foundation is required to resist overturning.



<u>Bearing Pressure</u>

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	36 in			36 in			36 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	201 lbs	444 lbs	201 lbs	551 lbs	1391 lbs	551 lbs	59 lbs	130 lbs	59 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9827 lbs	7776 lbs	9827 lbs	9715 lbs	7776 lbs	9715 lbs	2874 lbs	7776 lbs	2874 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	12 lbs-ft	0 lbs-ft	12 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft
f_{min}	274.7 psf	217.5 psf	274.7 psf	271.1 psf	217.5 psf	271.1 psf	80.4 psf	217.5 psf	80.4 psf
f_{max}	275.1 psf	217.5 psf	275.1 psf	272.4 psf	217.5 psf	272.4 psf	80.4 psf	217.5 psf	80.4 psf

Maximum Bearing Pressure = 275 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

<u>Foundation Requirements: 143in long x 38in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.</u>

5.3 Foundation Anchors

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

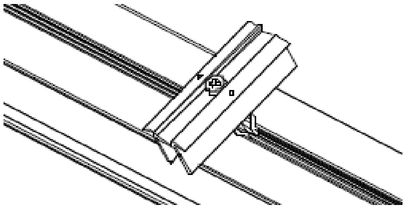
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

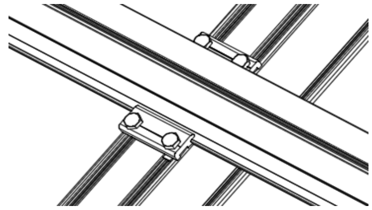
Fastening of Modules to Purlins

Maximum Uplifting Force =	1.230 k
Allowable Uplift =	1.214 k
Utilization =	101% ≤ 102%, Φ = 0.66



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.649 k
Allowable Uplift =	4.357 k
Utilization =	61%



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 =	2.391 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	32%

Rear Strut

Maximum Axial Load =	4.763 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	64%

Diagonal Strut

Maximum Axial Load =	2.911 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	39%

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.

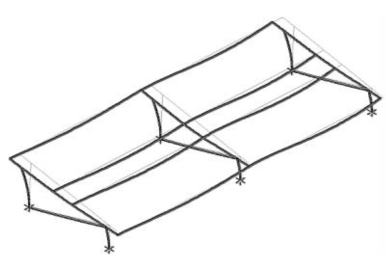
7. SEISMIC DESIGN

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} =	0.01 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 =	72 in	L_b =	72
J =	0.432	J =	0.432
	199.186		126.67
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
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=	28.8 ksi	φF_L=	29.7
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

3.4.18

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

$\varphi F_L St$ = 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

3.4.16.1

N/A for Weak Direction

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

$\varphi F_L Wk$ = 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

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

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

$M_{max}St$ = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 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 in^3

$M_{max}Wk$ = 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

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

$\varphi F_L =$ 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 in³

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 in³

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)/(λ²)

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	-100.114	-100.114	0	0
2	M14	y	-100.114	-100.114	0	0
3	M15	y	-161.053	-161.053	0	0
4	M16	y	-161.053	-161.053	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	226.345	226.345	0	0
2	M14	y	174.112	174.112	0	0
3	M15	y	95.761	95.761	0	0
4	M16	y	95.761	95.761	0	0

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	1010.604	2	1352.337	2	.311	1	.001	1	0	1	0	1
2		min	-1181.069	3	-1850.502	3	.017	15	0	10	0	1	0	1
3	N7	max	.015	9	849.353	1	-.298	15	0	15	0	1	0	1
4		min	-.298	2	-33.53	3	-5.975	1	-.011	1	0	1	0	1
5	N15	max	.015	9	2390.917	2	0	2	0	14	0	1	0	1
6		min	-2.533	2	-215.019	3	0	3	0	12	0	1	0	1
7	N16	max	2996.326	2	3847.126	2	0	3	0	3	0	1	0	1
8		min	-3320.577	3	-5434.607	3	0	11	0	2	0	1	0	1
9	N23	max	.015	9	849.353	1	5.975	1	.011	1	0	1	0	1
10		min	-.298	2	-33.53	3	.298	15	0	15	0	1	0	1
11	N24	max	1010.604	2	1352.337	2	-.017	15	0	10	0	1	0	1
12		min	-1181.069	3	-1850.502	3	-.311	1	-.001	1	0	1	0	1
13	Totals:	max	5014.406	2	10630.201	2	0	2						
14		min	-5682.998	3	-9417.689	3	0	12						

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	33.502	1	421.151	2	-5.777	15	0	15	.093	1	0	2
2			min	1.662	10	-820.851	3	-122.219	1	-.013	3	.005	10	0	3
3		2	max	33.502	1	292.972	2	-4.408	15	0	15	.021	1	.468	3
4			min	1.662	10	-583.032	3	-92.685	1	-.013	3	-.003	10	-.238	2
5		3	max	33.502	1	164.793	2	-3.039	15	0	15	.007	3	.777	3
6			min	1.662	10	-345.213	3	-63.151	1	-.013	3	-.031	1	-.391	2
7		4	max	33.502	1	36.614	2	-1.624	10	0	15	0	3	.928	3
8			min	1.662	10	-107.394	3	-33.617	1	-.013	3	-.063	1	-.458	2
9		5	max	33.502	1	130.425	3	2.158	10	0	15	-.003	12	.921	3
10			min	1.662	10	-91.564	2	-6.873	3	-.013	3	-.075	1	-.439	2
11		6	max	33.502	1	368.245	3	25.451	1	0	15	-.003	15	.754	3
12			min	1.662	10	-219.743	2	-4.785	3	-.013	3	-.068	1	-.336	2
13		7	max	33.502	1	606.064	3	54.985	1	0	15	-.002	10	.43	3
14			min	1.662	10	-347.922	2	-2.698	3	-.013	3	-.041	1	-.146	2
15		8	max	33.502	1	843.883	3	84.519	1	0	15	.009	2	.128	2
16			min	1.662	10	-476.101	2	-.611	3	-.013	3	-.012	3	-.054	3
17		9	max	33.502	1	1081.702	3	114.053	1	0	15	.071	1	.488	2
18			min	1.662	10	-604.28	2	1.243	12	-.013	3	-.012	3	-.696	3
19		10	max	33.502	1	732.459	2	-2.635	12	.013	3	.157	1	.934	2
20			min	1.662	10	-1319.521	3	-143.587	1	-.009	2	-.01	3	-1.496	3
21		11	max	33.502	1	604.28	2	-1.243	12	.013	3	.071	1	.488	2
22			min	1.662	10	-1081.702	3	-114.053	1	0	15	-.012	3	-.696	3
23		12	max	33.502	1	476.101	2	.611	3	.013	3	.009	2	.128	2
24			min	1.662	10	-843.883	3	-84.519	1	0	15	-.012	3	-.054	3
25		13	max	33.502	1	347.922	2	2.698	3	.013	3	-.002	10	.43	3
26			min	1.662	10	-606.064	3	-54.985	1	0	15	-.041	1	-.146	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	33.502	1	219.743	2	4.785	3	.013	3	-.003	15	.754	3
28			min	1.662	10	-368.245	3	-25.451	1	0	15	-.068	1	-.336	2
29		15	max	33.502	1	91.564	2	6.873	3	.013	3	-.003	12	.921	3
30			min	1.662	10	-130.425	3	-2.158	10	0	15	-.075	1	-.439	2
31		16	max	33.502	1	107.394	3	33.617	1	.013	3	0	3	.928	3
32			min	1.662	10	-36.614	2	1.624	10	0	15	-.063	1	-.458	2
33		17	max	33.502	1	345.213	3	63.151	1	.013	3	.007	3	.777	3
34			min	1.662	10	-164.793	2	3.039	15	0	15	-.031	1	-.391	2
35		18	max	33.502	1	583.032	3	92.685	1	.013	3	.021	1	.468	3
36			min	1.662	10	-292.972	2	4.408	15	0	15	-.003	10	-.238	2
37		19	max	33.502	1	820.851	3	122.219	1	.013	3	.093	1	0	2
38			min	1.662	10	-421.151	2	5.777	15	0	15	.005	10	0	3
39	M14	1	max	25.376	1	534.414	2	-6.081	15	.016	3	.118	1	0	2
40			min	1.242	15	-700.059	3	-128.56	1	-.016	2	.006	15	0	3
41		2	max	25.376	1	406.235	2	-4.711	15	.016	3	.042	1	.406	3
42			min	1.242	15	-517.955	3	-99.026	1	-.016	2	-.001	10	-.314	2
43		3	max	25.376	1	278.056	2	-3.342	15	.016	3	.01	3	.691	3
44			min	1.242	15	-335.851	3	-69.491	1	-.016	2	-.014	1	-.542	2
45		4	max	25.376	1	149.877	2	-1.973	15	.016	3	.003	3	.854	3
46			min	1.242	15	-153.748	3	-39.957	1	-.016	2	-.05	1	-.684	2
47		5	max	25.376	1	28.356	3	1.577	10	.016	3	-.002	12	.896	3
48			min	1.242	15	.071	15	-10.423	1	-.016	2	-.067	1	-.741	2
49		6	max	25.376	1	210.46	3	19.111	1	.016	3	-.003	15	.816	3
50			min	1.242	15	-106.481	2	-5.564	3	-.016	2	-.064	1	-.713	2
51		7	max	25.376	1	392.564	3	48.645	1	.016	3	-.002	15	.615	3
52			min	1.242	15	-234.659	2	-3.476	3	-.016	2	-.042	1	-.6	2
53		8	max	25.376	1	574.668	3	78.179	1	.016	3	.007	2	.293	3
54			min	1.242	15	-362.838	2	-1.389	3	-.016	2	-.012	3	-.4	2
55		9	max	25.376	1	756.772	3	107.713	1	.016	3	.063	1	0	15
56			min	1.242	15	-491.017	2	.698	3	-.016	2	-.012	3	-.151	3
57		10	max	25.376	1	619.196	2	-2.128	12	.016	3	.144	1	.254	2
58			min	1.242	15	-938.876	3	-137.247	1	-.016	2	-.011	3	-.716	3
59		11	max	25.376	1	491.017	2	-.698	3	.016	2	.063	1	0	15
60			min	1.242	15	-756.772	3	-107.713	1	-.016	3	-.012	3	-.151	3
61		12	max	25.376	1	362.838	2	1.389	3	.016	2	.007	2	.293	3
62			min	1.242	15	-574.668	3	-78.179	1	-.016	3	-.012	3	-.4	2
63		13	max	25.376	1	234.659	2	3.476	3	.016	2	-.002	15	.615	3
64			min	1.242	15	-392.564	3	-48.645	1	-.016	3	-.042	1	-.6	2
65		14	max	25.376	1	106.481	2	5.564	3	.016	2	-.003	15	.816	3
66			min	1.242	15	-210.46	3	-19.111	1	-.016	3	-.064	1	-.713	2
67		15	max	25.376	1	-.071	15	10.423	1	.016	2	-.002	12	.896	3
68			min	1.242	15	-28.356	3	-1.577	10	-.016	3	-.067	1	-.741	2
69		16	max	25.376	1	153.748	3	39.957	1	.016	2	.003	3	.854	3
70			min	1.242	15	-149.877	2	1.973	15	-.016	3	-.05	1	-.684	2
71		17	max	25.376	1	335.851	3	69.491	1	.016	2	.01	3	.691	3
72			min	1.242	15	-278.056	2	3.342	15	-.016	3	-.014	1	-.542	2
73		18	max	25.376	1	517.955	3	99.026	1	.016	2	.042	1	.406	3
74			min	1.242	15	-406.235	2	4.711	15	-.016	3	-.001	10	-.314	2
75		19	max	25.376	1	700.059	3	128.56	1	.016	2	.118	1	0	2
76			min	1.242	15	-534.414	2	6.081	15	-.016	3	.006	15	0	3
77	M15	1	max	-1.284	10	754.209	2	-6.077	15	.017	2	.118	1	0	2
78			min	-26.184	1	-419.41	3	-128.641	1	-.014	3	.006	15	0	3
79		2	max	-1.284	10	561.028	2	-4.708	15	.017	2	.042	1	.247	3
80			min	-26.184	1	-320.88	3	-99.107	1	-.014	3	0	10	-.438	2
81		3	max	-1.284	10	367.848	2	-3.338	15	.017	2	.009	3	.428	3
82			min	-26.184	1	-222.351	3	-69.573	1	-.014	3	-.014	1	-.748	2
83		4	max	-1.284	10	174.668	2	-1.969	15	.017	2	.002	3	.543	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	-26.184	1	-123.821	3	-40.039	1	-.014	3	-.05	1	-.929	2
85		5	max	-1.284	10	.887	9	1.386	10	.017	2	-.002	12	.593	3
86			min	-26.184	1	-25.291	3	-10.505	1	-.014	3	-.067	1	-.981	2
87		6	max	-1.284	10	73.238	3	19.029	1	.017	2	-.003	15	.577	3
88			min	-26.184	1	-211.693	2	-4.965	3	-.014	3	-.064	1	-.904	2
89		7	max	-1.284	10	171.768	3	48.563	1	.017	2	-.002	15	.495	3
90			min	-26.184	1	-404.874	2	-2.877	3	-.014	3	-.042	1	-.699	2
91		8	max	-1.284	10	270.297	3	78.097	1	.017	2	.007	2	.348	3
92			min	-26.184	1	-598.054	2	-.79	3	-.014	3	-.011	3	-.364	2
93		9	max	-1.284	10	368.827	3	107.631	1	.017	2	.062	1	.135	3
94			min	-26.184	1	-791.235	2	1.112	12	-.014	3	-.011	3	-.005	9
95		10	max	-1.284	10	984.415	2	-2.504	12	.017	2	.144	1	.691	2
96			min	-26.184	1	-467.356	3	-137.165	1	-.014	3	-.009	3	-.144	3
97		11	max	-1.284	10	791.235	2	-1.112	12	.014	3	.062	1	.135	3
98			min	-26.184	1	-368.827	3	-107.631	1	-.017	2	-.011	3	-.005	9
99		12	max	-1.284	10	598.054	2	.79	3	.014	3	.007	2	.348	3
100			min	-26.184	1	-270.297	3	-78.097	1	-.017	2	-.011	3	-.364	2
101		13	max	-1.284	10	404.874	2	2.877	3	.014	3	-.002	15	.495	3
102			min	-26.184	1	-171.768	3	-48.563	1	-.017	2	-.042	1	-.699	2
103		14	max	-1.284	10	211.693	2	4.965	3	.014	3	-.003	15	.577	3
104			min	-26.184	1	-73.238	3	-19.029	1	-.017	2	-.064	1	-.904	2
105		15	max	-1.284	10	25.291	3	10.505	1	.014	3	-.002	12	.593	3
106			min	-26.184	1	-.887	9	-1.386	10	-.017	2	-.067	1	-.981	2
107		16	max	-1.284	10	123.821	3	40.039	1	.014	3	.002	3	.543	3
108			min	-26.184	1	-174.668	2	1.969	15	-.017	2	-.05	1	-.929	2
109		17	max	-1.284	10	222.351	3	69.573	1	.014	3	.009	3	.428	3
110			min	-26.184	1	-367.848	2	3.338	15	-.017	2	-.014	1	-.748	2
111		18	max	-1.284	10	320.88	3	99.107	1	.014	3	.042	1	.247	3
112			min	-26.184	1	-561.028	2	4.708	15	-.017	2	0	10	-.438	2
113		19	max	-1.284	10	419.41	3	128.641	1	.014	3	.118	1	0	2
114			min	-26.184	1	-754.209	2	6.077	15	-.017	2	.006	15	0	3
115	M16	1	max	-1.883	15	649.139	2	-5.792	15	.002	1	.096	1	0	2
116			min	-38.358	1	-317.923	3	-123.024	1	-.01	3	.005	15	0	3
117		2	max	-1.883	15	455.959	2	-4.423	15	.002	1	.023	1	.179	3
118			min	-38.358	1	-219.393	3	-93.49	1	-.01	3	-.002	10	-.368	2
119		3	max	-1.883	15	262.779	2	-3.053	15	.002	1	.005	3	.293	3
120			min	-38.358	1	-120.864	3	-63.956	1	-.01	3	-.029	1	-.608	2
121		4	max	-1.883	15	69.598	2	-1.684	15	.002	1	0	12	.34	3
122			min	-38.358	1	-22.334	3	-34.422	1	-.01	3	-.062	1	-.719	2
123		5	max	-1.883	15	76.195	3	1.502	10	.002	1	-.003	12	.322	3
124			min	-38.358	1	-123.582	2	-5.031	3	-.01	3	-.075	1	-.701	2
125		6	max	-1.883	15	174.725	3	24.646	1	.002	1	-.003	15	.239	3
126			min	-38.358	1	-316.763	2	-2.943	3	-.01	3	-.068	1	-.554	2
127		7	max	-1.883	15	273.254	3	54.18	1	.002	1	-.002	15	.089	3
128			min	-38.358	1	-509.943	2	-.856	3	-.01	3	-.042	1	-.278	2
129		8	max	-1.883	15	371.784	3	83.714	1	.002	1	.007	2	.126	2
130			min	-38.358	1	-703.124	2	1.004	12	-.01	3	-.009	3	-.126	3
131		9	max	-1.883	15	470.313	3	113.248	1	.002	1	.069	1	.659	2
132			min	-38.358	1	-896.304	2	2.396	12	-.01	3	-.007	3	-.406	3
133		10	max	-1.883	15	1089.485	2	-3.787	12	.002	1	.155	1	1.321	2
134			min	-38.358	1	-568.843	3	-142.782	1	-.01	3	-.004	3	-.753	3
135		11	max	-1.883	15	896.304	2	-2.396	12	.01	3	.069	1	.659	2
136			min	-38.358	1	-470.313	3	-113.248	1	-.002	1	-.007	3	-.406	3
137		12	max	-1.883	15	703.124	2	-1.004	12	.01	3	.007	2	.126	2
138			min	-38.358	1	-371.784	3	-83.714	1	-.002	1	-.009	3	-.126	3
139		13	max	-1.883	15	509.943	2	.856	3	.01	3	-.002	15	.089	3
140			min	-38.358	1	-273.254	3	-54.18	1	-.002	1	-.042	1	-.278	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	-1.883	15	316.763	2	2.943	3	.01	3	-.003	15	.239	3
142			min	-38.358	1	-174.725	3	-24.646	1	-.002	1	-.068	1	-.554	2
143		15	max	-1.883	15	123.582	2	5.031	3	.01	3	-.003	12	.322	3
144			min	-38.358	1	-76.195	3	-1.502	10	-.002	1	-.075	1	-.701	2
145		16	max	-1.883	15	22.334	3	34.422	1	.01	3	0	12	.34	3
146			min	-38.358	1	-69.598	2	1.684	15	-.002	1	-.062	1	-.719	2
147		17	max	-1.883	15	120.864	3	63.956	1	.01	3	.005	3	.293	3
148			min	-38.358	1	-262.779	2	3.053	15	-.002	1	-.029	1	-.608	2
149		18	max	-1.883	15	219.393	3	93.49	1	.01	3	.023	1	.179	3
150			min	-38.358	1	-455.959	2	4.423	15	-.002	1	-.002	10	-.368	2
151		19	max	-1.883	15	317.923	3	123.024	1	.01	3	.096	1	0	2
152			min	-38.358	1	-649.139	2	5.792	15	-.002	1	.005	15	0	3
153	M2	1	max	1117.033	2	2.026	4	.183	1	0	2	0	3	0	1
154			min	-1616.558	3	.476	15	.009	15	0	1	0	2	0	1
155		2	max	1117.563	2	1.955	4	.183	1	0	2	0	1	0	15
156			min	-1616.161	3	.459	15	.009	15	0	1	0	10	0	4
157		3	max	1118.092	2	1.883	4	.183	1	0	2	0	1	0	15
158			min	-1615.764	3	.443	15	.009	15	0	1	0	10	-.001	4
159		4	max	1118.621	2	1.812	4	.183	1	0	2	0	1	0	15
160			min	-1615.367	3	.426	15	.009	15	0	1	0	10	-.002	4
161		5	max	1119.151	2	1.741	4	.183	1	0	2	0	1	0	15
162			min	-1614.97	3	.409	15	.009	15	0	1	0	10	-.003	4
163		6	max	1119.68	2	1.67	4	.183	1	0	2	0	1	0	15
164			min	-1614.573	3	.393	15	.009	15	0	1	0	10	-.003	4
165		7	max	1120.209	2	1.599	4	.183	1	0	2	0	1	0	15
166			min	-1614.176	3	.376	15	.009	15	0	1	0	10	-.004	4
167		8	max	1120.738	2	1.528	4	.183	1	0	2	0	1	-.001	15
168			min	-1613.779	3	.359	15	.009	15	0	1	0	10	-.004	4
169		9	max	1121.268	2	1.457	4	.183	1	0	2	0	1	-.001	15
170			min	-1613.382	3	.343	15	.009	15	0	1	0	10	-.005	4
171		10	max	1121.797	2	1.386	4	.183	1	0	2	0	1	-.001	15
172			min	-1612.985	3	.326	15	.009	15	0	1	0	10	-.006	4
173		11	max	1122.326	2	1.315	4	.183	1	0	2	0	1	-.001	15
174			min	-1612.588	3	.305	12	.009	15	0	1	0	10	-.006	4
175		12	max	1122.856	2	1.244	4	.183	1	0	2	0	1	-.002	15
176			min	-1612.191	3	.278	12	.009	15	0	1	0	10	-.006	4
177		13	max	1123.385	2	1.173	4	.183	1	0	2	0	1	-.002	15
178			min	-1611.794	3	.25	12	.009	15	0	1	0	10	-.007	4
179		14	max	1123.914	2	1.102	4	.183	1	0	2	0	1	-.002	15
180			min	-1611.397	3	.222	12	.009	15	0	1	0	10	-.007	4
181		15	max	1124.443	2	1.047	2	.183	1	0	2	0	1	-.002	15
182			min	-1611	3	.195	12	.009	15	0	1	0	10	-.008	4
183		16	max	1124.973	2	.991	2	.183	1	0	2	0	1	-.002	15
184			min	-1610.603	3	.167	12	.009	15	0	1	0	10	-.008	4
185		17	max	1125.502	2	.936	2	.183	1	0	2	.001	1	-.002	15
186			min	-1610.206	3	.139	12	.009	15	0	1	0	10	-.008	4
187		18	max	1126.031	2	.881	2	.183	1	0	2	.001	1	-.002	15
188			min	-1609.809	3	.112	12	.009	15	0	1	0	10	-.009	4
189		19	max	1126.561	2	.825	2	.183	1	0	2	.001	1	-.002	15
190			min	-1609.412	3	.084	12	.009	15	0	1	0	10	-.009	4
191	M3	1	max	922.414	2	8.877	4	.163	1	0	5	0	1	.009	4
192			min	-1043.715	3	2.087	15	.008	15	0	1	0	10	.002	15
193		2	max	922.243	2	8.008	4	.163	1	0	5	0	1	.005	2
194			min	-1043.842	3	1.882	15	.008	15	0	1	0	15	0	12
195		3	max	922.073	2	7.139	4	.163	1	0	5	0	1	.002	2
196			min	-1043.97	3	1.678	15	.008	15	0	1	0	15	-.001	3
197		4	max	921.903	2	6.27	4	.163	1	0	5	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-1044.098	3	1.474	15	.008	15	0	1	0	15	-.003	3
199		5	max	921.732	2	5.401	4	.163	1	0	5	0	1	-.001	15
200			min	-1044.226	3	1.27	15	.008	15	0	1	0	15	-.004	4
201		6	max	921.562	2	4.532	4	.163	1	0	5	0	1	-.002	15
202			min	-1044.354	3	1.065	15	.008	15	0	1	0	15	-.007	4
203		7	max	921.392	2	3.663	4	.163	1	0	5	0	1	-.002	15
204			min	-1044.481	3	.861	15	.008	15	0	1	0	15	-.009	4
205		8	max	921.221	2	2.794	4	.163	1	0	5	0	1	-.002	15
206			min	-1044.609	3	.657	15	.008	15	0	1	0	15	-.01	4
207		9	max	921.051	2	1.926	4	.163	1	0	5	0	1	-.003	15
208			min	-1044.737	3	.453	15	.008	15	0	1	0	15	-.011	4
209		10	max	920.881	2	1.057	4	.163	1	0	5	0	1	-.003	15
210			min	-1044.865	3	.248	15	.008	15	0	1	0	15	-.012	4
211		11	max	920.71	2	.332	2	.163	1	0	5	0	1	-.003	15
212			min	-1044.992	3	-.143	3	.008	15	0	1	0	15	-.012	4
213		12	max	920.54	2	-.16	15	.163	1	0	5	0	1	-.003	15
214			min	-1045.12	3	-.681	4	.008	15	0	1	0	15	-.012	4
215		13	max	920.37	2	-.364	15	.163	1	0	5	.001	1	-.003	15
216			min	-1045.248	3	-1.55	4	.008	15	0	1	0	15	-.012	4
217		14	max	920.199	2	-.569	15	.163	1	0	5	.001	1	-.003	15
218			min	-1045.376	3	-2.419	4	.008	15	0	1	0	15	-.011	4
219		15	max	920.029	2	-.773	15	.163	1	0	5	.001	1	-.002	15
220			min	-1045.503	3	-3.288	4	.008	15	0	1	0	15	-.009	4
221		16	max	919.858	2	-.977	15	.163	1	0	5	.001	1	-.002	15
222			min	-1045.631	3	-4.157	4	.008	15	0	1	0	15	-.008	4
223		17	max	919.688	2	-1.181	15	.163	1	0	5	.001	1	-.001	15
224			min	-1045.759	3	-5.026	4	.008	15	0	1	0	15	-.006	4
225		18	max	919.518	2	-1.386	15	.163	1	0	5	.001	1	0	15
226			min	-1045.887	3	-5.894	4	.008	15	0	1	0	15	-.003	4
227		19	max	919.347	2	-1.59	15	.163	1	0	5	.002	1	0	1
228			min	-1046.014	3	-6.763	4	.008	15	0	1	0	15	0	1
229	M4	1	max	846.287	1	0	1	-.298	15	0	1	.001	1	0	1
230			min	-35.83	3	0	1	-6.115	1	0	1	0	15	0	1
231		2	max	846.457	1	0	1	-.298	15	0	1	0	1	0	1
232			min	-35.702	3	0	1	-6.115	1	0	1	0	10	0	1
233		3	max	846.627	1	0	1	-.298	15	0	1	0	15	0	1
234			min	-35.574	3	0	1	-6.115	1	0	1	0	1	0	1
235		4	max	846.798	1	0	1	-.298	15	0	1	0	15	0	1
236			min	-35.446	3	0	1	-6.115	1	0	1	0	1	0	1
237		5	max	846.968	1	0	1	-.298	15	0	1	0	15	0	1
238			min	-35.319	3	0	1	-6.115	1	0	1	-.002	1	0	1
239		6	max	847.139	1	0	1	-.298	15	0	1	0	15	0	1
240			min	-35.191	3	0	1	-6.115	1	0	1	-.002	1	0	1
241		7	max	847.309	1	0	1	-.298	15	0	1	0	15	0	1
242			min	-35.063	3	0	1	-6.115	1	0	1	-.003	1	0	1
243		8	max	847.479	1	0	1	-.298	15	0	1	0	15	0	1
244			min	-34.935	3	0	1	-6.115	1	0	1	-.004	1	0	1
245		9	max	847.65	1	0	1	-.298	15	0	1	0	15	0	1
246			min	-34.808	3	0	1	-6.115	1	0	1	-.004	1	0	1
247		10	max	847.82	1	0	1	-.298	15	0	1	0	15	0	1
248			min	-34.68	3	0	1	-6.115	1	0	1	-.005	1	0	1
249		11	max	847.99	1	0	1	-.298	15	0	1	0	15	0	1
250			min	-34.552	3	0	1	-6.115	1	0	1	-.006	1	0	1
251		12	max	848.161	1	0	1	-.298	15	0	1	0	15	0	1
252			min	-34.424	3	0	1	-6.115	1	0	1	-.007	1	0	1
253		13	max	848.331	1	0	1	-.298	15	0	1	0	15	0	1
254			min	-34.297	3	0	1	-6.115	1	0	1	-.007	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	848.501	1	0	1	-.298	15	0	1	0	15	0	1
256			min	-34.169	3	0	1	-6.115	1	0	1	-.008	1	0	1
257		15	max	848.672	1	0	1	-.298	15	0	1	0	15	0	1
258			min	-34.041	3	0	1	-6.115	1	0	1	-.009	1	0	1
259		16	max	848.842	1	0	1	-.298	15	0	1	0	15	0	1
260			min	-33.913	3	0	1	-6.115	1	0	1	-.009	1	0	1
261		17	max	849.012	1	0	1	-.298	15	0	1	0	15	0	1
262			min	-33.786	3	0	1	-6.115	1	0	1	-.01	1	0	1
263		18	max	849.183	1	0	1	-.298	15	0	1	0	15	0	1
264			min	-33.658	3	0	1	-6.115	1	0	1	-.011	1	0	1
265		19	max	849.353	1	0	1	-.298	15	0	1	0	15	0	1
266			min	-33.53	3	0	1	-6.115	1	0	1	-.011	1	0	1
267	M6	1	max	3176.561	2	2.294	2	0	1	0	1	0	1	0	1
268			min	-4762.718	3	.2	12	0	1	0	1	0	1	0	1
269		2	max	3177.091	2	2.238	2	0	1	0	1	0	1	0	12
270			min	-4762.321	3	.172	12	0	1	0	1	0	1	0	2
271		3	max	3177.62	2	2.183	2	0	1	0	1	0	1	0	12
272			min	-4761.924	3	.144	12	0	1	0	1	0	1	-.002	2
273		4	max	3178.149	2	2.128	2	0	1	0	1	0	1	0	12
274			min	-4761.527	3	.117	12	0	1	0	1	0	1	-.002	2
275		5	max	3178.679	2	2.072	2	0	1	0	1	0	1	0	12
276			min	-4761.13	3	.075	3	0	1	0	1	0	1	-.003	2
277		6	max	3179.208	2	2.017	2	0	1	0	1	0	1	0	12
278			min	-4760.733	3	.034	3	0	1	0	1	0	1	-.004	2
279		7	max	3179.737	2	1.962	2	0	1	0	1	0	1	0	12
280			min	-4760.336	3	-.008	3	0	1	0	1	0	1	-.005	2
281		8	max	3180.266	2	1.906	2	0	1	0	1	0	1	0	3
282			min	-4759.939	3	-.049	3	0	1	0	1	0	1	-.005	2
283		9	max	3180.796	2	1.851	2	0	1	0	1	0	1	0	3
284			min	-4759.542	3	-.091	3	0	1	0	1	0	1	-.006	2
285		10	max	3181.325	2	1.795	2	0	1	0	1	0	1	0	3
286			min	-4759.145	3	-.132	3	0	1	0	1	0	1	-.007	2
287		11	max	3181.854	2	1.74	2	0	1	0	1	0	1	0	3
288			min	-4758.748	3	-.174	3	0	1	0	1	0	1	-.007	2
289		12	max	3182.384	2	1.685	2	0	1	0	1	0	1	0	3
290			min	-4758.351	3	-.215	3	0	1	0	1	0	1	-.008	2
291		13	max	3182.913	2	1.629	2	0	1	0	1	0	1	0	3
292			min	-4757.954	3	-.257	3	0	1	0	1	0	1	-.008	2
293		14	max	3183.442	2	1.574	2	0	1	0	1	0	1	0	3
294			min	-4757.557	3	-.298	3	0	1	0	1	0	1	-.009	2
295		15	max	3183.971	2	1.519	2	0	1	0	1	0	1	0	3
296			min	-4757.16	3	-.34	3	0	1	0	1	0	1	-.01	2
297		16	max	3184.501	2	1.463	2	0	1	0	1	0	1	0	3
298			min	-4756.763	3	-.381	3	0	1	0	1	0	1	-.01	2
299		17	max	3185.03	2	1.408	2	0	1	0	1	0	1	0	3
300			min	-4756.366	3	-.423	3	0	1	0	1	0	1	-.011	2
301		18	max	3185.559	2	1.353	2	0	1	0	1	0	1	0	3
302			min	-4755.969	3	-.464	3	0	1	0	1	0	1	-.011	2
303		19	max	3186.089	2	1.297	2	0	1	0	1	0	1	0	3
304			min	-4755.572	3	-.506	3	0	1	0	1	0	1	-.012	2
305	M7	1	max	2750.185	2	8.893	4	0	1	0	1	0	1	.012	2
306			min	-2908.882	3	2.089	15	0	1	0	1	0	1	0	3
307		2	max	2750.015	2	8.024	4	0	1	0	1	0	1	.008	2
308			min	-2909.01	3	1.885	15	0	1	0	1	0	1	-.003	3
309		3	max	2749.844	2	7.155	4	0	1	0	1	0	1	.005	2
310			min	-2909.138	3	1.681	15	0	1	0	1	0	1	-.005	3
311		4	max	2749.674	2	6.286	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	-2909.266	3	1.476	15	0	1	0	1	0	1	-.006	3
313		5	max	2749.504	2	5.417	4	0	1	0	1	0	1	0	2
314			min	-2909.393	3	1.272	15	0	1	0	1	0	1	-.007	3
315		6	max	2749.333	2	4.548	4	0	1	0	1	0	1	-.002	15
316			min	-2909.521	3	1.068	15	0	1	0	1	0	1	-.008	3
317		7	max	2749.163	2	3.679	4	0	1	0	1	0	1	-.002	15
318			min	-2909.649	3	.864	15	0	1	0	1	0	1	-.009	3
319		8	max	2748.993	2	2.811	4	0	1	0	1	0	1	-.002	15
320			min	-2909.777	3	.639	12	0	1	0	1	0	1	-.01	4
321		9	max	2748.822	2	2.046	2	0	1	0	1	0	1	-.003	15
322			min	-2909.904	3	.301	12	0	1	0	1	0	1	-.011	4
323		10	max	2748.652	2	1.369	2	0	1	0	1	0	1	-.003	15
324			min	-2910.032	3	-.101	3	0	1	0	1	0	1	-.012	4
325		11	max	2748.482	2	.692	2	0	1	0	1	0	1	-.003	15
326			min	-2910.16	3	-.609	3	0	1	0	1	0	1	-.012	4
327		12	max	2748.311	2	.015	2	0	1	0	1	0	1	-.003	15
328			min	-2910.288	3	-1.116	3	0	1	0	1	0	1	-.012	4
329		13	max	2748.141	2	-.362	15	0	1	0	1	0	1	-.003	15
330			min	-2910.415	3	-1.624	3	0	1	0	1	0	1	-.012	4
331		14	max	2747.971	2	-.566	15	0	1	0	1	0	1	-.003	15
332			min	-2910.543	3	-2.403	4	0	1	0	1	0	1	-.011	4
333		15	max	2747.8	2	-.77	15	0	1	0	1	0	1	-.002	15
334			min	-2910.671	3	-3.272	4	0	1	0	1	0	1	-.009	4
335		16	max	2747.63	2	-.975	15	0	1	0	1	0	1	-.002	15
336			min	-2910.799	3	-4.141	4	0	1	0	1	0	1	-.008	4
337		17	max	2747.46	2	-1.179	15	0	1	0	1	0	1	-.001	15
338			min	-2910.927	3	-5.009	4	0	1	0	1	0	1	-.006	4
339		18	max	2747.289	2	-1.383	15	0	1	0	1	0	1	0	15
340			min	-2911.054	3	-5.878	4	0	1	0	1	0	1	-.003	4
341		19	max	2747.119	2	-1.587	15	0	1	0	1	0	1	0	1
342			min	-2911.182	3	-6.747	4	0	1	0	1	0	1	0	1
343	M8	1	max	2387.851	2	0	1	0	1	0	1	0	1	0	1
344			min	-217.318	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2388.021	2	0	1	0	1	0	1	0	1	0	1
346			min	-217.191	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2388.191	2	0	1	0	1	0	1	0	1	0	1
348			min	-217.063	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2388.362	2	0	1	0	1	0	1	0	1	0	1
350			min	-216.935	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2388.532	2	0	1	0	1	0	1	0	1	0	1
352			min	-216.807	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2388.702	2	0	1	0	1	0	1	0	1	0	1
354			min	-216.68	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2388.873	2	0	1	0	1	0	1	0	1	0	1
356			min	-216.552	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2389.043	2	0	1	0	1	0	1	0	1	0	1
358			min	-216.424	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2389.214	2	0	1	0	1	0	1	0	1	0	1
360			min	-216.296	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2389.384	2	0	1	0	1	0	1	0	1	0	1
362			min	-216.169	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2389.554	2	0	1	0	1	0	1	0	1	0	1
364			min	-216.041	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2389.725	2	0	1	0	1	0	1	0	1	0	1
366			min	-215.913	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2389.895	2	0	1	0	1	0	1	0	1	0	1
368			min	-215.785	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	2390.065	2	0	1	0	1	0	1	0	1	0	1
370			min	-215.657	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2390.236	2	0	1	0	1	0	1	0	1	0	1
372			min	-215.53	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2390.406	2	0	1	0	1	0	1	0	1	0	1
374			min	-215.402	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2390.576	2	0	1	0	1	0	1	0	1	0	1
376			min	-215.274	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2390.747	2	0	1	0	1	0	1	0	1	0	1
378			min	-215.146	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2390.917	2	0	1	0	1	0	1	0	1	0	1
380			min	-215.019	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1117.033	2	2.026	4	-.009	15	0	1	0	2	0	1
382			min	-1616.558	3	.476	15	-.183	1	0	2	0	3	0	1
383		2	max	1117.563	2	1.955	4	-.009	15	0	1	0	10	0	15
384			min	-1616.161	3	.459	15	-.183	1	0	2	0	1	0	4
385		3	max	1118.092	2	1.883	4	-.009	15	0	1	0	10	0	15
386			min	-1615.764	3	.443	15	-.183	1	0	2	0	1	-.001	4
387		4	max	1118.621	2	1.812	4	-.009	15	0	1	0	10	0	15
388			min	-1615.367	3	.426	15	-.183	1	0	2	0	1	-.002	4
389		5	max	1119.151	2	1.741	4	-.009	15	0	1	0	10	0	15
390			min	-1614.97	3	.409	15	-.183	1	0	2	0	1	-.003	4
391		6	max	1119.68	2	1.67	4	-.009	15	0	1	0	10	0	15
392			min	-1614.573	3	.393	15	-.183	1	0	2	0	1	-.003	4
393		7	max	1120.209	2	1.599	4	-.009	15	0	1	0	10	0	15
394			min	-1614.176	3	.376	15	-.183	1	0	2	0	1	-.004	4
395		8	max	1120.738	2	1.528	4	-.009	15	0	1	0	10	-.001	15
396			min	-1613.779	3	.359	15	-.183	1	0	2	0	1	-.004	4
397		9	max	1121.268	2	1.457	4	-.009	15	0	1	0	10	-.001	15
398			min	-1613.382	3	.343	15	-.183	1	0	2	0	1	-.005	4
399		10	max	1121.797	2	1.386	4	-.009	15	0	1	0	10	-.001	15
400			min	-1612.985	3	.326	15	-.183	1	0	2	0	1	-.006	4
401		11	max	1122.326	2	1.315	4	-.009	15	0	1	0	10	-.001	15
402			min	-1612.588	3	.305	12	-.183	1	0	2	0	1	-.006	4
403		12	max	1122.856	2	1.244	4	-.009	15	0	1	0	10	-.002	15
404			min	-1612.191	3	.278	12	-.183	1	0	2	0	1	-.006	4
405		13	max	1123.385	2	1.173	4	-.009	15	0	1	0	10	-.002	15
406			min	-1611.794	3	.25	12	-.183	1	0	2	0	1	-.007	4
407		14	max	1123.914	2	1.102	4	-.009	15	0	1	0	10	-.002	15
408			min	-1611.397	3	.222	12	-.183	1	0	2	0	1	-.007	4
409		15	max	1124.443	2	1.047	2	-.009	15	0	1	0	10	-.002	15
410			min	-1611	3	.195	12	-.183	1	0	2	0	1	-.008	4
411		16	max	1124.973	2	.991	2	-.009	15	0	1	0	10	-.002	15
412			min	-1610.603	3	.167	12	-.183	1	0	2	0	1	-.008	4
413		17	max	1125.502	2	.936	2	-.009	15	0	1	0	10	-.002	15
414			min	-1610.206	3	.139	12	-.183	1	0	2	-.001	1	-.008	4
415		18	max	1126.031	2	.881	2	-.009	15	0	1	0	10	-.002	15
416			min	-1609.809	3	.112	12	-.183	1	0	2	-.001	1	-.009	4
417		19	max	1126.561	2	.825	2	-.009	15	0	1	0	10	-.002	15
418			min	-1609.412	3	.084	12	-.183	1	0	2	-.001	1	-.009	4
419	M11	1	max	922.414	2	8.877	4	-.008	15	0	1	0	10	.009	4
420			min	-1043.715	3	2.087	15	-.163	1	0	5	0	1	.002	15
421		2	max	922.243	2	8.008	4	-.008	15	0	1	0	15	.005	2
422			min	-1043.842	3	1.882	15	-.163	1	0	5	0	1	0	12
423		3	max	922.073	2	7.139	4	-.008	15	0	1	0	15	.002	2
424			min	-1043.97	3	1.678	15	-.163	1	0	5	0	1	-.001	3
425		4	max	921.903	2	6.27	4	-.008	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-1044.098	3	1.474	15	-.163	1	0	5	0	1	-.003	3
427		5	max	921.732	2	5.401	4	-.008	15	0	1	0	15	-.001	15
428			min	-1044.226	3	1.27	15	-.163	1	0	5	0	1	-.004	4
429		6	max	921.562	2	4.532	4	-.008	15	0	1	0	15	-.002	15
430			min	-1044.354	3	1.065	15	-.163	1	0	5	0	1	-.007	4
431		7	max	921.392	2	3.663	4	-.008	15	0	1	0	15	-.002	15
432			min	-1044.481	3	.861	15	-.163	1	0	5	0	1	-.009	4
433		8	max	921.221	2	2.794	4	-.008	15	0	1	0	15	-.002	15
434			min	-1044.609	3	.657	15	-.163	1	0	5	0	1	-.01	4
435		9	max	921.051	2	1.926	4	-.008	15	0	1	0	15	-.003	15
436			min	-1044.737	3	.453	15	-.163	1	0	5	0	1	-.011	4
437		10	max	920.881	2	1.057	4	-.008	15	0	1	0	15	-.003	15
438			min	-1044.865	3	.248	15	-.163	1	0	5	0	1	-.012	4
439		11	max	920.71	2	.332	2	-.008	15	0	1	0	15	-.003	15
440			min	-1044.992	3	-.143	3	-.163	1	0	5	0	1	-.012	4
441		12	max	920.54	2	-.16	15	-.008	15	0	1	0	15	-.003	15
442			min	-1045.12	3	-.681	4	-.163	1	0	5	0	1	-.012	4
443		13	max	920.37	2	-.364	15	-.008	15	0	1	0	15	-.003	15
444			min	-1045.248	3	-1.55	4	-.163	1	0	5	-.001	1	-.012	4
445		14	max	920.199	2	-.569	15	-.008	15	0	1	0	15	-.003	15
446			min	-1045.376	3	-2.419	4	-.163	1	0	5	-.001	1	-.011	4
447		15	max	920.029	2	-.773	15	-.008	15	0	1	0	15	-.002	15
448			min	-1045.503	3	-3.288	4	-.163	1	0	5	-.001	1	-.009	4
449		16	max	919.858	2	-.977	15	-.008	15	0	1	0	15	-.002	15
450			min	-1045.631	3	-4.157	4	-.163	1	0	5	-.001	1	-.008	4
451		17	max	919.688	2	-1.181	15	-.008	15	0	1	0	15	-.001	15
452			min	-1045.759	3	-5.026	4	-.163	1	0	5	-.001	1	-.006	4
453		18	max	919.518	2	-1.386	15	-.008	15	0	1	0	15	0	15
454			min	-1045.887	3	-5.894	4	-.163	1	0	5	-.001	1	-.003	4
455		19	max	919.347	2	-1.59	15	-.008	15	0	1	0	15	0	1
456			min	-1046.014	3	-6.763	4	-.163	1	0	5	-.002	1	0	1
457	M12	1	max	846.287	1	0	1	6.115	1	0	1	0	15	0	1
458			min	-35.83	3	0	1	.298	15	0	1	-.001	1	0	1
459		2	max	846.457	1	0	1	6.115	1	0	1	0	10	0	1
460			min	-35.702	3	0	1	.298	15	0	1	0	1	0	1
461		3	max	846.627	1	0	1	6.115	1	0	1	0	1	0	1
462			min	-35.574	3	0	1	.298	15	0	1	0	15	0	1
463		4	max	846.798	1	0	1	6.115	1	0	1	0	1	0	1
464			min	-35.446	3	0	1	.298	15	0	1	0	15	0	1
465		5	max	846.968	1	0	1	6.115	1	0	1	.002	1	0	1
466			min	-35.319	3	0	1	.298	15	0	1	0	15	0	1
467		6	max	847.139	1	0	1	6.115	1	0	1	.002	1	0	1
468			min	-35.191	3	0	1	.298	15	0	1	0	15	0	1
469		7	max	847.309	1	0	1	6.115	1	0	1	.003	1	0	1
470			min	-35.063	3	0	1	.298	15	0	1	0	15	0	1
471		8	max	847.479	1	0	1	6.115	1	0	1	.004	1	0	1
472			min	-34.935	3	0	1	.298	15	0	1	0	15	0	1
473		9	max	847.65	1	0	1	6.115	1	0	1	.004	1	0	1
474			min	-34.808	3	0	1	.298	15	0	1	0	15	0	1
475		10	max	847.82	1	0	1	6.115	1	0	1	.005	1	0	1
476			min	-34.68	3	0	1	.298	15	0	1	0	15	0	1
477		11	max	847.99	1	0	1	6.115	1	0	1	.006	1	0	1
478			min	-34.552	3	0	1	.298	15	0	1	0	15	0	1
479		12	max	848.161	1	0	1	6.115	1	0	1	.007	1	0	1
480			min	-34.424	3	0	1	.298	15	0	1	0	15	0	1
481		13	max	848.331	1	0	1	6.115	1	0	1	.007	1	0	1
482			min	-34.297	3	0	1	.298	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	848.501	1	0	1	6.115	1	0	1	.008	1	0	1
484			min	-34.169	3	0	1	.298	15	0	1	0	15	0	1
485		15	max	848.672	1	0	1	6.115	1	0	1	.009	1	0	1
486			min	-34.041	3	0	1	.298	15	0	1	0	15	0	1
487		16	max	848.842	1	0	1	6.115	1	0	1	.009	1	0	1
488			min	-33.913	3	0	1	.298	15	0	1	0	15	0	1
489		17	max	849.012	1	0	1	6.115	1	0	1	.01	1	0	1
490			min	-33.786	3	0	1	.298	15	0	1	0	15	0	1
491		18	max	849.183	1	0	1	6.115	1	0	1	.011	1	0	1
492			min	-33.658	3	0	1	.298	15	0	1	0	15	0	1
493		19	max	849.353	1	0	1	6.115	1	0	1	.011	1	0	1
494			min	-33.53	3	0	1	.298	15	0	1	0	15	0	1
495	M1	1	max	122.223	1	820.726	3	-1.662	10	0	2	.093	1	0	15
496			min	5.777	15	-420.334	2	-33.464	1	0	3	.005	10	-.013	3
497		2	max	123.065	1	819.631	3	-1.662	10	0	2	.072	1	.252	2
498			min	6.032	15	-421.793	2	-33.464	1	0	3	.003	10	-.522	3
499		3	max	675.18	3	589.951	2	-1.653	15	0	3	.051	1	.504	2
500			min	-404.38	2	-666.154	3	-33.343	1	0	2	.002	10	-1.014	3
501		4	max	675.812	3	588.492	2	-1.653	15	0	3	.031	1	.138	2
502			min	-403.538	2	-667.248	3	-33.343	1	0	2	.001	10	-.6	3
503		5	max	676.444	3	587.033	2	-1.653	15	0	3	.01	1	-.005	15
504			min	-402.696	2	-668.342	3	-33.343	1	0	2	0	10	-.227	2
505		6	max	677.075	3	585.574	2	-1.653	15	0	3	0	15	.23	3
506			min	-401.853	2	-669.437	3	-33.343	1	0	2	-.011	1	-.591	2
507		7	max	677.707	3	584.115	2	-1.653	15	0	3	-.002	15	.645	3
508			min	-401.011	2	-670.531	3	-33.343	1	0	2	-.031	1	-.954	2
509		8	max	678.339	3	582.656	2	-1.653	15	0	3	-.003	15	1.062	3
510			min	-400.169	2	-671.625	3	-33.343	1	0	2	-.052	1	-1.316	2
511		9	max	694.97	3	53.738	2	-2.896	15	0	9	.036	1	1.232	3
512			min	-349.684	2	.445	15	-58.746	1	0	3	.002	15	-1.497	2
513		10	max	695.602	3	52.279	2	-2.896	15	0	9	0	10	1.21	3
514			min	-348.841	2	.005	15	-58.746	1	0	3	0	1	-1.53	2
515		11	max	696.234	3	50.82	2	-2.896	15	0	9	-.002	15	1.189	3
516			min	-347.999	2	-1.796	4	-58.746	1	0	3	-.037	1	-1.562	2
517		12	max	712.269	3	461.443	3	-1.593	15	0	2	.051	1	1.048	3
518			min	-297.229	2	-699.872	2	-32.563	1	0	3	.003	15	-1.39	2
519		13	max	712.901	3	460.349	3	-1.593	15	0	2	.031	1	.762	3
520			min	-296.386	2	-701.331	2	-32.563	1	0	3	.002	15	-.955	2
521		14	max	713.533	3	459.255	3	-1.593	15	0	2	.011	1	.477	3
522			min	-295.544	2	-702.79	2	-32.563	1	0	3	0	15	-.519	2
523		15	max	714.165	3	458.16	3	-1.593	15	0	2	0	15	.192	3
524			min	-294.702	2	-704.249	2	-32.563	1	0	3	-.009	1	-.089	1
525		16	max	714.796	3	457.066	3	-1.593	15	0	2	-.001	15	.355	2
526			min	-293.859	2	-705.708	2	-32.563	1	0	3	-.029	1	-.092	3
527		17	max	715.428	3	455.972	3	-1.593	15	0	2	-.002	15	.794	2
528			min	-293.017	2	-707.168	2	-32.563	1	0	3	-.05	1	-.375	3
529		18	max	-6.046	15	651.33	2	-1.883	15	0	3	-.004	15	.404	2
530			min	-123.863	1	-317.008	3	-38.394	1	0	2	-.072	1	-.187	3
531		19	max	-5.792	15	649.87	2	-1.883	15	0	3	-.005	15	.01	3
532			min	-123.021	1	-318.103	3	-38.394	1	0	2	-.096	1	-.002	1
533	M5	1	max	287.167	1	2639.045	3	0	1	0	1	0	1	.025	3
534			min	5.271	12	-1461.891	2	0	1	0	1	0	1	0	15
535		2	max	288.009	1	2637.951	3	0	1	0	1	0	1	.926	2
536			min	5.692	12	-1463.35	2	0	1	0	1	0	1	-1.612	3
537		3	max	1944.988	3	1397.92	2	0	1	0	1	0	1	1.803	2
538			min	-1163.554	2	-1760.614	3	0	1	0	1	0	1	-3.201	3
539		4	max	1945.62	3	1396.461	2	0	1	0	1	0	1	.936	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1162.711	2	-1761.708	3	0	1	0	1	0	1	-2.108	3
541		5	max	1946.252	3	1395.002	2	0	1	0	1	0	1	.088	1
542			min	-1161.869	2	-1762.802	3	0	1	0	1	0	1	-1.014	3
543		6	max	1946.883	3	1393.543	2	0	1	0	1	0	1	.08	3
544			min	-1161.026	2	-1763.897	3	0	1	0	1	0	1	-.796	2
545		7	max	1947.515	3	1392.084	2	0	1	0	1	0	1	1.175	3
546			min	-1160.184	2	-1764.991	3	0	1	0	1	0	1	-1.66	2
547		8	max	1948.147	3	1390.625	2	0	1	0	1	0	1	2.271	3
548			min	-1159.342	2	-1766.085	3	0	1	0	1	0	1	-2.524	2
549		9	max	1954.353	3	186.477	2	0	1	0	1	0	1	2.621	3
550			min	-1035.487	2	.437	15	0	1	0	1	0	1	-2.906	2
551		10	max	1954.985	3	185.018	2	0	1	0	1	0	1	2.525	3
552			min	-1034.644	2	-.004	15	0	1	0	1	0	1	-3.022	2
553		11	max	1955.617	3	183.559	2	0	1	0	1	0	1	2.429	3
554			min	-1033.802	2	-1.764	4	0	1	0	1	0	1	-3.136	2
555		12	max	1963.016	3	1137.877	3	0	1	0	1	0	1	2.116	3
556			min	-910.518	2	-1758.201	2	0	1	0	1	0	1	-2.801	2
557		13	max	1963.647	3	1136.783	3	0	1	0	1	0	1	1.411	3
558			min	-909.675	2	-1759.66	2	0	1	0	1	0	1	-1.709	2
559		14	max	1964.279	3	1135.689	3	0	1	0	1	0	1	.705	3
560			min	-908.833	2	-1761.119	2	0	1	0	1	0	1	-.617	2
561		15	max	1964.911	3	1134.594	3	0	1	0	1	0	1	.476	2
562			min	-907.99	2	-1762.578	2	0	1	0	1	0	1	-.009	12
563		16	max	1965.543	3	1133.5	3	0	1	0	1	0	1	1.571	2
564			min	-907.148	2	-1764.037	2	0	1	0	1	0	1	-.703	3
565		17	max	1966.175	3	1132.406	3	0	1	0	1	0	1	2.666	2
566			min	-906.306	2	-1765.496	2	0	1	0	1	0	1	-1.406	3
567		18	max	-7.994	12	2182.585	2	0	1	0	1	0	1	1.354	2
568			min	-286.413	1	-1136.838	3	0	1	0	1	0	1	-.726	3
569		19	max	-7.573	12	2181.126	2	0	1	0	1	0	1	.003	1
570			min	-285.571	1	-1137.933	3	0	1	0	1	0	1	-.02	3
571	M9	1	max	122.223	1	820.726	3	33.464	1	0	3	-.005	10	0	15
572			min	5.777	15	-420.334	2	1.662	10	0	2	-.093	1	-.013	3
573		2	max	123.065	1	819.631	3	33.464	1	0	3	-.003	10	.252	2
574			min	6.032	15	-421.793	2	1.662	10	0	2	-.072	1	-.522	3
575		3	max	675.18	3	589.951	2	33.343	1	0	2	-.002	10	.504	2
576			min	-404.38	2	-666.154	3	1.653	15	0	3	-.051	1	-1.014	3
577		4	max	675.812	3	588.492	2	33.343	1	0	2	-.001	10	.138	2
578			min	-403.538	2	-667.248	3	1.653	15	0	3	-.031	1	-.6	3
579		5	max	676.444	3	587.033	2	33.343	1	0	2	0	10	-.005	15
580			min	-402.696	2	-668.342	3	1.653	15	0	3	-.01	1	-.227	2
581		6	max	677.075	3	585.574	2	33.343	1	0	2	.011	1	.23	3
582			min	-401.853	2	-669.437	3	1.653	15	0	3	0	15	-.591	2
583		7	max	677.707	3	584.115	2	33.343	1	0	2	.031	1	.645	3
584			min	-401.011	2	-670.531	3	1.653	15	0	3	.002	15	-.954	2
585		8	max	678.339	3	582.656	2	33.343	1	0	2	.052	1	1.062	3
586			min	-400.169	2	-671.625	3	1.653	15	0	3	.003	15	-1.316	2
587		9	max	694.97	3	53.738	2	58.746	1	0	3	-.002	15	1.232	3
588			min	-349.684	2	.445	15	2.896	15	0	9	-.036	1	-1.497	2
589		10	max	695.602	3	52.279	2	58.746	1	0	3	0	1	1.21	3
590			min	-348.841	2	.005	15	2.896	15	0	9	0	10	-1.53	2
591		11	max	696.234	3	50.82	2	58.746	1	0	3	.037	1	1.189	3
592			min	-347.999	2	-1.796	4	2.896	15	0	9	.002	15	-1.562	2
593		12	max	712.269	3	461.443	3	32.563	1	0	3	-.003	15	1.048	3
594			min	-297.229	2	-699.872	2	1.593	15	0	2	-.051	1	-1.39	2
595		13	max	712.901	3	460.349	3	32.563	1	0	3	-.002	15	.762	3
596			min	-296.386	2	-701.331	2	1.593	15	0	2	-.031	1	-.955	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	713.533	3	459.255	3	32.563	1	0	3	0	15	.477	3
598			min	-295.544	2	-702.79	2	1.593	15	0	2	-.011	1	-.519	2
599		15	max	714.165	3	458.16	3	32.563	1	0	3	.009	1	.192	3
600			min	-294.702	2	-704.249	2	1.593	15	0	2	0	15	-.089	1
601		16	max	714.796	3	457.066	3	32.563	1	0	3	.029	1	.355	2
602			min	-293.859	2	-705.708	2	1.593	15	0	2	.001	15	-.092	3
603		17	max	715.428	3	455.972	3	32.563	1	0	3	.05	1	.794	2
604			min	-293.017	2	-707.168	2	1.593	15	0	2	.002	15	-.375	3
605		18	max	-6.046	15	651.33	2	38.394	1	0	2	.072	1	.404	2
606			min	-123.863	1	-317.008	3	1.883	15	0	3	.004	15	-.187	3
607		19	max	-5.792	15	649.87	2	38.394	1	0	2	.096	1	.01	3
608			min	-123.021	1	-318.103	3	1.883	15	0	3	.005	15	-.002	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.241	2	.013	3	1.664e-2	2	NC	1	NC	1
2			min	0	10	-.086	3	-.008	2	-5.966e-3	3	NC	1	NC	1
3		2	max	0	1	.208	2	.015	3	1.717e-2	2	NC	4	NC	1
4			min	0	10	.004	15	-.006	2	-5.221e-3	3	1456.603	3	NC	1
5		3	max	0	1	.183	2	.018	3	1.769e-2	2	NC	4	NC	2
6			min	0	10	.004	15	-.005	10	-4.476e-3	3	792.593	3	8804.974	1
7		4	max	0	1	.171	2	.022	3	1.822e-2	2	NC	4	NC	2
8			min	0	10	.003	15	-.006	10	-3.731e-3	3	606.18	3	6180.419	1
9		5	max	0	1	.176	2	.026	3	1.874e-2	2	NC	4	NC	2
10			min	0	10	.003	15	-.007	10	-2.986e-3	3	551.402	3	5557.701	1
11		6	max	0	1	.196	2	.029	3	1.927e-2	2	NC	4	NC	2
12			min	0	10	.004	15	-.009	10	-2.241e-3	3	569.732	3	6181.412	1
13		7	max	0	1	.227	2	.032	3	1.979e-2	2	NC	2	NC	2
14			min	0	10	.004	15	-.012	2	-1.495e-3	3	659.916	3	7504.382	3
15		8	max	0	1	.263	2	.034	3	2.032e-2	2	NC	1	NC	1
16			min	0	10	.005	15	-.018	2	-7.502e-4	3	852.148	3	6768.78	3
17		9	max	0	1	.295	2	.035	3	2.084e-2	2	NC	4	NC	1
18			min	0	10	.005	15	-.023	2	-5.063e-6	3	1179.156	3	6398.743	3
19		10	max	0	1	.309	2	.036	3	2.137e-2	2	NC	4	NC	1
20			min	0	1	.006	15	-.026	2	3.727e-4	15	1436.307	3	6288.186	3
21		11	max	0	10	.295	2	.035	3	2.084e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.023	2	-5.063e-6	3	1179.156	3	6398.743	3
23		12	max	0	10	.263	2	.034	3	2.032e-2	2	NC	1	NC	1
24			min	0	1	.005	15	-.018	2	-7.502e-4	3	852.148	3	6768.78	3
25		13	max	0	10	.227	2	.032	3	1.979e-2	2	NC	2	NC	2
26			min	0	1	.004	15	-.012	2	-1.495e-3	3	659.916	3	7504.382	3
27		14	max	0	10	.196	2	.029	3	1.927e-2	2	NC	4	NC	2
28			min	0	1	.004	15	-.009	10	-2.241e-3	3	569.732	3	6181.412	1
29		15	max	0	10	.176	2	.026	3	1.874e-2	2	NC	4	NC	2
30			min	0	1	.003	15	-.007	10	-2.986e-3	3	551.402	3	5557.701	1
31		16	max	0	10	.171	2	.022	3	1.822e-2	2	NC	4	NC	2
32			min	0	1	.003	15	-.006	10	-3.731e-3	3	606.18	3	6180.419	1
33		17	max	0	10	.183	2	.018	3	1.769e-2	2	NC	4	NC	2
34			min	0	1	.004	15	-.005	10	-4.476e-3	3	792.593	3	8804.974	1
35		18	max	0	10	.208	2	.015	3	1.717e-2	2	NC	4	NC	1
36			min	0	1	.004	15	-.006	2	-5.221e-3	3	1456.603	3	NC	1
37		19	max	0	10	.241	2	.013	3	1.664e-2	2	NC	1	NC	1
38			min	0	1	-.086	3	-.008	2	-5.966e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.528	3	.011	3	8.881e-3	2	NC	1	NC	1
40			min	0	15	-.702	2	-.008	2	-7.714e-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	.671	3	.013	3	9.839e-3	2	NC	5	NC	1
42			min	0	15	-.842	2	-.006	2	-8.653e-3	3	1002.509	3	NC	1
43		3	max	0	1	.801	3	.015	3	1.08e-2	2	NC	5	NC	1
44			min	0	15	-.972	2	-.005	10	-9.592e-3	3	526.861	3	NC	1
45		4	max	0	1	.907	3	.018	3	1.176e-2	2	NC	5	NC	2
46			min	0	15	-1.083	2	-.005	10	-1.053e-2	3	377.382	2	7820.888	1
47		5	max	0	1	.983	3	.022	3	1.271e-2	2	NC	5	NC	2
48			min	0	15	-1.17	2	-.006	10	-1.147e-2	3	307.223	2	6682.618	1
49		6	max	0	1	1.027	3	.025	3	1.367e-2	2	NC	5	NC	2
50			min	0	15	-1.232	2	-.008	10	-1.241e-2	3	271.722	2	7186.421	1
51		7	max	0	1	1.043	3	.028	3	1.463e-2	2	NC	5	NC	1
52			min	0	15	-1.268	2	-.011	2	-1.335e-2	3	254.287	2	8745.427	3
53		8	max	0	1	1.038	3	.03	3	1.559e-2	2	NC	5	NC	1
54			min	0	15	-1.283	2	-.016	2	-1.429e-2	3	247.537	2	7764.842	3
55		9	max	0	1	1.023	3	.031	3	1.655e-2	2	NC	5	NC	1
56			min	0	15	-1.285	2	-.021	2	-1.523e-2	3	246.869	2	7272.978	3
57		10	max	0	1	1.014	3	.032	3	1.75e-2	2	NC	5	NC	1
58			min	0	1	-1.283	2	-.023	2	-1.617e-2	3	247.827	2	7124.48	3
59		11	max	0	15	1.023	3	.031	3	1.655e-2	2	NC	5	NC	1
60			min	0	1	-1.285	2	-.021	2	-1.523e-2	3	246.869	2	7272.978	3
61		12	max	0	15	1.038	3	.03	3	1.559e-2	2	NC	5	NC	1
62			min	0	1	-1.283	2	-.016	2	-1.429e-2	3	247.537	2	7764.842	3
63		13	max	0	15	1.043	3	.028	3	1.463e-2	2	NC	5	NC	1
64			min	0	1	-1.268	2	-.011	2	-1.335e-2	3	254.287	2	8745.427	3
65		14	max	0	15	1.027	3	.025	3	1.367e-2	2	NC	5	NC	2
66			min	0	1	-1.232	2	-.008	10	-1.241e-2	3	271.722	2	7186.421	1
67		15	max	0	15	.983	3	.022	3	1.271e-2	2	NC	5	NC	2
68			min	0	1	-1.17	2	-.006	10	-1.147e-2	3	307.223	2	6682.618	1
69		16	max	0	15	.907	3	.018	3	1.176e-2	2	NC	5	NC	2
70			min	0	1	-1.083	2	-.005	10	-1.053e-2	3	377.382	2	7820.888	1
71		17	max	0	15	.801	3	.015	3	1.08e-2	2	NC	5	NC	1
72			min	0	1	-.972	2	-.005	10	-9.592e-3	3	526.861	3	NC	1
73		18	max	0	15	.671	3	.013	3	9.839e-3	2	NC	5	NC	1
74			min	0	1	-.842	2	-.006	2	-8.653e-3	3	1002.509	3	NC	1
75		19	max	0	15	.528	3	.011	3	8.881e-3	2	NC	1	NC	1
76			min	0	1	-.702	2	-.008	2	-7.714e-3	3	NC	1	NC	1
77	M15	1	max	0	10	.539	3	.011	3	6.646e-3	3	NC	1	NC	1
78			min	0	1	-.7	2	-.007	2	-9.27e-3	2	NC	1	NC	1
79		2	max	0	10	.655	3	.012	3	7.44e-3	3	NC	5	NC	1
80			min	0	1	-.863	2	-.006	2	-1.028e-2	2	881.452	2	NC	1
81		3	max	0	10	.763	3	.014	3	8.235e-3	3	NC	5	NC	1
82			min	0	1	-1.011	2	-.004	10	-1.129e-2	2	462.057	2	NC	1
83		4	max	0	10	.856	3	.017	3	9.029e-3	3	NC	5	NC	2
84			min	0	1	-1.134	2	-.005	10	-1.23e-2	2	331.851	2	7744.607	1
85		5	max	0	10	.93	3	.02	3	9.823e-3	3	NC	5	NC	2
86			min	0	1	-1.223	2	-.006	10	-1.33e-2	2	274.9	2	6606.643	1
87		6	max	0	10	.983	3	.023	3	1.062e-2	3	NC	5	NC	2
88			min	0	1	-1.279	2	-.007	10	-1.431e-2	2	248.487	2	7076.647	1
89		7	max	0	10	1.016	3	.026	3	1.141e-2	3	NC	5	NC	2
90			min	0	1	-1.303	2	-.01	2	-1.532e-2	2	238.538	2	9399.116	3
91		8	max	0	10	1.032	3	.028	3	1.221e-2	3	NC	5	NC	1
92			min	0	1	-1.303	2	-.015	2	-1.633e-2	2	238.575	2	8382.104	3
93		9	max	0	10	1.035	3	.029	3	1.3e-2	3	NC	5	NC	1
94			min	0	1	-1.291	2	-.02	2	-1.734e-2	2	243.648	2	7877.388	3
95		10	max	0	1	1.035	3	.029	3	1.379e-2	3	NC	5	NC	1
96			min	0	1	-1.282	2	-.022	2	-1.835e-2	2	247.29	2	7727.508	3
97		11	max	0	1	1.035	3	.029	3	1.3e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	10	-1.291	2	-.02	2	-1.734e-2	2	243.648	2	7877.388	3
99		12	max	0	1	1.032	3	.028	3	1.221e-2	3	NC	5	NC	1
100			min	0	10	-1.303	2	-.015	2	-1.633e-2	2	238.575	2	8382.104	3
101		13	max	0	1	1.016	3	.026	3	1.141e-2	3	NC	5	NC	2
102			min	0	10	-1.303	2	-.01	2	-1.532e-2	2	238.538	2	9399.116	3
103		14	max	0	1	.983	3	.023	3	1.062e-2	3	NC	5	NC	2
104			min	0	10	-1.279	2	-.007	10	-1.431e-2	2	248.487	2	7076.647	1
105		15	max	0	1	.93	3	.02	3	9.823e-3	3	NC	5	NC	2
106			min	0	10	-1.223	2	-.006	10	-1.33e-2	2	274.9	2	6606.643	1
107		16	max	0	1	.856	3	.017	3	9.029e-3	3	NC	5	NC	2
108			min	0	10	-1.134	2	-.005	10	-1.23e-2	2	331.851	2	7744.607	1
109		17	max	0	1	.763	3	.014	3	8.235e-3	3	NC	5	NC	1
110			min	0	10	-1.011	2	-.004	10	-1.129e-2	2	462.057	2	NC	1
111		18	max	0	1	.655	3	.012	3	7.44e-3	3	NC	5	NC	1
112			min	0	10	-.863	2	-.006	2	-1.028e-2	2	881.452	2	NC	1
113		19	max	0	1	.539	3	.011	3	6.646e-3	3	NC	1	NC	1
114			min	0	10	-.7	2	-.007	2	-9.27e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.214	2	.009	3	1.312e-2	3	NC	1	NC	1
116			min	0	1	-.194	3	-.007	2	-1.403e-2	2	NC	1	NC	1
117		2	max	0	15	.151	2	.011	3	1.37e-2	3	NC	4	NC	1
118			min	0	1	-.174	3	-.004	2	-1.404e-2	2	2265.999	2	NC	1
119		3	max	0	15	.1	2	.015	1	1.428e-2	3	NC	4	NC	2
120			min	0	1	-.161	3	-.004	10	-1.404e-2	2	1257.828	2	8720.139	1
121		4	max	0	15	.076	1	.022	1	1.486e-2	3	NC	4	NC	2
122			min	0	1	-.157	3	-.004	10	-1.405e-2	2	997.54	2	6072.768	1
123		5	max	0	15	.074	1	.025	1	1.544e-2	3	NC	4	NC	2
124			min	0	1	-.165	3	-.004	10	-1.405e-2	2	964.78	2	5404.907	1
125		6	max	0	15	.09	1	.023	1	1.602e-2	3	NC	3	NC	2
126			min	0	1	-.184	3	-.006	10	-1.406e-2	2	1109.203	2	5907.685	1
127		7	max	0	15	.123	2	.023	3	1.659e-2	3	NC	4	NC	2
128			min	0	1	-.212	3	-.008	10	-1.406e-2	2	1578.428	2	8286.891	1
129		8	max	0	15	.171	2	.024	3	1.717e-2	3	NC	4	NC	1
130			min	0	1	-.242	3	-.013	2	-1.407e-2	2	2989.219	3	9532.878	3
131		9	max	0	15	.214	2	.025	3	1.775e-2	3	NC	1	NC	1
132			min	0	1	-.268	3	-.018	2	-1.407e-2	2	1944.577	3	9121.201	3
133		10	max	0	1	.234	2	.025	3	1.833e-2	3	NC	4	NC	1
134			min	0	1	-.28	3	-.02	2	-1.408e-2	2	1686.072	3	9011.932	3
135		11	max	0	1	.214	2	.025	3	1.775e-2	3	NC	1	NC	1
136			min	0	15	-.268	3	-.018	2	-1.407e-2	2	1944.577	3	9121.201	3
137		12	max	0	1	.171	2	.024	3	1.717e-2	3	NC	4	NC	1
138			min	0	15	-.242	3	-.013	2	-1.407e-2	2	2989.219	3	9532.878	3
139		13	max	0	1	.123	2	.023	3	1.659e-2	3	NC	4	NC	2
140			min	0	15	-.212	3	-.008	10	-1.406e-2	2	1578.428	2	8286.891	1
141		14	max	0	1	.09	1	.023	1	1.602e-2	3	NC	3	NC	2
142			min	0	15	-.184	3	-.006	10	-1.406e-2	2	1109.203	2	5907.685	1
143		15	max	0	1	.074	1	.025	1	1.544e-2	3	NC	4	NC	2
144			min	0	15	-.165	3	-.004	10	-1.405e-2	2	964.78	2	5404.907	1
145		16	max	0	1	.076	1	.022	1	1.486e-2	3	NC	4	NC	2
146			min	0	15	-.157	3	-.004	10	-1.405e-2	2	997.54	2	6072.768	1
147		17	max	0	1	.1	2	.015	1	1.428e-2	3	NC	4	NC	2
148			min	0	15	-.161	3	-.004	10	-1.404e-2	2	1257.828	2	8720.139	1
149		18	max	0	1	.151	2	.011	3	1.37e-2	3	NC	4	NC	1
150			min	0	15	-.174	3	-.004	2	-1.404e-2	2	2265.999	2	NC	1
151		19	max	0	1	.214	2	.009	3	1.312e-2	3	NC	1	NC	1
152			min	0	15	-.194	3	-.007	2	-1.403e-2	2	NC	1	NC	1
153	M2	1	max	.008	2	.013	2	.004	1	-3.47e-6	10	NC	1	NC	1
154			min	-.012	3	-.019	3	0	10	-9.218e-5	1	5935.556	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
155		2	max	.008	2	.011	2	.004	1	-3.304e-6	10	NC	1	NC	1
156			min	-.011	3	-.019	3	0	10	-8.775e-5	1	6837.933	2	NC	1
157		3	max	.007	2	.01	2	.004	1	-3.138e-6	10	NC	1	NC	1
158			min	-.011	3	-.018	3	0	10	-8.332e-5	1	8046.214	2	NC	1
159		4	max	.007	2	.008	2	.003	1	-2.972e-6	10	NC	1	NC	1
160			min	-.01	3	-.017	3	0	10	-7.889e-5	1	9722.158	2	NC	1
161		5	max	.007	2	.006	2	.003	1	-2.806e-6	10	NC	1	NC	1
162			min	-.009	3	-.017	3	0	10	-7.447e-5	1	NC	1	NC	1
163		6	max	.006	2	.005	2	.003	1	-2.639e-6	10	NC	1	NC	1
164			min	-.009	3	-.016	3	0	10	-7.004e-5	1	NC	1	NC	1
165		7	max	.006	2	.003	2	.002	1	-2.473e-6	10	NC	1	NC	1
166			min	-.008	3	-.015	3	0	10	-6.561e-5	1	NC	1	NC	1
167		8	max	.005	2	.002	2	.002	1	-2.307e-6	10	NC	1	NC	1
168			min	-.007	3	-.014	3	0	10	-6.118e-5	1	NC	1	NC	1
169		9	max	.005	2	0	2	.002	1	-2.141e-6	10	NC	1	NC	1
170			min	-.007	3	-.013	3	0	10	-5.675e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	.001	1	-1.975e-6	10	NC	1	NC	1
172			min	-.006	3	-.012	3	0	10	-5.232e-5	1	NC	1	NC	1
173		11	max	.004	2	0	2	.001	1	-1.808e-6	10	NC	1	NC	1
174			min	-.005	3	-.011	3	0	10	-4.79e-5	1	NC	1	NC	1
175		12	max	.003	2	-.002	2	0	1	-1.642e-6	10	NC	1	NC	1
176			min	-.005	3	-.01	3	0	10	-4.347e-5	1	NC	1	NC	1
177		13	max	.003	2	-.002	15	0	1	-1.476e-6	10	NC	1	NC	1
178			min	-.004	3	-.009	3	0	10	-3.904e-5	1	NC	1	NC	1
179		14	max	.002	2	-.002	15	0	1	-1.31e-6	10	NC	1	NC	1
180			min	-.003	3	-.008	3	0	10	-3.461e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.144e-6	10	NC	1	NC	1
182			min	-.003	3	-.006	3	0	10	-3.018e-5	1	NC	1	NC	1
183		16	max	.001	2	-.001	15	0	1	-9.774e-7	10	NC	1	NC	1
184			min	-.002	3	-.005	3	0	10	-2.575e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-8.112e-7	10	NC	1	NC	1
186			min	-.001	3	-.003	3	0	10	-2.133e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-6.45e-7	10	NC	1	NC	1
188			min	0	3	-.002	4	0	10	-1.69e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-4.788e-7	10	NC	1	NC	1
190			min	0	1	0	1	0	1	-1.247e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	2.577e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	9.487e-8	10	NC	1	NC	1
193		2	max	0	3	0	15	0	10	1.374e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	1	6.73e-7	15	NC	1	NC	1
195		3	max	.001	3	-.001	15	0	10	2.49e-5	1	NC	1	NC	1
196			min	-.001	2	-.006	4	0	1	1.216e-6	15	NC	1	NC	1
197		4	max	.002	3	-.002	15	0	10	3.607e-5	1	NC	1	NC	1
198			min	-.002	2	-.009	4	0	1	1.759e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	10	4.723e-5	1	NC	1	NC	1
200			min	-.002	2	-.012	4	0	1	2.302e-6	15	8396.876	4	NC	1
201		6	max	.003	3	-.004	15	0	10	5.839e-5	1	NC	2	NC	1
202			min	-.003	2	-.015	4	0	1	2.845e-6	15	6813.16	4	NC	1
203		7	max	.003	3	-.004	15	0	10	6.956e-5	1	NC	5	NC	1
204			min	-.003	2	-.018	4	0	1	3.388e-6	15	5858.941	4	NC	1
205		8	max	.004	3	-.005	15	0	10	8.072e-5	1	NC	5	NC	1
206			min	-.004	2	-.02	4	0	1	3.931e-6	15	5270.577	4	NC	1
207		9	max	.005	3	-.005	15	0	1	9.189e-5	1	NC	5	NC	1
208			min	-.004	2	-.021	4	0	3	4.474e-6	15	4923.949	4	NC	1
209		10	max	.005	3	-.005	15	0	1	1.03e-4	1	NC	5	NC	1
210			min	-.005	2	-.022	4	0	3	5.017e-6	15	4758.942	4	NC	1
211		11	max	.006	3	-.005	15	0	1	1.142e-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	-.005	2	-.022	4	0	15	5.56e-6	15	4751.331	4	NC	1
213		12	max	.006	3	-.005	15	0	1	1.254e-4	1	NC	5	NC	1
214			min	-.006	2	-.021	4	0	15	6.103e-6	15	4903.504	4	NC	1
215		13	max	.007	3	-.005	15	0	1	1.365e-4	1	NC	5	NC	1
216			min	-.006	2	-.02	4	0	15	6.646e-6	15	5246.57	4	NC	1
217		14	max	.007	3	-.004	15	.001	1	1.477e-4	1	NC	5	NC	1
218			min	-.007	2	-.018	4	0	15	7.189e-6	15	5856.369	4	NC	1
219		15	max	.008	3	-.004	15	.002	1	1.589e-4	1	NC	3	NC	1
220			min	-.007	2	-.015	4	0	15	7.732e-6	15	6900.55	4	NC	1
221		16	max	.009	3	-.003	15	.002	1	1.7e-4	1	NC	1	NC	1
222			min	-.008	2	-.012	4	0	15	8.275e-6	15	8784.798	4	NC	1
223		17	max	.009	3	-.002	15	.003	1	1.812e-4	1	NC	1	NC	1
224			min	-.008	2	-.008	4	0	15	8.818e-6	15	NC	1	NC	1
225		18	max	.01	3	-.001	15	.003	1	1.924e-4	1	NC	1	NC	1
226			min	-.009	2	-.005	3	0	15	9.361e-6	15	NC	1	NC	1
227		19	max	.01	3	0	10	.004	1	2.035e-4	1	NC	1	NC	1
228			min	-.009	2	-.002	3	0	15	9.904e-6	15	NC	1	NC	1
229	M4	1	max	.002	1	.009	2	0	15	8.087e-5	1	NC	1	NC	2
230			min	0	3	-.011	3	-.004	1	3.972e-6	15	NC	1	6039.882	1
231		2	max	.002	1	.008	2	0	15	8.087e-5	1	NC	1	NC	2
232			min	0	3	-.01	3	-.004	1	3.972e-6	15	NC	1	6552.062	1
233		3	max	.002	1	.008	2	0	15	8.087e-5	1	NC	1	NC	2
234			min	0	3	-.009	3	-.003	1	3.972e-6	15	NC	1	7162.639	1
235		4	max	.002	1	.007	2	0	15	8.087e-5	1	NC	1	NC	2
236			min	0	3	-.009	3	-.003	1	3.972e-6	15	NC	1	7896.998	1
237		5	max	.002	1	.007	2	0	15	8.087e-5	1	NC	1	NC	2
238			min	0	3	-.008	3	-.003	1	3.972e-6	15	NC	1	8789.648	1
239		6	max	.001	1	.006	2	0	15	8.087e-5	1	NC	1	NC	2
240			min	0	3	-.008	3	-.003	1	3.972e-6	15	NC	1	9888.451	1
241		7	max	.001	1	.006	2	0	15	8.087e-5	1	NC	1	NC	1
242			min	0	3	-.007	3	-.002	1	3.972e-6	15	NC	1	NC	1
243		8	max	.001	1	.005	2	0	15	8.087e-5	1	NC	1	NC	1
244			min	0	3	-.006	3	-.002	1	3.972e-6	15	NC	1	NC	1
245		9	max	.001	1	.005	2	0	15	8.087e-5	1	NC	1	NC	1
246			min	0	3	-.006	3	-.002	1	3.972e-6	15	NC	1	NC	1
247		10	max	.001	1	.004	2	0	15	8.087e-5	1	NC	1	NC	1
248			min	0	3	-.005	3	-.001	1	3.972e-6	15	NC	1	NC	1
249		11	max	0	1	.004	2	0	15	8.087e-5	1	NC	1	NC	1
250			min	0	3	-.005	3	-.001	1	3.972e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	8.087e-5	1	NC	1	NC	1
252			min	0	3	-.004	3	0	1	3.972e-6	15	NC	1	NC	1
253		13	max	0	1	.003	2	0	15	8.087e-5	1	NC	1	NC	1
254			min	0	3	-.004	3	0	1	3.972e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	8.087e-5	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	3.972e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	8.087e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	3.972e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	8.087e-5	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	3.972e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	8.087e-5	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	3.972e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	8.087e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	3.972e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.087e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	3.972e-6	15	NC	1	NC	1
267	M6	1	max	.024	2	.039	2	0	1	0	1	NC	3	NC	1
268			min	-.035	3	-.055	3	0	1	0	1	2007.032	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	2	.035	2	0	1	0	1	NC	3	NC	1
270			min	-.034	3	-.052	3	0	1	0	1	2203.477	2	NC	1
271		3	max	.021	2	.032	2	0	1	0	1	NC	3	NC	1
272			min	-.032	3	-.049	3	0	1	0	1	2440.499	2	NC	1
273		4	max	.02	2	.028	2	0	1	0	1	NC	3	NC	1
274			min	-.03	3	-.046	3	0	1	0	1	2729.58	2	NC	1
275		5	max	.018	2	.025	2	0	1	0	1	NC	3	NC	1
276			min	-.028	3	-.043	3	0	1	0	1	3086.711	2	NC	1
277		6	max	.017	2	.022	2	0	1	0	1	NC	3	NC	1
278			min	-.026	3	-.04	3	0	1	0	1	3534.694	2	NC	1
279		7	max	.016	2	.019	2	0	1	0	1	NC	1	NC	1
280			min	-.024	3	-.037	3	0	1	0	1	4106.958	2	NC	1
281		8	max	.014	2	.016	2	0	1	0	1	NC	1	NC	1
282			min	-.022	3	-.034	3	0	1	0	1	4854.135	2	NC	1
283		9	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
284			min	-.02	3	-.031	3	0	1	0	1	5855.955	2	NC	1
285		10	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
286			min	-.018	3	-.028	3	0	1	0	1	7244.055	2	NC	1
287		11	max	.011	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.016	3	-.025	3	0	1	0	1	9248.9	2	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.014	3	-.021	3	0	1	0	1	NC	1	NC	1
291		13	max	.008	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.012	3	-.018	3	0	1	0	1	NC	1	NC	1
293		14	max	.007	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.01	3	-.015	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.006	3	-.009	3	0	1	0	1	NC	1	NC	1
299		17	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.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	.002	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.008	3	0	1	0	1	NC	1	NC	1
311		4	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.006	2	-.014	3	0	1	0	1	7950.39	3	NC	1
315		6	max	.008	3	-.004	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.017	3	0	1	0	1	6713.683	3	NC	1
317		7	max	.009	3	-.004	15	0	1	0	1	NC	2	NC	1
318			min	-.009	2	-.019	3	0	1	0	1	5911.421	4	NC	1
319		8	max	.011	3	-.005	15	0	1	0	1	NC	2	NC	1
320			min	-.01	2	-.021	3	0	1	0	1	5314.454	4	NC	1
321		9	max	.013	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.012	2	-.022	3	0	1	0	1	4962.344	4	NC	1
323		10	max	.014	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.013	2	-.023	3	0	1	0	1	4793.943	4	NC	1
325		11	max	.016	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	-.015	2	-.023	3	0	1	0	1	4784.501	4	NC	1
327		12	max	.017	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.016	2	-.022	3	0	1	0	1	4936.19	4	NC	1
329		13	max	.019	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.018	2	-.021	3	0	1	0	1	5280.151	4	NC	1
331		14	max	.021	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.019	2	-.02	3	0	1	0	1	5892.56	4	NC	1
333		15	max	.022	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.021	2	-.018	3	0	1	0	1	6941.951	4	NC	1
335		16	max	.024	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.022	2	-.015	3	0	1	0	1	8836.256	4	NC	1
337		17	max	.025	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.024	2	-.013	3	0	1	0	1	NC	1	NC	1
339		18	max	.027	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.025	2	-.01	3	0	1	0	1	NC	1	NC	1
341		19	max	.028	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.027	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	2	.026	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.029	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	2	.025	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.028	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	2	.023	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.026	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	2	.022	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.024	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	2	.02	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.023	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	2	.019	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.021	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	2	.018	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.016	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	2	.015	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	2	.013	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.012	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	2	.01	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.009	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	2	.006	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.002	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	.008	2	.013	2	0	10	9.218e-5	1	NC	1	NC	1
382			min	-.012	3	-.019	3	-.004	1	3.47e-6	10	5935.556	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
383		2	max	.008	2	.011	2	0	10	8.775e-5	1	NC	1	NC	1
384			min	-.011	3	-.019	3	-.004	1	3.304e-6	10	6837.933	2	NC	1
385		3	max	.007	2	.01	2	0	10	8.332e-5	1	NC	1	NC	1
386			min	-.011	3	-.018	3	-.004	1	3.138e-6	10	8046.214	2	NC	1
387		4	max	.007	2	.008	2	0	10	7.889e-5	1	NC	1	NC	1
388			min	-.01	3	-.017	3	-.003	1	2.972e-6	10	9722.158	2	NC	1
389		5	max	.007	2	.006	2	0	10	7.447e-5	1	NC	1	NC	1
390			min	-.009	3	-.017	3	-.003	1	2.806e-6	10	NC	1	NC	1
391		6	max	.006	2	.005	2	0	10	7.004e-5	1	NC	1	NC	1
392			min	-.009	3	-.016	3	-.003	1	2.639e-6	10	NC	1	NC	1
393		7	max	.006	2	.003	2	0	10	6.561e-5	1	NC	1	NC	1
394			min	-.008	3	-.015	3	-.002	1	2.473e-6	10	NC	1	NC	1
395		8	max	.005	2	.002	2	0	10	6.118e-5	1	NC	1	NC	1
396			min	-.007	3	-.014	3	-.002	1	2.307e-6	10	NC	1	NC	1
397		9	max	.005	2	0	2	0	10	5.675e-5	1	NC	1	NC	1
398			min	-.007	3	-.013	3	-.002	1	2.141e-6	10	NC	1	NC	1
399		10	max	.004	2	0	2	0	10	5.232e-5	1	NC	1	NC	1
400			min	-.006	3	-.012	3	-.001	1	1.975e-6	10	NC	1	NC	1
401		11	max	.004	2	0	2	0	10	4.79e-5	1	NC	1	NC	1
402			min	-.005	3	-.011	3	-.001	1	1.808e-6	10	NC	1	NC	1
403		12	max	.003	2	-.002	2	0	10	4.347e-5	1	NC	1	NC	1
404			min	-.005	3	-.01	3	0	1	1.642e-6	10	NC	1	NC	1
405		13	max	.003	2	-.002	15	0	10	3.904e-5	1	NC	1	NC	1
406			min	-.004	3	-.009	3	0	1	1.476e-6	10	NC	1	NC	1
407		14	max	.002	2	-.002	15	0	10	3.461e-5	1	NC	1	NC	1
408			min	-.003	3	-.008	3	0	1	1.31e-6	10	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	10	3.018e-5	1	NC	1	NC	1
410			min	-.003	3	-.006	3	0	1	1.144e-6	10	NC	1	NC	1
411		16	max	.001	2	-.001	15	0	10	2.575e-5	1	NC	1	NC	1
412			min	-.002	3	-.005	3	0	1	9.774e-7	10	NC	1	NC	1
413		17	max	0	2	0	15	0	10	2.133e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	8.112e-7	10	NC	1	NC	1
415		18	max	0	2	0	15	0	10	1.69e-5	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	6.45e-7	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	1.247e-5	1	NC	1	NC	1
418			min	0	1	0	1	0	1	4.788e-7	10	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-9.487e-8	10	NC	1	NC	1
420			min	0	1	0	1	0	1	-2.577e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-6.73e-7	15	NC	1	NC	1
422			min	0	2	-.003	4	0	10	-1.374e-5	1	NC	1	NC	1
423		3	max	.001	3	-.001	15	0	1	-1.216e-6	15	NC	1	NC	1
424			min	-.001	2	-.006	4	0	10	-2.49e-5	1	NC	1	NC	1
425		4	max	.002	3	-.002	15	0	1	-1.759e-6	15	NC	1	NC	1
426			min	-.002	2	-.009	4	0	10	-3.607e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	1	-2.302e-6	15	NC	1	NC	1
428			min	-.002	2	-.012	4	0	10	-4.723e-5	1	8396.876	4	NC	1
429		6	max	.003	3	-.004	15	0	1	-2.845e-6	15	NC	2	NC	1
430			min	-.003	2	-.015	4	0	10	-5.839e-5	1	6813.16	4	NC	1
431		7	max	.003	3	-.004	15	0	1	-3.388e-6	15	NC	5	NC	1
432			min	-.003	2	-.018	4	0	10	-6.956e-5	1	5858.941	4	NC	1
433		8	max	.004	3	-.005	15	0	1	-3.931e-6	15	NC	5	NC	1
434			min	-.004	2	-.02	4	0	10	-8.072e-5	1	5270.577	4	NC	1
435		9	max	.005	3	-.005	15	0	3	-4.474e-6	15	NC	5	NC	1
436			min	-.004	2	-.021	4	0	1	-9.189e-5	1	4923.949	4	NC	1
437		10	max	.005	3	-.005	15	0	3	-5.017e-6	15	NC	5	NC	1
438			min	-.005	2	-.022	4	0	1	-1.03e-4	1	4758.942	4	NC	1
439		11	max	.006	3	-.005	15	0	15	-5.56e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.005	2	-.022	4	0	1	-1.142e-4	1	4751.331	4	NC	1
441		12	max	.006	3	-.005	15	0	15	-6.103e-6	15	NC	5	NC	1
442			min	-.006	2	-.021	4	0	1	-1.254e-4	1	4903.504	4	NC	1
443		13	max	.007	3	-.005	15	0	15	-6.646e-6	15	NC	5	NC	1
444			min	-.006	2	-.02	4	0	1	-1.365e-4	1	5246.57	4	NC	1
445		14	max	.007	3	-.004	15	0	15	-7.189e-6	15	NC	5	NC	1
446			min	-.007	2	-.018	4	-.001	1	-1.477e-4	1	5856.369	4	NC	1
447		15	max	.008	3	-.004	15	0	15	-7.732e-6	15	NC	3	NC	1
448			min	-.007	2	-.015	4	-.002	1	-1.589e-4	1	6900.55	4	NC	1
449		16	max	.009	3	-.003	15	0	15	-8.275e-6	15	NC	1	NC	1
450			min	-.008	2	-.012	4	-.002	1	-1.7e-4	1	8784.798	4	NC	1
451		17	max	.009	3	-.002	15	0	15	-8.818e-6	15	NC	1	NC	1
452			min	-.008	2	-.008	4	-.003	1	-1.812e-4	1	NC	1	NC	1
453		18	max	.01	3	-.001	15	0	15	-9.361e-6	15	NC	1	NC	1
454			min	-.009	2	-.005	3	-.003	1	-1.924e-4	1	NC	1	NC	1
455		19	max	.01	3	0	10	0	15	-9.904e-6	15	NC	1	NC	1
456			min	-.009	2	-.002	3	-.004	1	-2.035e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.009	2	.004	1	-3.972e-6	15	NC	1	NC	2
458			min	0	3	-.011	3	0	15	-8.087e-5	1	NC	1	6039.882	1
459		2	max	.002	1	.008	2	.004	1	-3.972e-6	15	NC	1	NC	2
460			min	0	3	-.01	3	0	15	-8.087e-5	1	NC	1	6552.062	1
461		3	max	.002	1	.008	2	.003	1	-3.972e-6	15	NC	1	NC	2
462			min	0	3	-.009	3	0	15	-8.087e-5	1	NC	1	7162.639	1
463		4	max	.002	1	.007	2	.003	1	-3.972e-6	15	NC	1	NC	2
464			min	0	3	-.009	3	0	15	-8.087e-5	1	NC	1	7896.998	1
465		5	max	.002	1	.007	2	.003	1	-3.972e-6	15	NC	1	NC	2
466			min	0	3	-.008	3	0	15	-8.087e-5	1	NC	1	8789.648	1
467		6	max	.001	1	.006	2	.003	1	-3.972e-6	15	NC	1	NC	2
468			min	0	3	-.008	3	0	15	-8.087e-5	1	NC	1	9888.451	1
469		7	max	.001	1	.006	2	.002	1	-3.972e-6	15	NC	1	NC	1
470			min	0	3	-.007	3	0	15	-8.087e-5	1	NC	1	NC	1
471		8	max	.001	1	.005	2	.002	1	-3.972e-6	15	NC	1	NC	1
472			min	0	3	-.006	3	0	15	-8.087e-5	1	NC	1	NC	1
473		9	max	.001	1	.005	2	.002	1	-3.972e-6	15	NC	1	NC	1
474			min	0	3	-.006	3	0	15	-8.087e-5	1	NC	1	NC	1
475		10	max	.001	1	.004	2	.001	1	-3.972e-6	15	NC	1	NC	1
476			min	0	3	-.005	3	0	15	-8.087e-5	1	NC	1	NC	1
477		11	max	0	1	.004	2	.001	1	-3.972e-6	15	NC	1	NC	1
478			min	0	3	-.005	3	0	15	-8.087e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-3.972e-6	15	NC	1	NC	1
480			min	0	3	-.004	3	0	15	-8.087e-5	1	NC	1	NC	1
481		13	max	0	1	.003	2	0	1	-3.972e-6	15	NC	1	NC	1
482			min	0	3	-.004	3	0	15	-8.087e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-3.972e-6	15	NC	1	NC	1
484			min	0	3	-.003	3	0	15	-8.087e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-3.972e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-8.087e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-3.972e-6	15	NC	1	NC	1
488			min	0	3	-.002	3	0	15	-8.087e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-3.972e-6	15	NC	1	NC	1
490			min	0	3	-.001	3	0	15	-8.087e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-3.972e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-8.087e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.972e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-8.087e-5	1	NC	1	NC	1
495	M1	1	max	.013	3	.241	2	0	1	4.358e-3	2	NC	1	NC	1
496			min	-.008	2	-.086	3	0	10	-1.278e-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	.013	3	.116	2	0	10	2.143e-3	2	NC	5	NC	1
498			min	-.008	2	-.04	3	-.003	1	-6.351e-3	3	1088.96	2	NC	1
499		3	max	.013	3	.02	3	0	10	2.919e-5	10	NC	5	NC	1
500			min	-.009	2	-.015	2	-.004	1	-9.185e-5	3	529.431	2	NC	1
501		4	max	.013	3	.106	3	0	10	3.323e-3	2	NC	5	NC	1
502			min	-.008	2	-.159	2	-.004	1	-3.463e-3	3	338.949	2	NC	1
503		5	max	.012	3	.209	3	0	10	6.622e-3	2	NC	15	NC	1
504			min	-.008	2	-.307	2	-.003	1	-6.835e-3	3	247.512	2	NC	1
505		6	max	.012	3	.317	3	0	10	9.921e-3	2	9806.554	15	NC	1
506			min	-.008	2	-.448	2	-.001	1	-1.021e-2	3	196.72	2	NC	1
507		7	max	.012	3	.418	3	0	1	1.322e-2	2	8319.22	15	NC	1
508			min	-.008	2	-.573	2	0	3	-1.358e-2	3	166.535	2	NC	1
509		8	max	.012	3	.502	3	0	1	1.652e-2	2	7435.753	15	NC	1
510			min	-.008	2	-.672	2	0	15	-1.695e-2	3	148.598	2	NC	1
511		9	max	.011	3	.556	3	0	15	1.839e-2	2	6971.673	15	NC	1
512			min	-.008	2	-.734	2	0	1	-1.763e-2	3	139.225	2	NC	1
513		10	max	.011	3	.576	3	0	1	1.932e-2	2	6829.197	15	NC	1
514			min	-.007	2	-.755	2	0	10	-1.652e-2	3	136.494	2	NC	1
515		11	max	.011	3	.562	3	0	1	2.024e-2	2	6970.928	15	NC	1
516			min	-.007	2	-.733	2	0	15	-1.541e-2	3	139.769	2	NC	1
517		12	max	.01	3	.516	3	0	15	1.926e-2	2	7434.124	15	NC	1
518			min	-.007	2	-.668	2	0	1	-1.364e-2	3	150.152	2	NC	1
519		13	max	.01	3	.441	3	0	10	1.544e-2	2	8316.302	15	NC	1
520			min	-.007	2	-.565	2	0	1	-1.092e-2	3	170.121	2	NC	1
521		14	max	.01	3	.344	3	.001	1	1.161e-2	2	9801.565	15	NC	1
522			min	-.007	2	-.435	2	0	15	-8.187e-3	3	204.096	2	NC	1
523		15	max	.01	3	.235	3	.003	1	7.792e-3	2	NC	15	NC	1
524			min	-.007	2	-.291	2	0	15	-5.458e-3	3	262.183	2	NC	1
525		16	max	.009	3	.12	3	.004	1	3.97e-3	2	NC	5	NC	1
526			min	-.007	2	-.145	2	0	15	-2.729e-3	3	368.78	2	NC	1
527		17	max	.009	3	.007	3	.004	1	2.891e-4	1	NC	5	NC	1
528			min	-.007	2	-.008	2	0	15	-4.775e-8	3	594.396	2	NC	1
529		18	max	.009	3	.108	2	.003	1	4.146e-3	2	NC	5	NC	1
530			min	-.007	2	-.096	3	0	15	-1.293e-3	3	1250.846	2	NC	1
531		19	max	.009	3	.214	2	0	15	8.284e-3	2	NC	1	NC	1
532			min	-.007	2	-.194	3	0	1	-2.658e-3	3	NC	1	NC	1
533	M5	1	max	.036	3	.309	2	0	1	0	1	NC	1	NC	1
534			min	-.026	2	.006	15	0	1	0	1	NC	1	NC	1
535		2	max	.036	3	.147	2	0	1	0	1	NC	5	NC	1
536			min	-.026	2	.003	15	0	1	0	1	849.164	2	NC	1
537		3	max	.036	3	.056	3	0	1	0	1	NC	5	NC	1
538			min	-.026	2	-.041	2	0	1	0	1	392.685	2	NC	1
539		4	max	.035	3	.181	3	0	1	0	1	NC	15	NC	1
540			min	-.025	2	-.274	2	0	1	0	1	235.244	2	NC	1
541		5	max	.034	3	.364	3	0	1	0	1	8967.086	15	NC	1
542			min	-.025	2	-.532	2	0	1	0	1	162.648	2	NC	1
543		6	max	.033	3	.575	3	0	1	0	1	6837.894	15	NC	1
544			min	-.024	2	-.793	2	0	1	0	1	124.071	2	NC	1
545		7	max	.033	3	.783	3	0	1	0	1	5620.863	15	NC	1
546			min	-.024	2	-1.031	2	0	1	0	1	101.962	2	NC	1
547		8	max	.032	3	.959	3	0	1	0	1	4918.778	15	NC	1
548			min	-.023	2	-1.224	2	0	1	0	1	89.182	2	NC	1
549		9	max	.031	3	1.073	3	0	1	0	1	4560.321	15	NC	1
550			min	-.023	2	-1.347	2	0	1	0	1	82.647	2	NC	1
551		10	max	.03	3	1.113	3	0	1	0	1	4452.56	15	NC	1
552			min	-.022	2	-1.389	2	0	1	0	1	80.746	2	NC	1
553		11	max	.03	3	1.084	3	0	1	0	1	4560.956	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	-.022	2	-1.348	2	0	1	0	1	83.012	2	NC	1
555		12	max	.029	3	.988	3	0	1	0	1	4920.24	15	NC	1
556			min	-.022	2	-1.22	2	0	1	0	1	90.433	2	NC	1
557		13	max	.028	3	.833	3	0	1	0	1	5623.697	15	NC	1
558			min	-.021	2	-1.014	2	0	1	0	1	105.335	2	NC	1
559		14	max	.027	3	.639	3	0	1	0	1	6843.216	15	NC	1
560			min	-.021	2	-.761	2	0	1	0	1	131.984	2	NC	1
561		15	max	.027	3	.426	3	0	1	0	1	8977.359	15	NC	1
562			min	-.021	2	-.491	2	0	1	0	1	180.746	2	NC	1
563		16	max	.026	3	.212	3	0	1	0	1	NC	15	NC	1
564			min	-.02	2	-.235	2	0	1	0	1	278.801	2	NC	1
565		17	max	.025	3	.018	3	0	1	0	1	NC	5	NC	1
566			min	-.02	2	-.021	2	0	1	0	1	505.419	3	NC	1
567		18	max	.025	3	.125	2	0	1	0	1	NC	5	NC	1
568			min	-.02	2	-.141	3	0	1	0	1	1093.732	3	NC	1
569		19	max	.025	3	.234	2	0	1	0	1	NC	1	NC	1
570			min	-.02	2	-.28	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.013	3	.241	2	0	10	1.278e-2	3	NC	1	NC	1
572			min	-.008	2	-.086	3	0	1	-4.358e-3	2	NC	1	NC	1
573		2	max	.013	3	.116	2	.003	1	6.351e-3	3	NC	5	NC	1
574			min	-.008	2	-.04	3	0	10	-2.143e-3	2	1088.96	2	NC	1
575		3	max	.013	3	.02	3	.004	1	9.185e-5	3	NC	5	NC	1
576			min	-.009	2	-.015	2	0	10	-2.919e-5	10	529.431	2	NC	1
577		4	max	.013	3	.106	3	.004	1	3.463e-3	3	NC	5	NC	1
578			min	-.008	2	-.159	2	0	10	-3.323e-3	2	338.949	2	NC	1
579		5	max	.012	3	.209	3	.003	1	6.835e-3	3	NC	15	NC	1
580			min	-.008	2	-.307	2	0	10	-6.622e-3	2	247.512	2	NC	1
581		6	max	.012	3	.317	3	.001	1	1.021e-2	3	9806.554	15	NC	1
582			min	-.008	2	-.448	2	0	10	-9.921e-3	2	196.72	2	NC	1
583		7	max	.012	3	.418	3	0	3	1.358e-2	3	8319.22	15	NC	1
584			min	-.008	2	-.573	2	0	1	-1.322e-2	2	166.535	2	NC	1
585		8	max	.012	3	.502	3	0	15	1.695e-2	3	7435.753	15	NC	1
586			min	-.008	2	-.672	2	0	1	-1.652e-2	2	148.598	2	NC	1
587		9	max	.011	3	.556	3	0	1	1.763e-2	3	6971.673	15	NC	1
588			min	-.008	2	-.734	2	0	15	-1.839e-2	2	139.225	2	NC	1
589		10	max	.011	3	.576	3	0	10	1.652e-2	3	6829.197	15	NC	1
590			min	-.007	2	-.755	2	0	1	-1.932e-2	2	136.494	2	NC	1
591		11	max	.011	3	.562	3	0	15	1.541e-2	3	6970.928	15	NC	1
592			min	-.007	2	-.733	2	0	1	-2.024e-2	2	139.769	2	NC	1
593		12	max	.01	3	.516	3	0	1	1.364e-2	3	7434.124	15	NC	1
594			min	-.007	2	-.668	2	0	15	-1.926e-2	2	150.152	2	NC	1
595		13	max	.01	3	.441	3	0	1	1.092e-2	3	8316.302	15	NC	1
596			min	-.007	2	-.565	2	0	10	-1.544e-2	2	170.121	2	NC	1
597		14	max	.01	3	.344	3	0	15	8.187e-3	3	9801.565	15	NC	1
598			min	-.007	2	-.435	2	-.001	1	-1.161e-2	2	204.096	2	NC	1
599		15	max	.01	3	.235	3	0	15	5.458e-3	3	NC	15	NC	1
600			min	-.007	2	-.291	2	-.003	1	-7.792e-3	2	262.183	2	NC	1
601		16	max	.009	3	.12	3	0	15	2.729e-3	3	NC	5	NC	1
602			min	-.007	2	-.145	2	-.004	1	-3.97e-3	2	368.78	2	NC	1
603		17	max	.009	3	.007	3	0	15	4.775e-8	3	NC	5	NC	1
604			min	-.007	2	-.008	2	-.004	1	-2.891e-4	1	594.396	2	NC	1
605		18	max	.009	3	.108	2	0	15	1.293e-3	3	NC	5	NC	1
606			min	-.007	2	-.096	3	-.003	1	-4.146e-3	2	1250.846	2	NC	1
607		19	max	.009	3	.214	2	0	1	2.658e-3	3	NC	1	NC	1
608			min	-.007	2	-.194	3	0	15	-8.284e-3	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

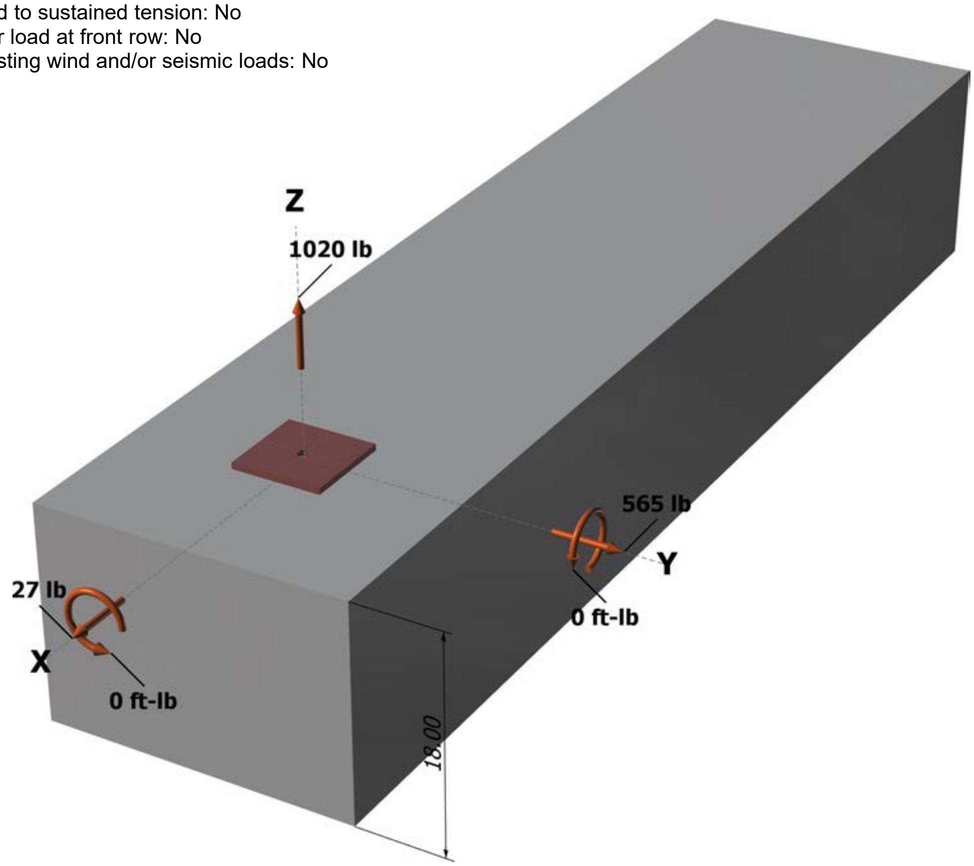
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

<Figure 1>



Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 14-40 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>

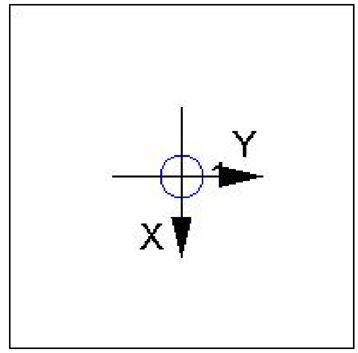
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, ϕN_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, ϕV_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.

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

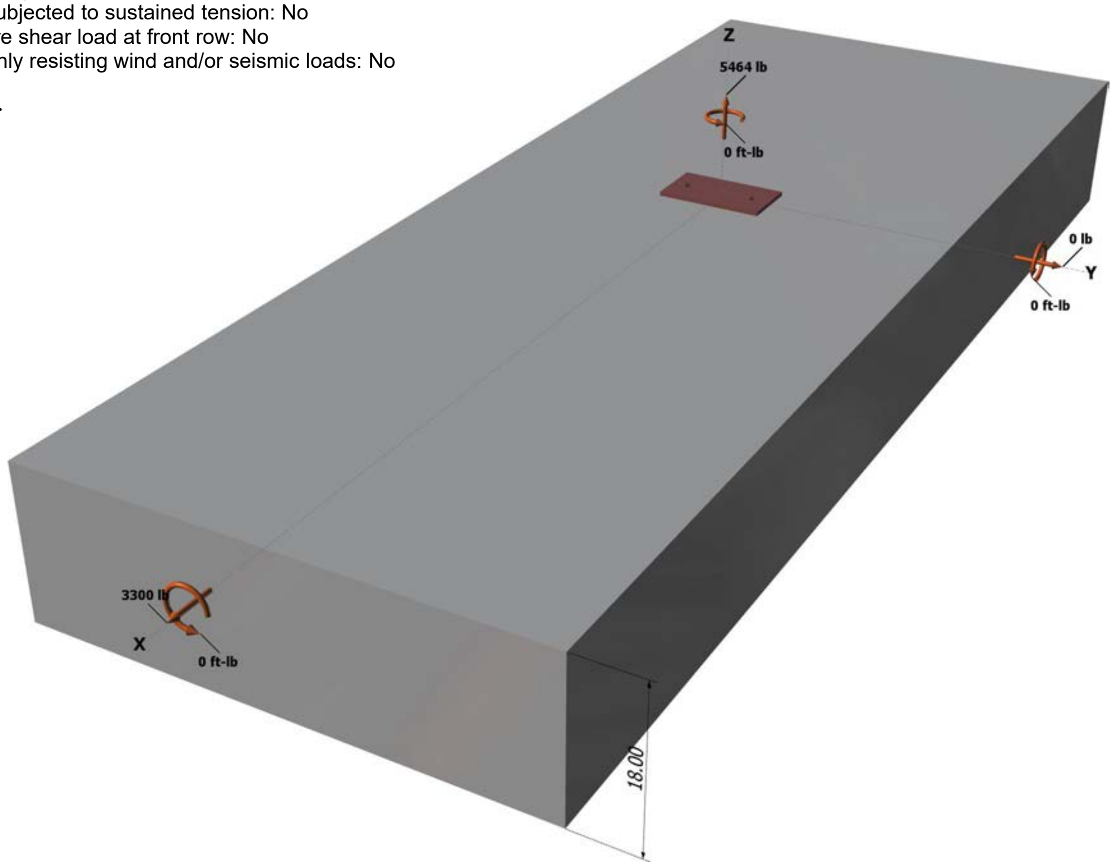
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

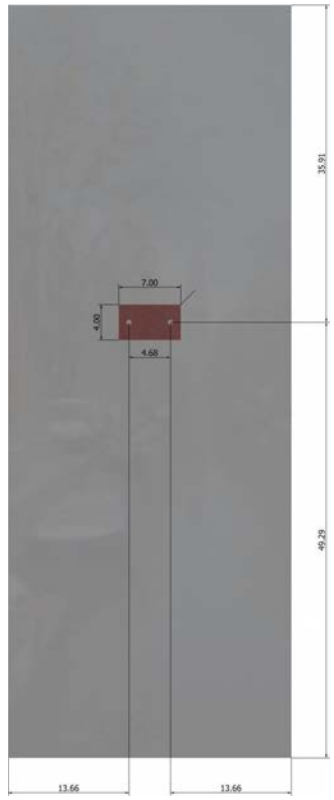
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



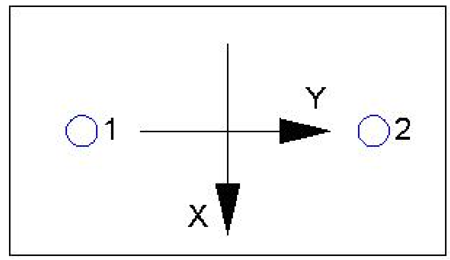
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	6.000	12492

$\phi N_{cbg} = \phi\,(A_{Nc}/A_{Nco})\,\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b$ (Sec. D.4.1 & Eq. D-5)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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

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

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

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

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

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

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

Shear perpendicular to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
576.00	648.00	1.000	0.928	1.000	1.000	15593	0.70	9001

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.66	18939

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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

$\phi V_{cpg} = \phi\min|k_{cp}N_{ag}\,;\,k_{cp}N_{cbg}| = \phi\min|k_{cp}(A_{Na} / A_{Na0})\Psi_{ed,Na}\Psi_{g,Na}\Psi_{ec,Na}\Psi_{p,Na}N_{a0}\,;\,k_{cp}(A_{Nc} / A_{Nco})\Psi_{ec,N}\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	158.66	109.66	1.000	1.043	1.000	1.000	9755	14715

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
408.24	324.00	1.000	1.000	1.000	1.000	12492	15740	0.70

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

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

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	119.8 %	1.2	Pass

AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS) with hef = 6.000 inch meets the selected design criteria.

12. Warnings

- This temperature range is currently outside the scope of ACI 318-11 and ACI 355.4, and is provided for historical purposes.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer’s product literature for hole cleaning and installation instructions.