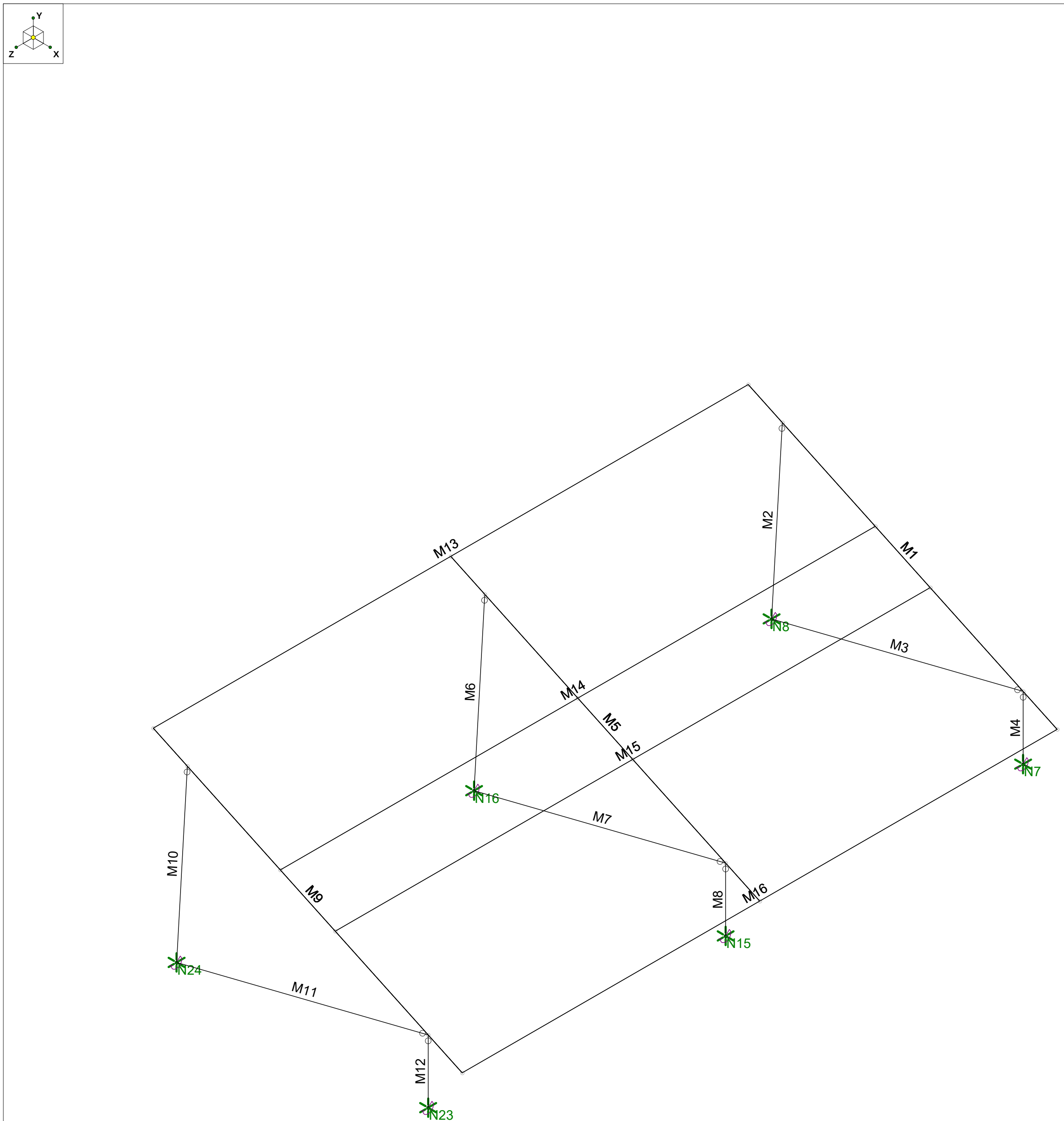


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

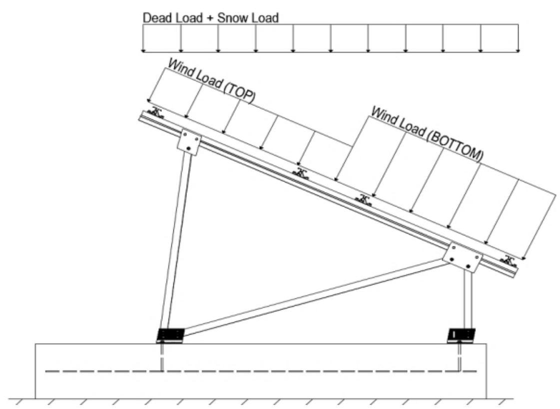
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 =	25°
Maximum Height Above Grade =	3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	18.56	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.82		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	90	mph	Exposure Category = C
Height <	15	ft	Importance Category = II

Peak Velocity Pressure, q_z = 12.72 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
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

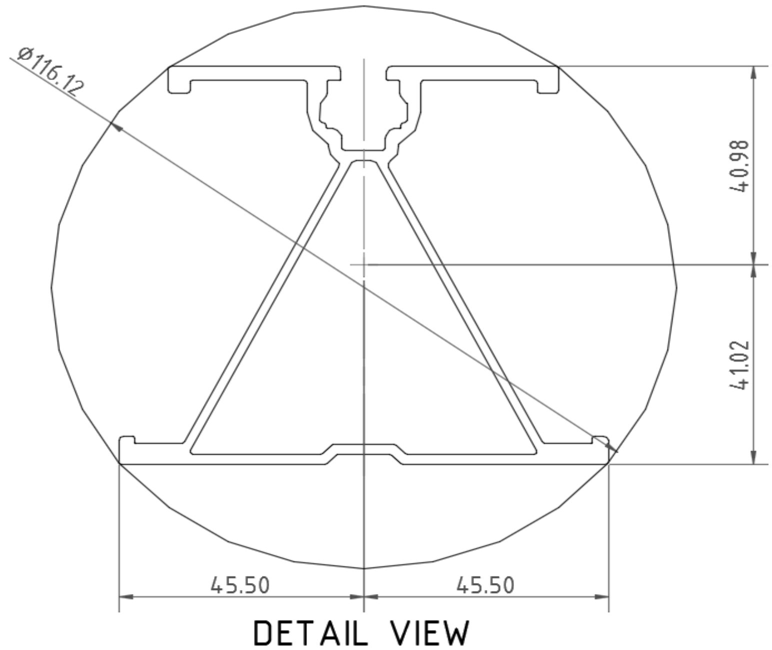
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

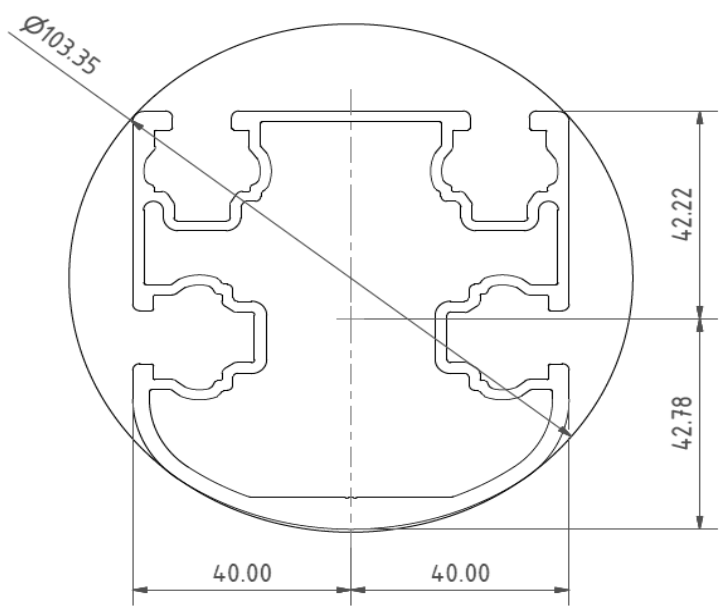
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	117	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.841	k-ft
M_z =	0.372	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	98%	



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).

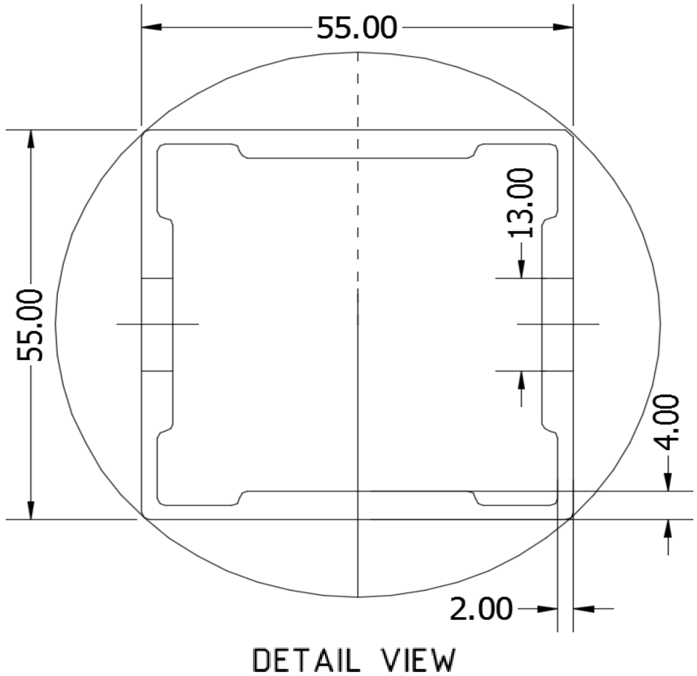
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.325	k-ft
M_z =	0.000	k-ft
P_n =	-0.378	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



4.3 Front Strut Design

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

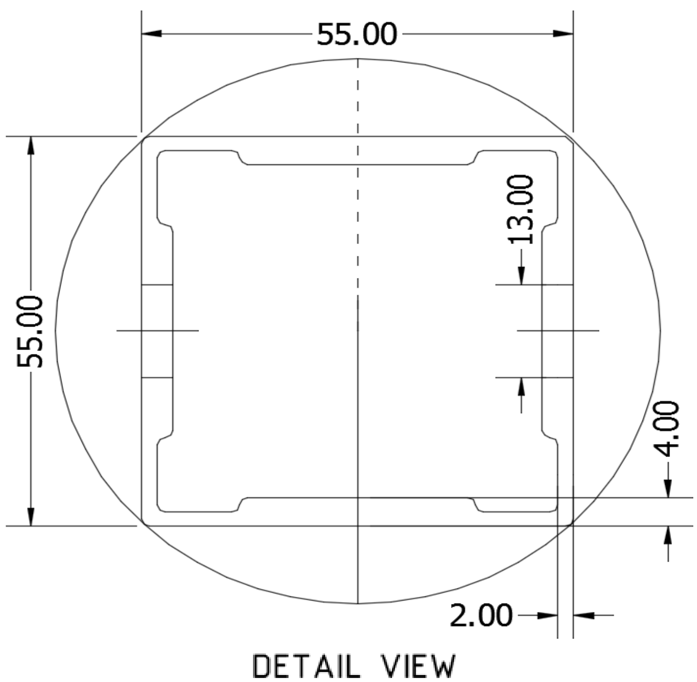
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.147	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M12 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

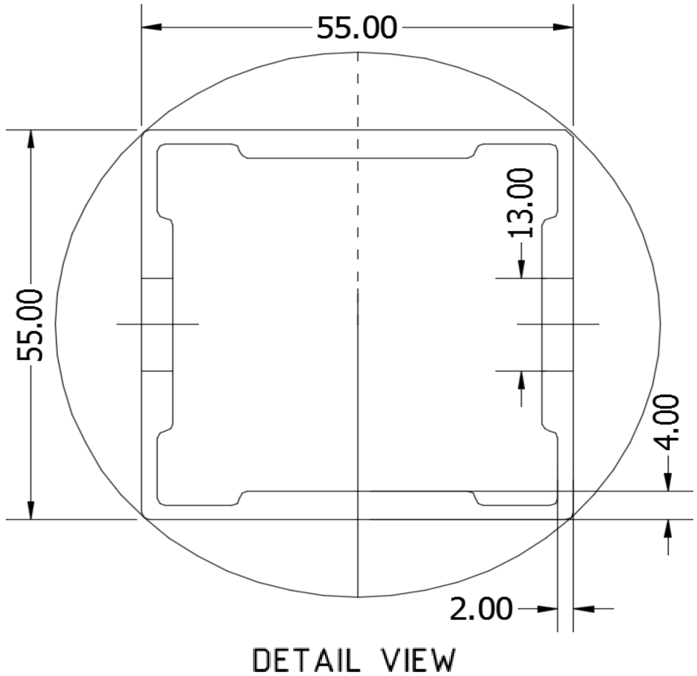
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	1.891	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	32%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	69.80	in
$\Phi F_{ty\ AXIAL}$ =	10.82	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.419	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.629	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

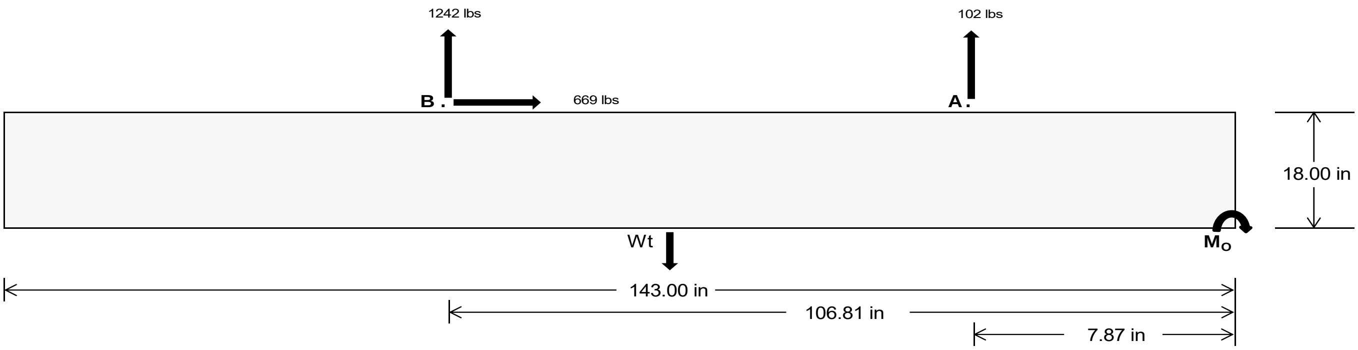
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	437.36	5178.65	k
Compressive Load =	4090.84	4786.69	k
Lateral Load =	21.44	2782.73	k
Moment (Weak Axis) =	0.04	0.01	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check	
M_O =	145456.4 in-lbs
Resisting Force Required =	2034.36 lbs
S.F. =	1.67
Weight Required =	3390.59 lbs
Minimum Width =	35 in in
Weight Provided =	7559.64 lbs

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

Sliding	
Force =	668.70 lbs
Friction =	0.4
Weight Required =	1671.75 lbs
Resisting Weight =	7559.64 lbs
Additional Weight Required =	0 lbs

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

Cohesion	
Sliding Force =	668.70 lbs
Cohesion =	130 psf
Area =	34.76 ft^2
Resisting =	3779.82 lbs
Additional Weight Required =	0 lbs

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

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

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1537 lbs	1537 lbs	1537 lbs	1537 lbs	1286 lbs	1286 lbs	1286 lbs	1286 lbs	1976 lbs	1976 lbs	1976 lbs	1976 lbs	-204 lbs	-204 lbs	-204 lbs	-204 lbs
F_B	1604 lbs	1604 lbs	1604 lbs	1604 lbs	1828 lbs	1828 lbs	1828 lbs	1828 lbs	2428 lbs	2428 lbs	2428 lbs	2428 lbs	-2483 lbs	-2483 lbs	-2483 lbs	-2483 lbs
F_V	202 lbs	202 lbs	202 lbs	202 lbs	1215 lbs	1215 lbs	1215 lbs	1215 lbs	1046 lbs	1046 lbs	1046 lbs	1046 lbs	-1337 lbs	-1337 lbs	-1337 lbs	-1337 lbs
P_{total}	10700 lbs	10916 lbs	11132 lbs	11348 lbs	10673 lbs	10889 lbs	11105 lbs	11321 lbs	11964 lbs	12180 lbs	12396 lbs	12612 lbs	1849 lbs	1979 lbs	2108 lbs	2238 lbs
M	3731 lbs-ft	3731 lbs-ft	3731 lbs-ft	3731 lbs-ft	3260 lbs-ft	3260 lbs-ft	3260 lbs-ft	3260 lbs-ft	4900 lbs-ft	4900 lbs-ft	4900 lbs-ft	4900 lbs-ft	4222 lbs-ft	4222 lbs-ft	4222 lbs-ft	4222 lbs-ft
e	0.35 ft	0.34 ft	0.34 ft	0.33 ft	0.31 ft	0.30 ft	0.29 ft	0.29 ft	0.41 ft	0.40 ft	0.40 ft	0.39 ft	2.28 ft	2.13 ft	2.00 ft	1.89 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}	253.8 psf	252.8 psf	251.9 psf	250.9 psf	259.9 psf	258.7 psf	257.6 psf	256.5 psf	273.2 psf	271.7 psf	270.2 psf	268.8 psf	0.0 psf	0.0 psf	0.0 psf	3.0 psf
f_{max}	361.9 psf	357.9 psf	354.1 psf	350.5 psf	354.3 psf	350.5 psf	346.9 psf	343.5 psf	415.2 psf	409.7 psf	404.5 psf	399.6 psf	115.0 psf	115.0 psf	115.2 psf	115.6 psf

Maximum Bearing Pressure = 415 psf
Allowable Bearing Pressure = 1500 psf

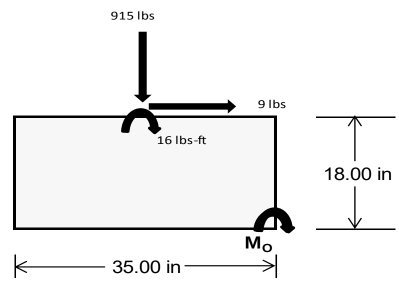
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1305.9 ft-lbs
Resisting Force Required = 895.50 lbs
S.F. = 1.67
Weight Required = 1492.50 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	277 lbs	710 lbs	277 lbs	915 lbs	2602 lbs	915 lbs	81 lbs	208 lbs	81 lbs
F_V	2 lbs	0 lbs	2 lbs	9 lbs	0 lbs	9 lbs	1 lbs	0 lbs	1 lbs
P_{total}	9636 lbs	7560 lbs	9636 lbs	9824 lbs	7560 lbs	9824 lbs	2818 lbs	7560 lbs	2818 lbs
M	8 lbs-ft	0 lbs-ft	8 lbs-ft	29 lbs-ft	0 lbs-ft	29 lbs-ft	2 lbs-ft	0 lbs-ft	2 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	276.8 psf	217.5 psf	276.8 psf	281.0 psf	217.5 psf	281.0 psf	81.0 psf	217.5 psf	81.0 psf
f_{max}	277.7 psf	217.5 psf	277.7 psf	284.4 psf	217.5 psf	284.4 psf	81.2 psf	217.5 psf	81.2 psf

Maximum Bearing Pressure = 284 psf
Allowable Bearing Pressure = 1500 psf

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

Foundation Requirements: 143in long x 27in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

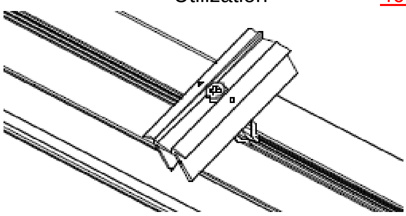
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

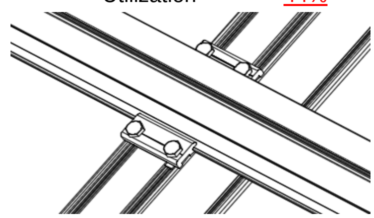
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.557	k
Allowable Uplift =	1.214	k
Utilization =	46%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.920	k
Allowable Uplift =	4.357	k
Utilization =	44%	



6.2 Strut Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Single M12 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut

Maximum Axial Load =	3.147	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	42%	

Rear Strut

Maximum Axial Load =	3.519	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	47%	

Diagonal Strut

Maximum Axial Load =	1.986	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	27%	

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).

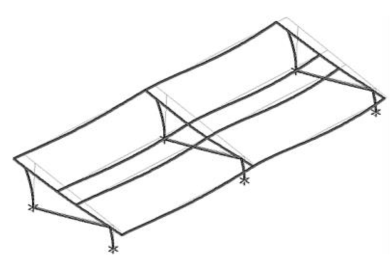
Mean Height, h_{sx} = 56.48 in

Allowable Story Drift for All Other Structures, Δ = { $0.020h_{sx}$; 1.130 in

Max Drift, Δ_{MAX} = 0.054 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 =	117 in	L_b =	117
J =	0.432	J =	0.432
	323.677		205.839
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	27.5 ksi	φF_L=	28.7
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

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 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

3.4.18

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 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

$φF_L$= φcc(Bc-Dc*λ)

$φF_L$= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$φF_L$= φc[Bp-1.6Dp*b/t]

$φF_L$= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

$φF_L$= φc[Bp-1.6Dp*b/t]

$φF_L$= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$φF_L$= φyFcy

$φF_L$= 33.25 ksi

$φF_L$= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **<u>55x55</u>**

Strong Axis:

3.4.14

L_b = 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 (weak)

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

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

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi y Fcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

$L_b =$ 69.80 in
J = 0.942
108.93

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\surd((LbSc)/(Cb*\surd(IyJ)/2))]$
$\varphi F_L =$ 30.0 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

Weak Axis:
3.4.14

$L_b =$ 69.8
J = 0.942
108.93

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\surd((LbSc)/(Cb*\surd(IyJ)/2))]$
$\varphi F_L =$ 30.0

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

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.61471

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80606

φF_L= (φccFcy)/(λ²)

φF_L= 10.8205 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

$\varphi F_L =$ 10.82 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 11.14 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	-55.176	-55.176	0	0
2	M14	Y	-55.176	-55.176	0	0
3	M15	Y	-55.176	-55.176	0	0
4	M16	Y	-55.176	-55.176	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	-45.897	-45.897	0	0
2	M14	y	-45.897	-45.897	0	0
3	M15	y	-70.932	-70.932	0	0
4	M16	y	-70.932	-70.932	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	104.312	104.312	0	0
2	M14	y	79.277	79.277	0	0
3	M15	y	41.725	41.725	0	0
4	M16	y	41.725	41.725	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	533.869	2	1111.801	1	.945	1	.004	1	0	1	0	1
2		min	-690.11	3	-1231.986	3	.046	15	0	15	0	1	0	1
3	N7	max	.043	9	1181.383	1	-.69	15	-.001	15	0	1	0	1
4		min	-.158	2	-77.923	3	-16.493	1	-.033	1	0	1	0	1
5	N15	max	0	15	3146.803	1	0	3	0	3	0	1	0	1
6		min	-1.821	2	-336.428	3	0	10	0	10	0	1	0	1
7	N16	max	2015.343	2	3682.071	1	0	9	0	1	0	1	0	1
8		min	-2140.562	3	-3983.575	3	0	3	0	12	0	1	0	1
9	N23	max	.043	9	1181.383	1	16.493	1	.033	1	0	1	0	1
10		min	-.158	2	-77.923	3	.69	15	.001	15	0	1	0	1
11	N24	max	533.869	2	1111.801	1	-.046	15	0	15	0	1	0	1
12		min	-690.11	3	-1231.986	3	-.945	1	-.004	1	0	1	0	1
13	Totals:	max	3080.942	2	11415.242	1	0	3						
14		min	-3521.093	3	-6939.822	3	0	13						

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	99.605	1	464.34	1	-8.091	15	0	15	.279	1	0	1
2			min	4.045	15	-590.199	3	-200.266	1	-.015	1	.011	15	0	3
3		2	max	99.605	1	324.516	1	-6.21	15	0	15	.088	1	.545	3
4			min	4.045	15	-415.54	3	-153.613	1	-.015	1	.004	15	-.427	1
5		3	max	99.605	1	184.691	1	-4.33	15	0	15	0	3	.9	3
6			min	4.045	15	-240.881	3	-106.96	1	-.015	1	-.054	1	-.703	1
7		4	max	99.605	1	44.867	1	-2.449	15	0	15	-.005	12	1.067	3
8			min	4.045	15	-66.222	3	-60.308	1	-.015	1	-.144	1	-.827	1
9		5	max	99.605	1	108.437	3	-.568	15	0	15	-.007	12	1.044	3
10			min	4.045	15	-94.958	1	-13.655	1	-.015	1	-.184	1	-.8	1
11		6	max	99.605	1	283.095	3	32.998	1	0	15	-.007	15	.832	3
12			min	4.045	15	-234.782	1	.585	12	-.015	1	-.174	1	-.622	1
13		7	max	99.605	1	457.754	3	79.651	1	0	15	-.005	15	.43	3
14			min	4.045	15	-374.607	1	2.497	12	-.015	1	-.113	1	-.292	1
15		8	max	99.605	1	632.413	3	126.303	1	0	15	.002	2	.19	1
16			min	4.045	15	-514.431	1	4.408	12	-.015	1	-.004	3	-.16	3
17		9	max	99.605	1	807.072	3	172.956	1	0	15	.161	1	.823	1
18			min	4.045	15	-654.255	1	6.319	12	-.015	1	.003	12	-.94	3
19		10	max	99.605	1	794.08	1	-8.231	12	.015	1	.374	1	1.607	1
20			min	4.045	15	-981.731	3	-219.609	1	-.001	3	.011	12	-1.909	3
21		11	max	99.605	1	654.255	1	-6.319	12	.015	1	.161	1	.823	1
22			min	4.045	15	-807.072	3	-172.956	1	0	15	.003	12	-.94	3
23		12	max	99.605	1	514.431	1	-4.408	12	.015	1	.002	2	.19	1
24			min	4.045	15	-632.413	3	-126.303	1	0	15	-.004	3	-.16	3
25		13	max	99.605	1	374.607	1	-2.497	12	.015	1	-.005	15	.43	3
26			min	4.045	15	-457.754	3	-79.651	1	0	15	-.113	1	-.292	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	99.605	1	234.782	1	-.585	12	.015	1	-.007	15	.832	3
28			min	4.045	15	-283.095	3	-32.998	1	0	15	-.174	1	-.622	1
29		15	max	99.605	1	94.958	1	13.655	1	.015	1	-.007	12	1.044	3
30			min	4.045	15	-108.437	3	.568	15	0	15	-.184	1	-.8	1
31		16	max	99.605	1	66.222	3	60.308	1	.015	1	-.005	12	1.067	3
32			min	4.045	15	-44.867	1	2.449	15	0	15	-.144	1	-.827	1
33		17	max	99.605	1	240.881	3	106.96	1	.015	1	0	3	.9	3
34			min	4.045	15	-184.691	1	4.33	15	0	15	-.054	1	-.703	1
35		18	max	99.605	1	415.54	3	153.613	1	.015	1	.088	1	.545	3
36			min	4.045	15	-324.516	1	6.21	15	0	15	.004	15	-.427	1
37		19	max	99.605	1	590.199	3	200.266	1	.015	1	.279	1	0	1
38			min	4.045	15	-464.34	1	8.091	15	0	15	.011	15	0	3
39	M14	1	max	54.894	1	506.979	1	-8.386	15	.01	3	.327	1	0	1
40			min	2.236	15	-463.697	3	-207.573	1	-.014	1	.013	15	0	3
41		2	max	54.894	1	367.155	1	-6.505	15	.01	3	.127	1	.431	3
42			min	2.236	15	-332.432	3	-160.92	1	-.014	1	.005	15	-.473	1
43		3	max	54.894	1	227.33	1	-4.624	15	.01	3	.002	3	.72	3
44			min	2.236	15	-201.167	3	-114.267	1	-.014	1	-.022	1	-.795	1
45		4	max	54.894	1	87.506	1	-2.744	15	.01	3	-.004	12	.867	3
46			min	2.236	15	-69.902	3	-67.615	1	-.014	1	-.12	1	-.966	1
47		5	max	54.894	1	61.362	3	-.863	15	.01	3	-.007	12	.872	3
48			min	2.236	15	-52.319	1	-20.962	1	-.014	1	-.168	1	-.985	1
49		6	max	54.894	1	192.627	3	25.691	1	.01	3	-.007	15	.734	3
50			min	2.236	15	-192.143	1	.288	12	-.014	1	-.166	1	-.853	1
51		7	max	54.894	1	323.892	3	72.344	1	.01	3	-.005	15	.454	3
52			min	2.236	15	-331.968	1	2.199	12	-.014	1	-.113	1	-.569	1
53		8	max	54.894	1	455.157	3	118.996	1	.01	3	0	10	.032	3
54			min	2.236	15	-471.792	1	4.111	12	-.014	1	-.009	1	-.133	1
55		9	max	54.894	1	586.422	3	165.649	1	.01	3	.145	1	.453	1
56			min	2.236	15	-611.616	1	6.022	12	-.014	1	.003	12	-.532	3
57		10	max	54.894	1	751.441	1	-7.933	12	.014	1	.35	1	1.192	1
58			min	2.236	15	-717.687	3	-212.302	1	-.01	3	.011	12	-1.238	3
59		11	max	54.894	1	611.616	1	-6.022	12	.014	1	.145	1	.453	1
60			min	2.236	15	-586.422	3	-165.649	1	-.01	3	.003	12	-.532	3
61		12	max	54.894	1	471.792	1	-4.111	12	.014	1	0	10	.032	3
62			min	2.236	15	-455.157	3	-118.996	1	-.01	3	-.009	1	-.133	1
63		13	max	54.894	1	331.968	1	-2.199	12	.014	1	-.005	15	.454	3
64			min	2.236	15	-323.892	3	-72.344	1	-.01	3	-.113	1	-.569	1
65		14	max	54.894	1	192.143	1	-.288	12	.014	1	-.007	15	.734	3
66			min	2.236	15	-192.627	3	-25.691	1	-.01	3	-.166	1	-.853	1
67		15	max	54.894	1	52.319	1	20.962	1	.014	1	-.007	12	.872	3
68			min	2.236	15	-61.362	3	.863	15	-.01	3	-.168	1	-.985	1
69		16	max	54.894	1	69.902	3	67.615	1	.014	1	-.004	12	.867	3
70			min	2.236	15	-87.506	1	2.744	15	-.01	3	-.12	1	-.966	1
71		17	max	54.894	1	201.167	3	114.267	1	.014	1	.002	3	.72	3
72			min	2.236	15	-227.33	1	4.624	15	-.01	3	-.022	1	-.795	1
73		18	max	54.894	1	332.432	3	160.92	1	.014	1	.127	1	.431	3
74			min	2.236	15	-367.155	1	6.505	15	-.01	3	.005	15	-.473	1
75		19	max	54.894	1	463.697	3	207.573	1	.014	1	.327	1	0	1
76			min	2.236	15	-506.979	1	8.386	15	-.01	3	.013	15	0	3
77	M15	1	max	-2.396	15	584.046	2	-8.382	15	.014	1	.326	1	0	2
78			min	-58.797	1	-244.449	3	-207.505	1	-.008	3	.013	15	0	3
79		2	max	-2.396	15	420.642	2	-6.501	15	.014	1	.127	1	.229	3
80			min	-58.797	1	-178.275	3	-160.852	1	-.008	3	.005	15	-.544	2
81		3	max	-2.396	15	257.237	2	-4.621	15	.014	1	.002	3	.386	3
82			min	-58.797	1	-112.1	3	-114.199	1	-.008	3	-.022	1	-.911	2
83		4	max	-2.396	15	95.598	1	-2.74	15	.014	1	-.004	12	.472	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	-58.797	1	-45.925	3	-67.547	1	-.008	3	-.121	1	-1.102	2
85		5	max	-2.396	15	20.25	3	-.859	15	.014	1	-.007	12	.486	3
86			min	-58.797	1	-69.573	2	-20.894	1	-.008	3	-.169	1	-1.115	2
87		6	max	-2.396	15	86.425	3	25.759	1	.014	1	-.007	15	.428	3
88			min	-58.797	1	-232.978	2	.354	12	-.008	3	-.166	1	-.955	1
89		7	max	-2.396	15	152.599	3	72.411	1	.014	1	-.005	15	.299	3
90			min	-58.797	1	-396.382	2	2.266	12	-.008	3	-.113	1	-.621	1
91		8	max	-2.396	15	218.774	3	119.064	1	.014	1	0	10	.097	3
92			min	-58.797	1	-559.787	2	4.177	12	-.008	3	-.009	1	-.113	1
93		9	max	-2.396	15	284.949	3	165.717	1	.014	1	.145	1	.603	2
94			min	-58.797	1	-723.192	2	6.089	12	-.008	3	.003	12	-.175	3
95		10	max	-2.396	15	886.597	2	-8	12	.008	3	.35	1	1.475	2
96			min	-58.797	1	-351.124	3	-212.369	1	-.014	1	.011	12	-.52	3
97		11	max	-2.396	15	723.192	2	-6.089	12	.008	3	.145	1	.603	2
98			min	-58.797	1	-284.949	3	-165.717	1	-.014	1	.003	12	-.175	3
99		12	max	-2.396	15	559.787	2	-4.177	12	.008	3	0	10	.097	3
100			min	-58.797	1	-218.774	3	-119.064	1	-.014	1	-.009	1	-.113	1
101		13	max	-2.396	15	396.382	2	-2.266	12	.008	3	-.005	15	.299	3
102			min	-58.797	1	-152.599	3	-72.411	1	-.014	1	-.113	1	-.621	1
103		14	max	-2.396	15	232.978	2	-.354	12	.008	3	-.007	15	.428	3
104			min	-58.797	1	-86.425	3	-25.759	1	-.014	1	-.166	1	-.955	1
105		15	max	-2.396	15	69.573	2	20.894	1	.008	3	-.007	12	.486	3
106			min	-58.797	1	-20.25	3	.859	15	-.014	1	-.169	1	-1.115	2
107		16	max	-2.396	15	45.925	3	67.547	1	.008	3	-.004	12	.472	3
108			min	-58.797	1	-95.598	1	2.74	15	-.014	1	-.121	1	-1.102	2
109		17	max	-2.396	15	112.1	3	114.199	1	.008	3	.002	3	.386	3
110			min	-58.797	1	-257.237	2	4.621	15	-.014	1	-.022	1	-.911	2
111		18	max	-2.396	15	178.275	3	160.852	1	.008	3	.127	1	.229	3
112			min	-58.797	1	-420.642	2	6.501	15	-.014	1	.005	15	-.544	2
113		19	max	-2.396	15	244.449	3	207.505	1	.008	3	.326	1	0	2
114			min	-58.797	1	-584.046	2	8.382	15	-.014	1	.013	15	0	3
115	M16	1	max	-4.529	15	545.559	2	-8.106	15	.013	1	.282	1	0	2
116			min	-111.251	1	-217.58	3	-200.737	1	-.011	3	.011	15	0	3
117		2	max	-4.529	15	382.154	2	-6.226	15	.013	1	.09	1	.2	3
118			min	-111.251	1	-151.406	3	-154.085	1	-.011	3	.004	15	-.503	2
119		3	max	-4.529	15	218.75	2	-4.345	15	.013	1	0	12	.328	3
120			min	-111.251	1	-85.231	3	-107.432	1	-.011	3	-.052	1	-.828	2
121		4	max	-4.529	15	55.345	2	-2.464	15	.013	1	-.005	12	.385	3
122			min	-111.251	1	-19.056	3	-60.779	1	-.011	3	-.143	1	-.976	2
123		5	max	-4.529	15	47.119	3	-.584	15	.013	1	-.007	12	.369	3
124			min	-111.251	1	-108.066	1	-14.127	1	-.011	3	-.183	1	-.948	2
125		6	max	-4.529	15	113.294	3	32.526	1	.013	1	-.007	15	.282	3
126			min	-111.251	1	-271.465	2	.785	12	-.011	3	-.173	1	-.742	2
127		7	max	-4.529	15	179.468	3	79.179	1	.013	1	-.005	15	.124	3
128			min	-111.251	1	-434.87	2	2.697	12	-.011	3	-.113	1	-.36	2
129		8	max	-4.529	15	245.643	3	125.831	1	.013	1	0	10	.207	1
130			min	-111.251	1	-598.274	2	4.608	12	-.011	3	-.003	3	-.106	3
131		9	max	-4.529	15	311.818	3	172.484	1	.013	1	.16	1	.937	1
132			min	-111.251	1	-761.679	2	6.519	12	-.011	3	.004	12	-.408	3
133		10	max	-4.529	15	925.084	2	-8.431	12	.013	1	.372	1	1.85	2
134			min	-111.251	1	-377.993	3	-219.137	1	-.011	3	.012	12	-.782	3
135		11	max	-4.529	15	761.679	2	-6.519	12	.011	3	.16	1	.937	1
136			min	-111.251	1	-311.818	3	-172.484	1	-.013	1	.004	12	-.408	3
137		12	max	-4.529	15	598.274	2	-4.608	12	.011	3	0	10	.207	1
138			min	-111.251	1	-245.643	3	-125.831	1	-.013	1	-.003	3	-.106	3
139		13	max	-4.529	15	434.87	2	-2.697	12	.011	3	-.005	15	.124	3
140			min	-111.251	1	-179.468	3	-79.179	1	-.013	1	-.113	1	-.36	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-4.529	15	271.465	2	-.785	12	.011	3	-.007	15	.282	3
142			min	-111.251	1	-113.294	3	-32.526	1	-.013	1	-.173	1	-.742	2
143		15	max	-4.529	15	108.066	1	14.127	1	.011	3	-.007	12	.369	3
144			min	-111.251	1	-47.119	3	.584	15	-.013	1	-.183	1	-.948	2
145		16	max	-4.529	15	19.056	3	60.779	1	.011	3	-.005	12	.385	3
146			min	-111.251	1	-55.345	2	2.464	15	-.013	1	-.143	1	-.976	2
147		17	max	-4.529	15	85.231	3	107.432	1	.011	3	0	12	.328	3
148			min	-111.251	1	-218.75	2	4.345	15	-.013	1	-.052	1	-.828	2
149		18	max	-4.529	15	151.406	3	154.085	1	.011	3	.09	1	.2	3
150			min	-111.251	1	-382.154	2	6.226	15	-.013	1	.004	15	-.503	2
151		19	max	-4.529	15	217.58	3	200.737	1	.011	3	.282	1	0	2
152			min	-111.251	1	-545.559	2	8.106	15	-.013	1	.011	15	0	3
153	M2	1	max	1078.971	1	2.022	4	.796	1	0	5	0	3	0	1
154			min	-1089.019	3	.476	15	.032	15	0	1	0	1	0	1
155		2	max	1079.444	1	1.985	4	.796	1	0	5	0	1	0	15
156			min	-1088.664	3	.467	15	.032	15	0	1	0	15	0	4
157		3	max	1079.918	1	1.948	4	.796	1	0	5	0	1	0	15
158			min	-1088.309	3	.458	15	.032	15	0	1	0	15	-.001	4
159		4	max	1080.392	1	1.911	4	.796	1	0	5	0	1	0	15
160			min	-1087.953	3	.45	15	.032	15	0	1	0	15	-.002	4
161		5	max	1080.866	1	1.874	4	.796	1	0	5	.001	1	0	15
162			min	-1087.598	3	.441	15	.032	15	0	1	0	15	-.002	4
163		6	max	1081.339	1	1.837	4	.796	1	0	5	.001	1	0	15
164			min	-1087.243	3	.432	15	.032	15	0	1	0	15	-.003	4
165		7	max	1081.813	1	1.8	4	.796	1	0	5	.002	1	0	15
166			min	-1086.887	3	.423	15	.032	15	0	1	0	15	-.004	4
167		8	max	1082.287	1	1.763	4	.796	1	0	5	.002	1	0	15
168			min	-1086.532	3	.415	15	.032	15	0	1	0	15	-.004	4
169		9	max	1082.761	1	1.726	4	.796	1	0	5	.002	1	-.001	15
170			min	-1086.177	3	.406	15	.032	15	0	1	0	15	-.005	4
171		10	max	1083.234	1	1.689	4	.796	1	0	5	.002	1	-.001	15
172			min	-1085.821	3	.397	15	.032	15	0	1	0	15	-.005	4
173		11	max	1083.708	1	1.652	4	.796	1	0	5	.003	1	-.001	15
174			min	-1085.466	3	.389	15	.032	15	0	1	0	15	-.006	4
175		12	max	1084.182	1	1.615	4	.796	1	0	5	.003	1	-.002	15
176			min	-1085.111	3	.38	15	.032	15	0	1	0	15	-.006	4
177		13	max	1084.656	1	1.578	4	.796	1	0	5	.003	1	-.002	15
178			min	-1084.756	3	.371	15	.032	15	0	1	0	15	-.007	4
179		14	max	1085.129	1	1.541	4	.796	1	0	5	.003	1	-.002	15
180			min	-1084.4	3	.363	15	.032	15	0	1	0	15	-.007	4
181		15	max	1085.603	1	1.504	4	.796	1	0	5	.004	1	-.002	15
182			min	-1084.045	3	.354	15	.032	15	0	1	0	15	-.008	4
183		16	max	1086.077	1	1.467	4	.796	1	0	5	.004	1	-.002	15
184			min	-1083.69	3	.345	15	.032	15	0	1	0	15	-.008	4
185		17	max	1086.551	1	1.43	4	.796	1	0	5	.004	1	-.002	15
186			min	-1083.334	3	.336	15	.032	15	0	1	0	15	-.009	4
187		18	max	1087.024	1	1.393	4	.796	1	0	5	.004	1	-.002	15
188			min	-1082.979	3	.328	15	.032	15	0	1	0	15	-.009	4
189		19	max	1087.498	1	1.356	4	.796	1	0	5	.005	1	-.002	15
190			min	-1082.624	3	.319	15	.032	15	0	1	0	15	-.01	4
191	M3	1	max	490.862	2	8.992	4	.343	1	0	12	0	1	.01	4
192			min	-642.667	3	2.114	15	.014	15	0	1	0	15	.002	15
193		2	max	490.691	2	8.12	4	.343	1	0	12	0	1	.006	4
194			min	-642.795	3	1.909	15	.014	15	0	1	0	15	.001	12
195		3	max	490.521	2	7.248	4	.343	1	0	12	0	1	.003	2
196			min	-642.923	3	1.704	15	.014	15	0	1	0	15	0	3
197		4	max	490.351	2	6.376	4	.343	1	0	12	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	-643.051	3	1.499	15	.014	15	0	1	0	15	-.002	3
199		5	max	490.18	2	5.504	4	.343	1	0	12	0	1	0	15
200			min	-643.178	3	1.294	15	.014	15	0	1	0	15	-.004	4
201		6	max	490.01	2	4.632	4	.343	1	0	12	.001	1	-.001	15
202			min	-643.306	3	1.089	15	.014	15	0	1	0	15	-.006	4
203		7	max	489.839	2	3.76	4	.343	1	0	12	.001	1	-.002	15
204			min	-643.434	3	.884	15	.014	15	0	1	0	15	-.008	4
205		8	max	489.669	2	2.888	4	.343	1	0	12	.001	1	-.002	15
206			min	-643.562	3	.679	15	.014	15	0	1	0	15	-.01	4
207		9	max	489.499	2	2.016	4	.343	1	0	12	.002	1	-.003	15
208			min	-643.689	3	.474	15	.014	15	0	1	0	15	-.011	4
209		10	max	489.328	2	1.144	4	.343	1	0	12	.002	1	-.003	15
210			min	-643.817	3	.269	15	.014	15	0	1	0	15	-.012	4
211		11	max	489.158	2	.341	2	.343	1	0	12	.002	1	-.003	15
212			min	-643.945	3	-.019	3	.014	15	0	1	0	15	-.012	4
213		12	max	488.988	2	-.141	15	.343	1	0	12	.002	1	-.003	15
214			min	-644.073	3	-.6	4	.014	15	0	1	0	15	-.012	4
215		13	max	488.817	2	-.346	15	.343	1	0	12	.002	1	-.003	15
216			min	-644.201	3	-1.472	4	.014	15	0	1	0	15	-.012	4
217		14	max	488.647	2	-.551	15	.343	1	0	12	.002	1	-.003	15
218			min	-644.328	3	-2.344	4	.014	15	0	1	0	15	-.011	4
219		15	max	488.477	2	-.756	15	.343	1	0	12	.003	1	-.002	15
220			min	-644.456	3	-3.216	4	.014	15	0	1	0	15	-.009	4
221		16	max	488.306	2	-.961	15	.343	1	0	12	.003	1	-.002	15
222			min	-644.584	3	-4.088	4	.014	15	0	1	0	15	-.008	4
223		17	max	488.136	2	-1.166	15	.343	1	0	12	.003	1	-.001	15
224			min	-644.712	3	-4.96	4	.014	15	0	1	0	15	-.006	4
225		18	max	487.966	2	-1.371	15	.343	1	0	12	.003	1	0	15
226			min	-644.839	3	-5.832	4	.014	15	0	1	0	15	-.003	4
227		19	max	487.795	2	-1.576	15	.343	1	0	12	.003	1	0	1
228			min	-644.967	3	-6.704	4	.014	15	0	1	0	15	0	1
229	M4	1	max	1178.317	1	0	1	-.691	15	0	1	.002	1	0	1
230			min	-80.223	3	0	1	-17.069	1	0	1	0	15	0	1
231		2	max	1178.487	1	0	1	-.691	15	0	1	0	1	0	1
232			min	-80.095	3	0	1	-17.069	1	0	1	0	15	0	1
233		3	max	1178.657	1	0	1	-.691	15	0	1	0	15	0	1
234			min	-79.968	3	0	1	-17.069	1	0	1	-.002	1	0	1
235		4	max	1178.828	1	0	1	-.691	15	0	1	0	15	0	1
236			min	-79.84	3	0	1	-17.069	1	0	1	-.004	1	0	1
237		5	max	1178.998	1	0	1	-.691	15	0	1	0	15	0	1
238			min	-79.712	3	0	1	-17.069	1	0	1	-.006	1	0	1
239		6	max	1179.168	1	0	1	-.691	15	0	1	0	15	0	1
240			min	-79.584	3	0	1	-17.069	1	0	1	-.008	1	0	1
241		7	max	1179.339	1	0	1	-.691	15	0	1	0	15	0	1
242			min	-79.457	3	0	1	-17.069	1	0	1	-.01	1	0	1
243		8	max	1179.509	1	0	1	-.691	15	0	1	0	15	0	1
244			min	-79.329	3	0	1	-17.069	1	0	1	-.012	1	0	1
245		9	max	1179.679	1	0	1	-.691	15	0	1	0	15	0	1
246			min	-79.201	3	0	1	-17.069	1	0	1	-.013	1	0	1
247		10	max	1179.85	1	0	1	-.691	15	0	1	0	15	0	1
248			min	-79.073	3	0	1	-17.069	1	0	1	-.015	1	0	1
249		11	max	1180.02	1	0	1	-.691	15	0	1	0	15	0	1
250			min	-78.945	3	0	1	-17.069	1	0	1	-.017	1	0	1
251		12	max	1180.19	1	0	1	-.691	15	0	1	0	15	0	1
252			min	-78.818	3	0	1	-17.069	1	0	1	-.019	1	0	1
253		13	max	1180.361	1	0	1	-.691	15	0	1	0	15	0	1
254			min	-78.69	3	0	1	-17.069	1	0	1	-.021	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	1180.531	1	0	1	-.691	15	0	1	0	15	0	1
256			min	-78.562	3	0	1	-17.069	1	0	1	-.023	1	0	1
257		15	max	1180.701	1	0	1	-.691	15	0	1	-.001	15	0	1
258			min	-78.434	3	0	1	-17.069	1	0	1	-.025	1	0	1
259		16	max	1180.872	1	0	1	-.691	15	0	1	-.001	15	0	1
260			min	-78.307	3	0	1	-17.069	1	0	1	-.027	1	0	1
261		17	max	1181.042	1	0	1	-.691	15	0	1	-.001	15	0	1
262			min	-78.179	3	0	1	-17.069	1	0	1	-.029	1	0	1
263		18	max	1181.213	1	0	1	-.691	15	0	1	-.001	15	0	1
264			min	-78.051	3	0	1	-17.069	1	0	1	-.031	1	0	1
265		19	max	1181.383	1	0	1	-.691	15	0	1	-.001	15	0	1
266			min	-77.923	3	0	1	-17.069	1	0	1	-.033	1	0	1
267	M6	1	max	3410.153	1	2.266	2	0	1	0	1	0	1	0	1
268			min	-3518.9	3	.271	12	0	1	0	1	0	1	0	1
269		2	max	3410.627	1	2.237	2	0	1	0	1	0	1	0	12
270			min	-3518.544	3	.257	12	0	1	0	1	0	1	0	2
271		3	max	3411.101	1	2.208	2	0	1	0	1	0	1	0	12
272			min	-3518.189	3	.242	12	0	1	0	1	0	1	-.001	2
273		4	max	3411.574	1	2.179	2	0	1	0	1	0	1	0	12
274			min	-3517.834	3	.228	12	0	1	0	1	0	1	-.002	2
275		5	max	3412.048	1	2.151	2	0	1	0	1	0	1	0	12
276			min	-3517.478	3	.214	12	0	1	0	1	0	1	-.003	2
277		6	max	3412.522	1	2.122	2	0	1	0	1	0	1	0	12
278			min	-3517.123	3	.199	12	0	1	0	1	0	1	-.004	2
279		7	max	3412.996	1	2.093	2	0	1	0	1	0	1	0	12
280			min	-3516.768	3	.185	12	0	1	0	1	0	1	-.004	2
281		8	max	3413.469	1	2.064	2	0	1	0	1	0	1	0	12
282			min	-3516.413	3	.17	12	0	1	0	1	0	1	-.005	2
283		9	max	3413.943	1	2.035	2	0	1	0	1	0	1	0	12
284			min	-3516.057	3	.156	12	0	1	0	1	0	1	-.006	2
285		10	max	3414.417	1	2.006	2	0	1	0	1	0	1	0	12
286			min	-3515.702	3	.141	12	0	1	0	1	0	1	-.006	2
287		11	max	3414.891	1	1.977	2	0	1	0	1	0	1	0	12
288			min	-3515.347	3	.127	12	0	1	0	1	0	1	-.007	2
289		12	max	3415.364	1	1.949	2	0	1	0	1	0	1	0	12
290			min	-3514.991	3	.112	12	0	1	0	1	0	1	-.007	2
291		13	max	3415.838	1	1.92	2	0	1	0	1	0	1	0	12
292			min	-3514.636	3	.095	3	0	1	0	1	0	1	-.008	2
293		14	max	3416.312	1	1.891	2	0	1	0	1	0	1	0	12
294			min	-3514.281	3	.073	3	0	1	0	1	0	1	-.009	2
295		15	max	3416.786	1	1.862	2	0	1	0	1	0	1	0	12
296			min	-3513.925	3	.052	3	0	1	0	1	0	1	-.009	2
297		16	max	3417.259	1	1.833	2	0	1	0	1	0	1	0	12
298			min	-3513.57	3	.03	3	0	1	0	1	0	1	-.01	2
299		17	max	3417.733	1	1.804	2	0	1	0	1	0	1	0	12
300			min	-3513.215	3	.008	3	0	1	0	1	0	1	-.01	2
301		18	max	3418.207	1	1.775	2	0	1	0	1	0	1	0	12
302			min	-3512.86	3	-.013	3	0	1	0	1	0	1	-.011	2
303		19	max	3418.681	1	1.746	2	0	1	0	1	0	1	0	12
304			min	-3512.504	3	-.035	3	0	1	0	1	0	1	-.012	2
305	M7	1	max	1890.608	2	9.031	4	0	1	0	1	0	1	.012	2
306			min	-1983.446	3	2.12	15	0	1	0	1	0	1	0	12
307		2	max	1890.438	2	8.159	4	0	1	0	1	0	1	.008	2
308			min	-1983.574	3	1.915	15	0	1	0	1	0	1	-.001	3
309		3	max	1890.267	2	7.287	4	0	1	0	1	0	1	.005	2
310			min	-1983.702	3	1.71	15	0	1	0	1	0	1	-.003	3
311		4	max	1890.097	2	6.415	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	-1983.829	3	1.505	15	0	1	0	1	0	1	-.005	3
313		5	max	1889.927	2	5.543	4	0	1	0	1	0	1	0	2
314			min	-1983.957	3	1.3	15	0	1	0	1	0	1	-.006	3
315		6	max	1889.756	2	4.671	4	0	1	0	1	0	1	-.001	15
316			min	-1984.085	3	1.095	15	0	1	0	1	0	1	-.007	3
317		7	max	1889.586	2	3.799	4	0	1	0	1	0	1	-.002	15
318			min	-1984.213	3	.89	15	0	1	0	1	0	1	-.008	4
319		8	max	1889.416	2	2.927	4	0	1	0	1	0	1	-.002	15
320			min	-1984.34	3	.685	15	0	1	0	1	0	1	-.01	4
321		9	max	1889.245	2	2.055	4	0	1	0	1	0	1	-.003	15
322			min	-1984.468	3	.436	12	0	1	0	1	0	1	-.011	4
323		10	max	1889.075	2	1.359	2	0	1	0	1	0	1	-.003	15
324			min	-1984.596	3	.096	12	0	1	0	1	0	1	-.012	4
325		11	max	1888.905	2	.68	2	0	1	0	1	0	1	-.003	15
326			min	-1984.724	3	-.401	3	0	1	0	1	0	1	-.012	4
327		12	max	1888.734	2	0	2	0	1	0	1	0	1	-.003	15
328			min	-1984.851	3	-.911	3	0	1	0	1	0	1	-.012	4
329		13	max	1888.564	2	-.34	15	0	1	0	1	0	1	-.003	15
330			min	-1984.979	3	-1.433	4	0	1	0	1	0	1	-.011	4
331		14	max	1888.394	2	-.545	15	0	1	0	1	0	1	-.002	15
332			min	-1985.107	3	-2.305	4	0	1	0	1	0	1	-.011	4
333		15	max	1888.223	2	-.75	15	0	1	0	1	0	1	-.002	15
334			min	-1985.235	3	-3.177	4	0	1	0	1	0	1	-.009	4
335		16	max	1888.053	2	-.955	15	0	1	0	1	0	1	-.002	15
336			min	-1985.363	3	-4.049	4	0	1	0	1	0	1	-.008	4
337		17	max	1887.883	2	-1.16	15	0	1	0	1	0	1	-.001	15
338			min	-1985.49	3	-4.921	4	0	1	0	1	0	1	-.005	4
339		18	max	1887.712	2	-1.365	15	0	1	0	1	0	1	0	15
340			min	-1985.618	3	-5.793	4	0	1	0	1	0	1	-.003	4
341		19	max	1887.542	2	-1.57	15	0	1	0	1	0	1	0	1
342			min	-1985.746	3	-6.665	4	0	1	0	1	0	1	0	1
343	M8	1	max	3143.737	1	0	1	0	1	0	1	0	1	0	1
344			min	-338.728	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3143.907	1	0	1	0	1	0	1	0	1	0	1
346			min	-338.6	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3144.078	1	0	1	0	1	0	1	0	1	0	1
348			min	-338.473	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3144.248	1	0	1	0	1	0	1	0	1	0	1
350			min	-338.345	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3144.418	1	0	1	0	1	0	1	0	1	0	1
352			min	-338.217	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3144.589	1	0	1	0	1	0	1	0	1	0	1
354			min	-338.089	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3144.759	1	0	1	0	1	0	1	0	1	0	1
356			min	-337.962	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3144.929	1	0	1	0	1	0	1	0	1	0	1
358			min	-337.834	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3145.1	1	0	1	0	1	0	1	0	1	0	1
360			min	-337.706	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3145.27	1	0	1	0	1	0	1	0	1	0	1
362			min	-337.578	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3145.44	1	0	1	0	1	0	1	0	1	0	1
364			min	-337.451	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3145.611	1	0	1	0	1	0	1	0	1	0	1
366			min	-337.323	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3145.781	1	0	1	0	1	0	1	0	1	0	1
368			min	-337.195	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	3145.951	1	0	1	0	1	0	1	0	1	0	1
370			min	-337.067	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3146.122	1	0	1	0	1	0	1	0	1	0	1
372			min	-336.939	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3146.292	1	0	1	0	1	0	1	0	1	0	1
374			min	-336.812	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3146.462	1	0	1	0	1	0	1	0	1	0	1
376			min	-336.684	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3146.633	1	0	1	0	1	0	1	0	1	0	1
378			min	-336.556	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3146.803	1	0	1	0	1	0	1	0	1	0	1
380			min	-336.428	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1078.971	1	2.022	4	-.032	15	0	1	0	1	0	1
382			min	-1089.019	3	.476	15	-.796	1	0	5	0	3	0	1
383		2	max	1079.444	1	1.985	4	-.032	15	0	1	0	15	0	15
384			min	-1088.664	3	.467	15	-.796	1	0	5	0	1	0	4
385		3	max	1079.918	1	1.948	4	-.032	15	0	1	0	15	0	15
386			min	-1088.309	3	.458	15	-.796	1	0	5	0	1	-.001	4
387		4	max	1080.392	1	1.911	4	-.032	15	0	1	0	15	0	15
388			min	-1087.953	3	.45	15	-.796	1	0	5	0	1	-.002	4
389		5	max	1080.866	1	1.874	4	-.032	15	0	1	0	15	0	15
390			min	-1087.598	3	.441	15	-.796	1	0	5	-.001	1	-.002	4
391		6	max	1081.339	1	1.837	4	-.032	15	0	1	0	15	0	15
392			min	-1087.243	3	.432	15	-.796	1	0	5	-.001	1	-.003	4
393		7	max	1081.813	1	1.8	4	-.032	15	0	1	0	15	0	15
394			min	-1086.887	3	.423	15	-.796	1	0	5	-.002	1	-.004	4
395		8	max	1082.287	1	1.763	4	-.032	15	0	1	0	15	0	15
396			min	-1086.532	3	.415	15	-.796	1	0	5	-.002	1	-.004	4
397		9	max	1082.761	1	1.726	4	-.032	15	0	1	0	15	-.001	15
398			min	-1086.177	3	.406	15	-.796	1	0	5	-.002	1	-.005	4
399		10	max	1083.234	1	1.689	4	-.032	15	0	1	0	15	-.001	15
400			min	-1085.821	3	.397	15	-.796	1	0	5	-.002	1	-.005	4
401		11	max	1083.708	1	1.652	4	-.032	15	0	1	0	15	-.001	15
402			min	-1085.466	3	.389	15	-.796	1	0	5	-.003	1	-.006	4
403		12	max	1084.182	1	1.615	4	-.032	15	0	1	0	15	-.002	15
404			min	-1085.111	3	.38	15	-.796	1	0	5	-.003	1	-.006	4
405		13	max	1084.656	1	1.578	4	-.032	15	0	1	0	15	-.002	15
406			min	-1084.756	3	.371	15	-.796	1	0	5	-.003	1	-.007	4
407		14	max	1085.129	1	1.541	4	-.032	15	0	1	0	15	-.002	15
408			min	-1084.4	3	.363	15	-.796	1	0	5	-.003	1	-.007	4
409		15	max	1085.603	1	1.504	4	-.032	15	0	1	0	15	-.002	15
410			min	-1084.045	3	.354	15	-.796	1	0	5	-.004	1	-.008	4
411		16	max	1086.077	1	1.467	4	-.032	15	0	1	0	15	-.002	15
412			min	-1083.69	3	.345	15	-.796	1	0	5	-.004	1	-.008	4
413		17	max	1086.551	1	1.43	4	-.032	15	0	1	0	15	-.002	15
414			min	-1083.334	3	.336	15	-.796	1	0	5	-.004	1	-.009	4
415		18	max	1087.024	1	1.393	4	-.032	15	0	1	0	15	-.002	15
416			min	-1082.979	3	.328	15	-.796	1	0	5	-.004	1	-.009	4
417		19	max	1087.498	1	1.356	4	-.032	15	0	1	0	15	-.002	15
418			min	-1082.624	3	.319	15	-.796	1	0	5	-.005	1	-.01	4
419	M11	1	max	490.862	2	8.992	4	-.014	15	0	1	0	15	.01	4
420			min	-642.667	3	2.114	15	-.343	1	0	12	0	1	.002	15
421		2	max	490.691	2	8.12	4	-.014	15	0	1	0	15	.006	4
422			min	-642.795	3	1.909	15	-.343	1	0	12	0	1	.001	12
423		3	max	490.521	2	7.248	4	-.014	15	0	1	0	15	.003	2
424			min	-642.923	3	1.704	15	-.343	1	0	12	0	1	0	3
425		4	max	490.351	2	6.376	4	-.014	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	-643.051	3	1.499	15	-.343	1	0	12	0	1	-.002	3
427		5	max	490.18	2	5.504	4	-.014	15	0	1	0	15	0	15
428			min	-643.178	3	1.294	15	-.343	1	0	12	0	1	-.004	4
429		6	max	490.01	2	4.632	4	-.014	15	0	1	0	15	-.001	15
430			min	-643.306	3	1.089	15	-.343	1	0	12	-.001	1	-.006	4
431		7	max	489.839	2	3.76	4	-.014	15	0	1	0	15	-.002	15
432			min	-643.434	3	.884	15	-.343	1	0	12	-.001	1	-.008	4
433		8	max	489.669	2	2.888	4	-.014	15	0	1	0	15	-.002	15
434			min	-643.562	3	.679	15	-.343	1	0	12	-.001	1	-.01	4
435		9	max	489.499	2	2.016	4	-.014	15	0	1	0	15	-.003	15
436			min	-643.689	3	.474	15	-.343	1	0	12	-.002	1	-.011	4
437		10	max	489.328	2	1.144	4	-.014	15	0	1	0	15	-.003	15
438			min	-643.817	3	.269	15	-.343	1	0	12	-.002	1	-.012	4
439		11	max	489.158	2	.341	2	-.014	15	0	1	0	15	-.003	15
440			min	-643.945	3	-.019	3	-.343	1	0	12	-.002	1	-.012	4
441		12	max	488.988	2	-.141	15	-.014	15	0	1	0	15	-.003	15
442			min	-644.073	3	-.6	4	-.343	1	0	12	-.002	1	-.012	4
443		13	max	488.817	2	-.346	15	-.014	15	0	1	0	15	-.003	15
444			min	-644.201	3	-1.472	4	-.343	1	0	12	-.002	1	-.012	4
445		14	max	488.647	2	-.551	15	-.014	15	0	1	0	15	-.003	15
446			min	-644.328	3	-2.344	4	-.343	1	0	12	-.002	1	-.011	4
447		15	max	488.477	2	-.756	15	-.014	15	0	1	0	15	-.002	15
448			min	-644.456	3	-3.216	4	-.343	1	0	12	-.003	1	-.009	4
449		16	max	488.306	2	-.961	15	-.014	15	0	1	0	15	-.002	15
450			min	-644.584	3	-4.088	4	-.343	1	0	12	-.003	1	-.008	4
451		17	max	488.136	2	-1.166	15	-.014	15	0	1	0	15	-.001	15
452			min	-644.712	3	-4.96	4	-.343	1	0	12	-.003	1	-.006	4
453		18	max	487.966	2	-1.371	15	-.014	15	0	1	0	15	0	15
454			min	-644.839	3	-5.832	4	-.343	1	0	12	-.003	1	-.003	4
455		19	max	487.795	2	-1.576	15	-.014	15	0	1	0	15	0	1
456			min	-644.967	3	-6.704	4	-.343	1	0	12	-.003	1	0	1
457	M12	1	max	1178.317	1	0	1	17.069	1	0	1	0	15	0	1
458			min	-80.223	3	0	1	.691	15	0	1	-.002	1	0	1
459		2	max	1178.487	1	0	1	17.069	1	0	1	0	15	0	1
460			min	-80.095	3	0	1	.691	15	0	1	0	1	0	1
461		3	max	1178.657	1	0	1	17.069	1	0	1	.002	1	0	1
462			min	-79.968	3	0	1	.691	15	0	1	0	15	0	1
463		4	max	1178.828	1	0	1	17.069	1	0	1	.004	1	0	1
464			min	-79.84	3	0	1	.691	15	0	1	0	15	0	1
465		5	max	1178.998	1	0	1	17.069	1	0	1	.006	1	0	1
466			min	-79.712	3	0	1	.691	15	0	1	0	15	0	1
467		6	max	1179.168	1	0	1	17.069	1	0	1	.008	1	0	1
468			min	-79.584	3	0	1	.691	15	0	1	0	15	0	1
469		7	max	1179.339	1	0	1	17.069	1	0	1	.01	1	0	1
470			min	-79.457	3	0	1	.691	15	0	1	0	15	0	1
471		8	max	1179.509	1	0	1	17.069	1	0	1	.012	1	0	1
472			min	-79.329	3	0	1	.691	15	0	1	0	15	0	1
473		9	max	1179.679	1	0	1	17.069	1	0	1	.013	1	0	1
474			min	-79.201	3	0	1	.691	15	0	1	0	15	0	1
475		10	max	1179.85	1	0	1	17.069	1	0	1	.015	1	0	1
476			min	-79.073	3	0	1	.691	15	0	1	0	15	0	1
477		11	max	1180.02	1	0	1	17.069	1	0	1	.017	1	0	1
478			min	-78.945	3	0	1	.691	15	0	1	0	15	0	1
479		12	max	1180.19	1	0	1	17.069	1	0	1	.019	1	0	1
480			min	-78.818	3	0	1	.691	15	0	1	0	15	0	1
481		13	max	1180.361	1	0	1	17.069	1	0	1	.021	1	0	1
482			min	-78.69	3	0	1	.691	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	1180.531	1	0	1	17.069	1	0	1	.023	1	0	1
484			min	-78.562	3	0	1	.691	15	0	1	0	15	0	1
485		15	max	1180.701	1	0	1	17.069	1	0	1	.025	1	0	1
486			min	-78.434	3	0	1	.691	15	0	1	.001	15	0	1
487		16	max	1180.872	1	0	1	17.069	1	0	1	.027	1	0	1
488			min	-78.307	3	0	1	.691	15	0	1	.001	15	0	1
489		17	max	1181.042	1	0	1	17.069	1	0	1	.029	1	0	1
490			min	-78.179	3	0	1	.691	15	0	1	.001	15	0	1
491		18	max	1181.213	1	0	1	17.069	1	0	1	.031	1	0	1
492			min	-78.051	3	0	1	.691	15	0	1	.001	15	0	1
493		19	max	1181.383	1	0	1	17.069	1	0	1	.033	1	0	1
494			min	-77.923	3	0	1	.691	15	0	1	.001	15	0	1
495	M1	1	max	200.273	1	590.161	3	-4.045	15	0	1	.279	1	0	15
496			min	8.091	15	-461.931	1	-99.415	1	0	3	.011	15	-.015	1
497		2	max	200.985	1	589.016	3	-4.045	15	0	1	.218	1	.273	1
498			min	8.306	15	-463.458	1	-99.415	1	0	3	.009	15	-.367	3
499		3	max	414.645	3	534.206	1	-4.013	15	0	3	.156	1	.55	1
500			min	-265.302	2	-427.887	3	-98.949	1	0	1	.006	15	-.721	3
501		4	max	415.179	3	532.679	1	-4.013	15	0	3	.095	1	.219	1
502			min	-264.59	2	-429.033	3	-98.949	1	0	1	.004	15	-.455	3
503		5	max	415.713	3	531.152	1	-4.013	15	0	3	.033	1	-.005	15
504			min	-263.878	2	-430.178	3	-98.949	1	0	1	.001	15	-.189	3
505		6	max	416.247	3	529.625	1	-4.013	15	0	3	-.001	15	.079	3
506			min	-263.166	2	-431.323	3	-98.949	1	0	1	-.028	1	-.441	1
507		7	max	416.781	3	528.098	1	-4.013	15	0	3	-.004	15	.347	3
508			min	-262.454	2	-432.468	3	-98.949	1	0	1	-.09	1	-.769	1
509		8	max	417.315	3	526.571	1	-4.013	15	0	3	-.006	15	.615	3
510			min	-261.742	2	-433.613	3	-98.949	1	0	1	-.151	1	-1.096	1
511		9	max	431.826	3	37.522	2	-6.249	15	0	9	.094	1	.721	3
512			min	-177.812	2	.466	15	-153.906	1	0	3	.004	15	-1.249	1
513		10	max	432.36	3	35.995	2	-6.249	15	0	9	0	15	.702	3
514			min	-177.1	2	.005	15	-153.906	1	0	3	-.002	1	-1.261	1
515		11	max	432.894	3	34.468	2	-6.249	15	0	9	-.004	15	.683	3
516			min	-176.388	2	-1.828	4	-153.906	1	0	3	-.097	1	-1.273	1
517		12	max	447.3	3	276.188	3	-3.854	15	0	1	.148	1	.596	3
518			min	-105.345	10	-567.283	1	-95.183	1	0	3	.006	15	-1.124	1
519		13	max	447.834	3	275.043	3	-3.854	15	0	1	.089	1	.424	3
520			min	-104.752	10	-568.81	1	-95.183	1	0	3	.004	15	-.772	1
521		14	max	448.368	3	273.898	3	-3.854	15	0	1	.03	1	.254	3
522			min	-104.159	10	-570.337	1	-95.183	1	0	3	.001	15	-.418	1
523		15	max	448.902	3	272.753	3	-3.854	15	0	1	-.001	15	.084	3
524			min	-103.565	10	-571.864	1	-95.183	1	0	3	-.029	1	-.064	1
525		16	max	449.436	3	271.607	3	-3.854	15	0	1	-.004	15	.312	2
526			min	-102.972	10	-573.39	1	-95.183	1	0	3	-.088	1	-.084	3
527		17	max	449.97	3	270.462	3	-3.854	15	0	1	-.006	15	.658	2
528			min	-102.379	10	-574.917	1	-95.183	1	0	3	-.147	1	-.253	3
529		18	max	-8.321	15	547.91	2	-4.53	15	0	3	-.009	15	.329	2
530			min	-201.444	1	-216.524	3	-111.43	1	0	2	-.213	1	-.124	3
531		19	max	-8.106	15	546.383	2	-4.53	15	0	3	-.011	15	.011	3
532			min	-200.732	1	-217.669	3	-111.43	1	0	2	-.282	1	-.013	1
533	M5	1	max	439.203	1	1963.379	3	0	1	0	1	0	1	.029	1
534			min	16.463	12	-1575.966	1	0	1	0	1	0	1	0	15
535		2	max	439.915	1	1962.234	3	0	1	0	1	0	1	1.008	1
536			min	16.819	12	-1577.493	1	0	1	0	1	0	1	-1.216	3
537		3	max	1314.674	3	1554.232	1	0	1	0	1	0	1	1.953	1
538			min	-917.076	2	-1337.984	3	0	1	0	1	0	1	-2.397	3
539		4	max	1315.208	3	1552.705	1	0	1	0	1	0	1	.989	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-916.364	2	-1339.129	3	0	1	0	1	0	1	-1.566	3
541		5	max	1315.742	3	1551.178	1	0	1	0	1	0	1	.033	9
542			min	-915.652	2	-1340.275	3	0	1	0	1	0	1	-.735	3
543		6	max	1316.276	3	1549.651	1	0	1	0	1	0	1	.097	3
544			min	-914.939	2	-1341.42	3	0	1	0	1	0	1	-.937	1
545		7	max	1316.81	3	1548.124	1	0	1	0	1	0	1	.93	3
546			min	-914.227	2	-1342.565	3	0	1	0	1	0	1	-1.898	1
547		8	max	1317.344	3	1546.597	1	0	1	0	1	0	1	1.764	3
548			min	-913.515	2	-1343.71	3	0	1	0	1	0	1	-2.858	1
549		9	max	1341.533	3	125.089	2	0	1	0	1	0	1	2.037	3
550			min	-739.67	2	.465	15	0	1	0	1	0	1	-3.241	1
551		10	max	1342.067	3	123.562	2	0	1	0	1	0	1	1.966	3
552			min	-738.958	2	.004	15	0	1	0	1	0	1	-3.284	1
553		11	max	1342.601	3	122.035	2	0	1	0	1	0	1	1.896	3
554			min	-738.246	2	-1.57	4	0	1	0	1	0	1	-3.325	1
555		12	max	1366.999	3	841.596	3	0	1	0	1	0	1	1.661	3
556			min	-564.426	2	-1683.182	1	0	1	0	1	0	1	-2.96	1
557		13	max	1367.533	3	840.451	3	0	1	0	1	0	1	1.139	3
558			min	-563.714	2	-1684.709	1	0	1	0	1	0	1	-1.915	1
559		14	max	1368.067	3	839.306	3	0	1	0	1	0	1	.618	3
560			min	-563.002	2	-1686.236	1	0	1	0	1	0	1	-.868	1
561		15	max	1368.601	3	838.161	3	0	1	0	1	0	1	.25	2
562			min	-562.29	2	-1687.763	1	0	1	0	1	0	1	0	13
563		16	max	1369.135	3	837.016	3	0	1	0	1	0	1	1.267	2
564			min	-561.578	2	-1689.289	1	0	1	0	1	0	1	-.423	3
565		17	max	1369.669	3	835.87	3	0	1	0	1	0	1	2.286	2
566			min	-560.866	2	-1690.816	1	0	1	0	1	0	1	-.942	3
567		18	max	-17.217	12	1855.673	2	0	1	0	1	0	1	1.172	2
568			min	-438.997	1	-755.307	3	0	1	0	1	0	1	-.491	3
569		19	max	-16.861	12	1854.146	2	0	1	0	1	0	1	.025	1
570			min	-438.285	1	-756.452	3	0	1	0	1	0	1	-.022	3
571	M9	1	max	200.273	1	590.161	3	99.415	1	0	3	-.011	15	0	15
572			min	8.091	15	-461.931	1	4.045	15	0	1	-.279	1	-.015	1
573		2	max	200.985	1	589.016	3	99.415	1	0	3	-.009	15	.273	1
574			min	8.306	15	-463.458	1	4.045	15	0	1	-.218	1	-.367	3
575		3	max	414.645	3	534.206	1	98.949	1	0	1	-.006	15	.55	1
576			min	-265.302	2	-427.887	3	4.013	15	0	3	-.156	1	-.721	3
577		4	max	415.179	3	532.679	1	98.949	1	0	1	-.004	15	.219	1
578			min	-264.59	2	-429.033	3	4.013	15	0	3	-.095	1	-.455	3
579		5	max	415.713	3	531.152	1	98.949	1	0	1	-.001	15	-.005	15
580			min	-263.878	2	-430.178	3	4.013	15	0	3	-.033	1	-.189	3
581		6	max	416.247	3	529.625	1	98.949	1	0	1	.028	1	.079	3
582			min	-263.166	2	-431.323	3	4.013	15	0	3	.001	15	-.441	1
583		7	max	416.781	3	528.098	1	98.949	1	0	1	.09	1	.347	3
584			min	-262.454	2	-432.468	3	4.013	15	0	3	.004	15	-.769	1
585		8	max	417.315	3	526.571	1	98.949	1	0	1	.151	1	.615	3
586			min	-261.742	2	-433.613	3	4.013	15	0	3	.006	15	-1.096	1
587		9	max	431.826	3	37.522	2	153.906	1	0	3	-.004	15	.721	3
588			min	-177.812	2	.466	15	6.249	15	0	9	-.094	1	-1.249	1
589		10	max	432.36	3	35.995	2	153.906	1	0	3	.002	1	.702	3
590			min	-177.1	2	.005	15	6.249	15	0	9	0	15	-1.261	1
591		11	max	432.894	3	34.468	2	153.906	1	0	3	.097	1	.683	3
592			min	-176.388	2	-1.828	4	6.249	15	0	9	.004	15	-1.273	1
593		12	max	447.3	3	276.188	3	95.183	1	0	3	-.006	15	.596	3
594			min	-105.345	10	-567.283	1	3.854	15	0	1	-.148	1	-1.124	1
595		13	max	447.834	3	275.043	3	95.183	1	0	3	-.004	15	.424	3
596			min	-104.752	10	-568.81	1	3.854	15	0	1	-.089	1	-.772	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	448.368	3	273.898	3	95.183	1	0	3	-.001	15	.254	3
598			min	-104.159	10	-570.337	1	3.854	15	0	1	-.03	1	-.418	1
599		15	max	448.902	3	272.753	3	95.183	1	0	3	.029	1	.084	3
600			min	-103.565	10	-571.864	1	3.854	15	0	1	.001	15	-.064	1
601		16	max	449.436	3	271.607	3	95.183	1	0	3	.088	1	.312	2
602			min	-102.972	10	-573.39	1	3.854	15	0	1	.004	15	-.084	3
603		17	max	449.97	3	270.462	3	95.183	1	0	3	.147	1	.658	2
604			min	-102.379	10	-574.917	1	3.854	15	0	1	.006	15	-.253	3
605		18	max	-8.321	15	547.91	2	111.43	1	0	2	.213	1	.329	2
606			min	-201.444	1	-216.524	3	4.53	15	0	3	.009	15	-.124	3
607		19	max	-8.106	15	546.383	2	111.43	1	0	2	.282	1	.011	3
608			min	-200.732	1	-217.669	3	4.53	15	0	3	.011	15	-.013	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	.182	1	.008	3	1.221e-2	1	NC	1	NC	1
2			min	0	15	-.028	3	-.004	2	-1.811e-3	3	NC	1	NC	1
3		2	max	0	1	.233	3	.046	1	1.36e-2	1	NC	5	NC	2
4			min	0	15	-.004	9	.001	10	-1.688e-3	3	897.034	3	5264.163	1
5		3	max	0	1	.445	3	.107	1	1.499e-2	1	NC	5	NC	3
6			min	0	15	-.131	1	.005	15	-1.564e-3	3	495.287	3	2205.645	1
7		4	max	0	1	.574	3	.16	1	1.638e-2	1	NC	5	NC	3
8			min	0	15	-.204	1	.007	15	-1.441e-3	3	388.92	3	1476.273	1
9		5	max	0	1	.605	3	.186	1	1.777e-2	1	NC	5	NC	3
10			min	0	15	-.201	1	.008	15	-1.317e-3	3	369.665	3	1266.616	1
11		6	max	0	1	.541	3	.179	1	1.916e-2	1	NC	5	NC	3
12			min	0	15	-.124	1	.007	15	-1.194e-3	3	411.535	3	1319.757	1
13		7	max	0	1	.4	3	.14	1	2.055e-2	1	NC	5	NC	3
14			min	0	15	-.008	9	.006	15	-1.07e-3	3	546.464	3	1693.795	1
15		8	max	0	1	.221	3	.08	1	2.194e-2	1	NC	1	NC	2
16			min	0	15	.005	15	0	10	-9.467e-4	3	939.029	3	2973.302	1
17		9	max	0	1	.309	1	.026	3	2.333e-2	1	NC	4	NC	1
18			min	0	15	.009	15	-.008	10	-8.232e-4	3	1805.184	2	NC	1
19		10	max	0	1	.371	1	.025	3	2.472e-2	1	NC	3	NC	1
20			min	0	1	-.015	3	-.017	2	-6.998e-4	3	1234.015	1	NC	1
21		11	max	0	15	.309	1	.026	3	2.333e-2	1	NC	4	NC	1
22			min	0	1	.009	15	-.008	10	-8.232e-4	3	1805.184	2	NC	1
23		12	max	0	15	.221	3	.08	1	2.194e-2	1	NC	1	NC	2
24			min	0	1	.005	15	0	10	-9.467e-4	3	939.029	3	2973.302	1
25		13	max	0	15	.4	3	.14	1	2.055e-2	1	NC	5	NC	3
26			min	0	1	-.008	9	.006	15	-1.07e-3	3	546.464	3	1693.795	1
27		14	max	0	15	.541	3	.179	1	1.916e-2	1	NC	5	NC	3
28			min	0	1	-.124	1	.007	15	-1.194e-3	3	411.535	3	1319.757	1
29		15	max	0	15	.605	3	.186	1	1.777e-2	1	NC	5	NC	3
30			min	0	1	-.201	1	.008	15	-1.317e-3	3	369.665	3	1266.616	1
31		16	max	0	15	.574	3	.16	1	1.638e-2	1	NC	5	NC	3
32			min	0	1	-.204	1	.007	15	-1.441e-3	3	388.92	3	1476.273	1
33		17	max	0	15	.445	3	.107	1	1.499e-2	1	NC	5	NC	3
34			min	0	1	-.131	1	.005	15	-1.564e-3	3	495.287	3	2205.645	1
35		18	max	0	15	.233	3	.046	1	1.36e-2	1	NC	5	NC	2
36			min	0	1	-.004	9	.001	10	-1.688e-3	3	897.034	3	5264.163	1
37		19	max	0	15	.182	1	.008	3	1.221e-2	1	NC	1	NC	1
38			min	0	1	-.028	3	-.004	2	-1.811e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.294	3	.007	3	7.402e-3	1	NC	1	NC	1
40			min	0	15	-.567	1	-.004	2	-4.549e-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	.572	3	.03	1	8.716e-3	1	NC	5	NC	2
42			min	0	15	-.916	1	0	10	-5.46e-3	3	669.938	1	8105.725	1
43		3	max	0	1	.811	3	.084	1	1.003e-2	1	NC	15	NC	3
44			min	0	15	-1.222	1	.004	15	-6.37e-3	3	356.897	1	2842.956	1
45		4	max	0	1	.984	3	.134	1	1.134e-2	1	9360.02	15	NC	3
46			min	0	15	-1.456	1	.006	15	-7.281e-3	3	263.186	1	1767.013	1
47		5	max	0	1	1.077	3	.162	1	1.266e-2	1	8073.641	15	NC	3
48			min	0	15	-1.6	1	.007	15	-8.192e-3	3	226.356	1	1455.342	1
49		6	max	0	1	1.09	3	.16	1	1.397e-2	1	7703.398	15	NC	3
50			min	0	15	-1.654	1	.007	15	-9.102e-3	3	215.101	1	1477.175	1
51		7	max	0	1	1.036	3	.127	1	1.529e-2	1	7921.422	15	NC	3
52			min	0	15	-1.63	1	.005	15	-1.001e-2	3	219.983	1	1860.437	1
53		8	max	0	1	.941	3	.074	1	1.66e-2	1	8589.309	15	NC	2
54			min	0	15	-1.554	1	0	10	-1.092e-2	3	236.894	1	3213.261	1
55		9	max	0	1	.844	3	.023	3	1.791e-2	1	9488.943	15	NC	1
56			min	0	15	-1.467	1	-.007	10	-1.183e-2	3	259.828	1	NC	1
57		10	max	0	1	.798	3	.022	3	1.923e-2	1	NC	15	NC	1
58			min	0	1	-1.423	1	-.015	2	-1.274e-2	3	273.105	1	NC	1
59		11	max	0	15	.844	3	.023	3	1.791e-2	1	9488.943	15	NC	1
60			min	0	1	-1.467	1	-.007	10	-1.183e-2	3	259.828	1	NC	1
61		12	max	0	15	.941	3	.074	1	1.66e-2	1	8589.309	15	NC	2
62			min	0	1	-1.554	1	0	10	-1.092e-2	3	236.894	1	3213.261	1
63		13	max	0	15	1.036	3	.127	1	1.529e-2	1	7921.422	15	NC	3
64			min	0	1	-1.63	1	.005	15	-1.001e-2	3	219.983	1	1860.437	1
65		14	max	0	15	1.09	3	.16	1	1.397e-2	1	7703.398	15	NC	3
66			min	0	1	-1.654	1	.007	15	-9.102e-3	3	215.101	1	1477.175	1
67		15	max	0	15	1.077	3	.162	1	1.266e-2	1	8073.641	15	NC	3
68			min	0	1	-1.6	1	.007	15	-8.192e-3	3	226.356	1	1455.342	1
69		16	max	0	15	.984	3	.134	1	1.134e-2	1	9360.02	15	NC	3
70			min	0	1	-1.456	1	.006	15	-7.281e-3	3	263.186	1	1767.013	1
71		17	max	0	15	.811	3	.084	1	1.003e-2	1	NC	15	NC	3
72			min	0	1	-1.222	1	.004	15	-6.37e-3	3	356.897	1	2842.956	1
73		18	max	0	15	.572	3	.03	1	8.716e-3	1	NC	5	NC	2
74			min	0	1	-.916	1	0	10	-5.46e-3	3	669.938	1	8105.725	1
75		19	max	0	15	.294	3	.007	3	7.402e-3	1	NC	1	NC	1
76			min	0	1	-.567	1	-.004	2	-4.549e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.301	3	.007	3	3.78e-3	3	NC	1	NC	1
78			min	0	1	-.566	1	-.003	2	-7.561e-3	1	NC	1	NC	1
79		2	max	0	15	.485	3	.031	1	4.536e-3	3	NC	5	NC	2
80			min	0	1	-.947	1	0	10	-8.914e-3	1	613.942	1	8035.635	1
81		3	max	0	15	.648	3	.084	1	5.292e-3	3	NC	15	NC	3
82			min	0	1	-1.279	1	.004	15	-1.027e-2	1	328.071	1	2828.439	1
83		4	max	0	15	.775	3	.135	1	6.048e-3	3	9373.932	15	NC	3
84			min	0	1	-1.528	1	.006	15	-1.162e-2	1	243.178	1	1760.026	1
85		5	max	0	15	.86	3	.163	1	6.805e-3	3	8087.032	15	NC	3
86			min	0	1	-1.676	1	.007	15	-1.297e-2	1	210.745	1	1450.153	1
87		6	max	0	15	.899	3	.161	1	7.561e-3	3	7718.037	15	NC	3
88			min	0	1	-1.722	1	.007	15	-1.432e-2	1	202.417	1	1471.739	1
89		7	max	0	15	.899	3	.128	1	8.317e-3	3	7939.066	15	NC	3
90			min	0	1	-1.68	1	.005	15	-1.568e-2	1	210.035	1	1852.064	1
91		8	max	0	15	.872	3	.075	1	9.073e-3	3	8612.003	15	NC	2
92			min	0	1	-1.581	1	0	10	-1.703e-2	1	230.391	1	3189.616	1
93		9	max	0	15	.836	3	.022	3	9.83e-3	3	9518.163	15	NC	1
94			min	0	1	-1.474	1	-.006	10	-1.838e-2	1	257.679	1	NC	1
95		10	max	0	1	.818	3	.021	3	1.059e-2	3	NC	15	NC	1
96			min	0	1	-1.421	1	-.015	2	-1.973e-2	1	273.647	1	NC	1
97		11	max	0	1	.836	3	.022	3	9.83e-3	3	9518.163	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.474	1	-.006	10	-1.838e-2	1	257.679	1	NC	1
99		12	max	0	1	.872	3	.075	1	9.073e-3	3	8612.003	15	NC	2
100			min	0	15	-1.581	1	0	10	-1.703e-2	1	230.391	1	3189.616	1
101		13	max	0	1	.899	3	.128	1	8.317e-3	3	7939.066	15	NC	3
102			min	0	15	-1.68	1	.005	15	-1.568e-2	1	210.035	1	1852.064	1
103		14	max	0	1	.899	3	.161	1	7.561e-3	3	7718.037	15	NC	3
104			min	0	15	-1.722	1	.007	15	-1.432e-2	1	202.417	1	1471.739	1
105		15	max	0	1	.86	3	.163	1	6.805e-3	3	8087.032	15	NC	3
106			min	0	15	-1.676	1	.007	15	-1.297e-2	1	210.745	1	1450.153	1
107		16	max	0	1	.775	3	.135	1	6.048e-3	3	9373.932	15	NC	3
108			min	0	15	-1.528	1	.006	15	-1.162e-2	1	243.178	1	1760.026	1
109		17	max	0	1	.648	3	.084	1	5.292e-3	3	NC	15	NC	3
110			min	0	15	-1.279	1	.004	15	-1.027e-2	1	328.071	1	2828.439	1
111		18	max	0	1	.485	3	.031	1	4.536e-3	3	NC	5	NC	2
112			min	0	15	-.947	1	0	10	-8.914e-3	1	613.942	1	8035.635	1
113		19	max	0	1	.301	3	.007	3	3.78e-3	3	NC	1	NC	1
114			min	0	15	-.566	1	-.003	2	-7.561e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.176	1	.006	3	6.951e-3	3	NC	1	NC	1
116			min	-.001	1	-.104	3	-.003	2	-1.14e-2	1	NC	1	NC	1
117		2	max	0	15	.005	4	.045	1	7.98e-3	3	NC	5	NC	2
118			min	0	1	-.061	2	.002	15	-1.259e-2	1	1077.679	2	5331.453	1
119		3	max	0	15	.027	3	.107	1	9.01e-3	3	NC	5	NC	3
120			min	0	1	-.233	2	.004	15	-1.379e-2	1	601.787	2	2220.247	1
121		4	max	0	15	.053	3	.159	1	1.004e-2	3	NC	5	NC	3
122			min	0	1	-.329	2	.007	15	-1.498e-2	1	482.662	2	1480.999	1
123		5	max	0	15	.044	3	.186	1	1.107e-2	3	NC	5	NC	3
124			min	0	1	-.335	2	.008	15	-1.618e-2	1	476.369	2	1267.17	1
125		6	max	0	15	.004	12	.179	1	1.21e-2	3	NC	5	NC	3
126			min	0	1	-.255	2	.007	15	-1.737e-2	1	569.74	2	1316.181	1
127		7	max	0	15	.005	4	.141	1	1.313e-2	3	NC	5	NC	3
128			min	0	1	-.106	2	.006	15	-1.857e-2	1	891.596	2	1680.584	1
129		8	max	0	15	.123	1	.082	1	1.416e-2	3	NC	4	NC	3
130			min	0	1	-.147	3	.002	10	-1.976e-2	1	2851.604	2	2912.739	1
131		9	max	0	15	.284	1	.023	1	1.519e-2	3	NC	5	NC	1
132			min	0	1	-.216	3	-.005	10	-2.096e-2	1	2077.4	3	NC	1
133		10	max	0	1	.355	1	.018	3	1.622e-2	3	NC	5	NC	1
134			min	0	1	-.247	3	-.013	2	-2.215e-2	1	1306.363	1	NC	1
135		11	max	0	1	.284	1	.023	1	1.519e-2	3	NC	5	NC	1
136			min	0	15	-.216	3	-.005	10	-2.096e-2	1	2077.4	3	NC	1
137		12	max	0	1	.123	1	.082	1	1.416e-2	3	NC	4	NC	3
138			min	0	15	-.147	3	.002	10	-1.976e-2	1	2851.604	2	2912.739	1
139		13	max	0	1	.005	4	.141	1	1.313e-2	3	NC	5	NC	3
140			min	0	15	-.106	2	.006	15	-1.857e-2	1	891.596	2	1680.584	1
141		14	max	0	1	.004	12	.179	1	1.21e-2	3	NC	5	NC	3
142			min	0	15	-.255	2	.007	15	-1.737e-2	1	569.74	2	1316.181	1
143		15	max	0	1	.044	3	.186	1	1.107e-2	3	NC	5	NC	3
144			min	0	15	-.335	2	.008	15	-1.618e-2	1	476.369	2	1267.17	1
145		16	max	0	1	.053	3	.159	1	1.004e-2	3	NC	5	NC	3
146			min	0	15	-.329	2	.007	15	-1.498e-2	1	482.662	2	1480.999	1
147		17	max	0	1	.027	3	.107	1	9.01e-3	3	NC	5	NC	3
148			min	0	15	-.233	2	.004	15	-1.379e-2	1	601.787	2	2220.247	1
149		18	max	0	1	.005	4	.045	1	7.98e-3	3	NC	5	NC	2
150			min	0	15	-.061	2	.002	15	-1.259e-2	1	1077.679	2	5331.453	1
151		19	max	.001	1	.176	1	.006	3	6.951e-3	3	NC	1	NC	1
152			min	0	15	-.104	3	-.003	2	-1.14e-2	1	NC	1	NC	1
153	M2	1	max	.007	1	.007	2	.013	1	-1.218e-5	15	NC	1	NC	2
154			min	-.007	3	-.012	3	0	15	-3.006e-4	1	NC	1	5307.435	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	1	.006	2	.012	1	-1.149e-5	15	NC	1	NC	2
156			min	-.007	3	-.011	3	0	15	-2.836e-4	1	NC	1	5786.948	1
157		3	max	.006	1	.005	2	.011	1	-1.08e-5	15	NC	1	NC	2
158			min	-.006	3	-.011	3	0	15	-2.666e-4	1	NC	1	6358.022	1
159		4	max	.006	1	.004	2	.01	1	-1.011e-5	15	NC	1	NC	2
160			min	-.006	3	-.011	3	0	15	-2.496e-4	1	NC	1	7044.824	1
161		5	max	.006	1	.003	2	.009	1	-9.425e-6	15	NC	1	NC	2
162			min	-.006	3	-.01	3	0	15	-2.325e-4	1	NC	1	7880.298	1
163		6	max	.005	1	.002	2	.008	1	-8.736e-6	15	NC	1	NC	2
164			min	-.005	3	-.01	3	0	15	-2.155e-4	1	NC	1	8910.297	1
165		7	max	.005	1	0	2	.007	1	-8.048e-6	15	NC	1	NC	1
166			min	-.005	3	-.01	3	0	15	-1.985e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.006	1	-7.36e-6	15	NC	1	NC	1
168			min	-.004	3	-.009	3	0	15	-1.815e-4	1	NC	1	NC	1
169		9	max	.004	1	0	2	.005	1	-6.672e-6	15	NC	1	NC	1
170			min	-.004	3	-.009	3	0	15	-1.645e-4	1	NC	1	NC	1
171		10	max	.004	1	-.001	15	.004	1	-5.984e-6	15	NC	1	NC	1
172			min	-.004	3	-.008	3	0	15	-1.475e-4	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-5.296e-6	15	NC	1	NC	1
174			min	-.003	3	-.008	3	0	15	-1.305e-4	1	NC	1	NC	1
175		12	max	.003	1	-.001	15	.003	1	-4.607e-6	15	NC	1	NC	1
176			min	-.003	3	-.007	3	0	15	-1.135e-4	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.002	1	-3.919e-6	15	NC	1	NC	1
178			min	-.002	3	-.006	3	0	15	-9.649e-5	1	NC	1	NC	1
179		14	max	.002	1	-.001	15	.001	1	-3.231e-6	15	NC	1	NC	1
180			min	-.002	3	-.005	3	0	15	-7.948e-5	1	NC	1	NC	1
181		15	max	.002	1	-.001	15	0	1	-2.543e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	4	0	15	-6.248e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-1.855e-6	15	NC	1	NC	1
184			min	-.001	3	-.004	4	0	15	-4.547e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-1.167e-6	15	NC	1	NC	1
186			min	0	3	-.003	4	0	15	-2.846e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-4.785e-7	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-1.146e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	5.55e-6	1	NC	1	NC	1
190			min	0	1	0	1	0	1	5.614e-8	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-1.156e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-3.275e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	3.215e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	12	1.302e-6	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	6.758e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	12	2.734e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	1	1.03e-4	1	NC	1	NC	1
198			min	0	2	-.009	4	0	12	4.165e-6	15	NC	1	NC	1
199		5	max	.001	3	-.003	15	0	1	1.384e-4	1	NC	1	NC	1
200			min	-.001	2	-.012	4	0	12	5.597e-6	15	8792.805	4	NC	1
201		6	max	.002	3	-.003	15	0	1	1.739e-4	1	NC	2	NC	1
202			min	-.001	2	-.015	4	0	12	7.028e-6	15	7098.313	4	NC	1
203		7	max	.002	3	-.004	15	0	1	2.093e-4	1	NC	5	NC	1
204			min	-.002	2	-.017	4	0	15	8.46e-6	15	6079.122	4	NC	1
205		8	max	.002	3	-.004	15	.001	1	2.447e-4	1	NC	5	NC	1
206			min	-.002	2	-.019	4	0	15	9.891e-6	15	5450.191	4	NC	1
207		9	max	.003	3	-.005	15	.002	1	2.801e-4	1	NC	5	NC	1
208			min	-.002	2	-.02	4	0	15	1.132e-5	15	5077.449	4	NC	1
209		10	max	.003	3	-.005	15	.002	1	3.156e-4	1	NC	5	NC	1
210			min	-.002	2	-.021	4	0	15	1.275e-5	15	4895.736	4	NC	1
211		11	max	.004	3	-.005	15	.003	1	3.51e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.021	4	0	15	1.419e-5	15	4878.202	4	NC	1
213		12	max	.004	3	-.005	15	.003	1	3.864e-4	1	NC	5	NC	1
214			min	-.003	2	-.021	4	0	15	1.562e-5	15	5026.009	4	NC	1
215		13	max	.004	3	-.005	15	.004	1	4.218e-4	1	NC	5	NC	1
216			min	-.003	2	-.02	4	0	15	1.705e-5	15	5370.08	4	NC	1
217		14	max	.005	3	-.004	15	.005	1	4.573e-4	1	NC	5	NC	1
218			min	-.003	2	-.018	4	0	15	1.848e-5	15	5987.22	4	NC	1
219		15	max	.005	3	-.004	15	.006	1	4.927e-4	1	NC	3	NC	1
220			min	-.004	2	-.015	4	0	15	1.991e-5	15	7047.997	4	NC	1
221		16	max	.005	3	-.003	15	.007	1	5.281e-4	1	NC	1	NC	1
222			min	-.004	2	-.012	4	0	15	2.134e-5	15	8965.765	4	NC	1
223		17	max	.006	3	-.002	15	.009	1	5.635e-4	1	NC	1	NC	1
224			min	-.004	2	-.009	4	0	15	2.277e-5	15	NC	1	NC	1
225		18	max	.006	3	-.001	15	.01	1	5.99e-4	1	NC	1	NC	2
226			min	-.005	2	-.006	1	0	15	2.421e-5	15	NC	1	9834.731	1
227		19	max	.006	3	0	15	.012	1	6.344e-4	1	NC	1	NC	2
228			min	-.005	2	-.003	1	0	15	2.564e-5	15	NC	1	8431.287	1
229	M4	1	max	.003	1	.004	2	0	15	1.567e-4	1	NC	1	NC	3
230			min	0	3	-.006	3	-.012	1	6.364e-6	15	NC	1	2050.247	1
231		2	max	.003	1	.004	2	0	15	1.567e-4	1	NC	1	NC	3
232			min	0	3	-.006	3	-.011	1	6.364e-6	15	NC	1	2227.766	1
233		3	max	.003	1	.004	2	0	15	1.567e-4	1	NC	1	NC	3
234			min	0	3	-.006	3	-.01	1	6.364e-6	15	NC	1	2439.146	1
235		4	max	.002	1	.004	2	0	15	1.567e-4	1	NC	1	NC	3
236			min	0	3	-.005	3	-.009	1	6.364e-6	15	NC	1	2693.162	1
237		5	max	.002	1	.003	2	0	15	1.567e-4	1	NC	1	NC	3
238			min	0	3	-.005	3	-.008	1	6.364e-6	15	NC	1	3001.745	1
239		6	max	.002	1	.003	2	0	15	1.567e-4	1	NC	1	NC	3
240			min	0	3	-.005	3	-.007	1	6.364e-6	15	NC	1	3381.439	1
241		7	max	.002	1	.003	2	0	15	1.567e-4	1	NC	1	NC	3
242			min	0	3	-.004	3	-.006	1	6.364e-6	15	NC	1	3855.727	1
243		8	max	.002	1	.003	2	0	15	1.567e-4	1	NC	1	NC	2
244			min	0	3	-.004	3	-.006	1	6.364e-6	15	NC	1	4458.857	1
245		9	max	.002	1	.002	2	0	15	1.567e-4	1	NC	1	NC	2
246			min	0	3	-.004	3	-.005	1	6.364e-6	15	NC	1	5242.382	1
247		10	max	.001	1	.002	2	0	15	1.567e-4	1	NC	1	NC	2
248			min	0	3	-.003	3	-.004	1	6.364e-6	15	NC	1	6286.885	1
249		11	max	.001	1	.002	2	0	15	1.567e-4	1	NC	1	NC	2
250			min	0	3	-.003	3	-.003	1	6.364e-6	15	NC	1	7724.173	1
251		12	max	.001	1	.002	2	0	15	1.567e-4	1	NC	1	NC	2
252			min	0	3	-.003	3	-.003	1	6.364e-6	15	NC	1	9782.219	1
253		13	max	0	1	.001	2	0	15	1.567e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	-.002	1	6.364e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.567e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.001	1	6.364e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	1.567e-4	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	6.364e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.567e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	6.364e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.567e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	6.364e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.567e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	6.364e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.567e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	6.364e-6	15	NC	1	NC	1
267	M6	1	max	.023	1	.027	2	0	1	0	1	NC	3	NC	1
268			min	-.023	3	-.036	3	0	1	0	1	2601.535	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	.021	1	.024	2	0	1	0	1	NC	3	NC	1
270			min	-.022	3	-.034	3	0	1	0	1	2864.342	2	NC	1
271		3	max	.02	1	.022	2	0	1	0	1	NC	3	NC	1
272			min	-.021	3	-.032	3	0	1	0	1	3183.452	2	NC	1
273		4	max	.019	1	.019	2	0	1	0	1	NC	3	NC	1
274			min	-.019	3	-.03	3	0	1	0	1	3575.647	2	NC	1
275		5	max	.018	1	.017	2	0	1	0	1	NC	3	NC	1
276			min	-.018	3	-.029	3	0	1	0	1	4064.685	2	NC	1
277		6	max	.016	1	.015	2	0	1	0	1	NC	3	NC	1
278			min	-.017	3	-.027	3	0	1	0	1	4685.112	2	NC	1
279		7	max	.015	1	.013	2	0	1	0	1	NC	1	NC	1
280			min	-.016	3	-.025	3	0	1	0	1	5488.786	2	NC	1
281		8	max	.014	1	.011	2	0	1	0	1	NC	1	NC	1
282			min	-.014	3	-.023	3	0	1	0	1	6556.543	2	NC	1
283		9	max	.013	1	.009	2	0	1	0	1	NC	1	NC	1
284			min	-.013	3	-.021	3	0	1	0	1	8020.356	2	NC	1
285		10	max	.011	1	.007	2	0	1	0	1	NC	1	NC	1
286			min	-.012	3	-.019	3	0	1	0	1	NC	1	NC	1
287		11	max	.01	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.01	3	-.017	3	0	1	0	1	NC	1	NC	1
289		12	max	.009	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.015	3	0	1	0	1	NC	1	NC	1
291		13	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.013	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	1	.001	2	0	1	0	1	NC	1	NC	1
294			min	-.006	3	-.011	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.009	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.009	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.012	3	0	1	0	1	9034.784	4	NC	1
315		6	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.015	3	0	1	0	1	7275.189	4	NC	1
317		7	max	.006	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.017	4	0	1	0	1	6217.904	4	NC	1
319		8	max	.008	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.007	2	-.019	4	0	1	0	1	5565.32	4	NC	1
321		9	max	.009	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.008	2	-.02	4	0	1	0	1	5177.544	4	NC	1
323		10	max	.01	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.009	2	-.021	4	0	1	0	1	4986.488	4	NC	1
325		11	max	.011	3	-.005	15	0	1	0	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.01	2	-.021	4	0	1	0	1	4963.814	4	NC	1
327		12	max	.012	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.011	2	-.021	4	0	1	0	1	5110.047	4	NC	1
329		13	max	.013	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.012	2	-.02	4	0	1	0	1	5456.141	4	NC	1
331		14	max	.014	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.013	2	-.018	4	0	1	0	1	6079.721	4	NC	1
333		15	max	.015	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.014	2	-.015	4	0	1	0	1	7153.58	4	NC	1
335		16	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.015	2	-.013	4	0	1	0	1	9096.774	4	NC	1
337		17	max	.017	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.016	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.018	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.018	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.019	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.019	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.018	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.017	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.016	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.015	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.014	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.013	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.011	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	1	.007	2	0	15	3.006e-4	1	NC	1	NC	2
382			min	-.007	3	-.012	3	-.013	1	1.218e-5	15	NC	1	5307.435	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	1	.006	2	0	15	2.836e-4	1	NC	1	NC	2
384			min	-.007	3	-.011	3	-.012	1	1.149e-5	15	NC	1	5786.948	1
385		3	max	.006	1	.005	2	0	15	2.666e-4	1	NC	1	NC	2
386			min	-.006	3	-.011	3	-.011	1	1.08e-5	15	NC	1	6358.022	1
387		4	max	.006	1	.004	2	0	15	2.496e-4	1	NC	1	NC	2
388			min	-.006	3	-.011	3	-.01	1	1.011e-5	15	NC	1	7044.824	1
389		5	max	.006	1	.003	2	0	15	2.325e-4	1	NC	1	NC	2
390			min	-.006	3	-.01	3	-.009	1	9.425e-6	15	NC	1	7880.298	1
391		6	max	.005	1	.002	2	0	15	2.155e-4	1	NC	1	NC	2
392			min	-.005	3	-.01	3	-.008	1	8.736e-6	15	NC	1	8910.297	1
393		7	max	.005	1	0	2	0	15	1.985e-4	1	NC	1	NC	1
394			min	-.005	3	-.01	3	-.007	1	8.048e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.815e-4	1	NC	1	NC	1
396			min	-.004	3	-.009	3	-.006	1	7.36e-6	15	NC	1	NC	1
397		9	max	.004	1	0	2	0	15	1.645e-4	1	NC	1	NC	1
398			min	-.004	3	-.009	3	-.005	1	6.672e-6	15	NC	1	NC	1
399		10	max	.004	1	-.001	15	0	15	1.475e-4	1	NC	1	NC	1
400			min	-.004	3	-.008	3	-.004	1	5.984e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	1.305e-4	1	NC	1	NC	1
402			min	-.003	3	-.008	3	-.003	1	5.296e-6	15	NC	1	NC	1
403		12	max	.003	1	-.001	15	0	15	1.135e-4	1	NC	1	NC	1
404			min	-.003	3	-.007	3	-.003	1	4.607e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	9.649e-5	1	NC	1	NC	1
406			min	-.002	3	-.006	3	-.002	1	3.919e-6	15	NC	1	NC	1
407		14	max	.002	1	-.001	15	0	15	7.948e-5	1	NC	1	NC	1
408			min	-.002	3	-.005	3	-.001	1	3.231e-6	15	NC	1	NC	1
409		15	max	.002	1	-.001	15	0	15	6.248e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	4	0	1	2.543e-6	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	4.547e-5	1	NC	1	NC	1
412			min	-.001	3	-.004	4	0	1	1.855e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.846e-5	1	NC	1	NC	1
414			min	0	3	-.003	4	0	1	1.167e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	1.146e-5	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	4.785e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-5.614e-8	12	NC	1	NC	1
418			min	0	1	0	1	0	1	-5.55e-6	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	3.275e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	1.156e-7	12	NC	1	NC	1
421		2	max	0	3	0	15	0	12	-1.302e-6	15	NC	1	NC	1
422			min	0	2	-.003	4	0	1	-3.215e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	12	-2.734e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	1	-6.758e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	12	-4.165e-6	15	NC	1	NC	1
426			min	0	2	-.009	4	0	1	-1.03e-4	1	NC	1	NC	1
427		5	max	.001	3	-.003	15	0	12	-5.597e-6	15	NC	1	NC	1
428			min	-.001	2	-.012	4	0	1	-1.384e-4	1	8792.805	4	NC	1
429		6	max	.002	3	-.003	15	0	12	-7.028e-6	15	NC	2	NC	1
430			min	-.001	2	-.015	4	0	1	-1.739e-4	1	7098.313	4	NC	1
431		7	max	.002	3	-.004	15	0	15	-8.46e-6	15	NC	5	NC	1
432			min	-.002	2	-.017	4	0	1	-2.093e-4	1	6079.122	4	NC	1
433		8	max	.002	3	-.004	15	0	15	-9.891e-6	15	NC	5	NC	1
434			min	-.002	2	-.019	4	-.001	1	-2.447e-4	1	5450.191	4	NC	1
435		9	max	.003	3	-.005	15	0	15	-1.132e-5	15	NC	5	NC	1
436			min	-.002	2	-.02	4	-.002	1	-2.801e-4	1	5077.449	4	NC	1
437		10	max	.003	3	-.005	15	0	15	-1.275e-5	15	NC	5	NC	1
438			min	-.002	2	-.021	4	-.002	1	-3.156e-4	1	4895.736	4	NC	1
439		11	max	.004	3	-.005	15	0	15	-1.419e-5	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.021	4	-.003	1	-3.51e-4	1	4878.202	4	NC	1
441		12	max	.004	3	-.005	15	0	15	-1.562e-5	15	NC	5	NC	1
442			min	-.003	2	-.021	4	-.003	1	-3.864e-4	1	5026.009	4	NC	1
443		13	max	.004	3	-.005	15	0	15	-1.705e-5	15	NC	5	NC	1
444			min	-.003	2	-.02	4	-.004	1	-4.218e-4	1	5370.08	4	NC	1
445		14	max	.005	3	-.004	15	0	15	-1.848e-5	15	NC	5	NC	1
446			min	-.003	2	-.018	4	-.005	1	-4.573e-4	1	5987.22	4	NC	1
447		15	max	.005	3	-.004	15	0	15	-1.991e-5	15	NC	3	NC	1
448			min	-.004	2	-.015	4	-.006	1	-4.927e-4	1	7047.997	4	NC	1
449		16	max	.005	3	-.003	15	0	15	-2.134e-5	15	NC	1	NC	1
450			min	-.004	2	-.012	4	-.007	1	-5.281e-4	1	8965.765	4	NC	1
451		17	max	.006	3	-.002	15	0	15	-2.277e-5	15	NC	1	NC	1
452			min	-.004	2	-.009	4	-.009	1	-5.635e-4	1	NC	1	NC	1
453		18	max	.006	3	-.001	15	0	15	-2.421e-5	15	NC	1	NC	2
454			min	-.005	2	-.006	1	-.01	1	-5.99e-4	1	NC	1	9834.731	1
455		19	max	.006	3	0	15	0	15	-2.564e-5	15	NC	1	NC	2
456			min	-.005	2	-.003	1	-.012	1	-6.344e-4	1	NC	1	8431.287	1
457	M12	1	max	.003	1	.004	2	.012	1	-6.364e-6	15	NC	1	NC	3
458			min	0	3	-.006	3	0	15	-1.567e-4	1	NC	1	2050.247	1
459		2	max	.003	1	.004	2	.011	1	-6.364e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-1.567e-4	1	NC	1	2227.766	1
461		3	max	.003	1	.004	2	.01	1	-6.364e-6	15	NC	1	NC	3
462			min	0	3	-.006	3	0	15	-1.567e-4	1	NC	1	2439.146	1
463		4	max	.002	1	.004	2	.009	1	-6.364e-6	15	NC	1	NC	3
464			min	0	3	-.005	3	0	15	-1.567e-4	1	NC	1	2693.162	1
465		5	max	.002	1	.003	2	.008	1	-6.364e-6	15	NC	1	NC	3
466			min	0	3	-.005	3	0	15	-1.567e-4	1	NC	1	3001.745	1
467		6	max	.002	1	.003	2	.007	1	-6.364e-6	15	NC	1	NC	3
468			min	0	3	-.005	3	0	15	-1.567e-4	1	NC	1	3381.439	1
469		7	max	.002	1	.003	2	.006	1	-6.364e-6	15	NC	1	NC	3
470			min	0	3	-.004	3	0	15	-1.567e-4	1	NC	1	3855.727	1
471		8	max	.002	1	.003	2	.006	1	-6.364e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-1.567e-4	1	NC	1	4458.857	1
473		9	max	.002	1	.002	2	.005	1	-6.364e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-1.567e-4	1	NC	1	5242.382	1
475		10	max	.001	1	.002	2	.004	1	-6.364e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-1.567e-4	1	NC	1	6286.885	1
477		11	max	.001	1	.002	2	.003	1	-6.364e-6	15	NC	1	NC	2
478			min	0	3	-.003	3	0	15	-1.567e-4	1	NC	1	7724.173	1
479		12	max	.001	1	.002	2	.003	1	-6.364e-6	15	NC	1	NC	2
480			min	0	3	-.003	3	0	15	-1.567e-4	1	NC	1	9782.219	1
481		13	max	0	1	.001	2	.002	1	-6.364e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.567e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-6.364e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.567e-4	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-6.364e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.567e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-6.364e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.567e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-6.364e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.567e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-6.364e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.567e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-6.364e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.567e-4	1	NC	1	NC	1
495	M1	1	max	.008	3	.182	1	0	1	1.41e-2	1	NC	1	NC	1
496			min	-.004	2	-.028	3	0	15	-2.081e-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	.008	3	.09	1	0	15	6.801e-3	1	NC	5	NC	1
498			min	-.004	2	-.013	3	-.009	1	-1.033e-2	3	1468.963	1	NC	1
499		3	max	.008	3	.012	3	0	15	3.228e-6	10	NC	5	NC	2
500			min	-.004	2	-.01	2	-.013	1	-2.81e-4	1	705.28	1	9753.443	1
501		4	max	.008	3	.055	3	0	15	4.864e-3	1	NC	15	NC	1
502			min	-.004	2	-.122	1	-.012	1	-4.152e-3	3	443.329	1	NC	1
503		5	max	.008	3	.11	3	0	15	1.001e-2	1	9546.857	15	NC	1
504			min	-.004	2	-.24	1	-.008	1	-8.201e-3	3	318.618	1	NC	1
505		6	max	.008	3	.171	3	0	15	1.515e-2	1	7536.806	15	NC	1
506			min	-.004	2	-.356	1	-.004	1	-1.225e-2	3	250.093	1	NC	1
507		7	max	.008	3	.229	3	0	1	2.03e-2	1	6350.97	15	NC	1
508			min	-.004	2	-.459	1	0	3	-1.63e-2	3	209.747	1	NC	1
509		8	max	.007	3	.278	3	.001	1	2.544e-2	1	5649.728	15	NC	1
510			min	-.004	2	-.542	1	0	15	-2.035e-2	3	185.932	1	NC	1
511		9	max	.007	3	.31	3	0	15	2.798e-2	1	5283.179	15	NC	1
512			min	-.003	2	-.593	1	0	1	-2.056e-2	3	173.532	1	NC	1
513		10	max	.007	3	.322	3	0	1	2.878e-2	1	5171.239	15	NC	1
514			min	-.003	2	-.611	1	0	15	-1.82e-2	3	169.814	1	NC	1
515		11	max	.007	3	.315	3	0	1	2.957e-2	1	5282.975	15	NC	1
516			min	-.003	2	-.593	1	0	15	-1.585e-2	3	173.763	1	NC	1
517		12	max	.007	3	.289	3	0	15	2.788e-2	1	5649.302	15	NC	1
518			min	-.003	2	-.54	1	-.001	1	-1.336e-2	3	186.641	1	NC	1
519		13	max	.006	3	.246	3	0	15	2.246e-2	1	6350.234	15	NC	1
520			min	-.003	2	-.456	1	0	1	-1.069e-2	3	211.482	1	NC	1
521		14	max	.006	3	.191	3	.003	1	1.704e-2	1	7535.572	15	NC	1
522			min	-.003	2	-.351	1	0	15	-8.016e-3	3	253.8	1	NC	1
523		15	max	.006	3	.129	3	.008	1	1.162e-2	1	9544.739	15	NC	1
524			min	-.003	2	-.234	1	0	15	-5.342e-3	3	326.217	1	NC	1
525		16	max	.006	3	.066	3	.011	1	6.207e-3	1	NC	15	NC	1
526			min	-.003	2	-.115	1	0	15	-2.669e-3	3	459.217	1	NC	1
527		17	max	.006	3	.004	3	.012	1	7.9e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	4.837e-6	3	740.797	1	NC	1
529		18	max	.006	3	.09	1	.009	1	8.759e-3	2	NC	5	NC	1
530			min	-.003	2	-.052	3	0	15	-2.942e-3	3	1558.774	1	NC	1
531		19	max	.006	3	.176	1	0	15	1.74e-2	2	NC	1	NC	1
532			min	-.003	2	-.104	3	-.001	1	-5.989e-3	3	NC	1	NC	1
533	M5	1	max	.025	3	.371	1	0	1	0	1	NC	1	NC	1
534			min	-.017	2	-.015	3	0	1	0	1	NC	1	NC	1
535		2	max	.025	3	.184	1	0	1	0	1	NC	5	NC	1
536			min	-.017	2	-.006	3	0	1	0	1	718.918	1	NC	1
537		3	max	.025	3	.036	3	0	1	0	1	NC	15	NC	1
538			min	-.017	2	-.032	2	0	1	0	1	334.422	1	NC	1
539		4	max	.025	3	.139	3	0	1	0	1	6757.225	15	NC	1
540			min	-.017	2	-.295	1	0	1	0	1	201.923	1	NC	1
541		5	max	.024	3	.286	3	0	1	0	1	4711.947	15	NC	1
542			min	-.017	2	-.587	1	0	1	0	1	140.48	1	NC	1
543		6	max	.023	3	.452	3	0	1	0	1	3617.767	15	NC	1
544			min	-.016	2	-.879	1	0	1	0	1	107.645	1	NC	1
545		7	max	.023	3	.616	3	0	1	0	1	2987.512	15	NC	1
546			min	-.016	2	-1.145	1	0	1	0	1	88.746	1	NC	1
547		8	max	.022	3	.754	3	0	1	0	1	2621.891	15	NC	1
548			min	-.016	2	-1.358	1	0	1	0	1	77.789	1	NC	1
549		9	max	.022	3	.844	3	0	1	0	1	2434.485	15	NC	1
550			min	-.015	2	-1.493	1	0	1	0	1	72.179	1	NC	1
551		10	max	.021	3	.877	3	0	1	0	1	2377.983	15	NC	1
552			min	-.015	2	-1.538	1	0	1	0	1	70.51	1	NC	1
553		11	max	.021	3	.856	3	0	1	0	1	2434.572	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.015	2	-1.492	1	0	1	0	1	72.289	1	NC	1
555		12	max	.02	3	.782	3	0	1	0	1	2622.104	15	NC	1
556			min	-.014	2	-1.354	1	0	1	0	1	78.154	1	NC	1
557		13	max	.02	3	.662	3	0	1	0	1	2987.953	15	NC	1
558			min	-.014	2	-1.134	1	0	1	0	1	89.7	1	NC	1
559		14	max	.019	3	.511	3	0	1	0	1	3618.642	15	NC	1
560			min	-.014	2	-.861	1	0	1	0	1	109.808	1	NC	1
561		15	max	.019	3	.342	3	0	1	0	1	4713.693	15	NC	1
562			min	-.014	2	-.565	1	0	1	0	1	145.218	1	NC	1
563		16	max	.018	3	.171	3	0	1	0	1	6760.909	15	NC	1
564			min	-.014	2	-.273	1	0	1	0	1	212.655	1	NC	1
565		17	max	.018	3	.012	3	0	1	0	1	NC	15	NC	1
566			min	-.013	2	-.017	2	0	1	0	1	360.803	1	NC	1
567		18	max	.018	3	.186	1	0	1	0	1	NC	5	NC	1
568			min	-.013	2	-.124	3	0	1	0	1	790.519	1	NC	1
569		19	max	.018	3	.355	1	0	1	0	1	NC	1	NC	1
570			min	-.013	2	-.247	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.008	3	.182	1	0	15	2.081e-2	3	NC	1	NC	1
572			min	-.004	2	-.028	3	0	1	-1.41e-2	1	NC	1	NC	1
573		2	max	.008	3	.09	1	.009	1	1.033e-2	3	NC	5	NC	1
574			min	-.004	2	-.013	3	0	15	-6.801e-3	1	1468.963	1	NC	1
575		3	max	.008	3	.012	3	.013	1	2.81e-4	1	NC	5	NC	2
576			min	-.004	2	-.01	2	0	15	-3.228e-6	10	705.28	1	9753.443	1
577		4	max	.008	3	.055	3	.012	1	4.152e-3	3	NC	15	NC	1
578			min	-.004	2	-.122	1	0	15	-4.864e-3	1	443.329	1	NC	1
579		5	max	.008	3	.11	3	.008	1	8.201e-3	3	9546.857	15	NC	1
580			min	-.004	2	-.24	1	0	15	-1.001e-2	1	318.618	1	NC	1
581		6	max	.008	3	.171	3	.004	1	1.225e-2	3	7536.806	15	NC	1
582			min	-.004	2	-.356	1	0	15	-1.515e-2	1	250.093	1	NC	1
583		7	max	.008	3	.229	3	0	3	1.63e-2	3	6350.97	15	NC	1
584			min	-.004	2	-.459	1	0	1	-2.03e-2	1	209.747	1	NC	1
585		8	max	.007	3	.278	3	0	15	2.035e-2	3	5649.728	15	NC	1
586			min	-.004	2	-.542	1	-.001	1	-2.544e-2	1	185.932	1	NC	1
587		9	max	.007	3	.31	3	0	1	2.056e-2	3	5283.179	15	NC	1
588			min	-.003	2	-.593	1	0	15	-2.798e-2	1	173.532	1	NC	1
589		10	max	.007	3	.322	3	0	15	1.82e-2	3	5171.239	15	NC	1
590			min	-.003	2	-.611	1	0	1	-2.878e-2	1	169.814	1	NC	1
591		11	max	.007	3	.315	3	0	15	1.585e-2	3	5282.975	15	NC	1
592			min	-.003	2	-.593	1	0	1	-2.957e-2	1	173.763	1	NC	1
593		12	max	.007	3	.289	3	.001	1	1.336e-2	3	5649.302	15	NC	1
594			min	-.003	2	-.54	1	0	15	-2.788e-2	1	186.641	1	NC	1
595		13	max	.006	3	.246	3	0	1	1.069e-2	3	6350.234	15	NC	1
596			min	-.003	2	-.456	1	0	15	-2.246e-2	1	211.482	1	NC	1
597		14	max	.006	3	.191	3	0	15	8.016e-3	3	7535.572	15	NC	1
598			min	-.003	2	-.351	1	-.003	1	-1.704e-2	1	253.8	1	NC	1
599		15	max	.006	3	.129	3	0	15	5.342e-3	3	9544.739	15	NC	1
600			min	-.003	2	-.234	1	-.008	1	-1.162e-2	1	326.217	1	NC	1
601		16	max	.006	3	.066	3	0	15	2.669e-3	3	NC	15	NC	1
602			min	-.003	2	-.115	1	-.011	1	-6.207e-3	1	459.217	1	NC	1
603		17	max	.006	3	.004	3	0	15	-4.837e-6	3	NC	5	NC	1
604			min	-.003	2	-.005	2	-.012	1	-7.9e-4	1	740.797	1	NC	1
605		18	max	.006	3	.09	1	0	15	2.942e-3	3	NC	5	NC	1
606			min	-.003	2	-.052	3	-.009	1	-8.759e-3	2	1558.774	1	NC	1
607		19	max	.006	3	.176	1	.001	1	5.989e-3	3	NC	1	NC	1
608			min	-.003	2	-.104	3	0	15	-1.74e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.6025.0

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

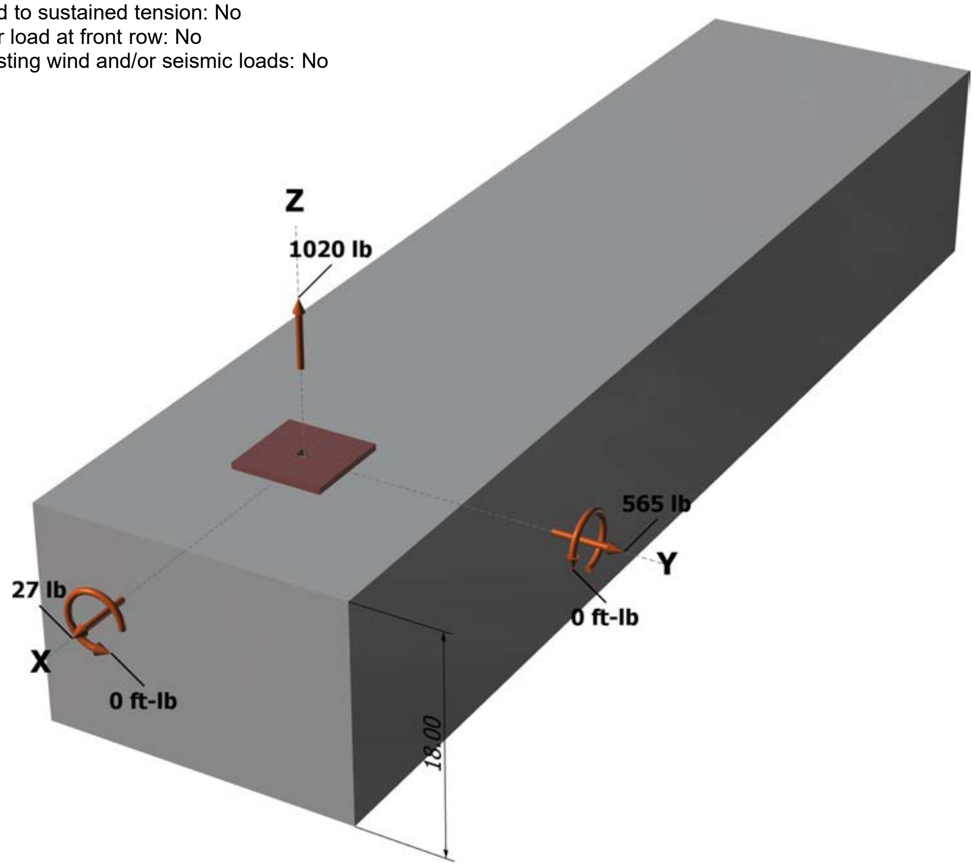
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

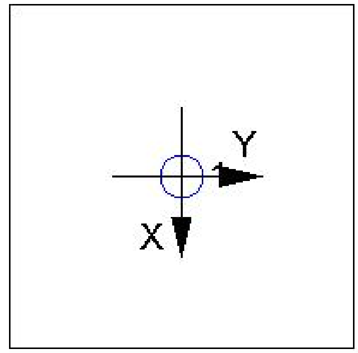
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.247	10215

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-4)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
220.36	247.75	0.967	1.00	1.000	10215	0.65	5710

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	1.0	Pass

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 21-31 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

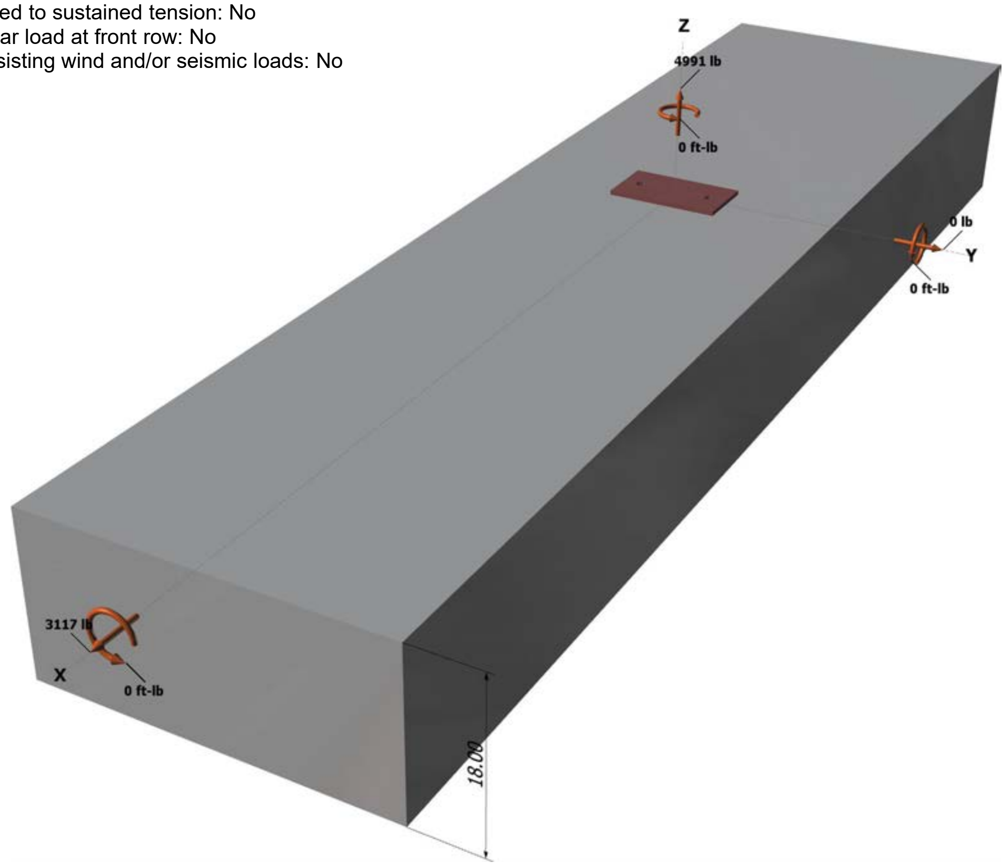
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

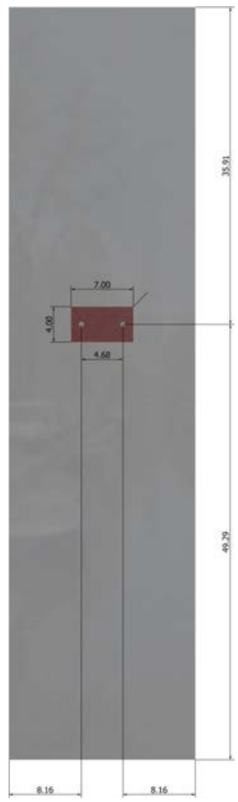
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



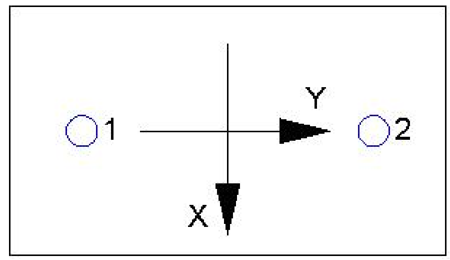
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

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

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	1.2	Pass

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

12. Warnings

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

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

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