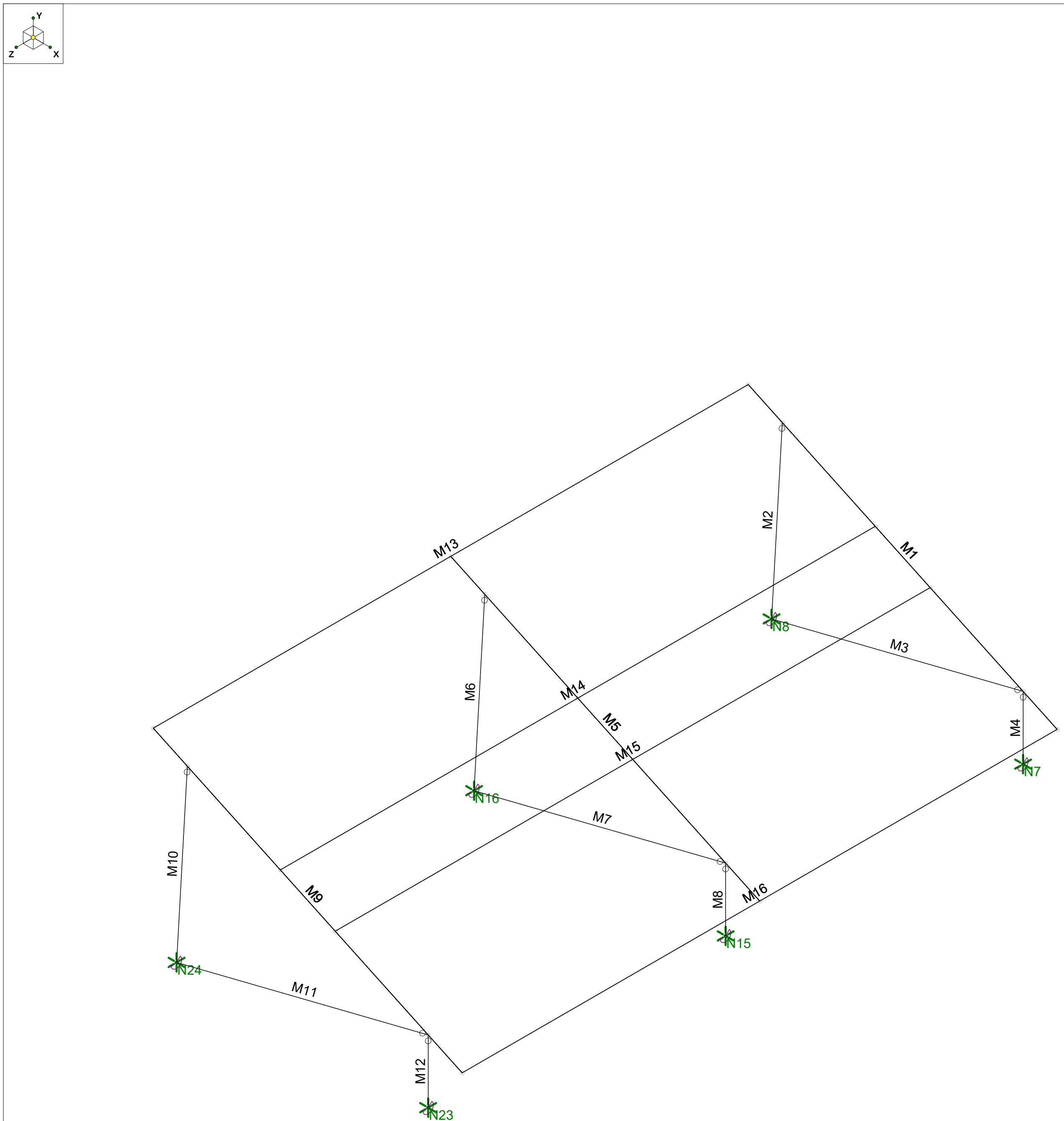


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

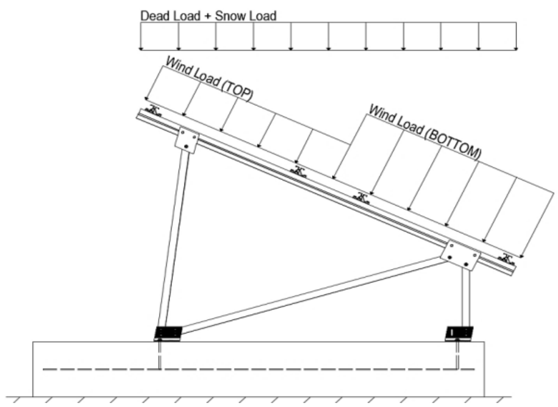
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 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 = 130 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 26.53 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.100	*(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

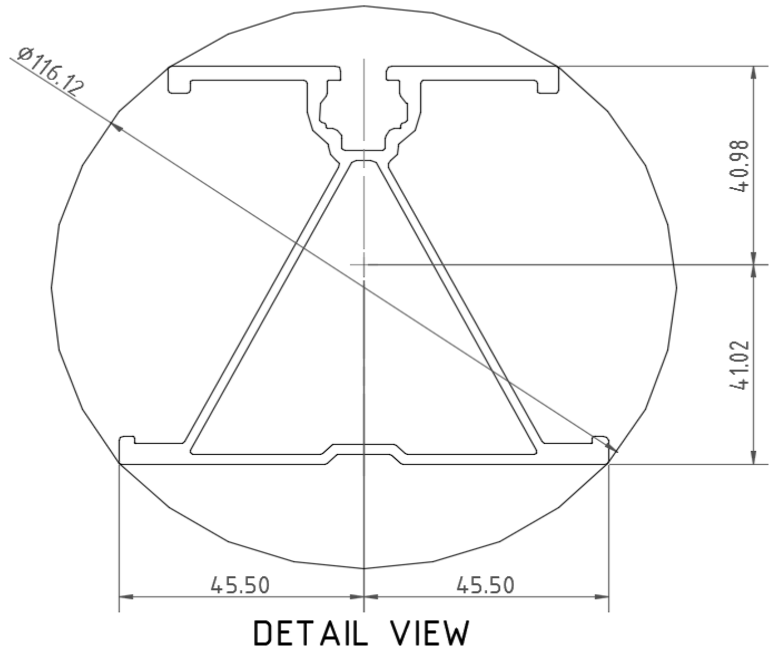
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

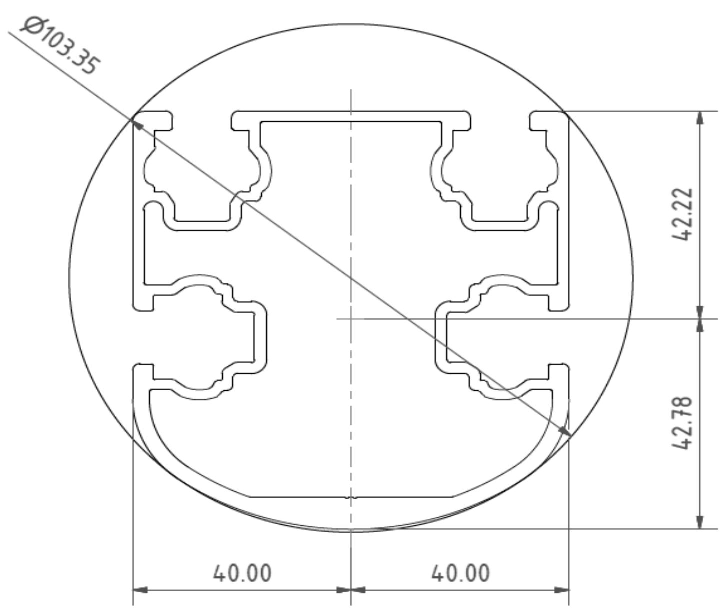
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	75	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.577	k-ft
M_z =	-0.008	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	57%	



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).

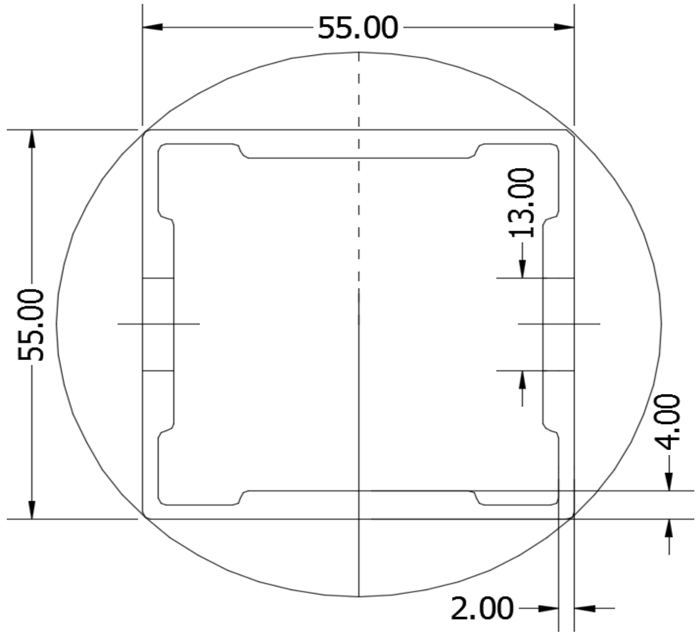
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.210	k-ft
M_z =	0.000	k-ft
P_n =	1.718	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	97%	



4.3 Front Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.725	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	

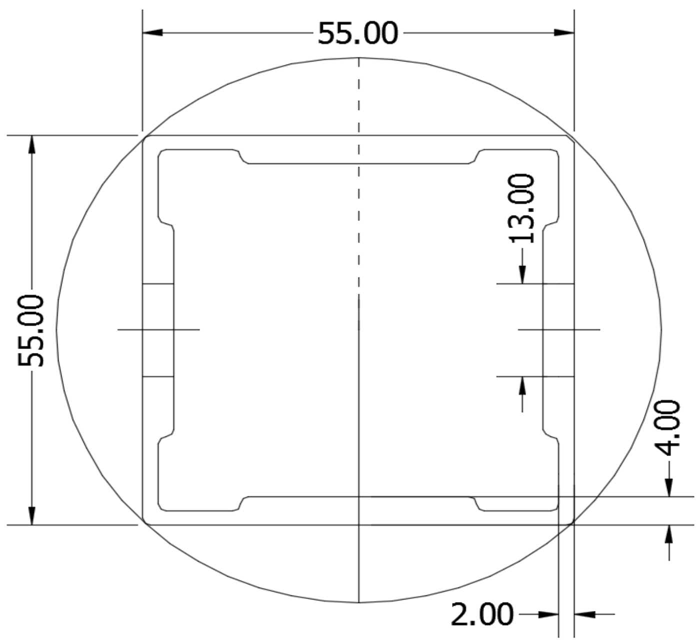


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.366	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	40%	

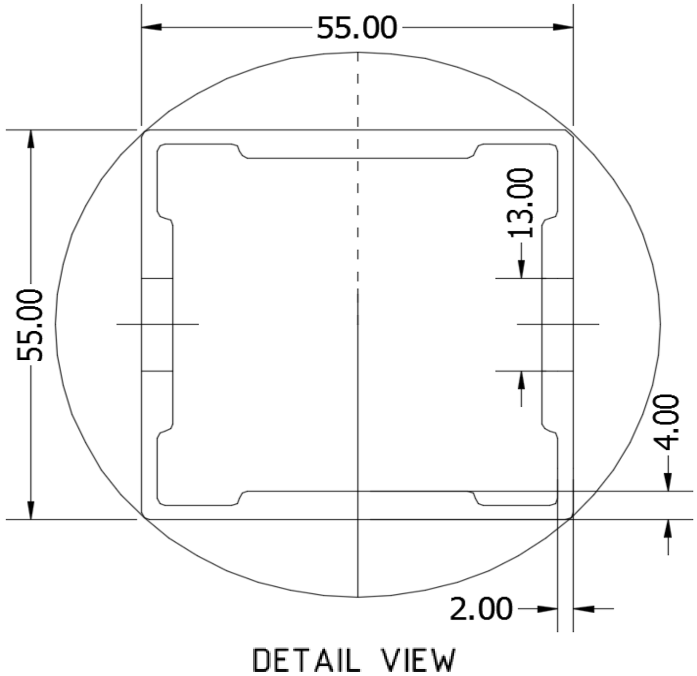


DETAIL VIEW

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 =	-0.012	k-ft
M_z =	0.000	k-ft
P_n =	3.223	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.629	k
Utilization =	31%	



5. FOUNDATION DESIGN CALCULATIONS

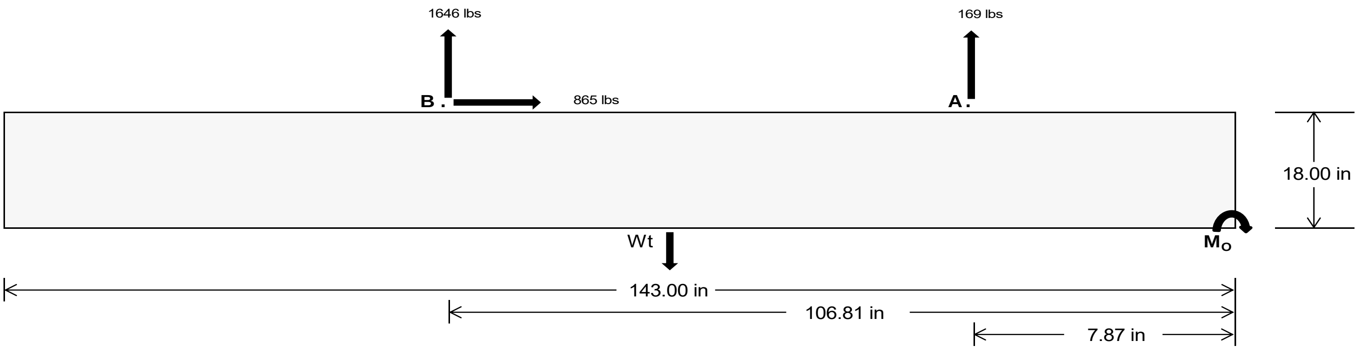
5.1 Helical Pile Foundations

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 =	712.08	6854.05	k
Compressive Load =	3542.83	4939.47	k
Lateral Load =	7.96	3595.48	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



<u>Concrete Properties</u>

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

<u>Footing Reinforcement</u>

Use fiber reinforcing with (3) #5 rebar.

<u>Overturning Check</u>

M_O = 192730.6 in-lbs
Resisting Force Required = 2695.53 lbs
S.F. = 1.67
Weight Required = 4492.55 lbs
Minimum Width = <u>36 in</u> in
Weight Provided = 7775.63 lbs

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

<u>Sliding</u>

Force = 864.67 lbs
Friction = 0.4
Weight Required = 2161.68 lbs
Resisting Weight = 7775.63 lbs
Additional Weight Required = 0 lbs

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

<u>Cohesion</u>

Sliding Force = 864.67 lbs
Cohesion = 130 psf
Area = 35.75 ft^2
Resisting = 3887.81 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 36in wide x 18in tall ballast foundation. Cohesion is OK.

<u>Shear Key</u>

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

Shear key is not required.

<u>Bearing Pressure</u>

	Ballast Width			
	<u>36 in</u>	<u>37 in</u>	<u>38 in</u>	<u>39 in</u>
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(3 ft) =	<u>7776 lbs</u>	<u>7992 lbs</u>	<u>8208 lbs</u>	<u>8424 lbs</u>

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in
F_A	983 lbs	983 lbs	983 lbs	983 lbs	1501 lbs	1501 lbs	1501 lbs	1501 lbs	1769 lbs	1769 lbs	1769 lbs	1769 lbs	-338 lbs	-338 lbs	-338 lbs	-338 lbs
F_B	996 lbs	996 lbs	996 lbs	996 lbs	2168 lbs	2168 lbs	2168 lbs	2168 lbs	2279 lbs	2279 lbs	2279 lbs	2279 lbs	-3292 lbs	-3292 lbs	-3292 lbs	-3292 lbs
F_V	97 lbs	97 lbs	97 lbs	97 lbs	1533 lbs	1533 lbs	1533 lbs	1533 lbs	1215 lbs	1215 lbs	1215 lbs	1215 lbs	-1729 lbs	-1729 lbs	-1729 lbs	-1729 lbs
P_{total}	9755 lbs	9971 lbs	10187 lbs	10403 lbs	11445 lbs	11661 lbs	11877 lbs	12093 lbs	11824 lbs	12040 lbs	12256 lbs	12472 lbs	1035 lbs	1164 lbs	1294 lbs	1424 lbs
M	2424 lbs-ft	2424 lbs-ft	2424 lbs-ft	2424 lbs-ft	3880 lbs-ft	3880 lbs-ft	3880 lbs-ft	3880 lbs-ft	4498 lbs-ft	4498 lbs-ft	4498 lbs-ft	4498 lbs-ft	5302 lbs-ft	5302 lbs-ft	5302 lbs-ft	5302 lbs-ft
e	0.25 ft	0.24 ft	0.24 ft	0.23 ft	0.34 ft	0.33 ft	0.33 ft	0.32 ft	0.38 ft	0.37 ft	0.37 ft	0.36 ft	5.12 ft	4.55 ft	4.10 ft	3.72 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}	238.7 psf	238.1 psf	237.6 psf	237.1 psf	265.5 psf	264.2 psf	263.0 psf	261.8 psf	267.4 psf	266.1 psf	264.8 psf	263.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	307.0 psf	304.6 psf	302.3 psf	300.1 psf	374.8 psf	370.5 psf	366.5 psf	362.7 psf	394.1 psf	389.3 psf	384.8 psf	380.5 psf	275.4 psf	179.2 psf	146.4 psf	130.7 psf

Maximum Bearing Pressure = 394 psf
Allowable Bearing Pressure = 1500 psf

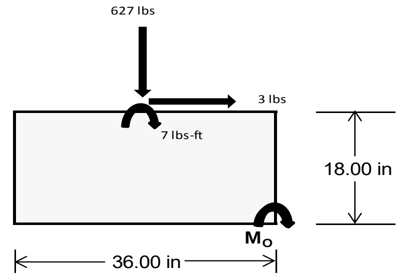
Use a 143in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	928.3 ft-lbs
Resisting Force Required =	618.87 lbs
S.F. =	1.67
Weight Required =	1031.45 lbs
Minimum Width =	36 in in
Weight Provided =	7775.63 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	36 in			36 in			36 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	203 lbs	465 lbs	203 lbs	627 lbs	1645 lbs	627 lbs	59 lbs	136 lbs	59 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9830 lbs	7776 lbs	9830 lbs	9790 lbs	7776 lbs	9790 lbs	2874 lbs	7776 lbs	2874 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	12 lbs-ft	0 lbs-ft	12 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft
f_{min}	274.8 psf	217.5 psf	274.8 psf	273.2 psf	217.5 psf	273.2 psf	80.4 psf	217.5 psf	80.4 psf
f_{max}	275.1 psf	217.5 psf	275.1 psf	274.5 psf	217.5 psf	274.5 psf	80.4 psf	217.5 psf	80.4 psf

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

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

Foundation Requirements: 143in long x 36in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

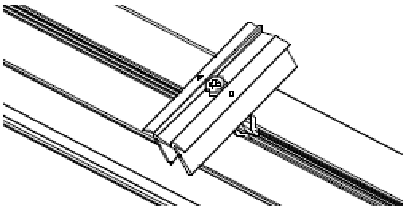
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

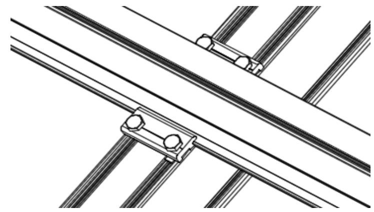
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	1.182	k
Allowable Uplift =	1.214	k
Utilization =	97%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.647	k
Allowable Uplift =	4.357	k
Utilization =	61%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	2.725	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	37%	

Rear Strut		
Maximum Axial Load =	4.671	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	63%	

Diagonal Strut		
Maximum Axial Load =	2.556	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	34%	

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.

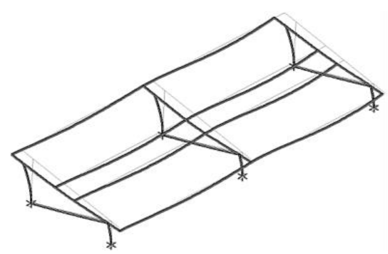
7. SEISMIC DESIGN

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} =	0.01	in
N/A		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:			Weak Axis:		
3.4.14			**3.4.14**		
L_b =	75	in	L_b =	75	
J =	0.432		J =	0.432	
	207.485			131.948	
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$			$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$		
S1 =	0.51461		S1 =	0.51461	
$S2 = \left(\frac{C_c}{1.6}\right)^2$			$S2 = \left(\frac{C_c}{1.6}\right)^2$		
S2 =	1701.56		S2 =	1701.56	
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]		φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	
φF_L=	28.7	ksi	φF_L=	29.6	
3.4.16			**3.4.16**		
b/t =	32.195		b/t =	37.0588	
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$			$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$		
S1 =	12.2		S1 =	12.2	
$S2 = \frac{k_1 Bp}{1.6Dp}$			$S2 = \frac{k_1 Bp}{1.6Dp}$		
S2 =	46.7		S2 =	46.7	
φF_L=	φb[Bp-1.6Dp*b/t]		φF_L=	φb[Bp-1.6Dp*b/t]	
φF_L=	25.1	ksi	φF_L=	23.1	ksi
3.4.16.1	Not Used		**3.4.16.1**		
Rb/t =			N/A for Weak Direction		
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$					
S1 =	1.1				
$S2 = C_t$					
S2 =	141.0				
φF_L=	1.17φyFcy				
φF_L=	38.9	ksi			
3.4.18			**3.4.18**		
h/t =	37.0588		h/t =	32.195	
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$			$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$		
S1 =	36.9		S1 =	36.9	
m =	0.65		m =	0.65	
C_0 =	40.985		C_0 =	45.5	
Cc =	41.015		Cc =	45.5	
$S2 = \frac{k_1 Bbr}{mDbr}$			$S2 = \frac{k_1 Bbr}{mDbr}$		
S2 =	77.2		S2 =	77.3	
φF_L=	φb[Bbr-mDbr*h/t]		φF_L=	1.3φyFcy	
φF_L=	43.2	ksi	φF_L=	43.2	ksi
$\varphi F_L St$=	25.1	ksi	$\varphi F_L Wk$=	23.1	ksi
Ix =	897074	mm^4	Iy =	446476	mm^4
	2.155	in^4		1.073	in^4
y =	41.015	mm	x =	45.5	mm
Sx =	1.335	in^3	Sy =	0.599	in^3
$M_{max}St$ =	2.788	k-ft	$M_{max}Wk$ =	1.152	k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
φF_L= φyFcy
φF_L= 33.25 ksi

φF_L= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 104.56 in
J = 1.08
179.85

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.0 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 104.56
J = 1.08
190.335

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 28.9

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1	Used	**3.4.16.1**	
Rb/t =	18.1	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= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.18		**3.4.18**	
h/t =	7.4	h/t =	16.2
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	35.2	S1 =	36.9
m =	0.68	m =	0.65
C_0 =	41.067	C_0 =	40
Cc =	43.717	Cc =	40
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	73.8	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	29.0 ksi	φF_LWk=	33.3 ksi
Ix =	984962 mm^4	Iy =	923544 mm^4
	2.366 in^4		2.219 in^4
y =	43.717 mm	x =	40 mm
Sx =	1.375 in^3	Sy =	1.409 in^3
M_{max}St =	3.323 k-ft	M_{max}Wk =	3.904 k-ft

Compression

3.4.9

b/t = 16.2
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

b/t = 7.4
S1 = 12.21
S2 = 32.70
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87
S2 = 131.3
φF_L= φc[Bt-Dt*√(Rb/t)]
φF_L= 31.09 ksi

φF_L= 31.09 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16

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

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

$C_0 =$ 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

φcc = 0.89749

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

$\varphi F_L =$ 6.10803 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
φF_L= φyFcy
φF_L= 33.25 ksi

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

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

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

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
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_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
φF_L= φb[Bp-1.6Dp*b/t]
φF_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
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_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
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.61471

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	-95.761	-95.761	0	0
2	M14	y	-95.761	-95.761	0	0
3	M15	y	-147.995	-147.995	0	0
4	M16	y	-147.995	-147.995	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	217.64	217.64	0	0
2	M14	y	165.406	165.406	0	0
3	M15	y	87.056	87.056	0	0
4	M16	y	87.056	87.056	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	817.262	2	1314.829	2	.371	1	.002	1	0	1	0	1
2		min	-971.437	3	-1767.566	3	.018	15	0	15	0	1	0	1
3	N7	max	.016	9	959.817	1	-.263	15	0	15	0	1	0	1
4		min	-.278	2	-154.028	3	-6.123	1	-.012	1	0	1	0	1
5	N15	max	.008	9	2725.257	2	0	3	0	3	0	1	0	1
6		min	-2.448	2	-547.756	3	0	11	0	2	0	1	0	1
7	N16	max	2489.108	2	3799.594	2	0	10	0	10	0	1	0	1
8		min	-2765.751	3	-5272.345	3	0	3	0	3	0	1	0	1
9	N23	max	.016	9	959.817	1	6.123	1	.012	1	0	1	0	1
10		min	-.278	2	-154.028	3	.263	15	0	15	0	1	0	1
11	N24	max	817.262	2	1314.829	2	-.018	15	0	15	0	1	0	1
12		min	-971.437	3	-1767.566	3	-.371	1	-.002	1	0	1	0	1
13	Totals:	max	4120.629	2	11060.581	2	0	12						
14		min	-4709.303	3	-9663.291	3	0	11						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	36.124	1	434.28	2	-5.091	15	0	15	.1	1	0	2
2			min	1.535	15	-818.2	3	-124.406	1	-.012	3	.004	15	0	3
3		2	max	36.124	1	301.945	2	-3.886	15	0	15	.024	1	.486	3
4			min	1.535	15	-580.319	3	-94.5	1	-.012	3	-.002	10	-.256	2
5		3	max	36.124	1	169.611	2	-2.68	15	0	15	.006	3	.806	3
6			min	1.535	15	-342.438	3	-64.595	1	-.012	3	-.031	1	-.419	2
7		4	max	36.124	1	37.276	2	-1.475	15	0	15	0	3	.961	3
8			min	1.535	15	-104.558	3	-34.689	1	-.012	3	-.065	1	-.491	2
9		5	max	36.124	1	133.323	3	1.609	10	0	15	-.003	12	.951	3
10			min	1.535	15	-95.058	2	-5.588	3	-.012	3	-.079	1	-.471	2
11		6	max	36.124	1	371.204	3	25.122	1	0	15	-.003	15	.776	3
12			min	1.535	15	-227.393	2	-3.75	3	-.012	3	-.072	1	-.359	2
13		7	max	36.124	1	609.085	3	55.028	1	0	15	-.002	15	.436	3
14			min	1.535	15	-359.727	2	-1.912	3	-.012	3	-.044	1	-.155	2
15		8	max	36.124	1	846.966	3	84.933	1	0	15	.008	2	.14	2
16			min	1.535	15	-492.062	2	-.074	3	-.012	3	-.01	3	-.07	3
17		9	max	36.124	1	1084.847	3	114.839	1	0	15	.074	1	.528	2
18			min	1.535	15	-624.396	2	1.385	12	-.012	3	-.01	3	-.741	3
19		10	max	36.124	1	1322.727	3	144.744	1	.01	2	.164	1	1.008	2
20			min	1.535	15	-756.731	2	2.61	12	-.012	3	-.008	3	-1.577	3
21		11	max	36.124	1	624.396	2	-1.385	12	.012	3	.074	1	.528	2
22			min	1.535	15	-1084.847	3	-114.839	1	0	15	-.01	3	-.741	3
23		12	max	36.124	1	492.062	2	.074	3	.012	3	.008	2	.14	2
24			min	1.535	15	-846.966	3	-84.933	1	0	15	-.01	3	-.07	3
25		13	max	36.124	1	359.727	2	1.912	3	.012	3	-.002	15	.436	3
26			min	1.535	15	-609.085	3	-55.028	1	0	15	-.044	1	-.155	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	36.124	1	227.393	2	3.75	3	.012	3	-.003	15	.776	3
28			min	1.535	15	-371.204	3	-25.122	1	0	15	-.072	1	-.359	2
29		15	max	36.124	1	95.058	2	5.588	3	.012	3	-.003	12	.951	3
30			min	1.535	15	-133.323	3	-1.609	10	0	15	-.079	1	-.471	2
31		16	max	36.124	1	104.558	3	34.689	1	.012	3	0	3	.961	3
32			min	1.535	15	-37.276	2	1.475	15	0	15	-.065	1	-.491	2
33		17	max	36.124	1	342.438	3	64.595	1	.012	3	.006	3	.806	3
34			min	1.535	15	-169.611	2	2.68	15	0	15	-.031	1	-.419	2
35		18	max	36.124	1	580.319	3	94.5	1	.012	3	.024	1	.486	3
36			min	1.535	15	-301.945	2	3.886	15	0	15	-.002	10	-.256	2
37		19	max	36.124	1	818.2	3	124.406	1	.012	3	.1	1	0	2
38			min	1.535	15	-434.28	2	5.091	15	0	15	.004	15	0	3
39	M14	1	max	26.599	1	541.811	2	-5.351	15	.016	3	.126	1	0	2
40			min	1.119	15	-682.267	3	-130.7	1	-.017	2	.005	15	0	3
41		2	max	26.599	1	409.477	2	-4.145	15	.016	3	.046	1	.411	3
42			min	1.119	15	-502.424	3	-100.794	1	-.017	2	0	10	-.33	2
43		3	max	26.599	1	277.142	2	-2.94	15	.016	3	.009	3	.698	3
44			min	1.119	15	-322.581	3	-70.889	1	-.017	2	-.014	1	-.569	2
45		4	max	26.599	1	144.808	2	-1.734	15	.016	3	.002	3	.859	3
46			min	1.119	15	-142.738	3	-40.983	1	-.017	2	-.053	1	-.715	2
47		5	max	26.599	1	37.105	3	1.078	10	.016	3	-.002	12	.896	3
48			min	1.119	15	-.685	9	-11.078	1	-.017	2	-.071	1	-.77	2
49		6	max	26.599	1	216.948	3	18.828	1	.016	3	-.003	15	.808	3
50			min	1.119	15	-119.861	2	-4.382	3	-.017	2	-.068	1	-.733	2
51		7	max	26.599	1	396.791	3	48.733	1	.016	3	-.002	15	.595	3
52			min	1.119	15	-252.196	2	-2.544	3	-.017	2	-.045	1	-.603	2
53		8	max	26.599	1	576.634	3	78.639	1	.016	3	.006	2	.257	3
54			min	1.119	15	-384.53	2	-.706	3	-.017	2	-.01	3	-.382	2
55		9	max	26.599	1	756.477	3	108.545	1	.016	3	.065	1	.004	9
56			min	1.119	15	-516.865	2	.973	12	-.017	2	-.01	3	-.206	3
57		10	max	26.599	1	936.32	3	138.45	1	.017	2	.15	1	.336	2
58			min	1.119	15	-649.199	2	-73.309	14	-.016	3	-.008	3	-.794	3
59		11	max	26.599	1	516.865	2	-.973	12	.017	2	.065	1	.004	9
60			min	1.119	15	-756.477	3	-108.545	1	-.016	3	-.01	3	-.206	3
61		12	max	26.599	1	384.53	2	.706	3	.017	2	.006	2	.257	3
62			min	1.119	15	-576.634	3	-78.639	1	-.016	3	-.01	3	-.382	2
63		13	max	26.599	1	252.196	2	2.544	3	.017	2	-.002	15	.595	3
64			min	1.119	15	-396.791	3	-48.733	1	-.016	3	-.045	1	-.603	2
65		14	max	26.599	1	119.861	2	4.382	3	.017	2	-.003	15	.808	3
66			min	1.119	15	-216.948	3	-18.828	1	-.016	3	-.068	1	-.733	2
67		15	max	26.599	1	.685	9	11.078	1	.017	2	-.002	12	.896	3
68			min	1.119	15	-37.105	3	-1.078	10	-.016	3	-.071	1	-.77	2
69		16	max	26.599	1	142.738	3	40.983	1	.017	2	.002	3	.859	3
70			min	1.119	15	-144.808	2	1.734	15	-.016	3	-.053	1	-.715	2
71		17	max	26.599	1	322.581	3	70.889	1	.017	2	.009	3	.698	3
72			min	1.119	15	-277.142	2	2.94	15	-.016	3	-.014	1	-.569	2
73		18	max	26.599	1	502.424	3	100.794	1	.017	2	.046	1	.411	3
74			min	1.119	15	-409.477	2	4.145	15	-.016	3	0	10	-.33	2
75		19	max	26.599	1	682.267	3	130.7	1	.017	2	.126	1	0	2
76			min	1.119	15	-541.811	2	5.351	15	-.016	3	.005	15	0	3
77	M15	1	max	-1.174	15	738.01	2	-5.348	15	.017	2	.126	1	0	2
78			min	-27.558	1	-390.041	3	-130.762	1	-.013	3	.005	15	0	3
79		2	max	-1.174	15	547.638	2	-4.143	15	.017	2	.046	1	.239	3
80			min	-27.558	1	-297.253	3	-100.856	1	-.013	3	0	10	-.446	2
81		3	max	-1.174	15	357.265	2	-2.937	15	.017	2	.008	3	.413	3
82			min	-27.558	1	-204.466	3	-70.951	1	-.013	3	-.014	1	-.761	2
83		4	max	-1.174	15	166.893	2	-1.731	15	.017	2	.002	3	.523	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	-27.558	1	-111.678	3	-41.045	1	-.013	3	-.053	1	-.943	2
85		5	max	-1.174	15	-.049	15	.927	10	.017	2	-.002	12	.568	3
86			min	-27.558	1	-23.479	2	-11.139	1	-.013	3	-.071	1	-.992	2
87		6	max	-1.174	15	73.897	3	18.766	1	.017	2	-.003	15	.549	3
88			min	-27.558	1	-213.851	2	-3.908	3	-.013	3	-.068	1	-.91	2
89		7	max	-1.174	15	166.684	3	48.672	1	.017	2	-.002	15	.465	3
90			min	-27.558	1	-404.224	2	-2.071	3	-.013	3	-.045	1	-.695	2
91		8	max	-1.174	15	259.472	3	78.577	1	.017	2	.005	2	.317	3
92			min	-27.558	1	-594.596	2	-.233	3	-.013	3	-.009	3	-.349	2
93		9	max	-1.174	15	352.259	3	108.483	1	.017	2	.064	1	.13	2
94			min	-27.558	1	-784.968	2	1.27	12	-.013	3	-.009	3	0	15
95		10	max	-1.174	15	445.047	3	138.389	1	.013	3	.15	1	.742	2
96			min	-27.558	1	-975.34	2	-73.345	14	-.017	2	-.007	3	-.172	3
97		11	max	-1.174	15	784.968	2	-1.27	12	.013	3	.064	1	.13	2
98			min	-27.558	1	-352.259	3	-108.483	1	-.017	2	-.009	3	0	15
99		12	max	-1.174	15	594.596	2	.233	3	.013	3	.005	2	.317	3
100			min	-27.558	1	-259.472	3	-78.577	1	-.017	2	-.009	3	-.349	2
101		13	max	-1.174	15	404.224	2	2.071	3	.013	3	-.002	15	.465	3
102			min	-27.558	1	-166.684	3	-48.672	1	-.017	2	-.045	1	-.695	2
103		14	max	-1.174	15	213.851	2	3.908	3	.013	3	-.003	15	.549	3
104			min	-27.558	1	-73.897	3	-18.766	1	-.017	2	-.068	1	-.91	2
105		15	max	-1.174	15	23.479	2	11.139	1	.013	3	-.002	12	.568	3
106			min	-27.558	1	.049	15	-.927	10	-.017	2	-.071	1	-.992	2
107		16	max	-1.174	15	111.678	3	41.045	1	.013	3	.002	3	.523	3
108			min	-27.558	1	-166.893	2	1.731	15	-.017	2	-.053	1	-.943	2
109		17	max	-1.174	15	204.466	3	70.951	1	.013	3	.008	3	.413	3
110			min	-27.558	1	-357.265	2	2.937	15	-.017	2	-.014	1	-.761	2
111		18	max	-1.174	15	297.253	3	100.856	1	.013	3	.046	1	.239	3
112			min	-27.558	1	-547.638	2	4.143	15	-.017	2	0	10	-.446	2
113		19	max	-1.174	15	390.041	3	130.762	1	.013	3	.126	1	0	2
114			min	-27.558	1	-738.01	2	5.348	15	-.017	2	.005	15	0	3
115	M16	1	max	-1.726	15	637.118	2	-5.105	15	.003	1	.103	1	0	2
116			min	-40.917	1	-298.702	3	-125.142	1	-.011	3	.004	15	0	3
117		2	max	-1.726	15	446.746	2	-3.9	15	.003	1	.026	1	.175	3
118			min	-40.917	1	-205.915	3	-95.237	1	-.011	3	0	10	-.376	2
119		3	max	-1.726	15	256.374	2	-2.694	15	.003	1	.004	3	.286	3
120			min	-40.917	1	-113.127	3	-65.331	1	-.011	3	-.03	1	-.62	2
121		4	max	-1.726	15	66.001	2	-1.488	15	.003	1	0	12	.332	3
122			min	-40.917	1	-20.34	3	-35.425	1	-.011	3	-.065	1	-.732	2
123		5	max	-1.726	15	72.448	3	1.079	10	.003	1	-.003	12	.314	3
124			min	-40.917	1	-124.371	2	-5.52	1	-.011	3	-.079	1	-.712	2
125		6	max	-1.726	15	165.235	3	24.386	1	.003	1	-.003	15	.232	3
126			min	-40.917	1	-314.743	2	-2.284	3	-.011	3	-.072	1	-.56	2
127		7	max	-1.726	15	258.023	3	54.291	1	.003	1	-.002	15	.085	3
128			min	-40.917	1	-505.115	2	-.447	3	-.011	3	-.045	1	-.275	2
129		8	max	-1.726	15	350.81	3	84.197	1	.003	1	.006	2	.142	2
130			min	-40.917	1	-695.488	2	1.077	12	-.011	3	-.007	3	-.127	3
131		9	max	-1.726	15	443.598	3	114.102	1	.003	1	.072	1	.691	2
132			min	-40.917	1	-885.86	2	2.302	12	-.011	3	-.006	3	-.402	3
133		10	max	-1.726	15	536.385	3	144.008	1	.011	3	.162	1	1.372	2
134			min	-40.917	1	-1076.232	2	-76.586	14	-.003	1	-.003	3	-.743	3
135		11	max	-1.726	15	885.86	2	-2.302	12	.011	3	.072	1	.691	2
136			min	-40.917	1	-443.598	3	-114.102	1	-.003	1	-.006	3	-.402	3
137		12	max	-1.726	15	695.488	2	-1.077	12	.011	3	.006	2	.142	2
138			min	-40.917	1	-350.81	3	-84.197	1	-.003	1	-.007	3	-.127	3
139		13	max	-1.726	15	505.115	2	.447	3	.011	3	-.002	15	.085	3
140			min	-40.917	1	-258.023	3	-54.291	1	-.003	1	-.045	1	-.275	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-1.726	15	314.743	2	2.284	3	.011	3	-.003	15	.232	3
142			min	-40.917	1	-165.235	3	-24.386	1	-.003	1	-.072	1	-.56	2
143		15	max	-1.726	15	124.371	2	5.52	1	.011	3	-.003	12	.314	3
144			min	-40.917	1	-72.448	3	-1.079	10	-.003	1	-.079	1	-.712	2
145		16	max	-1.726	15	20.34	3	35.425	1	.011	3	0	12	.332	3
146			min	-40.917	1	-66.001	2	1.488	15	-.003	1	-.065	1	-.732	2
147		17	max	-1.726	15	113.127	3	65.331	1	.011	3	.004	3	.286	3
148			min	-40.917	1	-256.374	2	2.694	15	-.003	1	-.03	1	-.62	2
149		18	max	-1.726	15	205.915	3	95.237	1	.011	3	.026	1	.175	3
150			min	-40.917	1	-446.746	2	3.9	15	-.003	1	0	10	-.376	2
151		19	max	-1.726	15	298.702	3	125.142	1	.011	3	.103	1	0	2
152			min	-40.917	1	-637.118	2	5.105	15	-.003	1	.004	15	0	3
153	M2	1	max	1113.549	2	2.026	4	.284	1	0	3	0	3	0	1
154			min	-1562.185	3	.476	15	.012	15	0	1	0	2	0	1
155		2	max	1114.023	2	1.989	4	.284	1	0	3	0	1	0	15
156			min	-1561.83	3	.468	15	.012	15	0	1	0	10	0	4
157		3	max	1114.497	2	1.952	4	.284	1	0	3	0	1	0	15
158			min	-1561.475	3	.459	15	.012	15	0	1	0	10	-.001	4
159		4	max	1114.97	2	1.915	4	.284	1	0	3	0	1	0	15
160			min	-1561.119	3	.45	15	.012	15	0	1	0	10	-.002	4
161		5	max	1115.444	2	1.878	4	.284	1	0	3	0	1	0	15
162			min	-1560.764	3	.441	15	.012	15	0	1	0	10	-.002	4
163		6	max	1115.918	2	1.841	4	.284	1	0	3	0	1	0	15
164			min	-1560.409	3	.433	15	.012	15	0	1	0	15	-.003	4
165		7	max	1116.391	2	1.804	4	.284	1	0	3	0	1	0	15
166			min	-1560.053	3	.424	15	.012	15	0	1	0	15	-.004	4
167		8	max	1116.865	2	1.767	4	.284	1	0	3	0	1	0	15
168			min	-1559.698	3	.415	15	.012	15	0	1	0	15	-.004	4
169		9	max	1117.339	2	1.73	4	.284	1	0	3	0	1	-.001	15
170			min	-1559.343	3	.407	15	.012	15	0	1	0	15	-.005	4
171		10	max	1117.813	2	1.693	4	.284	1	0	3	0	1	-.001	15
172			min	-1558.987	3	.398	15	.012	15	0	1	0	15	-.005	4
173		11	max	1118.286	2	1.656	4	.284	1	0	3	0	1	-.001	15
174			min	-1558.632	3	.389	15	.012	15	0	1	0	15	-.006	4
175		12	max	1118.76	2	1.619	4	.284	1	0	3	0	1	-.002	15
176			min	-1558.277	3	.38	15	.012	15	0	1	0	15	-.006	4
177		13	max	1119.234	2	1.581	4	.284	1	0	3	.001	1	-.002	15
178			min	-1557.921	3	.372	15	.012	15	0	1	0	15	-.007	4
179		14	max	1119.708	2	1.544	4	.284	1	0	3	.001	1	-.002	15
180			min	-1557.566	3	.363	15	.012	15	0	1	0	15	-.007	4
181		15	max	1120.181	2	1.507	4	.284	1	0	3	.001	1	-.002	15
182			min	-1557.211	3	.354	12	.012	15	0	1	0	15	-.008	4
183		16	max	1120.655	2	1.47	4	.284	1	0	3	.001	1	-.002	15
184			min	-1556.856	3	.339	12	.012	15	0	1	0	15	-.008	4
185		17	max	1121.129	2	1.433	4	.284	1	0	3	.001	1	-.002	15
186			min	-1556.5	3	.325	12	.012	15	0	1	0	15	-.009	4
187		18	max	1121.603	2	1.396	4	.284	1	0	3	.002	1	-.002	15
188			min	-1556.145	3	.31	12	.012	15	0	1	0	15	-.009	4
189		19	max	1122.076	2	1.359	4	.284	1	0	3	.002	1	-.002	15
190			min	-1555.79	3	.296	12	.012	15	0	1	0	15	-.01	4
191	M3	1	max	772.809	2	8.995	4	.139	1	0	5	0	1	.01	4
192			min	-902.747	3	2.114	15	.006	15	0	1	0	15	.002	15
193		2	max	772.639	2	8.123	4	.139	1	0	5	0	1	.006	2
194			min	-902.875	3	1.909	15	.006	15	0	1	0	15	0	12
195		3	max	772.468	2	7.251	4	.139	1	0	5	0	1	.003	2
196			min	-903.002	3	1.704	15	.006	15	0	1	0	15	0	3
197		4	max	772.298	2	6.379	4	.139	1	0	5	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-903.13	3	1.499	15	.006	15	0	1	0	15	-.002	3
199		5	max	772.128	2	5.507	4	.139	1	0	5	0	1	0	15
200			min	-903.258	3	1.294	15	.006	15	0	1	0	15	-.004	3
201		6	max	771.957	2	4.635	4	.139	1	0	5	0	1	-.001	15
202			min	-903.386	3	1.089	15	.006	15	0	1	0	15	-.006	4
203		7	max	771.787	2	3.763	4	.139	1	0	5	0	1	-.002	15
204			min	-903.513	3	.885	15	.006	15	0	1	0	15	-.008	4
205		8	max	771.617	2	2.891	4	.139	1	0	5	0	1	-.002	15
206			min	-903.641	3	.68	15	.006	15	0	1	0	15	-.01	4
207		9	max	771.446	2	2.019	4	.139	1	0	5	0	1	-.003	15
208			min	-903.769	3	.475	15	.006	15	0	1	0	15	-.011	4
209		10	max	771.276	2	1.147	4	.139	1	0	5	0	1	-.003	15
210			min	-903.897	3	.27	15	.006	15	0	1	0	15	-.012	4
211		11	max	771.106	2	.4	2	.139	1	0	5	0	1	-.003	15
212			min	-904.024	3	-.093	3	.006	15	0	1	0	15	-.012	4
213		12	max	770.935	2	-.14	15	.139	1	0	5	0	1	-.003	15
214			min	-904.152	3	-.603	3	.006	15	0	1	0	15	-.012	4
215		13	max	770.765	2	-.345	15	.139	1	0	5	0	1	-.003	15
216			min	-904.28	3	-1.469	4	.006	15	0	1	0	15	-.012	4
217		14	max	770.595	2	-.55	15	.139	1	0	5	0	1	-.003	15
218			min	-904.408	3	-2.341	4	.006	15	0	1	0	15	-.011	4
219		15	max	770.424	2	-.755	15	.139	1	0	5	.001	1	-.002	15
220			min	-904.535	3	-3.213	4	.006	15	0	1	0	15	-.009	4
221		16	max	770.254	2	-.96	15	.139	1	0	5	.001	1	-.002	15
222			min	-904.663	3	-4.085	4	.006	15	0	1	0	15	-.008	4
223		17	max	770.084	2	-1.165	15	.139	1	0	5	.001	1	-.001	15
224			min	-904.791	3	-4.957	4	.006	15	0	1	0	15	-.006	4
225		18	max	769.913	2	-1.37	15	.139	1	0	5	.001	1	0	15
226			min	-904.919	3	-5.829	4	.006	15	0	1	0	15	-.003	4
227		19	max	769.743	2	-1.575	15	.139	1	0	5	.001	1	0	1
228			min	-905.047	3	-6.701	4	.006	15	0	1	0	15	0	1
229	M4	1	max	956.751	1	0	1	-.264	15	0	1	0	1	0	1
230			min	-156.328	3	0	1	-6.293	1	0	1	0	15	0	1
231		2	max	956.921	1	0	1	-.264	15	0	1	0	1	0	1
232			min	-156.2	3	0	1	-6.293	1	0	1	0	10	0	1
233		3	max	957.091	1	0	1	-.264	15	0	1	0	15	0	1
234			min	-156.072	3	0	1	-6.293	1	0	1	0	1	0	1
235		4	max	957.262	1	0	1	-.264	15	0	1	0	15	0	1
236			min	-155.945	3	0	1	-6.293	1	0	1	-.001	1	0	1
237		5	max	957.432	1	0	1	-.264	15	0	1	0	15	0	1
238			min	-155.817	3	0	1	-6.293	1	0	1	-.002	1	0	1
239		6	max	957.602	1	0	1	-.264	15	0	1	0	15	0	1
240			min	-155.689	3	0	1	-6.293	1	0	1	-.003	1	0	1
241		7	max	957.773	1	0	1	-.264	15	0	1	0	15	0	1
242			min	-155.561	3	0	1	-6.293	1	0	1	-.003	1	0	1
243		8	max	957.943	1	0	1	-.264	15	0	1	0	15	0	1
244			min	-155.434	3	0	1	-6.293	1	0	1	-.004	1	0	1
245		9	max	958.113	1	0	1	-.264	15	0	1	0	15	0	1
246			min	-155.306	3	0	1	-6.293	1	0	1	-.005	1	0	1
247		10	max	958.284	1	0	1	-.264	15	0	1	0	15	0	1
248			min	-155.178	3	0	1	-6.293	1	0	1	-.006	1	0	1
249		11	max	958.454	1	0	1	-.264	15	0	1	0	15	0	1
250			min	-155.05	3	0	1	-6.293	1	0	1	-.006	1	0	1
251		12	max	958.624	1	0	1	-.264	15	0	1	0	15	0	1
252			min	-154.923	3	0	1	-6.293	1	0	1	-.007	1	0	1
253		13	max	958.795	1	0	1	-.264	15	0	1	0	15	0	1
254			min	-154.795	3	0	1	-6.293	1	0	1	-.008	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	958.965	1	0	1	-.264	15	0	1	0	15	0	1
256			min	-154.667	3	0	1	-6.293	1	0	1	-.009	1	0	1
257		15	max	959.135	1	0	1	-.264	15	0	1	0	15	0	1
258			min	-154.539	3	0	1	-6.293	1	0	1	-.009	1	0	1
259		16	max	959.306	1	0	1	-.264	15	0	1	0	15	0	1
260			min	-154.412	3	0	1	-6.293	1	0	1	-.01	1	0	1
261		17	max	959.476	1	0	1	-.264	15	0	1	0	15	0	1
262			min	-154.284	3	0	1	-6.293	1	0	1	-.011	1	0	1
263		18	max	959.646	1	0	1	-.264	15	0	1	0	15	0	1
264			min	-154.156	3	0	1	-6.293	1	0	1	-.011	1	0	1
265		19	max	959.817	1	0	1	-.264	15	0	1	0	15	0	1
266			min	-154.028	3	0	1	-6.293	1	0	1	-.012	1	0	1
267	M6	1	max	3214.494	2	2.405	2	0	1	0	1	0	1	0	1
268			min	-4670.996	3	.107	3	0	1	0	1	0	1	0	1
269		2	max	3214.968	2	2.376	2	0	1	0	1	0	1	0	3
270			min	-4670.64	3	.085	3	0	1	0	1	0	1	0	2
271		3	max	3215.442	2	2.347	2	0	1	0	1	0	1	0	3
272			min	-4670.285	3	.064	3	0	1	0	1	0	1	-.002	2
273		4	max	3215.915	2	2.318	2	0	1	0	1	0	1	0	3
274			min	-4669.93	3	.042	3	0	1	0	1	0	1	-.002	2
275		5	max	3216.389	2	2.289	2	0	1	0	1	0	1	0	3
276			min	-4669.574	3	.02	3	0	1	0	1	0	1	-.003	2
277		6	max	3216.863	2	2.261	2	0	1	0	1	0	1	0	3
278			min	-4669.219	3	-.001	3	0	1	0	1	0	1	-.004	2
279		7	max	3217.337	2	2.232	2	0	1	0	1	0	1	0	3
280			min	-4668.864	3	-.023	3	0	1	0	1	0	1	-.004	2
281		8	max	3217.81	2	2.203	2	0	1	0	1	0	1	0	3
282			min	-4668.508	3	-.045	3	0	1	0	1	0	1	-.005	2
283		9	max	3218.284	2	2.174	2	0	1	0	1	0	1	0	3
284			min	-4668.153	3	-.066	3	0	1	0	1	0	1	-.006	2
285		10	max	3218.758	2	2.145	2	0	1	0	1	0	1	0	3
286			min	-4667.798	3	-.088	3	0	1	0	1	0	1	-.007	2
287		11	max	3219.232	2	2.116	2	0	1	0	1	0	1	0	3
288			min	-4667.443	3	-.109	3	0	1	0	1	0	1	-.007	2
289		12	max	3219.705	2	2.087	2	0	1	0	1	0	1	0	3
290			min	-4667.087	3	-.131	3	0	1	0	1	0	1	-.008	2
291		13	max	3220.179	2	2.059	2	0	1	0	1	0	1	0	3
292			min	-4666.732	3	-.153	3	0	1	0	1	0	1	-.009	2
293		14	max	3220.653	2	2.03	2	0	1	0	1	0	1	0	3
294			min	-4666.377	3	-.174	3	0	1	0	1	0	1	-.009	2
295		15	max	3221.127	2	2.001	2	0	1	0	1	0	1	0	3
296			min	-4666.021	3	-.196	3	0	1	0	1	0	1	-.01	2
297		16	max	3221.6	2	1.972	2	0	1	0	1	0	1	0	3
298			min	-4665.666	3	-.218	3	0	1	0	1	0	1	-.011	2
299		17	max	3222.074	2	1.943	2	0	1	0	1	0	1	0	3
300			min	-4665.311	3	-.239	3	0	1	0	1	0	1	-.011	2
301		18	max	3222.548	2	1.914	2	0	1	0	1	0	1	0	3
302			min	-4664.955	3	-.261	3	0	1	0	1	0	1	-.012	2
303		19	max	3223.022	2	1.885	2	0	1	0	1	0	1	0	3
304			min	-4664.6	3	-.283	3	0	1	0	1	0	1	-.012	2
305	M7	1	max	2365.573	2	9.015	4	0	1	0	1	0	1	.012	2
306			min	-2554.167	3	2.117	15	0	1	0	1	0	1	0	3
307		2	max	2365.402	2	8.143	4	0	1	0	1	0	1	.009	2
308			min	-2554.295	3	1.912	15	0	1	0	1	0	1	-.003	3
309		3	max	2365.232	2	7.271	4	0	1	0	1	0	1	.006	2
310			min	-2554.422	3	1.707	15	0	1	0	1	0	1	-.004	3
311		4	max	2365.062	2	6.399	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2554.55	3	1.502	15	0	1	0	1	0	1	-.006	3
313		5	max	2364.891	2	5.527	4	0	1	0	1	0	1	0	2
314			min	-2554.678	3	1.297	15	0	1	0	1	0	1	-.007	3
315		6	max	2364.721	2	4.655	4	0	1	0	1	0	1	-.001	15
316			min	-2554.806	3	1.092	15	0	1	0	1	0	1	-.008	3
317		7	max	2364.551	2	3.783	4	0	1	0	1	0	1	-.002	15
318			min	-2554.933	3	.887	15	0	1	0	1	0	1	-.009	3
319		8	max	2364.38	2	2.911	4	0	1	0	1	0	1	-.002	15
320			min	-2555.061	3	.67	12	0	1	0	1	0	1	-.01	4
321		9	max	2364.21	2	2.133	2	0	1	0	1	0	1	-.003	15
322			min	-2555.189	3	.33	12	0	1	0	1	0	1	-.011	4
323		10	max	2364.039	2	1.453	2	0	1	0	1	0	1	-.003	15
324			min	-2555.317	3	-.059	3	0	1	0	1	0	1	-.012	4
325		11	max	2363.869	2	.774	2	0	1	0	1	0	1	-.003	15
326			min	-2555.445	3	-.569	3	0	1	0	1	0	1	-.012	4
327		12	max	2363.699	2	.094	2	0	1	0	1	0	1	-.003	15
328			min	-2555.572	3	-1.079	3	0	1	0	1	0	1	-.012	4
329		13	max	2363.528	2	-.342	15	0	1	0	1	0	1	-.003	15
330			min	-2555.7	3	-1.588	3	0	1	0	1	0	1	-.012	4
331		14	max	2363.358	2	-.547	15	0	1	0	1	0	1	-.003	15
332			min	-2555.828	3	-2.321	4	0	1	0	1	0	1	-.011	4
333		15	max	2363.188	2	-.752	15	0	1	0	1	0	1	-.002	15
334			min	-2555.956	3	-3.193	4	0	1	0	1	0	1	-.009	4
335		16	max	2363.017	2	-.957	15	0	1	0	1	0	1	-.002	15
336			min	-2556.083	3	-4.065	4	0	1	0	1	0	1	-.008	4
337		17	max	2362.847	2	-1.162	15	0	1	0	1	0	1	-.001	15
338			min	-2556.211	3	-4.937	4	0	1	0	1	0	1	-.005	4
339		18	max	2362.677	2	-1.367	15	0	1	0	1	0	1	0	15
340			min	-2556.339	3	-5.809	4	0	1	0	1	0	1	-.003	4
341		19	max	2362.506	2	-1.572	15	0	1	0	1	0	1	0	1
342			min	-2556.467	3	-6.681	4	0	1	0	1	0	1	0	1
343	M8	1	max	2722.19	2	0	1	0	1	0	1	0	1	0	1
344			min	-550.056	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2722.361	2	0	1	0	1	0	1	0	1	0	1
346			min	-549.928	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2722.531	2	0	1	0	1	0	1	0	1	0	1
348			min	-549.801	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2722.701	2	0	1	0	1	0	1	0	1	0	1
350			min	-549.673	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2722.872	2	0	1	0	1	0	1	0	1	0	1
352			min	-549.545	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2723.042	2	0	1	0	1	0	1	0	1	0	1
354			min	-549.417	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2723.212	2	0	1	0	1	0	1	0	1	0	1
356			min	-549.29	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2723.383	2	0	1	0	1	0	1	0	1	0	1
358			min	-549.162	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2723.553	2	0	1	0	1	0	1	0	1	0	1
360			min	-549.034	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2723.723	2	0	1	0	1	0	1	0	1	0	1
362			min	-548.906	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2723.894	2	0	1	0	1	0	1	0	1	0	1
364			min	-548.779	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2724.064	2	0	1	0	1	0	1	0	1	0	1
366			min	-548.651	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2724.234	2	0	1	0	1	0	1	0	1	0	1
368			min	-548.523	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	2724.405	2	0	1	0	1	0	1	0	1	0	1
370			min	-548.395	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2724.575	2	0	1	0	1	0	1	0	1	0	1
372			min	-548.268	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2724.745	2	0	1	0	1	0	1	0	1	0	1
374			min	-548.14	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2724.916	2	0	1	0	1	0	1	0	1	0	1
376			min	-548.012	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2725.086	2	0	1	0	1	0	1	0	1	0	1
378			min	-547.884	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2725.257	2	0	1	0	1	0	1	0	1	0	1
380			min	-547.756	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1113.549	2	2.026	4	-.012	15	0	1	0	2	0	1
382			min	-1562.185	3	.476	15	-.284	1	0	3	0	3	0	1
383		2	max	1114.023	2	1.989	4	-.012	15	0	1	0	10	0	15
384			min	-1561.83	3	.468	15	-.284	1	0	3	0	1	0	4
385		3	max	1114.497	2	1.952	4	-.012	15	0	1	0	10	0	15
386			min	-1561.475	3	.459	15	-.284	1	0	3	0	1	-.001	4
387		4	max	1114.97	2	1.915	4	-.012	15	0	1	0	10	0	15
388			min	-1561.119	3	.45	15	-.284	1	0	3	0	1	-.002	4
389		5	max	1115.444	2	1.878	4	-.012	15	0	1	0	10	0	15
390			min	-1560.764	3	.441	15	-.284	1	0	3	0	1	-.002	4
391		6	max	1115.918	2	1.841	4	-.012	15	0	1	0	15	0	15
392			min	-1560.409	3	.433	15	-.284	1	0	3	0	1	-.003	4
393		7	max	1116.391	2	1.804	4	-.012	15	0	1	0	15	0	15
394			min	-1560.053	3	.424	15	-.284	1	0	3	0	1	-.004	4
395		8	max	1116.865	2	1.767	4	-.012	15	0	1	0	15	0	15
396			min	-1559.698	3	.415	15	-.284	1	0	3	0	1	-.004	4
397		9	max	1117.339	2	1.73	4	-.012	15	0	1	0	15	-.001	15
398			min	-1559.343	3	.407	15	-.284	1	0	3	0	1	-.005	4
399		10	max	1117.813	2	1.693	4	-.012	15	0	1	0	15	-.001	15
400			min	-1558.987	3	.398	15	-.284	1	0	3	0	1	-.005	4
401		11	max	1118.286	2	1.656	4	-.012	15	0	1	0	15	-.001	15
402			min	-1558.632	3	.389	15	-.284	1	0	3	0	1	-.006	4
403		12	max	1118.76	2	1.619	4	-.012	15	0	1	0	15	-.002	15
404			min	-1558.277	3	.38	15	-.284	1	0	3	0	1	-.006	4
405		13	max	1119.234	2	1.581	4	-.012	15	0	1	0	15	-.002	15
406			min	-1557.921	3	.372	15	-.284	1	0	3	-.001	1	-.007	4
407		14	max	1119.708	2	1.544	4	-.012	15	0	1	0	15	-.002	15
408			min	-1557.566	3	.363	15	-.284	1	0	3	-.001	1	-.007	4
409		15	max	1120.181	2	1.507	4	-.012	15	0	1	0	15	-.002	15
410			min	-1557.211	3	.354	12	-.284	1	0	3	-.001	1	-.008	4
411		16	max	1120.655	2	1.47	4	-.012	15	0	1	0	15	-.002	15
412			min	-1556.856	3	.339	12	-.284	1	0	3	-.001	1	-.008	4
413		17	max	1121.129	2	1.433	4	-.012	15	0	1	0	15	-.002	15
414			min	-1556.5	3	.325	12	-.284	1	0	3	-.001	1	-.009	4
415		18	max	1121.603	2	1.396	4	-.012	15	0	1	0	15	-.002	15
416			min	-1556.145	3	.31	12	-.284	1	0	3	-.002	1	-.009	4
417		19	max	1122.076	2	1.359	4	-.012	15	0	1	0	15	-.002	15
418			min	-1555.79	3	.296	12	-.284	1	0	3	-.002	1	-.01	4
419	M11	1	max	772.809	2	8.995	4	-.006	15	0	1	0	15	.01	4
420			min	-902.747	3	2.114	15	-.139	1	0	5	0	1	.002	15
421		2	max	772.639	2	8.123	4	-.006	15	0	1	0	15	.006	2
422			min	-902.875	3	1.909	15	-.139	1	0	5	0	1	0	12
423		3	max	772.468	2	7.251	4	-.006	15	0	1	0	15	.003	2
424			min	-903.002	3	1.704	15	-.139	1	0	5	0	1	0	3
425		4	max	772.298	2	6.379	4	-.006	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-903.13	3	1.499	15	-.139	1	0	5	0	1	-.002	3
427		5	max	772.128	2	5.507	4	-.006	15	0	1	0	15	0	15
428			min	-903.258	3	1.294	15	-.139	1	0	5	0	1	-.004	3
429		6	max	771.957	2	4.635	4	-.006	15	0	1	0	15	-.001	15
430			min	-903.386	3	1.089	15	-.139	1	0	5	0	1	-.006	4
431		7	max	771.787	2	3.763	4	-.006	15	0	1	0	15	-.002	15
432			min	-903.513	3	.885	15	-.139	1	0	5	0	1	-.008	4
433		8	max	771.617	2	2.891	4	-.006	15	0	1	0	15	-.002	15
434			min	-903.641	3	.68	15	-.139	1	0	5	0	1	-.01	4
435		9	max	771.446	2	2.019	4	-.006	15	0	1	0	15	-.003	15
436			min	-903.769	3	.475	15	-.139	1	0	5	0	1	-.011	4
437		10	max	771.276	2	1.147	4	-.006	15	0	1	0	15	-.003	15
438			min	-903.897	3	.27	15	-.139	1	0	5	0	1	-.012	4
439		11	max	771.106	2	.4	2	-.006	15	0	1	0	15	-.003	15
440			min	-904.024	3	-.093	3	-.139	1	0	5	0	1	-.012	4
441		12	max	770.935	2	-.14	15	-.006	15	0	1	0	15	-.003	15
442			min	-904.152	3	-.603	3	-.139	1	0	5	0	1	-.012	4
443		13	max	770.765	2	-.345	15	-.006	15	0	1	0	15	-.003	15
444			min	-904.28	3	-1.469	4	-.139	1	0	5	0	1	-.012	4
445		14	max	770.595	2	-.55	15	-.006	15	0	1	0	15	-.003	15
446			min	-904.408	3	-2.341	4	-.139	1	0	5	0	1	-.011	4
447		15	max	770.424	2	-.755	15	-.006	15	0	1	0	15	-.002	15
448			min	-904.535	3	-3.213	4	-.139	1	0	5	-.001	1	-.009	4
449		16	max	770.254	2	-.96	15	-.006	15	0	1	0	15	-.002	15
450			min	-904.663	3	-4.085	4	-.139	1	0	5	-.001	1	-.008	4
451		17	max	770.084	2	-1.165	15	-.006	15	0	1	0	15	-.001	15
452			min	-904.791	3	-4.957	4	-.139	1	0	5	-.001	1	-.006	4
453		18	max	769.913	2	-1.37	15	-.006	15	0	1	0	15	0	15
454			min	-904.919	3	-5.829	4	-.139	1	0	5	-.001	1	-.003	4
455		19	max	769.743	2	-1.575	15	-.006	15	0	1	0	15	0	1
456			min	-905.047	3	-6.701	4	-.139	1	0	5	-.001	1	0	1
457	M12	1	max	956.751	1	0	1	6.293	1	0	1	0	15	0	1
458			min	-156.328	3	0	1	.264	15	0	1	0	1	0	1
459		2	max	956.921	1	0	1	6.293	1	0	1	0	10	0	1
460			min	-156.2	3	0	1	.264	15	0	1	0	1	0	1
461		3	max	957.091	1	0	1	6.293	1	0	1	0	1	0	1
462			min	-156.072	3	0	1	.264	15	0	1	0	15	0	1
463		4	max	957.262	1	0	1	6.293	1	0	1	.001	1	0	1
464			min	-155.945	3	0	1	.264	15	0	1	0	15	0	1
465		5	max	957.432	1	0	1	6.293	1	0	1	.002	1	0	1
466			min	-155.817	3	0	1	.264	15	0	1	0	15	0	1
467		6	max	957.602	1	0	1	6.293	1	0	1	.003	1	0	1
468			min	-155.689	3	0	1	.264	15	0	1	0	15	0	1
469		7	max	957.773	1	0	1	6.293	1	0	1	.003	1	0	1
470			min	-155.561	3	0	1	.264	15	0	1	0	15	0	1
471		8	max	957.943	1	0	1	6.293	1	0	1	.004	1	0	1
472			min	-155.434	3	0	1	.264	15	0	1	0	15	0	1
473		9	max	958.113	1	0	1	6.293	1	0	1	.005	1	0	1
474			min	-155.306	3	0	1	.264	15	0	1	0	15	0	1
475		10	max	958.284	1	0	1	6.293	1	0	1	.006	1	0	1
476			min	-155.178	3	0	1	.264	15	0	1	0	15	0	1
477		11	max	958.454	1	0	1	6.293	1	0	1	.006	1	0	1
478			min	-155.05	3	0	1	.264	15	0	1	0	15	0	1
479		12	max	958.624	1	0	1	6.293	1	0	1	.007	1	0	1
480			min	-154.923	3	0	1	.264	15	0	1	0	15	0	1
481		13	max	958.795	1	0	1	6.293	1	0	1	.008	1	0	1
482			min	-154.795	3	0	1	.264	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	958.965	1	0	1	6.293	1	0	1	.009	1	0	1
484			min	-154.667	3	0	1	.264	15	0	1	0	15	0	1
485		15	max	959.135	1	0	1	6.293	1	0	1	.009	1	0	1
486			min	-154.539	3	0	1	.264	15	0	1	0	15	0	1
487		16	max	959.306	1	0	1	6.293	1	0	1	.01	1	0	1
488			min	-154.412	3	0	1	.264	15	0	1	0	15	0	1
489		17	max	959.476	1	0	1	6.293	1	0	1	.011	1	0	1
490			min	-154.284	3	0	1	.264	15	0	1	0	15	0	1
491		18	max	959.646	1	0	1	6.293	1	0	1	.011	1	0	1
492			min	-154.156	3	0	1	.264	15	0	1	0	15	0	1
493		19	max	959.817	1	0	1	6.293	1	0	1	.012	1	0	1
494			min	-154.028	3	0	1	.264	15	0	1	0	15	0	1
495	M1	1	max	124.41	1	818.108	3	-1.535	15	0	2	.1	1	0	15
496			min	5.091	15	-433.481	2	-36.082	1	0	3	.004	15	-.012	3
497		2	max	125.122	1	816.963	3	-1.535	15	0	2	.078	1	.26	2
498			min	5.306	15	-435.008	2	-36.082	1	0	3	.003	15	-.52	3
499		3	max	587.296	3	593.209	2	-1.523	15	0	3	.056	1	.519	2
500			min	-358.072	2	-644.211	3	-35.878	1	0	2	.002	15	-1.01	3
501		4	max	587.83	3	591.682	2	-1.523	15	0	3	.033	1	.151	2
502			min	-357.36	2	-645.356	3	-35.878	1	0	2	.001	15	-.61	3
503		5	max	588.364	3	590.155	2	-1.523	15	0	3	.011	1	-.005	15
504			min	-356.648	2	-646.501	3	-35.878	1	0	2	0	10	-.216	2
505		6	max	588.898	3	588.628	2	-1.523	15	0	3	0	15	.192	3
506			min	-355.936	2	-647.646	3	-35.878	1	0	2	-.011	1	-.581	2
507		7	max	589.432	3	587.101	2	-1.523	15	0	3	-.001	15	.595	3
508			min	-355.224	2	-648.791	3	-35.878	1	0	2	-.034	1	-.946	2
509		8	max	589.966	3	585.574	2	-1.523	15	0	3	-.002	15	.998	3
510			min	-354.512	2	-649.937	3	-35.878	1	0	2	-.056	1	-1.31	2
511		9	max	604.071	3	48.363	2	-2.642	15	0	9	.038	1	1.161	3
512			min	-304.197	2	.465	15	-62.505	1	0	3	.002	15	-1.49	2
513		10	max	604.605	3	46.836	2	-2.642	15	0	9	0	10	1.138	3
514			min	-303.485	2	.005	15	-62.505	1	0	3	0	1	-1.52	2
515		11	max	605.139	3	45.309	2	-2.642	15	0	9	-.002	15	1.115	3
516			min	-302.773	2	-1.883	4	-62.505	1	0	3	-.039	1	-1.549	2
517		12	max	618.772	3	432.368	3	-1.468	15	0	2	.055	1	.982	3
518			min	-252.233	2	-690.051	2	-34.951	1	0	3	.002	15	-1.376	2
519		13	max	619.306	3	431.222	3	-1.468	15	0	2	.033	1	.714	3
520			min	-251.521	2	-691.578	2	-34.951	1	0	3	.001	15	-.948	2
521		14	max	619.84	3	430.077	3	-1.468	15	0	2	.012	1	.446	3
522			min	-250.809	2	-693.105	2	-34.951	1	0	3	0	15	-.518	2
523		15	max	620.374	3	428.932	3	-1.468	15	0	2	0	15	.18	3
524			min	-250.097	2	-694.632	2	-34.951	1	0	3	-.01	1	-.099	1
525		16	max	620.908	3	427.787	3	-1.468	15	0	2	-.001	15	.344	2
526			min	-249.385	2	-696.159	2	-34.951	1	0	3	-.032	1	-.086	3
527		17	max	621.442	3	426.642	3	-1.468	15	0	2	-.002	15	.777	2
528			min	-248.673	2	-697.686	2	-34.951	1	0	3	-.053	1	-.351	3
529		18	max	-5.32	15	639.366	2	-1.726	15	0	3	-.003	15	.394	2
530			min	-125.851	1	-297.7	3	-40.957	1	0	2	-.077	1	-.175	3
531		19	max	-5.105	15	637.839	2	-1.726	15	0	3	-.004	15	.011	3
532			min	-125.139	1	-298.845	3	-40.957	1	0	2	-.103	1	-.003	1
533	M5	1	max	289.481	1	2645.461	3	0	1	0	1	0	1	.025	3
534			min	5.222	12	-1510.479	2	0	1	0	1	0	1	0	15
535		2	max	290.193	1	2644.316	3	0	1	0	1	0	1	.958	2
536			min	5.578	12	-1512.006	2	0	1	0	1	0	1	-1.617	3
537		3	max	1718.371	3	1441.136	2	0	1	0	1	0	1	1.864	2
538			min	-1053.489	2	-1743.073	3	0	1	0	1	0	1	-3.21	3
539		4	max	1718.905	3	1439.609	2	0	1	0	1	0	1	.97	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1052.777	2	-1744.218	3	0	1	0	1	0	1	-2.128	3
541		5	max	1719.439	3	1438.083	2	0	1	0	1	0	1	.107	1
542			min	-1052.065	2	-1745.364	3	0	1	0	1	0	1	-1.045	3
543		6	max	1719.973	3	1436.556	2	0	1	0	1	0	1	.039	3
544			min	-1051.353	2	-1746.509	3	0	1	0	1	0	1	-.815	2
545		7	max	1720.507	3	1435.029	2	0	1	0	1	0	1	1.123	3
546			min	-1050.641	2	-1747.654	3	0	1	0	1	0	1	-1.706	2
547		8	max	1721.041	3	1433.502	2	0	1	0	1	0	1	2.208	3
548			min	-1049.929	2	-1748.799	3	0	1	0	1	0	1	-2.596	2
549		9	max	1727.516	3	166.699	2	0	1	0	1	0	1	2.552	3
550			min	-930.751	2	.458	15	0	1	0	1	0	1	-2.982	2
551		10	max	1728.05	3	165.173	2	0	1	0	1	0	1	2.453	3
552			min	-930.039	2	-.003	15	0	1	0	1	0	1	-3.085	2
553		11	max	1728.584	3	163.646	2	0	1	0	1	0	1	2.354	3
554			min	-929.327	2	-1.835	4	0	1	0	1	0	1	-3.187	2
555		12	max	1736.002	3	1091.333	3	0	1	0	1	0	1	2.05	3
556			min	-810.598	2	-1762.547	2	0	1	0	1	0	1	-2.843	2
557		13	max	1736.536	3	1090.188	3	0	1	0	1	0	1	1.373	3
558			min	-809.886	2	-1764.073	2	0	1	0	1	0	1	-1.749	2
559		14	max	1737.07	3	1089.042	3	0	1	0	1	0	1	.697	3
560			min	-809.174	2	-1765.6	2	0	1	0	1	0	1	-.654	2
561		15	max	1737.604	3	1087.897	3	0	1	0	1	0	1	.442	2
562			min	-808.462	2	-1767.127	2	0	1	0	1	0	1	.001	15
563		16	max	1738.138	3	1086.752	3	0	1	0	1	0	1	1.54	2
564			min	-807.75	2	-1768.654	2	0	1	0	1	0	1	-.654	3
565		17	max	1738.672	3	1085.607	3	0	1	0	1	0	1	2.638	2
566			min	-807.038	2	-1770.181	2	0	1	0	1	0	1	-1.328	3
567		18	max	-7.409	12	2156.218	2	0	1	0	1	0	1	1.342	2
568			min	-288.735	1	-1071.852	3	0	1	0	1	0	1	-.687	3
569		19	max	-7.053	12	2154.691	2	0	1	0	1	0	1	.007	1
570			min	-288.023	1	-1072.997	3	0	1	0	1	0	1	-.021	3
571	M9	1	max	124.41	1	818.108	3	36.082	1	0	3	-.004	15	0	15
572			min	5.091	15	-433.481	2	1.535	15	0	2	-.1	1	-.012	3
573		2	max	125.122	1	816.963	3	36.082	1	0	3	-.003	15	.26	2
574			min	5.306	15	-435.008	2	1.535	15	0	2	-.078	1	-.52	3
575		3	max	587.296	3	593.209	2	35.878	1	0	2	-.002	15	.519	2
576			min	-358.072	2	-644.211	3	1.523	15	0	3	-.056	1	-1.01	3
577		4	max	587.83	3	591.682	2	35.878	1	0	2	-.001	15	.151	2
578			min	-357.36	2	-645.356	3	1.523	15	0	3	-.033	1	-.61	3
579		5	max	588.364	3	590.155	2	35.878	1	0	2	0	10	-.005	15
580			min	-356.648	2	-646.501	3	1.523	15	0	3	-.011	1	-.216	2
581		6	max	588.898	3	588.628	2	35.878	1	0	2	.011	1	.192	3
582			min	-355.936	2	-647.646	3	1.523	15	0	3	0	15	-.581	2
583		7	max	589.432	3	587.101	2	35.878	1	0	2	.034	1	.595	3
584			min	-355.224	2	-648.791	3	1.523	15	0	3	.001	15	-.946	2
585		8	max	589.966	3	585.574	2	35.878	1	0	2	.056	1	.998	3
586			min	-354.512	2	-649.937	3	1.523	15	0	3	.002	15	-1.31	2
587		9	max	604.071	3	48.363	2	62.505	1	0	3	-.002	15	1.161	3
588			min	-304.197	2	.465	15	2.642	15	0	9	-.038	1	-1.49	2
589		10	max	604.605	3	46.836	2	62.505	1	0	3	0	1	1.138	3
590			min	-303.485	2	.005	15	2.642	15	0	9	0	10	-1.52	2
591		11	max	605.139	3	45.309	2	62.505	1	0	3	.039	1	1.115	3
592			min	-302.773	2	-1.883	4	2.642	15	0	9	.002	15	-1.549	2
593		12	max	618.772	3	432.368	3	34.951	1	0	3	-.002	15	.982	3
594			min	-252.233	2	-690.051	2	1.468	15	0	2	-.055	1	-1.376	2
595		13	max	619.306	3	431.222	3	34.951	1	0	3	-.001	15	.714	3
596			min	-251.521	2	-691.578	2	1.468	15	0	2	-.033	1	-.948	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	619.84	3	430.077	3	34.951	1	0	3	0	15	.446	3
598			min	-250.809	2	-693.105	2	1.468	15	0	2	-.012	1	-.518	2
599		15	max	620.374	3	428.932	3	34.951	1	0	3	.01	1	.18	3
600			min	-250.097	2	-694.632	2	1.468	15	0	2	0	15	-.099	1
601		16	max	620.908	3	427.787	3	34.951	1	0	3	.032	1	.344	2
602			min	-249.385	2	-696.159	2	1.468	15	0	2	.001	15	-.086	3
603		17	max	621.442	3	426.642	3	34.951	1	0	3	.053	1	.777	2
604			min	-248.673	2	-697.686	2	1.468	15	0	2	.002	15	-.351	3
605		18	max	-5.32	15	639.366	2	40.957	1	0	2	.077	1	.394	2
606			min	-125.851	1	-297.7	3	1.726	15	0	3	.003	15	-.175	3
607		19	max	-5.105	15	637.839	2	40.957	1	0	2	.103	1	.011	3
608			min	-125.139	1	-298.845	3	1.726	15	0	3	.004	15	-.003	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	.239	2	.011	3	1.635e-2	2	NC	1	NC	1
2			min	0	15	-.074	3	-.007	2	-4.926e-3	3	NC	1	NC	1
3		2	max	0	1	.201	2	.013	3	1.695e-2	2	NC	4	NC	1
4			min	0	15	.004	15	-.005	2	-4.176e-3	3	1379.55	3	NC	1
5		3	max	0	1	.172	2	.017	1	1.756e-2	2	NC	4	NC	2
6			min	0	15	.004	15	-.004	10	-3.426e-3	3	752.234	3	7974.855	1
7		4	max	0	1	.185	3	.025	1	1.816e-2	2	NC	4	NC	2
8			min	0	15	.003	15	-.005	10	-2.676e-3	3	577.45	3	5562.229	1
9		5	max	0	1	.21	3	.029	1	1.876e-2	2	NC	4	NC	2
10			min	0	15	.003	15	-.005	10	-1.925e-3	3	528.425	3	4962.186	1
11		6	max	0	1	.198	3	.026	3	1.936e-2	2	NC	4	NC	2
12			min	0	15	.004	15	-.007	10	-1.175e-3	3	551.294	3	5446.971	1
13		7	max	0	1	.225	2	.029	3	1.996e-2	2	NC	2	NC	2
14			min	0	15	.004	15	-.009	10	-4.253e-4	3	648.957	3	7716.241	1
15		8	max	0	1	.268	2	.031	3	2.057e-2	2	NC	4	NC	1
16			min	0	15	.005	15	-.015	2	3.247e-4	3	861.829	3	7768.506	3
17		9	max	0	1	.305	2	.032	3	2.117e-2	2	NC	4	NC	1
18			min	0	15	.006	15	-.02	2	4.052e-4	15	1248.341	3	7362.902	3
19		10	max	0	1	.321	2	.032	3	2.177e-2	2	NC	4	NC	1
20			min	0	1	.006	15	-.022	2	4.119e-4	15	1576.577	3	7244.26	3
21		11	max	0	15	.305	2	.032	3	2.117e-2	2	NC	4	NC	1
22			min	0	1	.006	15	-.02	2	4.052e-4	15	1248.341	3	7362.902	3
23		12	max	0	15	.268	2	.031	3	2.057e-2	2	NC	4	NC	1
24			min	0	1	.005	15	-.015	2	3.247e-4	3	861.829	3	7768.506	3
25		13	max	0	15	.225	2	.029	3	1.996e-2	2	NC	2	NC	2
26			min	0	1	.004	15	-.009	10	-4.253e-4	3	648.957	3	7716.241	1
27		14	max	0	15	.198	3	.026	3	1.936e-2	2	NC	4	NC	2
28			min	0	1	.004	15	-.007	10	-1.175e-3	3	551.294	3	5446.971	1
29		15	max	0	15	.21	3	.029	1	1.876e-2	2	NC	4	NC	2
30			min	0	1	.003	15	-.005	10	-1.925e-3	3	528.425	3	4962.186	1
31		16	max	0	15	.185	3	.025	1	1.816e-2	2	NC	4	NC	2
32			min	0	1	.003	15	-.005	10	-2.676e-3	3	577.45	3	5562.229	1
33		17	max	0	15	.172	2	.017	1	1.756e-2	2	NC	4	NC	2
34			min	0	1	.004	15	-.004	10	-3.426e-3	3	752.234	3	7974.855	1
35		18	max	0	15	.201	2	.013	3	1.695e-2	2	NC	4	NC	1
36			min	0	1	.004	15	-.005	2	-4.176e-3	3	1379.55	3	NC	1
37		19	max	0	15	.239	2	.011	3	1.635e-2	2	NC	1	NC	1
38			min	0	1	-.074	3	-.007	2	-4.926e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.49	3	.01	3	8.847e-3	2	NC	1	NC	1
40			min	0	15	-.695	2	-.007	2	-7.322e-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	.641	3	.011	3	9.856e-3	2	NC	5	NC	1
42			min	0	15	-.848	2	-.005	2	-8.273e-3	3	977.13	2	NC	1
43		3	max	0	1	.776	3	.014	3	1.086e-2	2	NC	5	NC	1
44			min	0	15	-.989	2	-.004	10	-9.224e-3	3	509.037	2	NC	1
45		4	max	0	1	.885	3	.02	1	1.187e-2	2	NC	5	NC	2
46			min	0	15	-1.109	2	-.004	10	-1.018e-2	3	361.998	2	7002.667	1
47		5	max	0	1	.961	3	.024	1	1.288e-2	2	NC	5	NC	2
48			min	0	15	-1.202	2	-.005	10	-1.113e-2	3	295.869	2	5939.323	1
49		6	max	0	1	1.004	3	.023	3	1.389e-2	2	NC	15	NC	2
50			min	0	15	-1.265	2	-.006	10	-1.208e-2	3	262.961	2	6305.075	1
51		7	max	0	1	1.016	3	.025	3	1.49e-2	2	NC	15	NC	2
52			min	0	15	-1.301	2	-.008	10	-1.303e-2	3	247.471	2	8704.632	1
53		8	max	0	1	1.005	3	.027	3	1.591e-2	2	NC	15	NC	1
54			min	0	15	-1.314	2	-.013	2	-1.398e-2	3	242.31	2	8890.298	3
55		9	max	0	1	.986	3	.028	3	1.692e-2	2	NC	15	NC	1
56			min	0	15	-1.312	2	-.018	2	-1.493e-2	3	242.871	2	8351.676	3
57		10	max	0	1	.974	3	.028	3	1.793e-2	2	NC	15	NC	1
58			min	0	1	-1.309	2	-.02	2	-1.588e-2	3	244.369	2	8192.016	3
59		11	max	0	15	.986	3	.028	3	1.692e-2	2	NC	15	NC	1
60			min	0	1	-1.312	2	-.018	2	-1.493e-2	3	242.871	2	8351.676	3
61		12	max	0	15	1.005	3	.027	3	1.591e-2	2	NC	15	NC	1
62			min	0	1	-1.314	2	-.013	2	-1.398e-2	3	242.31	2	8890.298	3
63		13	max	0	15	1.016	3	.025	3	1.49e-2	2	NC	15	NC	2
64			min	0	1	-1.301	2	-.008	10	-1.303e-2	3	247.471	2	8704.632	1
65		14	max	0	15	1.004	3	.023	3	1.389e-2	2	NC	15	NC	2
66			min	0	1	-1.265	2	-.006	10	-1.208e-2	3	262.961	2	6305.075	1
67		15	max	0	15	.961	3	.024	1	1.288e-2	2	NC	5	NC	2
68			min	0	1	-1.202	2	-.005	10	-1.113e-2	3	295.869	2	5939.323	1
69		16	max	0	15	.885	3	.02	1	1.187e-2	2	NC	5	NC	2
70			min	0	1	-1.109	2	-.004	10	-1.018e-2	3	361.998	2	7002.667	1
71		17	max	0	15	.776	3	.014	3	1.086e-2	2	NC	5	NC	1
72			min	0	1	-.989	2	-.004	10	-9.224e-3	3	509.037	2	NC	1
73		18	max	0	15	.641	3	.011	3	9.856e-3	2	NC	5	NC	1
74			min	0	1	-.848	2	-.005	2	-8.273e-3	3	977.13	2	NC	1
75		19	max	0	15	.49	3	.01	3	8.847e-3	2	NC	1	NC	1
76			min	0	1	-.695	2	-.007	2	-7.322e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.502	3	.009	3	6.18e-3	3	NC	1	NC	1
78			min	0	1	-.693	2	-.006	2	-9.183e-3	2	NC	1	NC	1
79		2	max	0	15	.62	3	.01	3	6.963e-3	3	NC	5	NC	1
80			min	0	1	-.869	2	-.005	2	-1.024e-2	2	850.523	2	NC	1
81		3	max	0	15	.73	3	.013	1	7.747e-3	3	NC	5	NC	1
82			min	0	1	-1.029	2	-.004	10	-1.129e-2	2	446.346	2	NC	1
83		4	max	0	15	.824	3	.02	1	8.53e-3	3	NC	5	NC	2
84			min	0	1	-1.16	2	-.004	10	-1.235e-2	2	321.146	2	6940.888	1
85		5	max	0	15	.898	3	.024	1	9.313e-3	3	NC	5	NC	2
86			min	0	1	-1.256	2	-.004	10	-1.34e-2	2	266.695	2	5879.688	1
87		6	max	0	15	.951	3	.023	1	1.01e-2	3	NC	15	NC	2
88			min	0	1	-1.313	2	-.006	10	-1.445e-2	2	241.839	2	6222.13	1
89		7	max	0	15	.983	3	.023	3	1.088e-2	3	NC	15	NC	2
90			min	0	1	-1.337	2	-.008	10	-1.551e-2	2	233.046	2	8521.502	1
91		8	max	0	15	.997	3	.025	3	1.166e-2	3	NC	15	NC	1
92			min	0	1	-1.334	2	-.012	2	-1.656e-2	2	234.059	2	9582.175	3
93		9	max	0	15	.999	3	.026	3	1.245e-2	3	NC	15	NC	1
94			min	0	1	-1.318	2	-.017	2	-1.762e-2	2	239.939	2	9033.279	3
95		10	max	0	1	.998	3	.026	3	1.323e-2	3	NC	15	NC	1
96			min	0	1	-1.308	2	-.019	2	-1.867e-2	2	243.954	2	8873.908	3
97		11	max	0	1	.999	3	.026	3	1.245e-2	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.318	2	-.017	2	-1.762e-2	2	239.939	2	9033.279	3
99		12	max	0	1	.997	3	.025	3	1.166e-2	3	NC	15	NC	1
100			min	0	15	-1.334	2	-.012	2	-1.656e-2	2	234.059	2	9582.175	3
101		13	max	0	1	.983	3	.023	3	1.088e-2	3	NC	15	NC	2
102			min	0	15	-1.337	2	-.008	10	-1.551e-2	2	233.046	2	8521.502	1
103		14	max	0	1	.951	3	.023	1	1.01e-2	3	NC	15	NC	2
104			min	0	15	-1.313	2	-.006	10	-1.445e-2	2	241.839	2	6222.13	1
105		15	max	0	1	.898	3	.024	1	9.313e-3	3	NC	5	NC	2
106			min	0	15	-1.256	2	-.004	10	-1.34e-2	2	266.695	2	5879.688	1
107		16	max	0	1	.824	3	.02	1	8.53e-3	3	NC	5	NC	2
108			min	0	15	-1.16	2	-.004	10	-1.235e-2	2	321.146	2	6940.888	1
109		17	max	0	1	.73	3	.013	1	7.747e-3	3	NC	5	NC	1
110			min	0	15	-1.029	2	-.004	10	-1.129e-2	2	446.346	2	NC	1
111		18	max	0	1	.62	3	.01	3	6.963e-3	3	NC	5	NC	1
112			min	0	15	-.869	2	-.005	2	-1.024e-2	2	850.523	2	NC	1
113		19	max	0	1	.502	3	.009	3	6.18e-3	3	NC	1	NC	1
114			min	0	15	-.693	2	-.006	2	-9.183e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.215	2	.008	3	1.225e-2	3	NC	1	NC	1
116			min	0	1	-.182	3	-.006	2	-1.403e-2	2	NC	1	NC	1
117		2	max	0	15	.147	2	.01	3	1.289e-2	3	NC	4	NC	1
118			min	0	1	-.162	3	-.003	10	-1.416e-2	2	2204.582	2	NC	1
119		3	max	0	15	.097	1	.018	1	1.354e-2	3	NC	4	NC	2
120			min	0	1	-.148	3	-.003	10	-1.429e-2	2	1228.504	2	7917.714	1
121		4	max	0	15	.076	1	.026	1	1.418e-2	3	NC	4	NC	2
122			min	0	1	-.144	3	-.003	10	-1.442e-2	2	981.445	2	5483.64	1
123		5	max	0	15	.076	1	.03	1	1.483e-2	3	NC	4	NC	2
124			min	0	1	-.154	3	-.003	10	-1.456e-2	2	961.755	2	4848.823	1
125		6	max	0	15	.096	1	.027	1	1.547e-2	3	NC	3	NC	2
126			min	0	1	-.175	3	-.005	10	-1.469e-2	2	1134.11	2	5245.602	1
127		7	max	0	15	.132	1	.021	3	1.612e-2	3	NC	4	NC	2
128			min	0	1	-.205	3	-.007	10	-1.482e-2	2	1713.05	2	7198.41	1
129		8	max	0	15	.182	2	.022	3	1.676e-2	3	NC	1	NC	1
130			min	0	1	-.237	3	-.01	2	-1.495e-2	2	2711.037	3	NC	1
131		9	max	0	15	.231	2	.022	3	1.741e-2	3	NC	4	NC	1
132			min	0	1	-.265	3	-.015	2	-1.508e-2	2	1805.36	3	NC	1
133		10	max	0	1	.253	2	.023	3	1.805e-2	3	NC	4	NC	1
134			min	0	1	-.277	3	-.017	2	-1.521e-2	2	1575.066	3	NC	1
135		11	max	0	1	.231	2	.022	3	1.741e-2	3	NC	4	NC	1
136			min	0	15	-.265	3	-.015	2	-1.508e-2	2	1805.36	3	NC	1
137		12	max	0	1	.182	2	.022	3	1.676e-2	3	NC	1	NC	1
138			min	0	15	-.237	3	-.01	2	-1.495e-2	2	2711.037	3	NC	1
139		13	max	0	1	.132	1	.021	3	1.612e-2	3	NC	4	NC	2
140			min	0	15	-.205	3	-.007	10	-1.482e-2	2	1713.05	2	7198.41	1
141		14	max	0	1	.096	1	.027	1	1.547e-2	3	NC	3	NC	2
142			min	0	15	-.175	3	-.005	10	-1.469e-2	2	1134.11	2	5245.602	1
143		15	max	0	1	.076	1	.03	1	1.483e-2	3	NC	4	NC	2
144			min	0	15	-.154	3	-.003	10	-1.456e-2	2	961.755	2	4848.823	1
145		16	max	0	1	.076	1	.026	1	1.418e-2	3	NC	4	NC	2
146			min	0	15	-.144	3	-.003	10	-1.442e-2	2	981.445	2	5483.64	1
147		17	max	0	1	.097	1	.018	1	1.354e-2	3	NC	4	NC	2
148			min	0	15	-.148	3	-.003	10	-1.429e-2	2	1228.504	2	7917.714	1
149		18	max	0	1	.147	2	.01	3	1.289e-2	3	NC	4	NC	1
150			min	0	15	-.162	3	-.003	10	-1.416e-2	2	2204.582	2	NC	1
151		19	max	0	1	.215	2	.008	3	1.225e-2	3	NC	1	NC	1
152			min	0	15	-.182	3	-.006	2	-1.403e-2	2	NC	1	NC	1
153	M2	1	max	.007	2	.011	2	.005	1	-4.106e-6	10	NC	1	NC	1
154			min	-.01	3	-.016	3	0	15	-9.9e-5	1	6435.488	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	2	.009	2	.004	1	-3.866e-6	10	NC	1	NC	1
156			min	-.01	3	-.016	3	0	15	-9.357e-5	1	7378.064	2	NC	1
157		3	max	.007	2	.008	2	.004	1	-3.627e-6	10	NC	1	NC	1
158			min	-.009	3	-.015	3	0	15	-8.814e-5	1	8627.563	2	NC	1
159		4	max	.006	2	.007	2	.004	1	-3.388e-6	10	NC	1	NC	1
160			min	-.009	3	-.015	3	0	15	-8.271e-5	1	NC	1	NC	1
161		5	max	.006	2	.005	2	.003	1	-3.149e-6	10	NC	1	NC	1
162			min	-.008	3	-.014	3	0	15	-7.728e-5	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.003	1	-2.909e-6	10	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-7.186e-5	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.002	1	-2.67e-6	10	NC	1	NC	1
166			min	-.007	3	-.013	3	0	15	-6.643e-5	1	NC	1	NC	1
167		8	max	.005	2	.002	2	.002	1	-2.431e-6	10	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-6.1e-5	1	NC	1	NC	1
169		9	max	.004	2	.001	2	.002	1	-2.191e-6	10	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-5.557e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	.001	1	-1.952e-6	10	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-5.014e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-1.713e-6	10	NC	1	NC	1
174			min	-.005	3	-.009	3	0	15	-4.471e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	2	0	1	-1.473e-6	10	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-3.929e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-1.234e-6	10	NC	1	NC	1
178			min	-.003	3	-.008	3	0	15	-3.386e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-9.948e-7	10	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-2.843e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-7.555e-7	10	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-2.3e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-5.162e-7	10	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-1.757e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-2.768e-7	10	NC	1	NC	1
186			min	-.001	3	-.003	3	0	15	-1.214e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-3.753e-8	10	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-6.715e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.018e-7	10	NC	1	NC	1
190			min	0	1	0	1	0	1	-1.287e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.477e-7	3	NC	1	NC	1
192			min	0	1	0	1	0	1	-3.718e-7	1	NC	1	NC	1
193		2	max	0	3	0	15	0	10	1.239e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	3	5.209e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	2	2.515e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	3	1.054e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	1	3.791e-5	1	NC	1	NC	1
198			min	-.001	2	-.009	4	0	3	1.588e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	1	5.067e-5	1	NC	1	NC	1
200			min	-.002	2	-.012	4	0	3	2.121e-6	15	8807.766	4	NC	1
201		6	max	.002	3	-.003	15	0	1	6.343e-5	1	NC	2	NC	1
202			min	-.002	2	-.015	4	0	3	2.654e-6	15	7109.275	4	NC	1
203		7	max	.003	3	-.004	15	0	1	7.619e-5	1	NC	5	NC	1
204			min	-.003	2	-.017	4	0	12	3.187e-6	15	6087.74	4	NC	1
205		8	max	.003	3	-.004	15	0	1	8.895e-5	1	NC	5	NC	1
206			min	-.003	2	-.019	4	0	15	3.721e-6	15	5457.351	4	NC	1
207		9	max	.004	3	-.005	15	0	1	1.017e-4	1	NC	5	NC	1
208			min	-.003	2	-.02	4	0	15	4.254e-6	15	5083.683	4	NC	1
209		10	max	.004	3	-.005	15	0	1	1.145e-4	1	NC	5	NC	1
210			min	-.004	2	-.021	4	0	15	4.787e-6	15	4901.393	4	NC	1
211		11	max	.005	3	-.005	15	0	1	1.272e-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	-.004	2	-.021	4	0	15	5.321e-6	15	4883.544	4	NC	1
213		12	max	.005	3	-.005	15	.001	1	1.4e-4	1	NC	5	NC	1
214			min	-.005	2	-.021	4	0	15	5.854e-6	15	5031.257	4	NC	1
215		13	max	.006	3	-.005	15	.001	1	1.527e-4	1	NC	5	NC	1
216			min	-.005	2	-.019	4	0	15	6.387e-6	15	5375.458	4	NC	1
217		14	max	.006	3	-.004	15	.002	1	1.655e-4	1	NC	5	NC	1
218			min	-.005	2	-.017	4	0	15	6.921e-6	15	5993.003	4	NC	1
219		15	max	.007	3	-.003	15	.002	1	1.783e-4	1	NC	3	NC	1
220			min	-.006	2	-.015	4	0	15	7.454e-6	15	7054.6	4	NC	1
221		16	max	.007	3	-.003	15	.003	1	1.91e-4	1	NC	1	NC	1
222			min	-.006	2	-.012	4	0	15	7.987e-6	15	8973.962	4	NC	1
223		17	max	.008	3	-.002	15	.003	1	2.038e-4	1	NC	1	NC	1
224			min	-.007	2	-.008	4	0	15	8.521e-6	15	NC	1	NC	1
225		18	max	.008	3	-.001	15	.004	1	2.165e-4	1	NC	1	NC	1
226			min	-.007	2	-.005	4	0	15	9.054e-6	15	NC	1	NC	1
227		19	max	.009	3	0	10	.004	1	2.293e-4	1	NC	1	NC	1
228			min	-.008	2	-.002	3	0	15	9.587e-6	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	6.437e-5	1	NC	1	NC	2
230			min	0	3	-.009	3	-.004	1	2.719e-6	15	NC	1	5609.227	1
231		2	max	.002	1	.007	2	0	15	6.437e-5	1	NC	1	NC	2
232			min	0	3	-.009	3	-.004	1	2.719e-6	15	NC	1	6093.319	1
233		3	max	.002	1	.006	2	0	15	6.437e-5	1	NC	1	NC	2
234			min	0	3	-.008	3	-.004	1	2.719e-6	15	NC	1	6669.845	1
235		4	max	.002	1	.006	2	0	15	6.437e-5	1	NC	1	NC	2
236			min	0	3	-.008	3	-.003	1	2.719e-6	15	NC	1	7362.748	1
237		5	max	.002	1	.006	2	0	15	6.437e-5	1	NC	1	NC	2
238			min	0	3	-.007	3	-.003	1	2.719e-6	15	NC	1	8204.574	1
239		6	max	.002	1	.005	2	0	15	6.437e-5	1	NC	1	NC	2
240			min	0	3	-.007	3	-.003	1	2.719e-6	15	NC	1	9240.453	1
241		7	max	.002	1	.005	2	0	15	6.437e-5	1	NC	1	NC	1
242			min	0	3	-.006	3	-.002	1	2.719e-6	15	NC	1	NC	1
243		8	max	.001	1	.004	2	0	15	6.437e-5	1	NC	1	NC	1
244			min	0	3	-.006	3	-.002	1	2.719e-6	15	NC	1	NC	1
245		9	max	.001	1	.004	2	0	15	6.437e-5	1	NC	1	NC	1
246			min	0	3	-.005	3	-.002	1	2.719e-6	15	NC	1	NC	1
247		10	max	.001	1	.004	2	0	15	6.437e-5	1	NC	1	NC	1
248			min	0	3	-.005	3	-.001	1	2.719e-6	15	NC	1	NC	1
249		11	max	.001	1	.003	2	0	15	6.437e-5	1	NC	1	NC	1
250			min	0	3	-.004	3	-.001	1	2.719e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	6.437e-5	1	NC	1	NC	1
252			min	0	3	-.004	3	0	1	2.719e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	6.437e-5	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	2.719e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	6.437e-5	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	2.719e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	6.437e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	2.719e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	6.437e-5	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	2.719e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	6.437e-5	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	2.719e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	6.437e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.719e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.437e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.719e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.033	2	0	1	0	1	NC	4	NC	1
268			min	-.031	3	-.047	3	0	1	0	1	1479.241	3	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	.02	2	.03	2	0	1	0	1	NC	4	NC	1
270			min	-.029	3	-.044	3	0	1	0	1	1566.106	3	NC	1
271		3	max	.019	2	.027	2	0	1	0	1	NC	4	NC	1
272			min	-.028	3	-.042	3	0	1	0	1	1663.841	3	NC	1
273		4	max	.018	2	.024	2	0	1	0	1	NC	4	NC	1
274			min	-.026	3	-.039	3	0	1	0	1	1774.651	3	NC	1
275		5	max	.017	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.024	3	-.036	3	0	1	0	1	1901.371	3	NC	1
277		6	max	.015	2	.019	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.034	3	0	1	0	1	2047.707	3	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	4	NC	1
280			min	-.021	3	-.031	3	0	1	0	1	2218.604	3	NC	1
281		8	max	.013	2	.014	2	0	1	0	1	NC	1	NC	1
282			min	-.019	3	-.029	3	0	1	0	1	2420.802	3	NC	1
283		9	max	.012	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.026	3	0	1	0	1	2663.736	3	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.023	3	0	1	0	1	2961.04	3	NC	1
287		11	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3333.16	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.018	3	0	1	0	1	3812.229	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.016	3	0	1	0	1	4451.804	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5348.287	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	6694.486	3	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	8940.288	3	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.014	3	0	1	0	1	8077.391	3	NC	1
315		6	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.016	3	0	1	0	1	6811.808	3	NC	1
317		7	max	.008	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.019	3	0	1	0	1	6051.562	3	NC	1
319		8	max	.01	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.009	2	-.02	3	0	1	0	1	5516.753	4	NC	1
321		9	max	.011	3	-.005	15	0	1	0	1	NC	2	NC	1
322			min	-.01	2	-.021	3	0	1	0	1	5135.353	4	NC	1
323		10	max	.013	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.012	2	-.022	3	0	1	0	1	4948.26	4	NC	1
325		11	max	.014	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	-.013	2	-.022	3	0	1	0	1	4927.772	4	NC	1
327		12	max	.015	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.014	2	-.021	3	0	1	0	1	5074.684	4	NC	1
329		13	max	.017	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.015	2	-.02	3	0	1	0	1	5419.941	4	NC	1
331		14	max	.018	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.017	2	-.018	3	0	1	0	1	6040.825	4	NC	1
333		15	max	.02	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.018	2	-.016	3	0	1	0	1	7109.195	4	NC	1
335		16	max	.021	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.019	2	-.014	3	0	1	0	1	9041.712	4	NC	1
337		17	max	.022	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.021	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.024	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.023	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	2	.022	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	2	.021	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.024	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	2	.02	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	2	.019	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.021	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	2	.017	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	2	.016	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	2	.015	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	2	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	2	.012	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	2	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.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	2	.011	2	0	15	9.9e-5	1	NC	1	NC	1
382			min	-.01	3	-.016	3	-.005	1	4.106e-6	10	6435.488	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	2	.009	2	0	15	9.357e-5	1	NC	1	NC	1
384			min	-.01	3	-.016	3	-.004	1	3.866e-6	10	7378.064	2	NC	1
385		3	max	.007	2	.008	2	0	15	8.814e-5	1	NC	1	NC	1
386			min	-.009	3	-.015	3	-.004	1	3.627e-6	10	8627.563	2	NC	1
387		4	max	.006	2	.007	2	0	15	8.271e-5	1	NC	1	NC	1
388			min	-.009	3	-.015	3	-.004	1	3.388e-6	10	NC	1	NC	1
389		5	max	.006	2	.005	2	0	15	7.728e-5	1	NC	1	NC	1
390			min	-.008	3	-.014	3	-.003	1	3.149e-6	10	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	7.186e-5	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.003	1	2.909e-6	10	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	6.643e-5	1	NC	1	NC	1
394			min	-.007	3	-.013	3	-.002	1	2.67e-6	10	NC	1	NC	1
395		8	max	.005	2	.002	2	0	15	6.1e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.002	1	2.431e-6	10	NC	1	NC	1
397		9	max	.004	2	.001	2	0	15	5.557e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.002	1	2.191e-6	10	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	5.014e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	-.001	1	1.952e-6	10	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	4.471e-5	1	NC	1	NC	1
402			min	-.005	3	-.009	3	-.001	1	1.713e-6	10	NC	1	NC	1
403		12	max	.003	2	-.001	2	0	15	3.929e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	0	1	1.473e-6	10	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	3.386e-5	1	NC	1	NC	1
406			min	-.003	3	-.008	3	0	1	1.234e-6	10	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	2.843e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	9.948e-7	10	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	2.3e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	7.555e-7	10	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.757e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	5.162e-7	10	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.214e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	2.768e-7	10	NC	1	NC	1
415		18	max	0	2	0	15	0	15	6.715e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	3.753e-8	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	1.287e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.018e-7	10	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	3.718e-7	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.477e-7	3	NC	1	NC	1
421		2	max	0	3	0	15	0	3	-5.209e-7	15	NC	1	NC	1
422			min	0	2	-.003	4	0	10	-1.239e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	3	-1.054e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	2	-2.515e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	3	-1.588e-6	15	NC	1	NC	1
426			min	-.001	2	-.009	4	0	1	-3.791e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	3	-2.121e-6	15	NC	1	NC	1
428			min	-.002	2	-.012	4	0	1	-5.067e-5	1	8807.766	4	NC	1
429		6	max	.002	3	-.003	15	0	3	-2.654e-6	15	NC	2	NC	1
430			min	-.002	2	-.015	4	0	1	-6.343e-5	1	7109.275	4	NC	1
431		7	max	.003	3	-.004	15	0	12	-3.187e-6	15	NC	5	NC	1
432			min	-.003	2	-.017	4	0	1	-7.619e-5	1	6087.74	4	NC	1
433		8	max	.003	3	-.004	15	0	15	-3.721e-6	15	NC	5	NC	1
434			min	-.003	2	-.019	4	0	1	-8.895e-5	1	5457.351	4	NC	1
435		9	max	.004	3	-.005	15	0	15	-4.254e-6	15	NC	5	NC	1
436			min	-.003	2	-.02	4	0	1	-1.017e-4	1	5083.683	4	NC	1
437		10	max	.004	3	-.005	15	0	15	-4.787e-6	15	NC	5	NC	1
438			min	-.004	2	-.021	4	0	1	-1.145e-4	1	4901.393	4	NC	1
439		11	max	.005	3	-.005	15	0	15	-5.321e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.021	4	0	1	-1.272e-4	1	4883.544	4	NC	1
441		12	max	.005	3	-.005	15	0	15	-5.854e-6	15	NC	5	NC	1
442			min	-.005	2	-.021	4	-.001	1	-1.4e-4	1	5031.257	4	NC	1
443		13	max	.006	3	-.005	15	0	15	-6.387e-6	15	NC	5	NC	1
444			min	-.005	2	-.019	4	-.001	1	-1.527e-4	1	5375.458	4	NC	1
445		14	max	.006	3	-.004	15	0	15	-6.921e-6	15	NC	5	NC	1
446			min	-.005	2	-.017	4	-.002	1	-1.655e-4	1	5993.003	4	NC	1
447		15	max	.007	3	-.003	15	0	15	-7.454e-6	15	NC	3	NC	1
448			min	-.006	2	-.015	4	-.002	1	-1.783e-4	1	7054.6	4	NC	1
449		16	max	.007	3	-.003	15	0	15	-7.987e-6	15	NC	1	NC	1
450			min	-.006	2	-.012	4	-.003	1	-1.91e-4	1	8973.962	4	NC	1
451		17	max	.008	3	-.002	15	0	15	-8.521e-6	15	NC	1	NC	1
452			min	-.007	2	-.008	4	-.003	1	-2.038e-4	1	NC	1	NC	1
453		18	max	.008	3	-.001	15	0	15	-9.054e-6	15	NC	1	NC	1
454			min	-.007	2	-.005	4	-.004	1	-2.165e-4	1	NC	1	NC	1
455		19	max	.009	3	0	10	0	15	-9.587e-6	15	NC	1	NC	1
456			min	-.008	2	-.002	3	-.004	1	-2.293e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.004	1	-2.719e-6	15	NC	1	NC	2
458			min	0	3	-.009	3	0	15	-6.437e-5	1	NC	1	5609.227	1
459		2	max	.002	1	.007	2	.004	1	-2.719e-6	15	NC	1	NC	2
460			min	0	3	-.009	3	0	15	-6.437e-5	1	NC	1	6093.319	1
461		3	max	.002	1	.006	2	.004	1	-2.719e-6	15	NC	1	NC	2
462			min	0	3	-.008	3	0	15	-6.437e-5	1	NC	1	6669.845	1
463		4	max	.002	1	.006	2	.003	1	-2.719e-6	15	NC	1	NC	2
464			min	0	3	-.008	3	0	15	-6.437e-5	1	NC	1	7362.748	1
465		5	max	.002	1	.006	2	.003	1	-2.719e-6	15	NC	1	NC	2
466			min	0	3	-.007	3	0	15	-6.437e-5	1	NC	1	8204.574	1
467		6	max	.002	1	.005	2	.003	1	-2.719e-6	15	NC	1	NC	2
468			min	0	3	-.007	3	0	15	-6.437e-5	1	NC	1	9240.453	1
469		7	max	.002	1	.005	2	.002	1	-2.719e-6	15	NC	1	NC	1
470			min	0	3	-.006	3	0	15	-6.437e-5	1	NC	1	NC	1
471		8	max	.001	1	.004	2	.002	1	-2.719e-6	15	NC	1	NC	1
472			min	0	3	-.006	3	0	15	-6.437e-5	1	NC	1	NC	1
473		9	max	.001	1	.004	2	.002	1	-2.719e-6	15	NC	1	NC	1
474			min	0	3	-.005	3	0	15	-6.437e-5	1	NC	1	NC	1
475		10	max	.001	1	.004	2	.001	1	-2.719e-6	15	NC	1	NC	1
476			min	0	3	-.005	3	0	15	-6.437e-5	1	NC	1	NC	1
477		11	max	.001	1	.003	2	.001	1	-2.719e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-6.437e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-2.719e-6	15	NC	1	NC	1
480			min	0	3	-.004	3	0	15	-6.437e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-2.719e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-6.437e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-2.719e-6	15	NC	1	NC	1
484			min	0	3	-.003	3	0	15	-6.437e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-2.719e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-6.437e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-2.719e-6	15	NC	1	NC	1
488			min	0	3	-.002	3	0	15	-6.437e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.719e-6	15	NC	1	NC	1
490			min	0	3	-.001	3	0	15	-6.437e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.719e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-6.437e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.719e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-6.437e-5	1	NC	1	NC	1
495	M1	1	max	.011	3	.239	2	0	1	4.814e-3	2	NC	1	NC	1
496			min	-.007	2	-.074	3	0	15	-1.35e-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	.011	3	.116	2	0	15	2.365e-3	2	NC	5	NC	1
498			min	-.007	2	-.036	3	-.003	1	-6.707e-3	3	1106.999	2	NC	1
499		3	max	.011	3	.017	3	0	15	2.881e-5	10	NC	5	NC	1
500			min	-.007	2	-.013	2	-.005	1	-8.955e-5	3	537.52	2	NC	1
501		4	max	.011	3	.095	3	0	15	3.48e-3	2	NC	5	NC	1
502			min	-.007	2	-.155	2	-.004	1	-3.486e-3	3	343.483	2	NC	1
503		5	max	.011	3	.19	3	0	15	6.939e-3	2	NC	15	NC	1
504			min	-.007	2	-.302	2	-.003	1	-6.883e-3	3	250.407	2	NC	1
505		6	max	.011	3	.291	3	0	10	1.04e-2	2	9209.092	15	NC	1
506			min	-.007	2	-.442	2	-.001	1	-1.028e-2	3	198.758	2	NC	1
507		7	max	.01	3	.386	3	0	1	1.386e-2	2	7808.959	15	NC	1
508			min	-.007	2	-.567	2	0	3	-1.368e-2	3	168.092	2	NC	1
509		8	max	.01	3	.465	3	0	1	1.732e-2	2	6977.504	15	NC	1
510			min	-.007	2	-.665	2	0	15	-1.707e-2	3	149.88	2	NC	1
511		9	max	.01	3	.517	3	0	15	1.924e-2	2	6540.892	15	NC	1
512			min	-.006	2	-.727	2	0	1	-1.768e-2	3	140.364	2	NC	1
513		10	max	.01	3	.536	3	0	1	2.013e-2	2	6406.937	15	NC	1
514			min	-.006	2	-.748	2	0	10	-1.643e-2	3	137.576	2	NC	1
515		11	max	.01	3	.524	3	0	1	2.102e-2	2	6540.343	15	NC	1
516			min	-.006	2	-.726	2	0	15	-1.518e-2	3	140.85	2	NC	1
517		12	max	.009	3	.481	3	0	15	1.997e-2	2	6976.305	15	NC	1
518			min	-.006	2	-.662	2	0	1	-1.335e-2	3	151.272	2	NC	1
519		13	max	.009	3	.411	3	0	10	1.601e-2	2	7806.816	15	NC	1
520			min	-.006	2	-.56	2	0	1	-1.068e-2	3	171.315	2	NC	1
521		14	max	.009	3	.321	3	.001	1	1.204e-2	2	9205.429	15	NC	1
522			min	-.006	2	-.431	2	0	15	-8.014e-3	3	205.404	2	NC	1
523		15	max	.009	3	.218	3	.003	1	8.081e-3	2	NC	15	NC	1
524			min	-.006	2	-.288	2	0	15	-5.345e-3	3	263.646	2	NC	1
525		16	max	.008	3	.111	3	.004	1	4.119e-3	2	NC	5	NC	1
526			min	-.006	2	-.143	2	0	15	-2.675e-3	3	370.437	2	NC	1
527		17	max	.008	3	.006	3	.004	1	3.115e-4	1	NC	5	NC	1
528			min	-.006	2	-.007	2	0	15	-5.394e-6	3	596.281	2	NC	1
529		18	max	.008	3	.109	2	.003	1	4.268e-3	2	NC	5	NC	1
530			min	-.006	2	-.091	3	0	15	-1.281e-3	3	1253.473	2	NC	1
531		19	max	.008	3	.215	2	0	15	8.524e-3	2	NC	1	NC	1
532			min	-.006	2	-.182	3	0	1	-2.627e-3	3	NC	1	NC	1
533	M5	1	max	.032	3	.321	2	0	1	0	1	NC	1	NC	1
534			min	-.022	2	.006	15	0	1	0	1	NC	1	NC	1
535		2	max	.032	3	.156	2	0	1	0	1	NC	3	NC	1
536			min	-.023	2	.003	15	0	1	0	1	830.737	2	NC	1
537		3	max	.032	3	.047	3	0	1	0	1	NC	5	NC	1
538			min	-.023	2	-.036	2	0	1	0	1	383.815	2	NC	1
539		4	max	.031	3	.164	3	0	1	0	1	NC	15	NC	1
540			min	-.022	2	-.274	2	0	1	0	1	229.677	2	NC	1
541		5	max	.031	3	.34	3	0	1	0	1	8143.687	15	NC	1
542			min	-.022	2	-.539	2	0	1	0	1	158.666	2	NC	1
543		6	max	.03	3	.545	3	0	1	0	1	6212.973	15	NC	1
544			min	-.021	2	-.806	2	0	1	0	1	120.962	2	NC	1
545		7	max	.029	3	.748	3	0	1	0	1	5108.749	15	NC	1
546			min	-.021	2	-1.051	2	0	1	0	1	99.368	2	NC	1
547		8	max	.029	3	.921	3	0	1	0	1	4471.47	15	NC	1
548			min	-.021	2	-1.248	2	0	1	0	1	86.892	2	NC	1
549		9	max	.028	3	1.032	3	0	1	0	1	4146.004	15	NC	1
550			min	-.02	2	-1.374	2	0	1	0	1	80.516	2	NC	1
551		10	max	.027	3	1.073	3	0	1	0	1	4048.111	15	NC	1
552			min	-.02	2	-1.417	2	0	1	0	1	78.656	2	NC	1
553		11	max	.027	3	1.045	3	0	1	0	1	4146.444	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	-.019	2	-1.375	2	0	1	0	1	80.831	2	NC	1
555		12	max	.026	3	.953	3	0	1	0	1	4472.484	15	NC	1
556			min	-.019	2	-1.244	2	0	1	0	1	87.962	2	NC	1
557		13	max	.025	3	.804	3	0	1	0	1	5110.718	15	NC	1
558			min	-.019	2	-1.035	2	0	1	0	1	102.241	2	NC	1
559		14	max	.025	3	.617	3	0	1	0	1	6216.679	15	NC	1
560			min	-.018	2	-.778	2	0	1	0	1	127.671	2	NC	1
561		15	max	.024	3	.411	3	0	1	0	1	8150.847	15	NC	1
562			min	-.018	2	-.503	2	0	1	0	1	173.925	2	NC	1
563		16	max	.023	3	.204	3	0	1	0	1	NC	15	NC	1
564			min	-.018	2	-.239	2	0	1	0	1	266.116	2	NC	1
565		17	max	.023	3	.015	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.019	2	0	1	0	1	479.982	2	NC	1
567		18	max	.023	3	.136	2	0	1	0	1	NC	5	NC	1
568			min	-.017	2	-.141	3	0	1	0	1	1107.374	2	NC	1
569		19	max	.023	3	.253	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.277	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.011	3	.239	2	0	15	1.35e-2	3	NC	1	NC	1
572			min	-.007	2	-.074	3	0	1	-4.814e-3	2	NC	1	NC	1
573		2	max	.011	3	.116	2	.003	1	6.707e-3	3	NC	5	NC	1
574			min	-.007	2	-.036	3	0	15	-2.365e-3	2	1106.999	2	NC	1
575		3	max	.011	3	.017	3	.005	1	8.955e-5	3	NC	5	NC	1
576			min	-.007	2	-.013	2	0	15	-2.881e-5	10	537.52	2	NC	1
577		4	max	.011	3	.095	3	.004	1	3.486e-3	3	NC	5	NC	1
578			min	-.007	2	-.155	2	0	15	-3.48e-3	2	343.483	2	NC	1
579		5	max	.011	3	.19	3	.003	1	6.883e-3	3	NC	15	NC	1
580			min	-.007	2	-.302	2	0	15	-6.939e-3	2	250.407	2	NC	1
581		6	max	.011	3	.291	3	.001	1	1.028e-2	3	9209.092	15	NC	1
582			min	-.007	2	-.442	2	0	10	-1.04e-2	2	198.758	2	NC	1
583		7	max	.01	3	.386	3	0	3	1.368e-2	3	7808.959	15	NC	1
584			min	-.007	2	-.567	2	0	1	-1.386e-2	2	168.092	2	NC	1
585		8	max	.01	3	.465	3	0	15	1.707e-2	3	6977.504	15	NC	1
586			min	-.007	2	-.665	2	0	1	-1.732e-2	2	149.88	2	NC	1
587		9	max	.01	3	.517	3	0	1	1.768e-2	3	6540.892	15	NC	1
588			min	-.006	2	-.727	2	0	15	-1.924e-2	2	140.364	2	NC	1
589		10	max	.01	3	.536	3	0	10	1.643e-2	3	6406.937	15	NC	1
590			min	-.006	2	-.748	2	0	1	-2.013e-2	2	137.576	2	NC	1
591		11	max	.01	3	.524	3	0	15	1.518e-2	3	6540.343	15	NC	1
592			min	-.006	2	-.726	2	0	1	-2.102e-2	2	140.85	2	NC	1
593		12	max	.009	3	.481	3	0	1	1.335e-2	3	6976.305	15	NC	1
594			min	-.006	2	-.662	2	0	15	-1.997e-2	2	151.272	2	NC	1
595		13	max	.009	3	.411	3	0	1	1.068e-2	3	7806.816	15	NC	1
596			min	-.006	2	-.56	2	0	10	-1.601e-2	2	171.315	2	NC	1
597		14	max	.009	3	.321	3	0	15	8.014e-3	3	9205.429	15	NC	1
598			min	-.006	2	-.431	2	-.001	1	-1.204e-2	2	205.404	2	NC	1
599		15	max	.009	3	.218	3	0	15	5.345e-3	3	NC	15	NC	1
600			min	-.006	2	-.288	2	-.003	1	-8.081e-3	2	263.646	2	NC	1
601		16	max	.008	3	.111	3	0	15	2.675e-3	3	NC	5	NC	1
602			min	-.006	2	-.143	2	-.004	1	-4.119e-3	2	370.437	2	NC	1
603		17	max	.008	3	.006	3	0	15	5.394e-6	3	NC	5	NC	1
604			min	-.006	2	-.007	2	-.004	1	-3.115e-4	1	596.281	2	NC	1
605		18	max	.008	3	.109	2	0	15	1.281e-3	3	NC	5	NC	1
606			min	-.006	2	-.091	3	-.003	1	-4.268e-3	2	1253.473	2	NC	1
607		19	max	.008	3	.215	2	0	1	2.627e-3	3	NC	1	NC	1
608			min	-.006	2	-.182	3	0	15	-8.524e-3	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

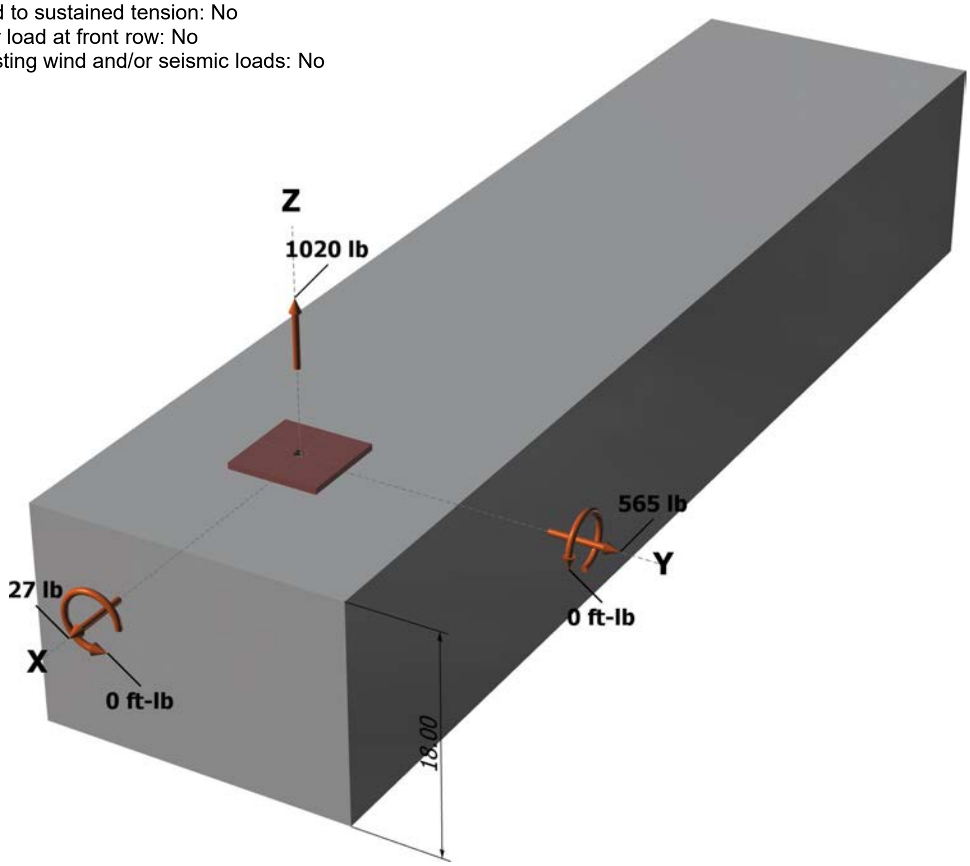
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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>

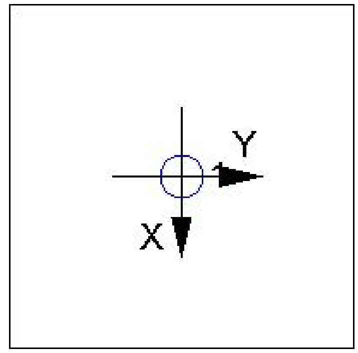
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

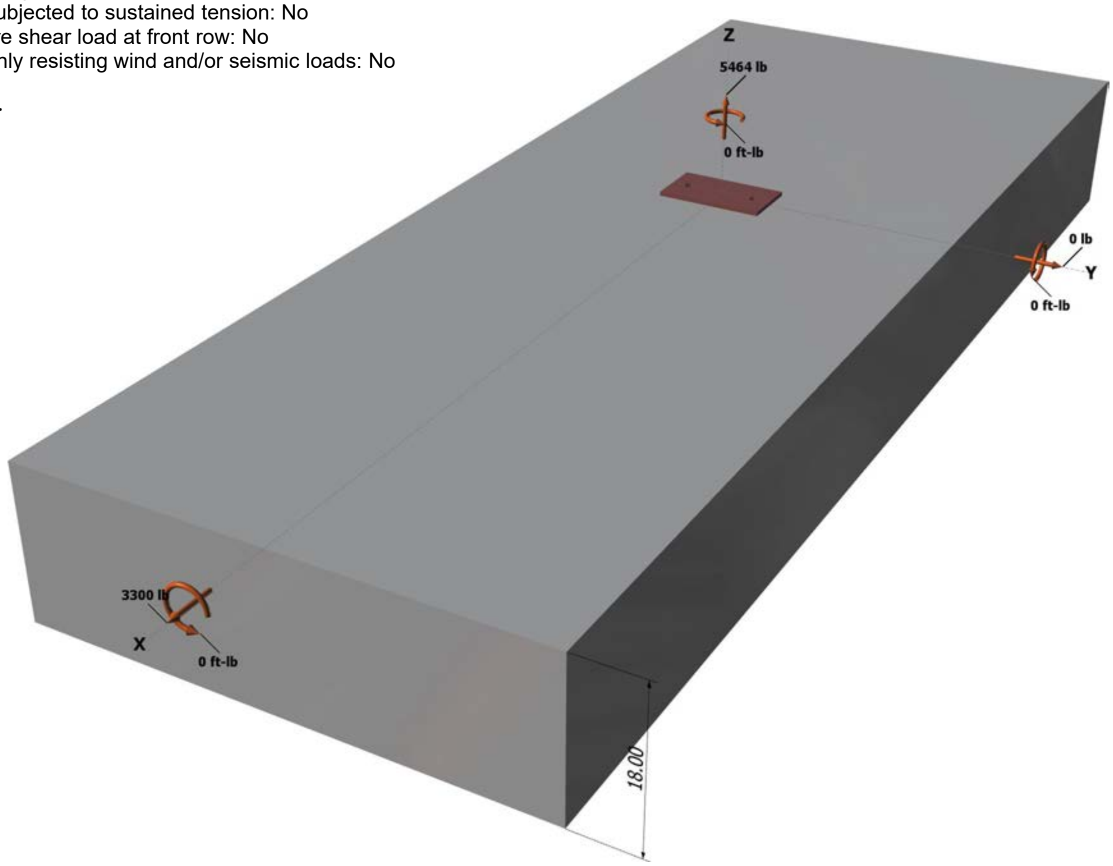
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>

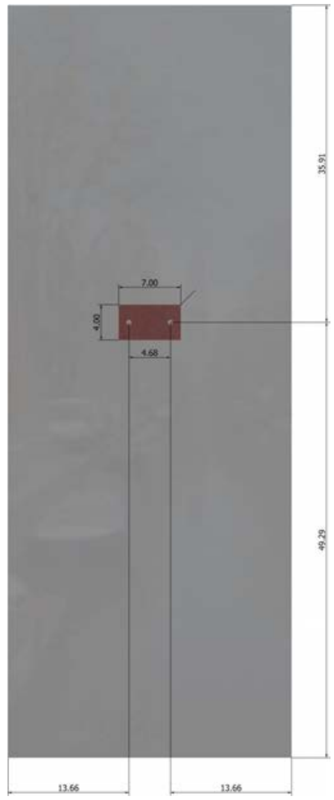


SIMPSON Strong-Tie

Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 32-40 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



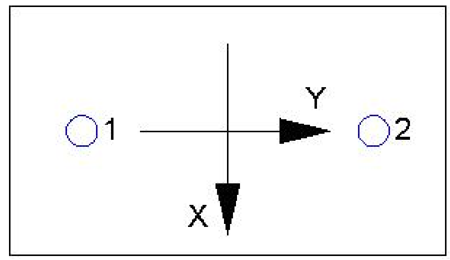
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

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

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

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

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

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

12. Warnings

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

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

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