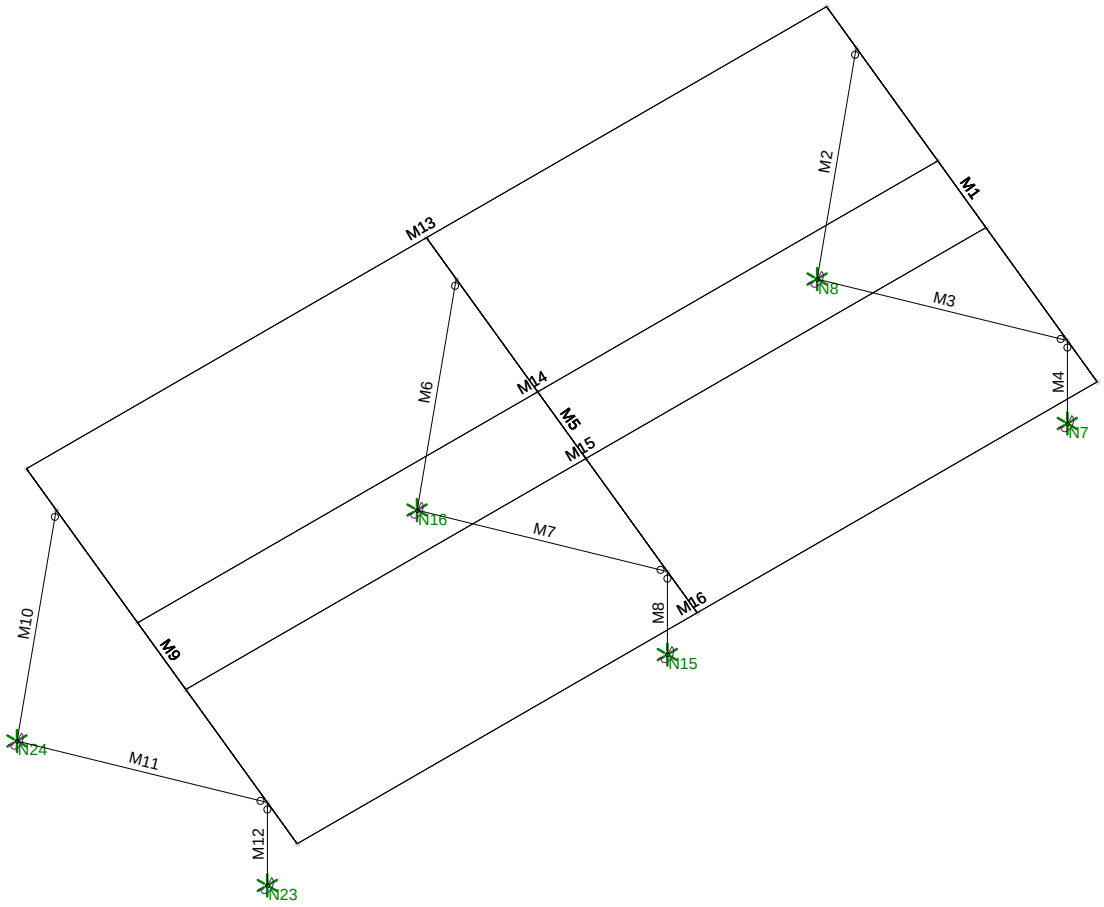


Schletter, Inc.		35ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

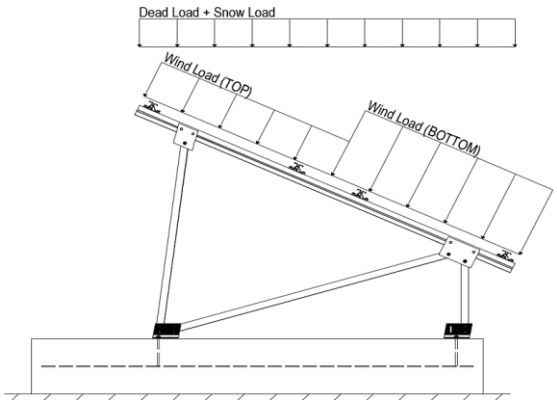
1.2 Construction

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 =	1700	mm	1550	mm
Width =	1050	mm	970	mm
Dead Load =	3.00	psf	1.75	psf

Modules Per Row =	2
Module Tilt =	35°
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 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	14.43	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	160	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	40.19	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.200	*(Pressure)*	*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.*
$Cf+_{BOTTOM}$ =	2.000		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.700		
$Cf-_{TOP, INNER PURLIN}$ =	-2.100	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.200		

2.4 Seismic Loads - N/A

S_S =	0.00	R =	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.*
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	

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 + 0.5W	
1.2D + 1.0W + 0.5S	
0.9D + 1.0W [M]	
1.54D + 1.3E + 0.2S [R]	*(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E [R]	
1.54D + 1.25E + 0.2S [O]	
0.56D + 1.25E [O]	

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 + 0.6W	
1.0D + 0.75L + 0.45W + 0.75S	
0.6D + 0.6W [M]	*(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E [O]	
1.1785D + 0.65625E + 0.75S [O]	
0.362D + 0.875E [O]	

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

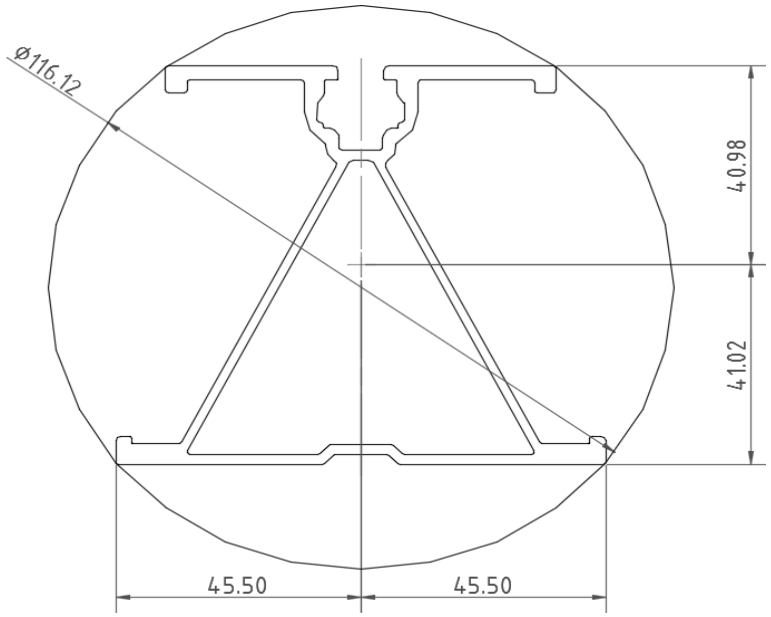
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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 =	-1.413	k-ft
M_z =	-0.005	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	51%	

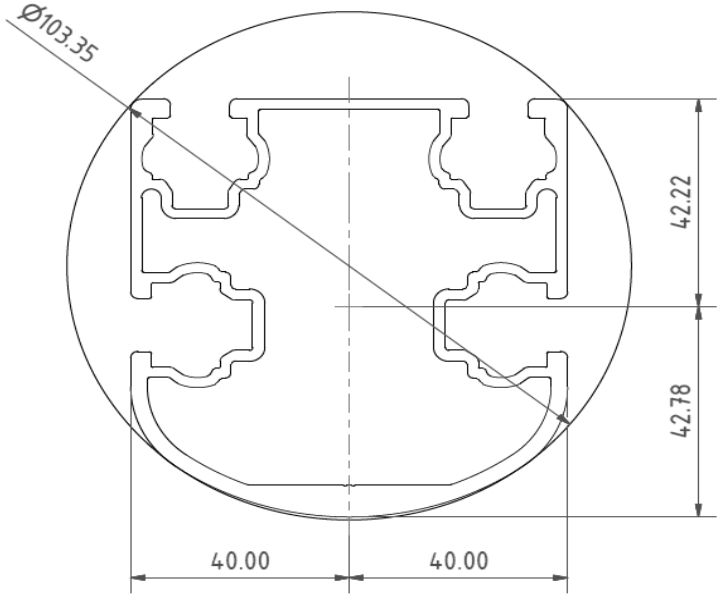


DETAIL VIEW

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).

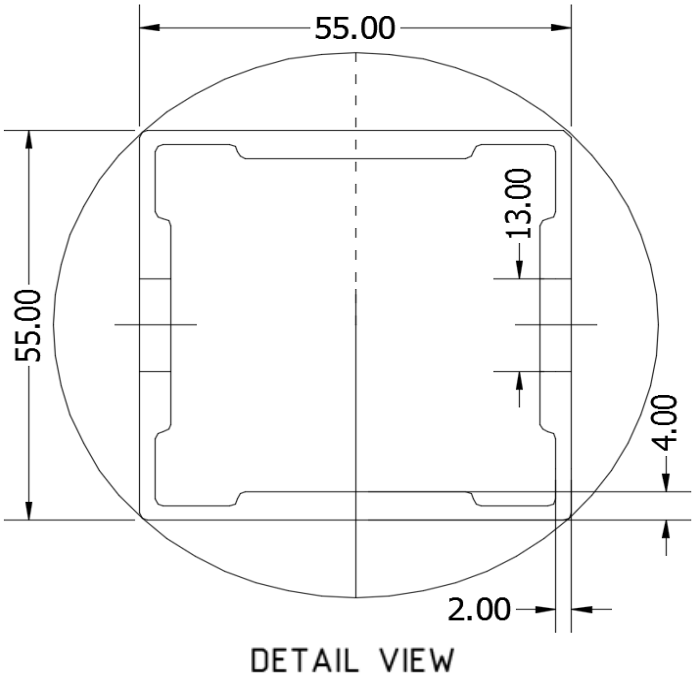
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.508	k-ft
M_z =	0.000	k-ft
P_n =	-0.947	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	74%	



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).

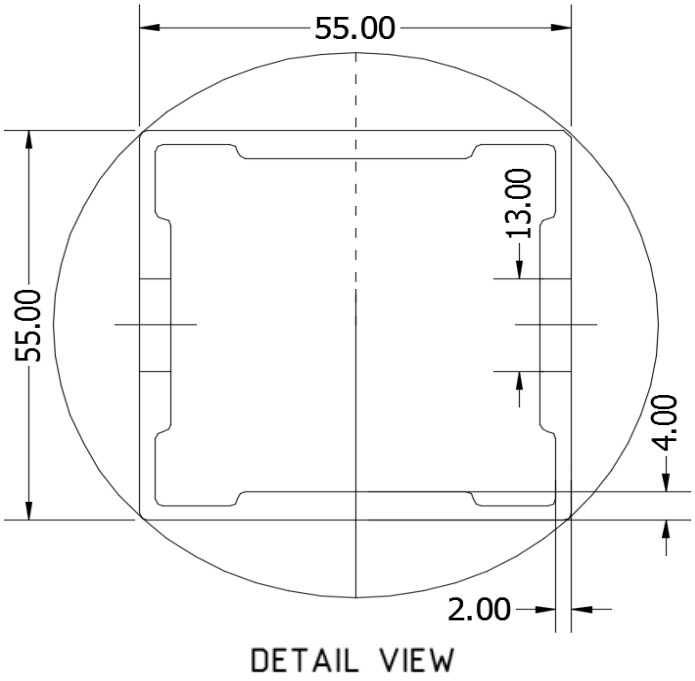
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.773	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	6%	



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).

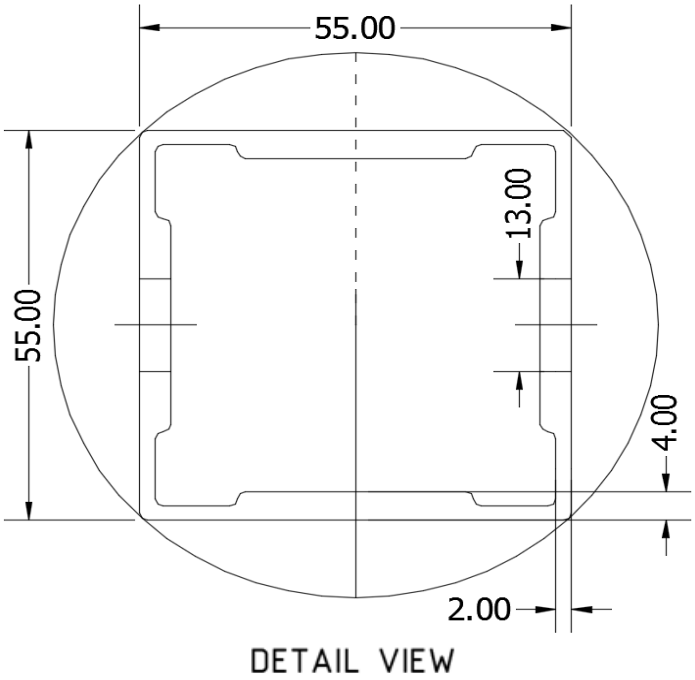
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.755	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	38%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	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 =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.814	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

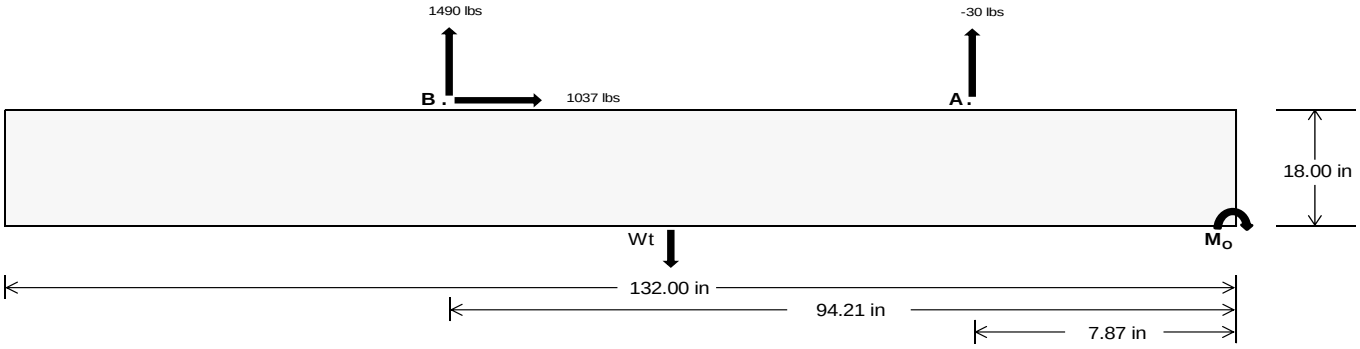
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	63.16	6468.09	k
Compressive Load =	2304.77	4599.51	k
Lateral Load =	5.64	4491.43	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

Ballast foundations are used to secure the racking structure in place. The foundations are checked for potential overturning and sliding. Bearing pressures applied by the racking and ballast foundations are checked against the allowable bearing pressures provided by the IBC table 1806.2 (2012, 2015).



Concrete Properties

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

Overturning Check

M_O =	158831.8 in-lbs
Resisting Force Required =	2406.54 lbs
S.F. =	1.67
Weight Required =	4010.90 lbs
Minimum Width =	31 in
Weight Provided =	6180.63 lbs

Sliding

Force =	1036.50 lbs
Friction =	0.4
Weight Required =	2591.26 lbs
Resisting Weight =	6180.63 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	1036.50 lbs
Cohesion =	130 psf
Area =	28.42 ft^2
Resisting =	3090.31 lbs
Additional Weight Required =	0 lbs

Shear Key

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

A minimum 132in long x 31in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 31in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 31in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	31 in	32 in	33 in	34 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.58 ft) =	6181 lbs	6380 lbs	6579 lbs	6779 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in	31 in	32 in	33 in	34 in
F_A	681 lbs	681 lbs	681 lbs	681 lbs	960 lbs	960 lbs	960 lbs	960 lbs	1144 lbs	1144 lbs	1144 lbs	1144 lbs	59 lbs	59 lbs	59 lbs	59 lbs
F_B	591 lbs	591 lbs	591 lbs	591 lbs	2032 lbs	2032 lbs	2032 lbs	2032 lbs	1892 lbs	1892 lbs	1892 lbs	1892 lbs	-2981 lbs	-2981 lbs	-2981 lbs	-2981 lbs
F_V	88 lbs	88 lbs	88 lbs	88 lbs	1867 lbs	1867 lbs	1867 lbs	1867 lbs	1456 lbs	1456 lbs	1456 lbs	1456 lbs	-2073 lbs	-2073 lbs	-2073 lbs	-2073 lbs
P_{total}	7453 lbs	7652 lbs	7851 lbs	8051 lbs	9173 lbs	9373 lbs	9572 lbs	9771 lbs	9217 lbs	9416 lbs	9615 lbs	9815 lbs	787 lbs	906 lbs	1026 lbs	1146 lbs
M	2038 lbs-ft	2038 lbs-ft	2038 lbs-ft	2038 lbs-ft	2674 lbs-ft	2674 lbs-ft	2674 lbs-ft	2674 lbs-ft	3278 lbs-ft	3278 lbs-ft	3278 lbs-ft	3278 lbs-ft	4184 lbs-ft	4184 lbs-ft	4184 lbs-ft	4184 lbs-ft
e	0.27 ft	0.27 ft	0.26 ft	0.25 ft	0.29 ft	0.29 ft	0.28 ft	0.27 ft	0.36 ft	0.35 ft	0.34 ft	0.33 ft	5.32 ft	4.62 ft	4.08 ft	3.65 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	223.1 psf	223.0 psf	222.8 psf	222.6 psf	271.5 psf	269.8 psf	268.2 psf	266.7 psf	261.4 psf	260.0 psf	258.8 psf	257.5 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	301.4 psf	298.8 psf	296.3 psf	294.0 psf	374.1 psf	369.2 psf	364.7 psf	360.3 psf	387.3 psf	381.9 psf	377.0 psf	372.3 psf	1116.2 psf	256.4 psf	174.9 psf	145.9 psf

Maximum Bearing Pressure = 1116 psf
Allowable Bearing Pressure = 1500 psf

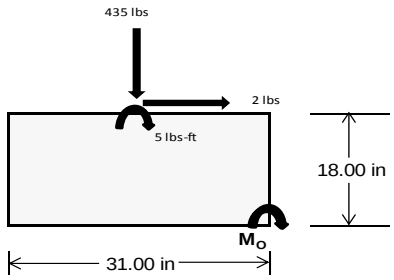
Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	553.7 ft-lbs
Resisting Force Required =	428.66 lbs
S.F. =	1.67
Weight Required =	714.43 lbs
Minimum Width =	31 in in
Weight Provided =	6180.63 lbs

A minimum 132in long x 31in 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	31 in			31 in			31 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	181 lbs	402 lbs	181 lbs	435 lbs	1093 lbs	435 lbs	53 lbs	118 lbs	53 lbs
F_V	1 lbs	0 lbs	1 lbs	2 lbs	0 lbs	2 lbs	0 lbs	0 lbs	0 lbs
P_{total}	7833 lbs	6181 lbs	7833 lbs	7719 lbs	6181 lbs	7719 lbs	2290 lbs	6181 lbs	2290 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	9 lbs-ft	0 lbs-ft	9 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	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft	0.43 ft
f_{min}	275.4 psf	217.5 psf	275.4 psf	270.9 psf	217.5 psf	270.9 psf	80.6 psf	217.5 psf	80.6 psf
f_{max}	275.9 psf	217.5 psf	275.9 psf	272.4 psf	217.5 psf	272.4 psf	80.6 psf	217.5 psf	80.6 psf

Maximum Bearing Pressure = 276 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 31in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 31in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

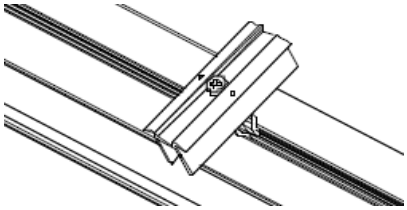
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

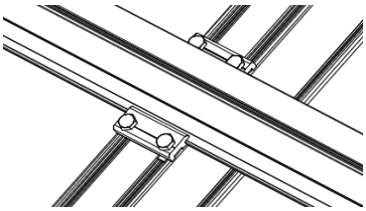
Fastening of Modules to Purlins

Maximum Uplifting Force	=	1.027 k
Allowable Uplift	=	1.214 k
Utilization	=	85%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	2.308 k
Allowable Uplift	=	4.357 k
Utilization	=	53%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	1.773 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	24%

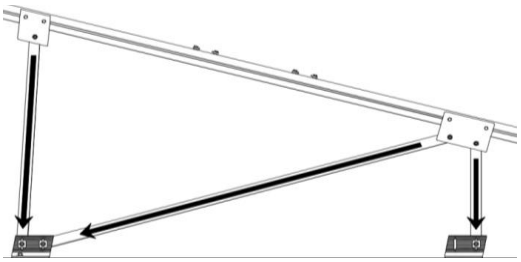
Rear Strut

Maximum Axial Load	=	4.276 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	58%

Diagonal Strut

Maximum Axial Load	=	2.814 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	38%

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

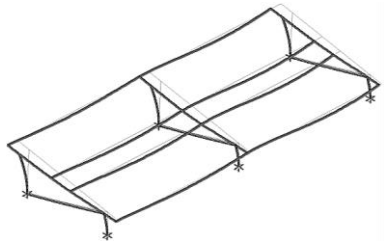
7.1 Seismic Drift - N/A

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}	=	53.78 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		1.076 in
Max Drift, Δ_{MAX}	=	0.011 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
φF_LSt=	25.1 ksi	φF_LWk=	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 = 88.9 in
J = 1.08
152.913

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

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

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 = 88.9
J = 1.08
161.829

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

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 = 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.363 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.87952

φF_L = φcc(Bc-Dc*λ)

φF_L = 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L = φyFcy

φF_L = 33.25 ksi

φF_L = 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

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 = 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

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 = 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

S1* = 0.33515

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

S2* = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 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 = 7.50 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 7.72 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 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 = 8.94 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 9.21 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	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	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	-4.45	-4.45	0	0
2	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	M16	Y	-4.45	-4.45	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	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	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	-134.509	-134.509	0	0
2	M14	y	-134.509	-134.509	0	0
3	M15	y	-224.182	-224.182	0	0
4	M16	y	-224.182	-224.182	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	302.645	302.645	0	0
2	M14	y	235.391	235.391	0	0
3	M15	y	134.509	134.509	0	0
4	M16	y	134.509	134.509	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 + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
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...	B...	Fa...
8																										
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																		
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6																
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45																
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6														
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	1003.559	2	1181.811	2	.244	1	0	1	0	1	0	1
2		min	-1165.806	3	-1623.186	3	.015	15	0	15	0	1	0	1
3	N7	max	.032	3	660.843	1	-.256	15	0	15	0	1	0	1
4		min	-.184	2	31.406	15	-4.34	1	-.008	1	0	1	0	1
5	N15	max	.156	3	1772.9	2	0	11	0	11	0	1	0	1
6		min	-1.682	2	62.422	15	0	1	0	2	0	1	0	1
7	N16	max	3138.35	2	3538.086	2	0	1	0	11	0	1	0	1
8		min	-3454.946	3	-4975.451	3	0	9	0	2	0	1	0	1
9	N23	max	.032	3	660.843	1	4.34	1	.008	1	0	1	0	1
10		min	-.184	2	31.406	15	.256	15	0	15	0	1	0	1
11	N24	max	1003.559	2	1181.811	2	-.015	15	0	15	0	1	0	1
12		min	-1165.806	3	-1623.186	3	-.244	1	0	1	0	1	0	1
13	Totals:	max	5143.418	2	8910.444	2	0	3						
14		min	-5786.339	3	-7884.495	3	0	2						

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	37.705	1	359.787	2	-6.065	15	0	15	.089	1	0	2
2			min	2.213	15	-705.95	3	-107.749	1	-.011	2	.005	15	0	3
3		2	max	37.705	1	250.263	2	-4.642	15	0	15	.023	1	.418	3
4			min	2.213	15	-498.828	3	-82.02	1	-.011	2	0	10	-.212	2
5		3	max	37.705	1	140.739	2	-3.219	15	0	15	.006	3	.693	3
6			min	2.213	15	-291.706	3	-56.29	1	-.011	2	-.025	1	-.348	2
7		4	max	37.705	1	31.214	2	-1.796	15	0	15	0	3	.823	3
8			min	2.213	15	-84.584	3	-30.56	1	-.011	2	-.055	1	-.407	2
9		5	max	37.705	1	122.537	3	1.25	10	0	15	-.003	12	.81	3
10			min	2.213	15	-78.31	2	-5.517	3	-.011	2	-.067	1	-.391	2
11		6	max	37.705	1	329.659	3	20.899	1	0	15	-.003	15	.653	3
12			min	2.213	15	-187.834	2	-3.383	3	-.011	2	-.061	1	-.299	2
13		7	max	37.705	1	536.781	3	46.629	1	0	15	-.002	15	.352	3
14			min	2.213	15	-297.358	2	-1.248	3	-.011	2	-.038	1	-.13	2
15		8	max	37.705	1	743.903	3	72.359	1	0	15	.007	2	.114	2
16			min	2.213	15	-406.883	2	.886	3	-.011	2	-.01	3	-.092	3
17		9	max	37.705	1	951.025	3	98.089	1	0	15	.062	1	.435	2
18			min	2.213	15	-516.407	2	2.34	12	-.011	2	-.008	3	-.681	3
19		10	max	37.705	1	1158.146	3	123.818	1	.004	3	.14	1	.832	2
20			min	2.213	15	-625.931	2	-80.855	9	-.011	2	-.005	3	-1.413	3
21		11	max	37.705	1	516.407	2	-2.34	12	.011	2	.062	1	.435	2
22			min	2.213	15	-951.025	3	-98.089	1	0	15	-.008	3	-.681	3
23		12	max	37.705	1	406.883	2	-.886	3	.011	2	.007	2	.114	2
24			min	2.213	15	-743.903	3	-72.359	1	0	15	-.01	3	-.092	3
25		13	max	37.705	1	297.358	2	1.248	3	.011	2	-.002	15	.352	3
26			min	2.213	15	-536.781	3	-46.629	1	0	15	-.038	1	-.13	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	37.705	1	187.834	2	3.383	3	.011	2	-.003	15	.653	3
28			min	2.213	15	-329.659	3	-20.899	1	0	15	-.061	1	-.299	2
29		15	max	37.705	1	78.31	2	5.517	3	.011	2	-.003	12	.81	3
30			min	2.213	15	-122.537	3	-1.25	10	0	15	-.067	1	-.391	2
31		16	max	37.705	1	84.584	3	30.56	1	.011	2	0	3	.823	3
32			min	2.213	15	-31.214	2	1.796	15	0	15	-.055	1	-.407	2
33		17	max	37.705	1	291.706	3	56.29	1	.011	2	.006	3	.693	3
34			min	2.213	15	-140.739	2	3.219	15	0	15	-.025	1	-.348	2
35		18	max	37.705	1	498.828	3	82.02	1	.011	2	.023	1	.418	3
36			min	2.213	15	-250.263	2	4.642	15	0	15	0	10	-.212	2
37		19	max	37.705	1	705.95	3	107.749	1	.011	2	.089	1	0	2
38			min	2.213	15	-359.787	2	6.065	15	0	15	.005	15	0	3
39	M14	1	max	23.771	1	432.49	2	-6.337	15	.011	3	.109	1	0	2
40			min	1.378	15	-594.562	3	-112.547	1	-.012	2	.006	15	0	3
41		2	max	23.771	1	322.966	2	-4.914	15	.011	3	.04	1	.357	3
42			min	1.378	15	-434.144	3	-86.817	1	-.012	2	.001	10	-.262	2
43		3	max	23.771	1	213.442	2	-3.491	15	.011	3	.008	3	.603	3
44			min	1.378	15	-273.726	3	-61.087	1	-.012	2	-.011	1	-.449	2
45		4	max	23.771	1	103.918	2	-2.068	15	.011	3	.002	3	.737	3
46			min	1.378	15	-113.309	3	-35.357	1	-.012	2	-.045	1	-.559	2
47		5	max	23.771	1	47.109	3	.644	10	.011	3	-.002	12	.76	3
48			min	1.378	15	-7.337	1	-9.628	1	-.012	2	-.061	1	-.593	2
49		6	max	23.771	1	207.526	3	16.102	1	.011	3	-.003	15	.672	3
50			min	1.378	15	-115.131	2	-3.929	3	-.012	2	-.058	1	-.551	2
51		7	max	23.771	1	367.944	3	41.832	1	.011	3	-.002	15	.472	3
52			min	1.378	15	-224.655	2	-1.794	3	-.012	2	-.038	1	-.433	2
53		8	max	23.771	1	528.362	3	67.562	1	.011	3	.005	2	.161	3
54			min	1.378	15	-334.179	2	.34	3	-.012	2	-.009	3	-.239	2
55		9	max	23.771	1	688.779	3	93.291	1	.011	3	.056	1	.041	1
56			min	1.378	15	-443.703	2	1.985	12	-.012	2	-.008	3	-.262	3
57		10	max	23.771	1	849.197	3	119.021	1	.011	3	.129	1	.377	2
58			min	1.378	15	-553.228	2	3.408	12	-.012	2	-.006	3	-.796	3
59		11	max	23.771	1	443.703	2	-1.985	12	.012	2	.056	1	.041	1
60			min	1.378	15	-688.779	3	-93.291	1	-.011	3	-.008	3	-.262	3
61		12	max	23.771	1	334.179	2	-.34	3	.012	2	.005	2	.161	3
62			min	1.378	15	-528.362	3	-67.562	1	-.011	3	-.009	3	-.239	2
63		13	max	23.771	1	224.655	2	1.794	3	.012	2	-.002	15	.472	3
64			min	1.378	15	-367.944	3	-41.832	1	-.011	3	-.038	1	-.433	2
65		14	max	23.771	1	115.131	2	3.929	3	.012	2	-.003	15	.672	3
66			min	1.378	15	-207.526	3	-16.102	1	-.011	3	-.058	1	-.551	2
67		15	max	23.771	1	7.337	1	9.628	1	.012	2	-.002	12	.76	3
68			min	1.378	15	-47.109	3	-.644	10	-.011	3	-.061	1	-.593	2
69		16	max	23.771	1	113.309	3	35.357	1	.012	2	.002	3	.737	3
70			min	1.378	15	-103.918	2	2.068	15	-.011	3	-.045	1	-.559	2
71		17	max	23.771	1	273.726	3	61.087	1	.012	2	.008	3	.603	3
72			min	1.378	15	-213.442	2	3.491	15	-.011	3	-.011	1	-.449	2
73		18	max	23.771	1	434.144	3	86.817	1	.012	2	.04	1	.357	3
74			min	1.378	15	-322.966	2	4.914	15	-.011	3	.001	10	-.262	2
75		19	max	23.771	1	594.562	3	112.547	1	.012	2	.109	1	0	2
76			min	1.378	15	-432.49	2	6.337	15	-.011	3	.006	15	0	3
77	M15	1	max	-1.427	15	642.782	2	-6.335	15	.013	2	.109	1	0	2
78			min	-24.226	1	-358.52	3	-112.618	1	-.01	3	.006	15	0	3
79		2	max	-1.427	15	470.985	2	-4.911	15	.013	2	.04	1	.218	3
80			min	-24.226	1	-268.159	3	-86.888	1	-.01	3	.001	10	-.387	2
81		3	max	-1.427	15	299.188	2	-3.488	15	.013	2	.007	3	.372	3
82			min	-24.226	1	-177.799	3	-61.158	1	-.01	3	-.011	1	-.654	2
83		4	max	-1.427	15	127.391	2	-2.065	15	.013	2	.001	3	.465	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	-24.226	1	-87.438	3	-35.428	1	-.01	3	-.045	1	-.802	2
85		5	max	-1.427	15	2.923	3	.512	10	.013	2	-.002	12	.494	3
86			min	-24.226	1	-44.406	2	-9.699	1	-.01	3	-.061	1	-.831	2
87		6	max	-1.427	15	93.283	3	16.031	1	.013	2	-.003	15	.46	3
88			min	-24.226	1	-216.203	2	-3.503	3	-.01	3	-.058	1	-.741	2
89		7	max	-1.427	15	183.644	3	41.761	1	.013	2	-.002	15	.364	3
90			min	-24.226	1	-388.001	2	-1.369	3	-.01	3	-.038	1	-.531	2
91		8	max	-1.427	15	274.005	3	67.491	1	.013	2	.005	2	.205	3
92			min	-24.226	1	-559.798	2	.766	3	-.01	3	-.009	3	-.202	2
93		9	max	-1.427	15	364.365	3	93.22	1	.013	2	.055	1	.247	2
94			min	-24.226	1	-731.595	2	2.241	12	-.01	3	-.007	3	-.016	3
95		10	max	-1.427	15	599.761	1	77.624	9	.013	2	.129	1	.814	2
96			min	-24.226	1	-903.392	2	-118.95	1	-.01	3	-.005	3	-.301	3
97		11	max	-1.427	15	731.595	2	-2.241	12	.01	3	.055	1	.247	2
98			min	-24.226	1	-364.365	3	-93.22	1	-.013	2	-.007	3	-.016	3
99		12	max	-1.427	15	559.798	2	-.766	3	.01	3	.005	2	.205	3
100			min	-24.226	1	-274.005	3	-67.491	1	-.013	2	-.009	3	-.202	2
101		13	max	-1.427	15	388.001	2	1.369	3	.01	3	-.002	15	.364	3
102			min	-24.226	1	-183.644	3	-41.761	1	-.013	2	-.038	1	-.531	2
103		14	max	-1.427	15	216.203	2	3.503	3	.01	3	-.003	15	.46	3
104			min	-24.226	1	-93.283	3	-16.031	1	-.013	2	-.058	1	-.741	2
105		15	max	-1.427	15	44.406	2	9.699	1	.01	3	-.002	12	.494	3
106			min	-24.226	1	-2.923	3	-.512	10	-.013	2	-.061	1	-.831	2
107		16	max	-1.427	15	87.438	3	35.428	1	.01	3	.001	3	.465	3
108			min	-24.226	1	-127.391	2	2.065	15	-.013	2	-.045	1	-.802	2
109		17	max	-1.427	15	177.799	3	61.158	1	.01	3	.007	3	.372	3
110			min	-24.226	1	-299.188	2	3.488	15	-.013	2	-.011	1	-.654	2
111		18	max	-1.427	15	268.159	3	86.888	1	.01	3	.04	1	.218	3
112			min	-24.226	1	-470.985	2	4.911	15	-.013	2	.001	10	-.387	2
113		19	max	-1.427	15	358.52	3	112.618	1	.01	3	.109	1	0	2
114			min	-24.226	1	-642.782	2	6.335	15	-.013	2	.006	15	0	3
115	M16	1	max	-2.405	15	574.176	2	-6.072	15	.005	2	.091	1	0	2
116			min	-41.347	1	-294.176	3	-108.255	1	-.01	3	.005	15	0	3
117		2	max	-2.405	15	402.379	2	-4.649	15	.005	2	.025	1	.173	3
118			min	-41.347	1	-203.816	3	-82.525	1	-.01	3	0	10	-.339	2
119		3	max	-2.405	15	230.582	2	-3.226	15	.005	2	.004	3	.283	3
120			min	-41.347	1	-113.455	3	-56.795	1	-.01	3	-.024	1	-.559	2
121		4	max	-2.405	15	58.784	2	-1.803	15	.005	2	-.001	12	.33	3
122			min	-41.347	1	-23.094	3	-31.065	1	-.01	3	-.054	1	-.659	2
123		5	max	-2.405	15	67.266	3	.779	10	.005	2	-.003	12	.315	3
124			min	-41.347	1	-113.013	2	-5.336	1	-.01	3	-.067	1	-.64	2
125		6	max	-2.405	15	157.627	3	20.394	1	.005	2	-.003	15	.237	3
126			min	-41.347	1	-284.81	2	-1.997	3	-.01	3	-.062	1	-.502	2
127		7	max	-2.405	15	247.988	3	46.124	1	.005	2	-.002	15	.096	3
128			min	-41.347	1	-456.607	2	.137	3	-.01	3	-.038	1	-.245	2
129		8	max	-2.405	15	338.349	3	71.854	1	.005	2	.006	2	.132	2
130			min	-41.347	1	-628.404	2	1.749	12	-.01	3	-.007	3	-.107	3
131		9	max	-2.405	15	428.709	3	97.583	1	.005	2	.061	1	.628	2
132			min	-41.347	1	-800.201	2	3.172	12	-.01	3	-.005	3	-.374	3
133		10	max	-2.405	15	971.999	2	80.77	9	.005	2	.138	1	1.243	2
134			min	-41.347	1	-560.273	10	-123.313	1	-.01	3	0	3	-.703	3
135		11	max	-2.405	15	800.201	2	-3.172	12	.01	3	.061	1	.628	2
136			min	-41.347	1	-428.709	3	-97.583	1	-.005	2	-.005	3	-.374	3
137		12	max	-2.405	15	628.404	2	-1.749	12	.01	3	.006	2	.132	2
138			min	-41.347	1	-338.349	3	-71.854	1	-.005	2	-.007	3	-.107	3
139		13	max	-2.405	15	456.607	2	-.137	3	.01	3	-.002	15	.096	3
140			min	-41.347	1	-247.988	3	-46.124	1	-.005	2	-.038	1	-.245	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-2.405	15	284.81	2	1.997	3	.01	3	-.003	15	.237	3
142			min	-41.347	1	-157.627	3	-20.394	1	-.005	2	-.062	1	-.502	2
143		15	max	-2.405	15	113.013	2	5.336	1	.01	3	-.003	12	.315	3
144			min	-41.347	1	-67.266	3	-.779	10	-.005	2	-.067	1	-.64	2
145		16	max	-2.405	15	23.094	3	31.065	1	.01	3	-.001	12	.33	3
146			min	-41.347	1	-58.784	2	1.803	15	-.005	2	-.054	1	-.659	2
147		17	max	-2.405	15	113.455	3	56.795	1	.01	3	.004	3	.283	3
148			min	-41.347	1	-230.582	2	3.226	15	-.005	2	-.024	1	-.559	2
149		18	max	-2.405	15	203.816	3	82.525	1	.01	3	.025	1	.173	3
150			min	-41.347	1	-402.379	2	4.649	15	-.005	2	0	10	-.339	2
151		19	max	-2.405	15	294.176	3	108.255	1	.01	3	.091	1	0	2
152			min	-41.347	1	-574.176	2	6.072	15	-.005	2	.005	15	0	3
153	M2	1	max	940.173	2	2.02	4	.126	1	0	2	0	3	0	1
154			min	-1391.054	3	.475	15	.007	15	0	1	0	2	0	1
155		2	max	940.694	2	1.901	4	.126	1	0	2	0	1	0	15
156			min	-1390.664	3	.447	15	.007	15	0	1	0	10	0	4
157		3	max	941.215	2	1.782	4	.126	1	0	2	0	1	0	15
158			min	-1390.273	3	.419	15	.007	15	0	1	0	10	-.001	4
159		4	max	941.735	2	1.664	4	.126	1	0	2	0	1	0	15
160			min	-1389.883	3	.391	15	.007	15	0	1	0	15	-.002	4
161		5	max	942.256	2	1.545	4	.126	1	0	2	0	1	0	15
162			min	-1389.492	3	.363	15	.007	15	0	1	0	15	-.003	4
163		6	max	942.777	2	1.426	4	.126	1	0	2	0	1	0	15
164			min	-1389.102	3	.335	15	.007	15	0	1	0	15	-.003	4
165		7	max	943.298	2	1.307	4	.126	1	0	2	0	1	0	15
166			min	-1388.711	3	.307	15	.007	15	0	1	0	15	-.004	4
167		8	max	943.818	2	1.188	4	.126	1	0	2	0	1	0	15
168			min	-1388.321	3	.279	15	.007	15	0	1	0	15	-.004	4
169		9	max	944.339	2	1.069	4	.126	1	0	2	0	1	-.001	15
170			min	-1387.93	3	.248	12	.007	15	0	1	0	15	-.004	4
171		10	max	944.86	2	.95	4	.126	1	0	2	0	1	-.001	15
172			min	-1387.54	3	.202	12	.007	15	0	1	0	15	-.005	4
173		11	max	945.38	2	.854	2	.126	1	0	2	0	1	-.001	15
174			min	-1387.149	3	.156	12	.007	15	0	1	0	15	-.005	4
175		12	max	945.901	2	.762	2	.126	1	0	2	0	1	-.001	15
176			min	-1386.758	3	.109	12	.007	15	0	1	0	15	-.005	4
177		13	max	946.422	2	.669	2	.126	1	0	2	0	1	-.001	15
178			min	-1386.368	3	.063	12	.007	15	0	1	0	15	-.006	4
179		14	max	946.942	2	.576	2	.126	1	0	2	0	1	-.001	15
180			min	-1385.977	3	-.003	3	.007	15	0	1	0	15	-.006	4
181		15	max	947.463	2	.484	2	.126	1	0	2	0	1	-.001	15
182			min	-1385.587	3	-.073	3	.007	15	0	1	0	15	-.006	4
183		16	max	947.984	2	.391	2	.126	1	0	2	0	1	-.001	15
184			min	-1385.196	3	-.142	3	.007	15	0	1	0	15	-.006	4
185		17	max	948.504	2	.299	2	.126	1	0	2	0	1	-.001	12
186			min	-1384.806	3	-.211	3	.007	15	0	1	0	15	-.006	4
187		18	max	949.025	2	.206	2	.126	1	0	2	0	1	-.001	12
188			min	-1384.415	3	-.281	3	.007	15	0	1	0	15	-.006	4
189		19	max	949.546	2	.113	2	.126	1	0	2	0	1	-.001	12
190			min	-1384.025	3	-.35	3	.007	15	0	1	0	15	-.006	4
191	M3	1	max	872.918	2	7.663	4	.134	1	0	3	0	1	.006	4
192			min	-958.898	3	1.802	15	.008	15	0	1	0	15	.001	12
193		2	max	872.747	2	6.902	4	.134	1	0	3	0	1	.004	2
194			min	-959.025	3	1.623	15	.008	15	0	1	0	15	0	3
195		3	max	872.577	2	6.142	4	.134	1	0	3	0	1	.001	2
196			min	-959.153	3	1.444	15	.008	15	0	1	0	15	-.001	3
197		4	max	872.407	2	5.381	4	.134	1	0	3	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-959.281	3	1.265	15	.008	15	0	1	0	15	-.003	3
199		5	max	872.236	2	4.62	4	.134	1	0	3	0	1	0	15
200			min	-959.409	3	1.086	15	.008	15	0	1	0	15	-.004	4
201		6	max	872.066	2	3.859	4	.134	1	0	3	0	1	-.001	15
202			min	-959.536	3	.907	15	.008	15	0	1	0	15	-.006	4
203		7	max	871.895	2	3.098	4	.134	1	0	3	0	1	-.002	15
204			min	-959.664	3	.728	15	.008	15	0	1	0	15	-.007	4
205		8	max	871.725	2	2.337	4	.134	1	0	3	0	1	-.002	15
206			min	-959.792	3	.549	15	.008	15	0	1	0	15	-.008	4
207		9	max	871.555	2	1.576	4	.134	1	0	3	0	1	-.002	15
208			min	-959.92	3	.37	15	.008	15	0	1	0	15	-.009	4
209		10	max	871.384	2	.815	4	.134	1	0	3	0	1	-.002	15
210			min	-960.047	3	.173	12	.008	15	0	1	0	15	-.01	4
211		11	max	871.214	2	.219	2	.134	1	0	3	0	1	-.002	15
212			min	-960.175	3	-.209	3	.008	15	0	1	0	15	-.01	4
213		12	max	871.044	2	-.166	15	.134	1	0	3	0	1	-.002	15
214			min	-960.303	3	-.707	4	.008	15	0	1	0	15	-.01	4
215		13	max	870.873	2	-.345	15	.134	1	0	3	0	1	-.002	15
216			min	-960.431	3	-1.468	4	.008	15	0	1	0	15	-.009	4
217		14	max	870.703	2	-.524	15	.134	1	0	3	0	1	-.002	15
218			min	-960.558	3	-2.229	4	.008	15	0	1	0	15	-.009	4
219		15	max	870.533	2	-.703	15	.134	1	0	3	0	1	-.002	15
220			min	-960.686	3	-2.99	4	.008	15	0	1	0	15	-.008	4
221		16	max	870.362	2	-.882	15	.134	1	0	3	0	1	-.001	15
222			min	-960.814	3	-3.751	4	.008	15	0	1	0	15	-.006	4
223		17	max	870.192	2	-1.061	15	.134	1	0	3	.001	1	-.001	15
224			min	-960.942	3	-4.512	4	.008	15	0	1	0	15	-.004	4
225		18	max	870.022	2	-1.239	15	.134	1	0	3	.001	1	0	15
226			min	-961.069	3	-5.273	4	.008	15	0	1	0	15	-.002	4
227		19	max	869.851	2	-1.418	15	.134	1	0	3	.001	1	0	1
228			min	-961.197	3	-6.034	4	.008	15	0	1	0	15	0	1
229	M4	1	max	657.777	1	0	1	-.256	15	0	1	.001	1	0	1
230			min	30.481	15	0	1	-4.416	1	0	1	0	15	0	1
231		2	max	657.948	1	0	1	-.256	15	0	1	0	1	0	1
232			min	30.533	15	0	1	-4.416	1	0	1	0	15	0	1
233		3	max	658.118	1	0	1	-.256	15	0	1	0	1	0	1
234			min	30.584	15	0	1	-4.416	1	0	1	0	10	0	1
235		4	max	658.288	1	0	1	-.256	15	0	1	0	15	0	1
236			min	30.636	15	0	1	-4.416	1	0	1	0	1	0	1
237		5	max	658.459	1	0	1	-.256	15	0	1	0	15	0	1
238			min	30.687	15	0	1	-4.416	1	0	1	0	1	0	1
239		6	max	658.629	1	0	1	-.256	15	0	1	0	15	0	1
240			min	30.738	15	0	1	-4.416	1	0	1	-.001	1	0	1
241		7	max	658.799	1	0	1	-.256	15	0	1	0	15	0	1
242			min	30.79	15	0	1	-4.416	1	0	1	-.002	1	0	1
243		8	max	658.97	1	0	1	-.256	15	0	1	0	15	0	1
244			min	30.841	15	0	1	-4.416	1	0	1	-.002	1	0	1
245		9	max	659.14	1	0	1	-.256	15	0	1	0	15	0	1
246			min	30.892	15	0	1	-4.416	1	0	1	-.003	1	0	1
247		10	max	659.31	1	0	1	-.256	15	0	1	0	15	0	1
248			min	30.944	15	0	1	-4.416	1	0	1	-.003	1	0	1
249		11	max	659.481	1	0	1	-.256	15	0	1	0	15	0	1
250			min	30.995	15	0	1	-4.416	1	0	1	-.004	1	0	1
251		12	max	659.651	1	0	1	-.256	15	0	1	0	15	0	1
252			min	31.047	15	0	1	-4.416	1	0	1	-.004	1	0	1
253		13	max	659.821	1	0	1	-.256	15	0	1	0	15	0	1
254			min	31.098	15	0	1	-4.416	1	0	1	-.005	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	659.992	1	0	1	-.256	15	0	1	0	15	0	1
256			min	31.149	15	0	1	-4.416	1	0	1	-.006	1	0	1
257		15	max	660.162	1	0	1	-.256	15	0	1	0	15	0	1
258			min	31.201	15	0	1	-4.416	1	0	1	-.006	1	0	1
259		16	max	660.332	1	0	1	-.256	15	0	1	0	15	0	1
260			min	31.252	15	0	1	-4.416	1	0	1	-.007	1	0	1
261		17	max	660.503	1	0	1	-.256	15	0	1	0	15	0	1
262			min	31.304	15	0	1	-4.416	1	0	1	-.007	1	0	1
263		18	max	660.673	1	0	1	-.256	15	0	1	0	15	0	1
264			min	31.355	15	0	1	-4.416	1	0	1	-.008	1	0	1
265		19	max	660.843	1	0	1	-.256	15	0	1	0	15	0	1
266			min	31.406	15	0	1	-4.416	1	0	1	-.008	1	0	1
267	M6	1	max	2805.059	2	2.212	2	0	1	0	1	0	1	0	1
268			min	-4276.497	3	.283	12	0	1	0	1	0	1	0	1
269		2	max	2805.58	2	2.12	2	0	1	0	1	0	1	0	12
270			min	-4276.106	3	.237	12	0	1	0	1	0	1	0	2
271		3	max	2806.101	2	2.027	2	0	1	0	1	0	1	0	12
272			min	-4275.716	3	.191	12	0	1	0	1	0	1	-.002	2
273		4	max	2806.621	2	1.934	2	0	1	0	1	0	1	0	12
274			min	-4275.325	3	.133	3	0	1	0	1	0	1	-.002	2
275		5	max	2807.142	2	1.842	2	0	1	0	1	0	1	0	12
276			min	-4274.935	3	.063	3	0	1	0	1	0	1	-.003	2
277		6	max	2807.663	2	1.749	2	0	1	0	1	0	1	0	3
278			min	-4274.544	3	-.006	3	0	1	0	1	0	1	-.004	2
279		7	max	2808.183	2	1.657	2	0	1	0	1	0	1	0	3
280			min	-4274.154	3	-.076	3	0	1	0	1	0	1	-.004	2
281		8	max	2808.704	2	1.564	2	0	1	0	1	0	1	0	3
282			min	-4273.763	3	-.145	3	0	1	0	1	0	1	-.005	2
283		9	max	2809.225	2	1.471	2	0	1	0	1	0	1	0	3
284			min	-4273.372	3	-.214	3	0	1	0	1	0	1	-.005	2
285		10	max	2809.745	2	1.379	2	0	1	0	1	0	1	0	3
286			min	-4272.982	3	-.284	3	0	1	0	1	0	1	-.006	2
287		11	max	2810.266	2	1.286	2	0	1	0	1	0	1	0	3
288			min	-4272.591	3	-.353	3	0	1	0	1	0	1	-.006	2
289		12	max	2810.787	2	1.193	2	0	1	0	1	0	1	0	3
290			min	-4272.201	3	-.423	3	0	1	0	1	0	1	-.007	2
291		13	max	2811.308	2	1.101	2	0	1	0	1	0	1	0	3
292			min	-4271.81	3	-.492	3	0	1	0	1	0	1	-.007	2
293		14	max	2811.828	2	1.008	2	0	1	0	1	0	1	0	3
294			min	-4271.42	3	-.562	3	0	1	0	1	0	1	-.007	2
295		15	max	2812.349	2	.916	2	0	1	0	1	0	1	0	3
296			min	-4271.029	3	-.631	3	0	1	0	1	0	1	-.008	2
297		16	max	2812.87	2	.823	2	0	1	0	1	0	1	0	3
298			min	-4270.639	3	-.701	3	0	1	0	1	0	1	-.008	2
299		17	max	2813.39	2	.73	2	0	1	0	1	0	1	.001	3
300			min	-4270.248	3	-.77	3	0	1	0	1	0	1	-.008	2
301		18	max	2813.911	2	.638	2	0	1	0	1	0	1	.002	3
302			min	-4269.858	3	-.84	3	0	1	0	1	0	1	-.009	2
303		19	max	2814.432	2	.545	2	0	1	0	1	0	1	.002	3
304			min	-4269.467	3	-.909	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2755.044	2	7.679	4	0	1	0	1	0	1	.009	2
306			min	-2811.984	3	1.804	15	0	1	0	1	0	1	-.002	3
307		2	max	2754.874	2	6.918	4	0	1	0	1	0	1	.006	2
308			min	-2812.111	3	1.625	15	0	1	0	1	0	1	-.003	3
309		3	max	2754.703	2	6.157	4	0	1	0	1	0	1	.004	2
310			min	-2812.239	3	1.446	15	0	1	0	1	0	1	-.005	3
311		4	max	2754.533	2	5.396	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2812.367	3	1.267	15	0	1	0	1	0	1	-.006	3
313		5	max	2754.363	2	4.635	4	0	1	0	1	0	1	0	2
314			min	-2812.495	3	1.089	15	0	1	0	1	0	1	-.007	3
315		6	max	2754.192	2	3.874	4	0	1	0	1	0	1	-.001	15
316			min	-2812.622	3	.91	15	0	1	0	1	0	1	-.007	3
317		7	max	2754.022	2	3.113	4	0	1	0	1	0	1	-.002	15
318			min	-2812.75	3	.731	15	0	1	0	1	0	1	-.008	3
319		8	max	2753.852	2	2.368	2	0	1	0	1	0	1	-.002	15
320			min	-2812.878	3	.479	12	0	1	0	1	0	1	-.008	4
321		9	max	2753.681	2	1.775	2	0	1	0	1	0	1	-.002	15
322			min	-2813.006	3	.182	12	0	1	0	1	0	1	-.009	4
323		10	max	2753.511	2	1.182	2	0	1	0	1	0	1	-.002	15
324			min	-2813.133	3	-.243	3	0	1	0	1	0	1	-.01	4
325		11	max	2753.34	2	.589	2	0	1	0	1	0	1	-.002	15
326			min	-2813.261	3	-.688	3	0	1	0	1	0	1	-.01	4
327		12	max	2753.17	2	-.004	2	0	1	0	1	0	1	-.002	15
328			min	-2813.389	3	-1.133	3	0	1	0	1	0	1	-.01	4
329		13	max	2753	2	-.342	15	0	1	0	1	0	1	-.002	15
330			min	-2813.517	3	-1.578	3	0	1	0	1	0	1	-.009	4
331		14	max	2752.829	2	-.521	15	0	1	0	1	0	1	-.002	15
332			min	-2813.644	3	-2.214	4	0	1	0	1	0	1	-.009	4
333		15	max	2752.659	2	-.7	15	0	1	0	1	0	1	-.002	15
334			min	-2813.772	3	-2.975	4	0	1	0	1	0	1	-.007	4
335		16	max	2752.489	2	-.879	15	0	1	0	1	0	1	-.001	15
336			min	-2813.9	3	-3.736	4	0	1	0	1	0	1	-.006	4
337		17	max	2752.318	2	-1.058	15	0	1	0	1	0	1	-.001	15
338			min	-2814.028	3	-4.497	4	0	1	0	1	0	1	-.004	4
339		18	max	2752.148	2	-1.237	15	0	1	0	1	0	1	0	15
340			min	-2814.156	3	-5.258	4	0	1	0	1	0	1	-.002	4
341		19	max	2751.978	2	-1.416	15	0	1	0	1	0	1	0	1
342			min	-2814.283	3	-6.019	4	0	1	0	1	0	1	0	1
343	M8	1	max	1769.834	2	0	1	0	1	0	1	0	1	0	1
344			min	61.497	15	0	1	0	1	0	1	0	1	0	1
345		2	max	1770.005	2	0	1	0	1	0	1	0	1	0	1
346			min	61.549	15	0	1	0	1	0	1	0	1	0	1
347		3	max	1770.175	2	0	1	0	1	0	1	0	1	0	1
348			min	61.6	15	0	1	0	1	0	1	0	1	0	1
349		4	max	1770.345	2	0	1	0	1	0	1	0	1	0	1
350			min	61.651	15	0	1	0	1	0	1	0	1	0	1
351		5	max	1770.516	2	0	1	0	1	0	1	0	1	0	1
352			min	61.703	15	0	1	0	1	0	1	0	1	0	1
353		6	max	1770.686	2	0	1	0	1	0	1	0	1	0	1
354			min	61.754	15	0	1	0	1	0	1	0	1	0	1
355		7	max	1770.856	2	0	1	0	1	0	1	0	1	0	1
356			min	61.805	15	0	1	0	1	0	1	0	1	0	1
357		8	max	1771.027	2	0	1	0	1	0	1	0	1	0	1
358			min	61.857	15	0	1	0	1	0	1	0	1	0	1
359		9	max	1771.197	2	0	1	0	1	0	1	0	1	0	1
360			min	61.908	15	0	1	0	1	0	1	0	1	0	1
361		10	max	1771.367	2	0	1	0	1	0	1	0	1	0	1
362			min	61.96	15	0	1	0	1	0	1	0	1	0	1
363		11	max	1771.538	2	0	1	0	1	0	1	0	1	0	1
364			min	62.011	15	0	1	0	1	0	1	0	1	0	1
365		12	max	1771.708	2	0	1	0	1	0	1	0	1	0	1
366			min	62.062	15	0	1	0	1	0	1	0	1	0	1
367		13	max	1771.878	2	0	1	0	1	0	1	0	1	0	1
368			min	62.114	15	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	1772.049	2	0	1	0	1	0	1	0	1	0	1
370			min	62.165	15	0	1	0	1	0	1	0	1	0	1
371		15	max	1772.219	2	0	1	0	1	0	1	0	1	0	1
372			min	62.217	15	0	1	0	1	0	1	0	1	0	1
373		16	max	1772.389	2	0	1	0	1	0	1	0	1	0	1
374			min	62.268	15	0	1	0	1	0	1	0	1	0	1
375		17	max	1772.56	2	0	1	0	1	0	1	0	1	0	1
376			min	62.319	15	0	1	0	1	0	1	0	1	0	1
377		18	max	1772.73	2	0	1	0	1	0	1	0	1	0	1
378			min	62.371	15	0	1	0	1	0	1	0	1	0	1
379		19	max	1772.9	2	0	1	0	1	0	1	0	1	0	1
380			min	62.422	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	940.173	2	2.02	4	-.007	15	0	1	0	2	0	1
382			min	-1391.054	3	.475	15	-.126	1	0	2	0	3	0	1
383		2	max	940.694	2	1.901	4	-.007	15	0	1	0	10	0	15
384			min	-1390.664	3	.447	15	-.126	1	0	2	0	1	0	4
385		3	max	941.215	2	1.782	4	-.007	15	0	1	0	10	0	15
386			min	-1390.273	3	.419	15	-.126	1	0	2	0	1	-.001	4
387		4	max	941.735	2	1.664	4	-.007	15	0	1	0	15	0	15
388			min	-1389.883	3	.391	15	-.126	1	0	2	0	1	-.002	4
389		5	max	942.256	2	1.545	4	-.007	15	0	1	0	15	0	15
390			min	-1389.492	3	.363	15	-.126	1	0	2	0	1	-.003	4
391		6	max	942.777	2	1.426	4	-.007	15	0	1	0	15	0	15
392			min	-1389.102	3	.335	15	-.126	1	0	2	0	1	-.003	4
393		7	max	943.298	2	1.307	4	-.007	15	0	1	0	15	0	15
394			min	-1388.711	3	.307	15	-.126	1	0	2	0	1	-.004	4
395		8	max	943.818	2	1.188	4	-.007	15	0	1	0	15	0	15
396			min	-1388.321	3	.279	15	-.126	1	0	2	0	1	-.004	4
397		9	max	944.339	2	1.069	4	-.007	15	0	1	0	15	-.001	15
398			min	-1387.93	3	.248	12	-.126	1	0	2	0	1	-.004	4
399		10	max	944.86	2	.95	4	-.007	15	0	1	0	15	-.001	15
400			min	-1387.54	3	.202	12	-.126	1	0	2	0	1	-.005	4
401		11	max	945.38	2	.854	2	-.007	15	0	1	0	15	-.001	15
402			min	-1387.149	3	.156	12	-.126	1	0	2	0	1	-.005	4
403		12	max	945.901	2	.762	2	-.007	15	0	1	0	15	-.001	15
404			min	-1386.758	3	.109	12	-.126	1	0	2	0	1	-.005	4
405		13	max	946.422	2	.669	2	-.007	15	0	1	0	15	-.001	15
406			min	-1386.368	3	.063	12	-.126	1	0	2	0	1	-.006	4
407		14	max	946.942	2	.576	2	-.007	15	0	1	0	15	-.001	15
408			min	-1385.977	3	-.003	3	-.126	1	0	2	0	1	-.006	4
409		15	max	947.463	2	.484	2	-.007	15	0	1	0	15	-.001	15
410			min	-1385.587	3	-.073	3	-.126	1	0	2	0	1	-.006	4
411		16	max	947.984	2	.391	2	-.007	15	0	1	0	15	-.001	15
412			min	-1385.196	3	-.142	3	-.126	1	0	2	0	1	-.006	4
413		17	max	948.504	2	.299	2	-.007	15	0	1	0	15	-.001	12
414			min	-1384.806	3	-.211	3	-.126	1	0	2	0	1	-.006	4
415		18	max	949.025	2	.206	2	-.007	15	0	1	0	15	-.001	12
416			min	-1384.415	3	-.281	3	-.126	1	0	2	0	1	-.006	4
417		19	max	949.546	2	.113	2	-.007	15	0	1	0	15	-.001	12
418			min	-1384.025	3	-.35	3	-.126	1	0	2	0	1	-.006	4
419	M11	1	max	872.918	2	7.663	4	-.008	15	0	1	0	15	.006	4
420			min	-958.898	3	1.802	15	-.134	1	0	3	0	1	.001	12
421		2	max	872.747	2	6.902	4	-.008	15	0	1	0	15	.004	2
422			min	-959.025	3	1.623	15	-.134	1	0	3	0	1	0	3
423		3	max	872.577	2	6.142	4	-.008	15	0	1	0	15	.001	2
424			min	-959.153	3	1.444	15	-.134	1	0	3	0	1	-.001	3
425		4	max	872.407	2	5.381	4	-.008	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-959.281	3	1.265	15	-.134	1	0	3	0	1	-.003	3
427		5	max	872.236	2	4.62	4	-.008	15	0	1	0	15	0	15
428			min	-959.409	3	1.086	15	-.134	1	0	3	0	1	-.004	4
429		6	max	872.066	2	3.859	4	-.008	15	0	1	0	15	-.001	15
430			min	-959.536	3	.907	15	-.134	1	0	3	0	1	-.006	4
431		7	max	871.895	2	3.098	4	-.008	15	0	1	0	15	-.002	15
432			min	-959.664	3	.728	15	-.134	1	0	3	0	1	-.007	4
433		8	max	871.725	2	2.337	4	-.008	15	0	1	0	15	-.002	15
434			min	-959.792	3	.549	15	-.134	1	0	3	0	1	-.008	4
435		9	max	871.555	2	1.576	4	-.008	15	0	1	0	15	-.002	15
436			min	-959.92	3	.37	15	-.134	1	0	3	0	1	-.009	4
437		10	max	871.384	2	.815	4	-.008	15	0	1	0	15	-.002	15
438			min	-960.047	3	.173	12	-.134	1	0	3	0	1	-.01	4
439		11	max	871.214	2	.219	2	-.008	15	0	1	0	15	-.002	15
440			min	-960.175	3	-.209	3	-.134	1	0	3	0	1	-.01	4
441		12	max	871.044	2	-.166	15	-.008	15	0	1	0	15	-.002	15
442			min	-960.303	3	-.707	4	-.134	1	0	3	0	1	-.01	4
443		13	max	870.873	2	-.345	15	-.008	15	0	1	0	15	-.002	15
444			min	-960.431	3	-1.468	4	-.134	1	0	3	0	1	-.009	4
445		14	max	870.703	2	-.524	15	-.008	15	0	1	0	15	-.002	15
446			min	-960.558	3	-2.229	4	-.134	1	0	3	0	1	-.009	4
447		15	max	870.533	2	-.703	15	-.008	15	0	1	0	15	-.002	15
448			min	-960.686	3	-2.99	4	-.134	1	0	3	0	1	-.008	4
449		16	max	870.362	2	-.882	15	-.008	15	0	1	0	15	-.001	15
450			min	-960.814	3	-3.751	4	-.134	1	0	3	0	1	-.006	4
451		17	max	870.192	2	-1.061	15	-.008	15	0	1	0	15	-.001	15
452			min	-960.942	3	-4.512	4	-.134	1	0	3	-.001	1	-.004	4
453		18	max	870.022	2	-1.239	15	-.008	15	0	1	0	15	0	15
454			min	-961.069	3	-5.273	4	-.134	1	0	3	-.001	1	-.002	4
455		19	max	869.851	2	-1.418	15	-.008	15	0	1	0	15	0	1
456			min	-961.197	3	-6.034	4	-.134	1	0	3	-.001	1	0	1
457	M12	1	max	657.777	1	0	1	4.416	1	0	1	0	15	0	1
458			min	30.481	15	0	1	.256	15	0	1	-.001	1	0	1
459		2	max	657.948	1	0	1	4.416	1	0	1	0	15	0	1
460			min	30.533	15	0	1	.256	15	0	1	0	1	0	1
461		3	max	658.118	1	0	1	4.416	1	0	1	0	10	0	1
462			min	30.584	15	0	1	.256	15	0	1	0	1	0	1
463		4	max	658.288	1	0	1	4.416	1	0	1	0	1	0	1
464			min	30.636	15	0	1	.256	15	0	1	0	15	0	1
465		5	max	658.459	1	0	1	4.416	1	0	1	0	1	0	1
466			min	30.687	15	0	1	.256	15	0	1	0	15	0	1
467		6	max	658.629	1	0	1	4.416	1	0	1	.001	1	0	1
468			min	30.738	15	0	1	.256	15	0	1	0	15	0	1
469		7	max	658.799	1	0	1	4.416	1	0	1	.002	1	0	1
470			min	30.79	15	0	1	.256	15	0	1	0	15	0	1
471		8	max	658.97	1	0	1	4.416	1	0	1	.002	1	0	1
472			min	30.841	15	0	1	.256	15	0	1	0	15	0	1
473		9	max	659.14	1	0	1	4.416	1	0	1	.003	1	0	1
474			min	30.892	15	0	1	.256	15	0	1	0	15	0	1
475		10	max	659.31	1	0	1	4.416	1	0	1	.003	1	0	1
476			min	30.944	15	0	1	.256	15	0	1	0	15	0	1
477		11	max	659.481	1	0	1	4.416	1	0	1	.004	1	0	1
478			min	30.995	15	0	1	.256	15	0	1	0	15	0	1
479		12	max	659.651	1	0	1	4.416	1	0	1	.004	1	0	1
480			min	31.047	15	0	1	.256	15	0	1	0	15	0	1
481		13	max	659.821	1	0	1	4.416	1	0	1	.005	1	0	1
482			min	31.098	15	0	1	.256	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	659.992	1	0	1	4.416	1	0	1	.006	1	0	1
484			min	31.149	15	0	1	.256	15	0	1	0	15	0	1
485		15	max	660.162	1	0	1	4.416	1	0	1	.006	1	0	1
486			min	31.201	15	0	1	.256	15	0	1	0	15	0	1
487		16	max	660.332	1	0	1	4.416	1	0	1	.007	1	0	1
488			min	31.252	15	0	1	.256	15	0	1	0	15	0	1
489		17	max	660.503	1	0	1	4.416	1	0	1	.007	1	0	1
490			min	31.304	15	0	1	.256	15	0	1	0	15	0	1
491		18	max	660.673	1	0	1	4.416	1	0	1	.008	1	0	1
492			min	31.355	15	0	1	.256	15	0	1	0	15	0	1
493		19	max	660.843	1	0	1	4.416	1	0	1	.008	1	0	1
494			min	31.406	15	0	1	.256	15	0	1	0	15	0	1
495	M1	1	max	107.753	1	705.885	3	-2.213	15	0	2	.089	1	0	15
496			min	6.065	15	-359.341	2	-37.678	1	0	3	.005	15	-.011	2
497		2	max	108.574	1	705.005	3	-2.213	15	0	2	.069	1	.179	2
498			min	6.313	15	-360.515	2	-37.678	1	0	3	.004	15	-.376	3
499		3	max	601.832	3	487.714	2	-2.206	15	0	3	.05	1	.359	2
500			min	-348.628	2	-561.708	3	-37.59	1	0	2	.003	15	-.733	3
501		4	max	602.448	3	486.541	2	-2.206	15	0	3	.03	1	.102	2
502			min	-347.806	2	-562.588	3	-37.59	1	0	2	.002	15	-.436	3
503		5	max	603.065	3	485.368	2	-2.206	15	0	3	.01	1	-.003	15
504			min	-346.985	2	-563.468	3	-37.59	1	0	2	0	15	-.154	2
505		6	max	603.681	3	484.194	2	-2.206	15	0	3	0	15	.159	3
506			min	-346.163	2	-564.348	3	-37.59	1	0	2	-.01	1	-.41	2
507		7	max	604.297	3	483.021	2	-2.206	15	0	3	-.002	15	.457	3
508			min	-345.341	2	-565.228	3	-37.59	1	0	2	-.03	1	-.665	2
509		8	max	604.913	3	481.847	2	-2.206	15	0	3	-.003	15	.755	3
510			min	-344.52	2	-566.108	3	-37.59	1	0	2	-.05	1	-.92	2
511		9	max	620.13	3	51.767	2	-3.584	15	0	9	.032	1	.875	3
512			min	-297.497	2	.359	15	-61.378	1	0	3	.002	15	-1.05	2
513		10	max	620.746	3	50.593	2	-3.584	15	0	9	0	10	.859	3
514			min	-296.676	2	.005	15	-61.378	1	0	3	0	1	-1.077	2
515		11	max	621.362	3	49.42	2	-3.584	15	0	9	-.002	15	.843	3
516			min	-295.854	2	-1.454	4	-61.378	1	0	3	-.033	1	-1.103	2
517		12	max	636.155	3	393.096	3	-2.157	15	0	2	.049	1	.74	3
518			min	-248.623	2	-592.063	2	-37.156	1	0	3	.003	15	-.981	2
519		13	max	636.772	3	392.216	3	-2.157	15	0	2	.03	1	.533	3
520			min	-247.802	2	-593.236	2	-37.156	1	0	3	.002	15	-.669	2
521		14	max	637.388	3	391.336	3	-2.157	15	0	2	.01	1	.326	3
522			min	-246.98	2	-594.41	2	-37.156	1	0	3	0	15	-.355	2
523		15	max	638.004	3	390.456	3	-2.157	15	0	2	0	15	.12	3
524			min	-246.159	2	-595.583	2	-37.156	1	0	3	-.009	1	-.045	1
525		16	max	638.62	3	389.576	3	-2.157	15	0	2	-.002	15	.273	2
526			min	-245.337	2	-596.757	2	-37.156	1	0	3	-.029	1	-.086	3
527		17	max	639.236	3	388.696	3	-2.157	15	0	2	-.003	15	.588	2
528			min	-244.515	2	-597.93	2	-37.156	1	0	3	-.049	1	-.291	3
529		18	max	-6.32	15	575.738	2	-2.405	15	0	3	-.004	15	.299	2
530			min	-109.073	1	-293.393	3	-41.374	1	0	2	-.069	1	-.145	3
531		19	max	-6.072	15	574.565	2	-2.405	15	0	3	-.005	15	.01	3
532			min	-108.252	1	-294.274	3	-41.374	1	0	2	-.091	1	-.005	2
533	M5	1	max	247.63	1	2316.266	3	0	1	0	1	0	1	.022	2
534			min	7.528	12	-1249.863	2	0	1	0	1	0	1	0	15
535		2	max	248.451	1	2315.386	3	0	1	0	1	0	1	.682	2
536			min	7.939	12	-1251.036	2	0	1	0	1	0	1	-1.214	3
537		3	max	1810.984	3	1267.63	2	0	1	0	1	0	1	1.312	2
538			min	-1064.561	2	-1594.901	3	0	1	0	1	0	1	-2.389	3
539		4	max	1811.6	3	1266.457	2	0	1	0	1	0	1	.643	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	-1063.74	2	-1595.781	3	0	1	0	1	0	1	-1.547	3
541		5	max	1812.216	3	1265.283	2	0	1	0	1	0	1	.017	9
542			min	-1062.918	2	-1596.661	3	0	1	0	1	0	1	-.705	3
543		6	max	1812.832	3	1264.11	2	0	1	0	1	0	1	.138	3
544			min	-1062.096	2	-1597.541	3	0	1	0	1	0	1	-.692	2
545		7	max	1813.448	3	1262.937	2	0	1	0	1	0	1	.981	3
546			min	-1061.275	2	-1598.421	3	0	1	0	1	0	1	-1.359	2
547		8	max	1814.065	3	1261.763	2	0	1	0	1	0	1	1.825	3
548			min	-1060.453	2	-1599.301	3	0	1	0	1	0	1	-2.025	2
549		9	max	1823.901	3	176.742	2	0	1	0	1	0	1	2.099	3
550			min	-948.921	2	.349	15	0	1	0	1	0	1	-2.323	2
551		10	max	1824.517	3	175.569	2	0	1	0	1	0	1	2.031	3
552			min	-948.1	2	-.006	5	0	1	0	1	0	1	-2.416	2
553		11	max	1825.133	3	174.396	2	0	1	0	1	0	1	1.965	3
554			min	-947.278	2	-1.46	4	0	1	0	1	0	1	-2.508	2
555		12	max	1835.816	3	1067.583	3	0	1	0	1	0	1	1.721	3
556			min	-836.163	2	-1615.427	2	0	1	0	1	0	1	-2.248	2
557		13	max	1836.432	3	1066.703	3	0	1	0	1	0	1	1.158	3
558			min	-835.341	2	-1616.601	2	0	1	0	1	0	1	-1.396	2
559		14	max	1837.048	3	1065.823	3	0	1	0	1	0	1	.595	3
560			min	-834.52	2	-1617.774	2	0	1	0	1	0	1	-.542	2
561		15	max	1837.665	3	1064.942	3	0	1	0	1	0	1	.312	2
562			min	-833.698	2	-1618.947	2	0	1	0	1	0	1	0	15
563		16	max	1838.281	3	1064.062	3	0	1	0	1	0	1	1.166	2
564			min	-832.877	2	-1620.121	2	0	1	0	1	0	1	-.529	3
565		17	max	1838.897	3	1063.182	3	0	1	0	1	0	1	2.021	2
566			min	-832.055	2	-1621.294	2	0	1	0	1	0	1	-1.09	3
567		18	max	-9.6	12	1946.633	2	0	1	0	1	0	1	1.037	2
568			min	-247.454	1	-1037.473	3	0	1	0	1	0	1	-.568	3
569		19	max	-9.189	12	1945.459	2	0	1	0	1	0	1	.01	2
570			min	-246.632	1	-1038.353	3	0	1	0	1	0	1	-.021	3
571	M9	1	max	107.753	1	705.885	3	37.678	1	0	3	-.005	15	0	15
572			min	6.065	15	-359.341	2	2.213	15	0	2	-.089	1	-.011	2
573		2	max	108.574	1	705.005	3	37.678	1	0	3	-.004	15	.179	2
574			min	6.313	15	-360.515	2	2.213	15	0	2	-.069	1	-.376	3
575		3	max	601.832	3	487.714	2	37.59	1	0	2	-.003	15	.359	2
576			min	-348.628	2	-561.708	3	2.206	15	0	3	-.05	1	-.733	3
577		4	max	602.448	3	486.541	2	37.59	1	0	2	-.002	15	.102	2
578			min	-347.806	2	-562.588	3	2.206	15	0	3	-.03	1	-.436	3
579		5	max	603.065	3	485.368	2	37.59	1	0	2	0	15	-.003	15
580			min	-346.985	2	-563.468	3	2.206	15	0	3	-.01	1	-.154	2
581		6	max	603.681	3	484.194	2	37.59	1	0	2	.01	1	.159	3
582			min	-346.163	2	-564.348	3	2.206	15	0	3	0	15	-.41	2
583		7	max	604.297	3	483.021	2	37.59	1	0	2	.03	1	.457	3
584			min	-345.341	2	-565.228	3	2.206	15	0	3	.002	15	-.665	2
585		8	max	604.913	3	481.847	2	37.59	1	0	2	.05	1	.755	3
586			min	-344.52	2	-566.108	3	2.206	15	0	3	.003	15	-.92	2
587		9	max	620.13	3	51.767	2	61.378	1	0	3	-.002	15	.875	3
588			min	-297.497	2	.359	15	3.584	15	0	9	-.032	1	-1.05	2
589		10	max	620.746	3	50.593	2	61.378	1	0	3	0	1	.859	3
590			min	-296.676	2	.005	15	3.584	15	0	9	0	10	-1.077	2
591		11	max	621.362	3	49.42	2	61.378	1	0	3	.033	1	.843	3
592			min	-295.854	2	-1.454	4	3.584	15	0	9	.002	15	-1.103	2
593		12	max	636.155	3	393.096	3	37.156	1	0	3	-.003	15	.74	3
594			min	-248.623	2	-592.063	2	2.157	15	0	2	-.049	1	-.981	2
595		13	max	636.772	3	392.216	3	37.156	1	0	3	-.002	15	.533	3
596			min	-247.802	2	-593.236	2	2.157	15	0	2	-.03	1	-.669	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	637.388	3	391.336	3	37.156	1	0	3	0	15	.326	3
598			min	-246.98	2	-594.41	2	2.157	15	0	2	-.01	1	-.355	2
599		15	max	638.004	3	390.456	3	37.156	1	0	3	.009	1	.12	3
600			min	-246.159	2	-595.583	2	2.157	15	0	2	0	15	-.045	1
601		16	max	638.62	3	389.576	3	37.156	1	0	3	.029	1	.273	2
602			min	-245.337	2	-596.757	2	2.157	15	0	2	.002	15	-.086	3
603		17	max	639.236	3	388.696	3	37.156	1	0	3	.049	1	.588	2
604			min	-244.515	2	-597.93	2	2.157	15	0	2	.003	15	-.291	3
605		18	max	-6.32	15	575.738	2	41.374	1	0	2	.069	1	.299	2
606			min	-109.073	1	-293.393	3	2.405	15	0	3	.004	15	-.145	3
607		19	max	-6.072	15	574.565	2	41.374	1	0	2	.091	1	.01	3
608			min	-108.252	1	-294.274	3	2.405	15	0	3	.005	15	-.005	2

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	.116	2	.01	3	9.83e-3	2	NC	1	NC	1
2			min	0	15	-.035	3	-.007	2	-3.403e-3	3	NC	1	NC	1
3		2	max	0	1	.084	2	.012	3	1.05e-2	2	NC	4	NC	1
4			min	0	15	.002	15	-.004	2	-3.163e-3	3	1709.54	3	NC	1
5		3	max	0	1	.125	3	.015	3	1.118e-2	2	NC	4	NC	2
6			min	0	15	.001	15	-.003	10	-2.923e-3	3	937.877	3	9676.171	1
7		4	max	0	1	.171	3	.021	1	1.185e-2	2	NC	4	NC	2
8			min	0	15	0	15	-.003	10	-2.682e-3	3	727.894	3	6686.093	1
9		5	max	0	1	.186	3	.024	1	1.253e-2	2	NC	4	NC	2
10			min	0	15	0	15	-.004	10	-2.442e-3	3	678.249	3	5935.452	1
11		6	max	0	1	.171	3	.024	3	1.32e-2	2	NC	4	NC	2
12			min	0	15	.001	15	-.005	10	-2.202e-3	3	729.249	3	6502.281	1
13		7	max	0	1	.131	3	.027	3	1.388e-2	2	NC	1	NC	2
14			min	0	15	.002	15	-.008	2	-1.962e-3	3	905.344	3	9021.538	3
15		8	max	0	1	.138	2	.028	3	1.455e-2	2	NC	1	NC	1
16			min	0	15	.002	15	-.014	2	-1.722e-3	3	1331.603	3	8219.385	3
17		9	max	0	1	.168	2	.029	3	1.523e-2	2	NC	4	NC	1
18			min	0	15	.003	15	-.019	2	-1.482e-3	3	2358.54	3	7837.657	3
19		10	max	0	1	.182	2	.03	3	1.59e-2	2	NC	4	NC	1
20			min	0	1	.003	15	-.021	2	-1.242e-3	3	2280.81	2	7732.882	3
21		11	max	0	15	.168	2	.029	3	1.523e-2	2	NC	4	NC	1
22			min	0	1	.003	15	-.019	2	-1.482e-3	3	2358.54	3	7837.657	3
23		12	max	0	15	.138	2	.028	3	1.455e-2	2	NC	1	NC	1
24			min	0	1	.002	15	-.014	2	-1.722e-3	3	1331.603	3	8219.385	3
25		13	max	0	15	.131	3	.027	3	1.388e-2	2	NC	1	NC	2
26			min	0	1	.002	15	-.008	2	-1.962e-3	3	905.344	3	9021.538	3
27		14	max	0	15	.171	3	.024	3	1.32e-2	2	NC	4	NC	2
28			min	0	1	.001	15	-.005	10	-2.202e-3	3	729.249	3	6502.281	1
29		15	max	0	15	.186	3	.024	1	1.253e-2	2	NC	4	NC	2
30			min	0	1	0	15	-.004	10	-2.442e-3	3	678.249	3	5935.452	1
31		16	max	0	15	.171	3	.021	1	1.185e-2	2	NC	4	NC	2
32			min	0	1	0	15	-.003	10	-2.682e-3	3	727.894	3	6686.093	1
33		17	max	0	15	.125	3	.015	3	1.118e-2	2	NC	4	NC	2
34			min	0	1	.001	15	-.003	10	-2.923e-3	3	937.877	3	9676.171	1
35		18	max	0	15	.084	2	.012	3	1.05e-2	2	NC	4	NC	1
36			min	0	1	.002	15	-.004	2	-3.163e-3	3	1709.54	3	NC	1
37		19	max	0	15	.116	2	.01	3	9.83e-3	2	NC	1	NC	1
38			min	0	1	-.035	3	-.007	2	-3.403e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.275	3	.009	3	5.297e-3	2	NC	1	NC	1
40			min	0	15	-.36	2	-.006	2	-4.589e-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	.394	3	.01	3	6.024e-3	2	NC	4	NC	1
42			min	0	15	-.469	2	-.005	2	-5.284e-3	3	1257.594	3	NC	1
43		3	max	0	1	.5	3	.012	3	6.752e-3	2	NC	5	NC	1
44			min	0	15	-.57	2	-.003	10	-5.98e-3	3	665.965	3	NC	1
45		4	max	0	1	.583	3	.017	1	7.48e-3	2	NC	5	NC	2
46			min	0	15	-.653	2	-.003	10	-6.676e-3	3	486.258	3	8239.933	1
47		5	max	0	1	.639	3	.02	1	8.208e-3	2	NC	5	NC	2
48			min	0	15	-.715	2	-.004	10	-7.371e-3	3	412.25	3	6983.862	1
49		6	max	0	1	.665	3	.021	3	8.936e-3	2	NC	5	NC	2
50			min	0	15	-.755	2	-.005	10	-8.067e-3	3	379.693	2	7422.654	1
51		7	max	0	1	.666	3	.023	3	9.663e-3	2	NC	5	NC	1
52			min	0	15	-.773	2	-.008	2	-8.763e-3	3	362.446	2	NC	1
53		8	max	0	1	.65	3	.025	3	1.039e-2	2	NC	5	NC	1
54			min	0	15	-.776	2	-.013	2	-9.459e-3	3	360.295	2	9351.993	3
55		9	max	0	1	.628	3	.026	3	1.112e-2	2	NC	5	NC	1
56			min	0	15	-.769	2	-.017	2	-1.015e-2	3	365.948	2	8852.003	3
57		10	max	0	1	.616	3	.026	3	1.185e-2	2	NC	5	NC	1
58			min	0	1	-.764	2	-.019	2	-1.085e-2	3	370.464	2	8712.086	3
59		11	max	0	15	.628	3	.026	3	1.112e-2	2	NC	5	NC	1
60			min	0	1	-.769	2	-.017	2	-1.015e-2	3	365.948	2	8852.003	3
61		12	max	0	15	.65	3	.025	3	1.039e-2	2	NC	5	NC	1
62			min	0	1	-.776	2	-.013	2	-9.459e-3	3	360.295	2	9351.993	3
63		13	max	0	15	.666	3	.023	3	9.663e-3	2	NC	5	NC	1
64			min	0	1	-.773	2	-.008	2	-8.763e-3	3	362.446	2	NC	1
65		14	max	0	15	.665	3	.021	3	8.936e-3	2	NC	5	NC	2
66			min	0	1	-.755	2	-.005	10	-8.067e-3	3	379.693	2	7422.654	1
67		15	max	0	15	.639	3	.02	1	8.208e-3	2	NC	5	NC	2
68			min	0	1	-.715	2	-.004	10	-7.371e-3	3	412.25	3	6983.862	1
69		16	max	0	15	.583	3	.017	1	7.48e-3	2	NC	5	NC	2
70			min	0	1	-.653	2	-.003	10	-6.676e-3	3	486.258	3	8239.933	1
71		17	max	0	15	.5	3	.012	3	6.752e-3	2	NC	5	NC	1
72			min	0	1	-.57	2	-.003	10	-5.98e-3	3	665.965	3	NC	1
73		18	max	0	15	.394	3	.01	3	6.024e-3	2	NC	4	NC	1
74			min	0	1	-.469	2	-.005	2	-5.284e-3	3	1257.594	3	NC	1
75		19	max	0	15	.275	3	.009	3	5.297e-3	2	NC	1	NC	1
76			min	0	1	-.36	2	-.006	2	-4.589e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.279	3	.008	3	4.088e-3	3	NC	1	NC	1
78			min	0	1	-.358	2	-.006	2	-5.575e-3	2	NC	1	NC	1
79		2	max	0	15	.371	3	.009	3	4.708e-3	3	NC	4	NC	1
80			min	0	1	-.493	2	-.004	2	-6.35e-3	2	1117.52	2	NC	1
81		3	max	0	15	.456	3	.012	3	5.328e-3	3	NC	5	NC	1
82			min	0	1	-.612	2	-.003	10	-7.125e-3	2	590.475	2	NC	1
83		4	max	0	15	.526	3	.017	1	5.949e-3	3	NC	5	NC	2
84			min	0	1	-.708	2	-.003	10	-7.9e-3	2	429.57	2	8185.068	1
85		5	max	0	15	.579	3	.021	1	6.569e-3	3	NC	5	NC	2
86			min	0	1	-.772	2	-.003	10	-8.675e-3	2	362.302	2	6927.857	1
87		6	max	0	15	.613	3	.02	3	7.189e-3	3	NC	5	NC	2
88			min	0	1	-.806	2	-.005	10	-9.449e-3	2	335.25	2	7341.142	1
89		7	max	0	15	.63	3	.022	3	7.81e-3	3	NC	5	NC	1
90			min	0	1	-.811	2	-.007	2	-1.022e-2	2	331.217	2	NC	1
91		8	max	0	15	.633	3	.023	3	8.43e-3	3	NC	5	NC	1
92			min	0	1	-.797	2	-.012	2	-1.1e-2	2	342.161	2	NC	1
93		9	max	0	15	.628	3	.024	3	9.051e-3	3	NC	5	NC	1
94			min	0	1	-.775	2	-.016	2	-1.177e-2	2	360.085	2	9548.801	3
95		10	max	0	1	.624	3	.024	3	9.671e-3	3	NC	5	NC	1
96			min	0	1	-.763	2	-.018	2	-1.255e-2	2	370.767	2	9413.766	3
97		11	max	0	1	.628	3	.024	3	9.051e-3	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.775	2	-.016	2	-1.177e-2	2	360.085	2	9548.801	3
99		12	max	0	1	.633	3	.023	3	8.43e-3	3	NC	5	NC	1
100			min	0	15	-.797	2	-.012	2	-1.1e-2	2	342.161	2	NC	1
101		13	max	0	1	.63	3	.022	3	7.81e-3	3	NC	5	NC	1
102			min	0	15	-.811	2	-.007	2	-1.022e-2	2	331.217	2	NC	1
103		14	max	0	1	.613	3	.02	3	7.189e-3	3	NC	5	NC	2
104			min	0	15	-.806	2	-.005	10	-9.449e-3	2	335.25	2	7341.142	1
105		15	max	0	1	.579	3	.021	1	6.569e-3	3	NC	5	NC	2
106			min	0	15	-.772	2	-.003	10	-8.675e-3	2	362.302	2	6927.857	1
107		16	max	0	1	.526	3	.017	1	5.949e-3	3	NC	5	NC	2
108			min	0	15	-.708	2	-.003	10	-7.9e-3	2	429.57	2	8185.068	1
109		17	max	0	1	.456	3	.012	3	5.328e-3	3	NC	5	NC	1
110			min	0	15	-.612	2	-.003	10	-7.125e-3	2	590.475	2	NC	1
111		18	max	0	1	.371	3	.009	3	4.708e-3	3	NC	4	NC	1
112			min	0	15	-.493	2	-.004	2	-6.35e-3	2	1117.52	2	NC	1
113		19	max	0	1	.279	3	.008	3	4.088e-3	3	NC	1	NC	1
114			min	0	15	-.358	2	-.006	2	-5.575e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.103	2	.007	3	7.685e-3	3	NC	1	NC	1
116			min	0	1	-.094	3	-.005	2	-8.124e-3	2	NC	1	NC	1
117		2	max	0	15	.042	2	.009	3	8.314e-3	3	NC	4	NC	1
118			min	0	1	-.071	3	-.003	2	-8.428e-3	2	2476.606	2	NC	1
119		3	max	0	15	.009	9	.015	1	8.944e-3	3	NC	4	NC	2
120			min	0	1	-.054	3	-.002	10	-8.732e-3	2	1382.007	2	9582.223	1
121		4	max	0	15	.007	9	.022	1	9.573e-3	3	NC	4	NC	2
122			min	0	1	-.048	3	-.002	10	-9.037e-3	2	1106.991	2	6583.971	1
123		5	max	0	15	.007	9	.025	1	1.02e-2	3	NC	4	NC	2
124			min	0	1	-.054	3	-.002	10	-9.341e-3	2	1089.992	2	5800.497	1
125		6	max	0	15	.011	9	.023	1	1.083e-2	3	NC	4	NC	2
126			min	0	1	-.072	3	-.003	10	-9.645e-3	2	1297.601	2	6272.516	1
127		7	max	0	15	.035	1	.02	3	1.146e-2	3	NC	3	NC	2
128			min	0	1	-.098	3	-.005	10	-9.95e-3	2	2007.078	2	8647.21	1
129		8	max	0	15	.078	2	.021	3	1.209e-2	3	NC	1	NC	1
130			min	0	1	-.129	3	-.01	2	-1.025e-2	2	4402.048	3	NC	1
131		9	max	0	15	.122	2	.021	3	1.272e-2	3	NC	4	NC	1
132			min	0	1	-.154	3	-.015	2	-1.056e-2	2	2499.053	3	NC	1
133		10	max	0	1	.142	2	.021	3	1.335e-2	3	NC	4	NC	1
134			min	0	1	-.166	3	-.017	2	-1.086e-2	2	2098.813	3	NC	1
135		11	max	0	1	.122	2	.021	3	1.272e-2	3	NC	4	NC	1
136			min	0	15	-.154	3	-.015	2	-1.056e-2	2	2499.053	3	NC	1
137		12	max	0	1	.078	2	.021	3	1.209e-2	3	NC	1	NC	1
138			min	0	15	-.129	3	-.01	2	-1.025e-2	2	4402.048	3	NC	1
139		13	max	0	1	.035	1	.02	3	1.146e-2	3	NC	3	NC	2
140			min	0	15	-.098	3	-.005	10	-9.95e-3	2	2007.078	2	8647.21	1
141		14	max	0	1	.011	9	.023	1	1.083e-2	3	NC	4	NC	2
142			min	0	15	-.072	3	-.003	10	-9.645e-3	2	1297.601	2	6272.516	1
143		15	max	0	1	.007	9	.025	1	1.02e-2	3	NC	4	NC	2
144			min	0	15	-.054	3	-.002	10	-9.341e-3	2	1089.992	2	5800.497	1
145		16	max	0	1	.007	9	.022	1	9.573e-3	3	NC	4	NC	2
146			min	0	15	-.048	3	-.002	10	-9.037e-3	2	1106.991	2	6583.971	1
147		17	max	0	1	.009	9	.015	1	8.944e-3	3	NC	4	NC	2
148			min	0	15	-.054	3	-.002	10	-8.732e-3	2	1382.007	2	9582.223	1
149		18	max	0	1	.042	2	.009	3	8.314e-3	3	NC	4	NC	1
150			min	0	15	-.071	3	-.003	2	-8.428e-3	2	2476.606	2	NC	1
151		19	max	0	1	.103	2	.007	3	7.685e-3	3	NC	1	NC	1
152			min	0	15	-.094	3	-.005	2	-8.124e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.011	2	.003	1	-4.537e-6	15	NC	1	NC	1
154			min	-.01	3	-.016	3	0	15	-7.671e-5	1	7301.202	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	.003	1	-4.307e-6	15	NC	1	NC	1
156			min	-.01	3	-.015	3	0	15	-7.282e-5	1	8450.626	2	NC	1
157		3	max	.006	2	.008	2	.002	1	-4.077e-6	15	NC	1	NC	1
158			min	-.009	3	-.015	3	0	15	-6.893e-5	1	NC	1	NC	1
159		4	max	.006	2	.006	2	.002	1	-3.848e-6	15	NC	1	NC	1
160			min	-.009	3	-.014	3	0	15	-6.504e-5	1	NC	1	NC	1
161		5	max	.005	2	.005	2	.002	1	-3.618e-6	15	NC	1	NC	1
162			min	-.008	3	-.014	3	0	15	-6.115e-5	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.002	1	-3.388e-6	15	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-5.726e-5	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.002	1	-3.159e-6	15	NC	1	NC	1
166			min	-.007	3	-.013	3	0	15	-5.337e-5	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.001	1	-2.929e-6	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-4.949e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.001	1	-2.699e-6	15	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-4.56e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	0	1	-2.47e-6	15	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-4.171e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	0	1	-2.24e-6	15	NC	1	NC	1
174			min	-.005	3	-.009	3	0	15	-3.782e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	2	0	1	-2.01e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-3.393e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-1.781e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-3.004e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-1.551e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-2.615e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.321e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-2.226e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.092e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-1.837e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-8.621e-7	15	NC	1	NC	1
186			min	-.001	3	-.003	3	0	15	-1.448e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-6.325e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-1.06e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-4.028e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-6.706e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.574e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	9.493e-8	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	8.988e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	5.23e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	10	1.64e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	9.51e-7	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	10	2.382e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	1	1.379e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	10	3.123e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	1	1.807e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	10	3.864e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	1	2.235e-6	15	9260.529	4	NC	1
203		7	max	.003	3	-.003	15	0	2	4.606e-5	1	NC	1	NC	1
204			min	-.003	2	-.011	4	0	3	2.663e-6	15	8007.63	4	NC	1
205		8	max	.003	3	-.003	15	0	1	5.347e-5	1	NC	2	NC	1
206			min	-.003	2	-.013	4	0	3	3.091e-6	15	7236.569	4	NC	1
207		9	max	.004	3	-.003	15	0	1	6.089e-5	1	NC	5	NC	1
208			min	-.003	2	-.013	4	0	12	3.519e-6	15	6786.654	4	NC	1
209		10	max	.004	3	-.003	15	0	1	6.83e-5	1	NC	5	NC	1
210			min	-.004	2	-.014	4	0	15	3.947e-6	15	6580.512	4	NC	1
211		11	max	.005	3	-.003	15	0	1	7.571e-5	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	-.014	4	0	15	4.375e-6	15	6588.041	4	NC	1
213		12	max	.005	3	-.003	15	0	1	8.313e-5	1	NC	5	NC	1
214			min	-.005	2	-.014	4	0	15	4.803e-6	15	6814.857	4	NC	1
215		13	max	.006	3	-.003	15	0	1	9.054e-5	1	NC	2	NC	1
216			min	-.005	2	-.013	4	0	15	5.231e-6	15	7305.948	4	NC	1
217		14	max	.006	3	-.003	15	.001	1	9.796e-5	1	NC	1	NC	1
218			min	-.005	2	-.011	4	0	15	5.66e-6	15	8168.449	4	NC	1
219		15	max	.006	3	-.002	15	.001	1	1.054e-4	1	NC	1	NC	1
220			min	-.006	2	-.01	4	0	15	6.088e-6	15	9637.746	4	NC	1
221		16	max	.007	3	-.002	15	.002	1	1.128e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	6.516e-6	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.002	1	1.202e-4	1	NC	1	NC	1
224			min	-.007	2	-.006	3	0	15	6.944e-6	15	NC	1	NC	1
225		18	max	.008	3	0	15	.002	1	1.276e-4	1	NC	1	NC	1
226			min	-.007	2	-.004	3	0	15	7.372e-6	15	NC	1	NC	1
227		19	max	.008	3	0	2	.003	1	1.35e-4	1	NC	1	NC	1
228			min	-.008	2	-.003	3	0	15	7.8e-6	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	5.573e-5	1	NC	1	NC	2
230			min	0	15	-.009	3	-.003	1	3.246e-6	15	NC	1	8723.374	1
231		2	max	.001	1	.007	2	0	15	5.573e-5	1	NC	1	NC	2
232			min	0	15	-.008	3	-.003	1	3.246e-6	15	NC	1	9450.454	1
233		3	max	.001	1	.007	2	0	15	5.573e-5	1	NC	1	NC	1
234			min	0	15	-.008	3	-.002	1	3.246e-6	15	NC	1	NC	1
235		4	max	.001	1	.006	2	0	15	5.573e-5	1	NC	1	NC	1
236			min	0	15	-.007	3	-.002	1	3.246e-6	15	NC	1	NC	1
237		5	max	.001	1	.006	2	0	15	5.573e-5	1	NC	1	NC	1
238			min	0	15	-.007	3	-.002	1	3.246e-6	15	NC	1	NC	1
239		6	max	.001	1	.005	2	0	15	5.573e-5	1	NC	1	NC	1
240			min	0	15	-.006	3	-.002	1	3.246e-6	15	NC	1	NC	1
241		7	max	.001	1	.005	2	0	15	5.573e-5	1	NC	1	NC	1
242			min	0	15	-.006	3	-.002	1	3.246e-6	15	NC	1	NC	1
243		8	max	0	1	.005	2	0	15	5.573e-5	1	NC	1	NC	1
244			min	0	15	-.005	3	-.001	1	3.246e-6	15	NC	1	NC	1
245		9	max	0	1	.004	2	0	15	5.573e-5	1	NC	1	NC	1
246			min	0	15	-.005	3	-.001	1	3.246e-6	15	NC	1	NC	1
247		10	max	0	1	.004	2	0	15	5.573e-5	1	NC	1	NC	1
248			min	0	15	-.004	3	0	1	3.246e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	5.573e-5	1	NC	1	NC	1
250			min	0	15	-.004	3	0	1	3.246e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	5.573e-5	1	NC	1	NC	1
252			min	0	15	-.003	3	0	1	3.246e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	5.573e-5	1	NC	1	NC	1
254			min	0	15	-.003	3	0	1	3.246e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	5.573e-5	1	NC	1	NC	1
256			min	0	15	-.002	3	0	1	3.246e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	5.573e-5	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	3.246e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	5.573e-5	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	3.246e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	5.573e-5	1	NC	1	NC	1
262			min	0	15	0	3	0	1	3.246e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	5.573e-5	1	NC	1	NC	1
264			min	0	15	0	3	0	1	3.246e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.573e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	3.246e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.033	2	0	1	0	1	NC	4	NC	1
268			min	-.032	3	-.047	3	0	1	0	1	1628.432	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	-.03	3	-.045	3	0	1	0	1	1723.556	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	1830.633	3	NC	1
273		4	max	.017	2	.024	2	0	1	0	1	NC	4	NC	1
274			min	-.026	3	-.039	3	0	1	0	1	1952.204	3	NC	1
275		5	max	.016	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.025	3	-.037	3	0	1	0	1	2091.534	3	NC	1
277		6	max	.015	2	.019	2	0	1	0	1	NC	4	NC	1
278			min	-.023	3	-.034	3	0	1	0	1	2252.893	3	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	1	NC	1
280			min	-.021	3	-.032	3	0	1	0	1	2441.977	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	2666.552	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.018	3	-.026	3	0	1	0	1	2937.5	3	NC	1
285		10	max	.01	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.024	3	0	1	0	1	3270.543	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3689.276	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	4230.796	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.016	3	0	1	0	1	4956.956	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	5979.131	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	7520.136	3	NC	1
297		16	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	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	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8887.592	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7939.913	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7298.589	4	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6841.345	4	NC	1
323		10	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.012	2	-.016	3	0	1	0	1	6630.693	4	NC	1
325		11	max	.014	3	-.003	15	0	1	0	1	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
326			min	-.013	2	-.017	3	0	1	0	1	6635.859	4	NC	1
327		12	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.015	2	-.016	3	0	1	0	1	6862.196	4	NC	1
329		13	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7354.775	4	NC	1
331		14	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.017	2	-.015	3	0	1	0	1	8221.243	4	NC	1
333		15	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9698.301	4	NC	1
335		16	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.02	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.022	3	0	2	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	.023	3	0	2	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.024	3	.002	2	0	1	0	1	NC	1	NC	1
342			min	-.024	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.004	2	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.025	3	0	1	0	1	NC	1	NC	1
345		2	max	.004	2	.022	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.024	3	0	1	0	1	NC	1	NC	1
347		3	max	.004	2	.021	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.004	2	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.021	3	0	1	0	1	NC	1	NC	1
351		5	max	.003	2	.018	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.003	2	.017	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.018	3	0	1	0	1	NC	1	NC	1
355		7	max	.003	2	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.002	2	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.002	2	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	2	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.001	2	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.001	2	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	0	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.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	15	-.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	7.671e-5	1	NC	1	NC	1
382			min	-.01	3	-.016	3	-.003	1	4.537e-6	15	7301.202	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	7.282e-5	1	NC	1	NC	1
384			min	-.01	3	-.015	3	-.003	1	4.307e-6	15	8450.626	2	NC	1
385		3	max	.006	2	.008	2	0	15	6.893e-5	1	NC	1	NC	1
386			min	-.009	3	-.015	3	-.002	1	4.077e-6	15	NC	1	NC	1
387		4	max	.006	2	.006	2	0	15	6.504e-5	1	NC	1	NC	1
388			min	-.009	3	-.014	3	-.002	1	3.848e-6	15	NC	1	NC	1
389		5	max	.005	2	.005	2	0	15	6.115e-5	1	NC	1	NC	1
390			min	-.008	3	-.014	3	-.002	1	3.618e-6	15	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	5.726e-5	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.002	1	3.388e-6	15	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	5.337e-5	1	NC	1	NC	1
394			min	-.007	3	-.013	3	-.002	1	3.159e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	4.949e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.001	1	2.929e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	4.56e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.001	1	2.699e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	4.171e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	0	1	2.47e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	3.782e-5	1	NC	1	NC	1
402			min	-.005	3	-.009	3	0	1	2.24e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	2	0	15	3.393e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	0	1	2.01e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	3.004e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	0	1	1.781e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	2.615e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	1.551e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	2.226e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.321e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.837e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	1.092e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.448e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	8.621e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	1.06e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	6.325e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	6.706e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	4.028e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-9.493e-8	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.574e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-5.23e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-8.988e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-9.51e-7	15	NC	1	NC	1
424			min	0	2	-.004	4	0	10	-1.64e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	1	-1.379e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	10	-2.382e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	1	-1.807e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	10	-3.123e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	1	-2.235e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	10	-3.864e-5	1	9260.529	4	NC	1
431		7	max	.003	3	-.003	15	0	3	-2.663e-6	15	NC	1	NC	1
432			min	-.003	2	-.011	4	0	2	-4.606e-5	1	8007.63	4	NC	1
433		8	max	.003	3	-.003	15	0	3	-3.091e-6	15	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-5.347e-5	1	7236.569	4	NC	1
435		9	max	.004	3	-.003	15	0	12	-3.519e-6	15	NC	5	NC	1
436			min	-.003	2	-.013	4	0	1	-6.089e-5	1	6786.654	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-3.947e-6	15	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-6.83e-5	1	6580.512	4	NC	1
439		11	max	.005	3	-.003	15	0	15	-4.375e-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	-.014	4	0	1	-7.571e-5	1	6588.041	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-4.803e-6	15	NC	5	NC	1
442			min	-.005	2	-.014	4	0	1	-8.313e-5	1	6814.857	4	NC	1
443		13	max	.006	3	-.003	15	0	15	-5.231e-6	15	NC	2	NC	1
444			min	-.005	2	-.013	4	0	1	-9.054e-5	1	7305.948	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-5.66e-6	15	NC	1	NC	1
446			min	-.005	2	-.011	4	-.001	1	-9.796e-5	1	8168.449	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-6.088e-6	15	NC	1	NC	1
448			min	-.006	2	-.01	4	-.001	1	-1.054e-4	1	9637.746	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-6.516e-6	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.002	1	-1.128e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-6.944e-6	15	NC	1	NC	1
452			min	-.007	2	-.006	3	-.002	1	-1.202e-4	1	NC	1	NC	1
453		18	max	.008	3	0	15	0	15	-7.372e-6	15	NC	1	NC	1
454			min	-.007	2	-.004	3	-.002	1	-1.276e-4	1	NC	1	NC	1
455		19	max	.008	3	0	2	0	15	-7.8e-6	15	NC	1	NC	1
456			min	-.008	2	-.003	3	-.003	1	-1.35e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.003	1	-3.246e-6	15	NC	1	NC	2
458			min	0	15	-.009	3	0	15	-5.573e-5	1	NC	1	8723.374	1
459		2	max	.001	1	.007	2	.003	1	-3.246e-6	15	NC	1	NC	2
460			min	0	15	-.008	3	0	15	-5.573e-5	1	NC	1	9450.454	1
461		3	max	.001	1	.007	2	.002	1	-3.246e-6	15	NC	1	NC	1
462			min	0	15	-.008	3	0	15	-5.573e-5	1	NC	1	NC	1
463		4	max	.001	1	.006	2	.002	1	-3.246e-6	15	NC	1	NC	1
464			min	0	15	-.007	3	0	15	-5.573e-5	1	NC	1	NC	1
465		5	max	.001	1	.006	2	.002	1	-3.246e-6	15	NC	1	NC	1
466			min	0	15	-.007	3	0	15	-5.573e-5	1	NC	1	NC	1
467		6	max	.001	1	.005	2	.002	1	-3.246e-6	15	NC	1	NC	1
468			min	0	15	-.006	3	0	15	-5.573e-5	1	NC	1	NC	1
469		7	max	.001	1	.005	2	.002	1	-3.246e-6	15	NC	1	NC	1
470			min	0	15	-.006	3	0	15	-5.573e-5	1	NC	1	NC	1
471		8	max	0	1	.005	2	.001	1	-3.246e-6	15	NC	1	NC	1
472			min	0	15	-.005	3	0	15	-5.573e-5	1	NC	1	NC	1
473		9	max	0	1	.004	2	.001	1	-3.246e-6	15	NC	1	NC	1
474			min	0	15	-.005	3	0	15	-5.573e-5	1	NC	1	NC	1
475		10	max	0	1	.004	2	0	1	-3.246e-6	15	NC	1	NC	1
476			min	0	15	-.004	3	0	15	-5.573e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	0	1	-3.246e-6	15	NC	1	NC	1
478			min	0	15	-.004	3	0	15	-5.573e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-3.246e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-5.573e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-3.246e-6	15	NC	1	NC	1
482			min	0	15	-.003	3	0	15	-5.573e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-3.246e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-5.573e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-3.246e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-5.573e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-3.246e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-5.573e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-3.246e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-5.573e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-3.246e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-5.573e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.246e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.573e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.116	2	0	1	4.031e-3	2	NC	1	NC	1
496			min	-.007	2	-.035	3	0	15	-1.092e-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	.01	3	.054	2	0	15	1.978e-3	2	NC	4	NC	1
498			min	-.007	2	-.013	3	-.002	1	-5.411e-3	3	1846.93	2	NC	1
499		3	max	.01	3	.017	3	0	15	2.887e-5	2	NC	5	NC	1
500			min	-.007	2	-.012	2	-.003	1	-8.404e-5	3	897.337	2	NC	1
501		4	max	.01	3	.06	3	0	15	2.51e-3	2	NC	5	NC	1
502			min	-.006	2	-.085	2	-.003	1	-2.779e-3	3	573.229	2	NC	1
503		5	max	.01	3	.112	3	0	15	4.99e-3	2	NC	5	NC	1
504			min	-.006	2	-.16	2	-.002	1	-5.474e-3	3	417.969	2	NC	1
505		6	max	.01	3	.167	3	0	15	7.471e-3	2	NC	5	NC	1
506			min	-.006	2	-.231	2	0	1	-8.169e-3	3	331.837	2	NC	1
507		7	max	.009	3	.219	3	0	1	9.951e-3	2	NC	15	NC	1
508			min	-.006	2	-.294	2	0	3	-1.086e-2	3	280.689	2	NC	1
509		8	max	.009	3	.262	3	0	1	1.243e-2	2	NC	15	NC	1
510			min	-.006	2	-.344	2	0	15	-1.356e-2	3	250.299	2	NC	1
511		9	max	.009	3	.289	3	0	15	1.399e-2	2	NC	15	NC	1
512			min	-.006	2	-.376	2	0	1	-1.401e-2	3	234.427	2	NC	1
513		10	max	.009	3	.299	3	0	1	1.494e-2	2	NC	15	NC	1
514			min	-.006	2	-.386	2	0	10	-1.296e-2	3	229.807	2	NC	1
515		11	max	.009	3	.291	3	0	1	1.588e-2	2	NC	15	NC	1
516			min	-.006	2	-.375	2	0	15	-1.192e-2	3	235.375	2	NC	1
517		12	max	.008	3	.267	3	0	15	1.525e-2	2	NC	15	NC	1
518			min	-.006	2	-.342	2	0	1	-1.046e-2	3	253.097	2	NC	1
519		13	max	.008	3	.228	3	0	10	1.222e-2	2	NC	15	NC	1
520			min	-.006	2	-.289	2	0	1	-8.371e-3	3	287.32	2	NC	1
521		14	max	.008	3	.178	3	0	1	9.199e-3	2	NC	5	NC	1
522			min	-.005	2	-.223	2	0	15	-6.282e-3	3	345.703	2	NC	1
523		15	max	.008	3	.122	3	.002	1	6.175e-3	2	NC	5	NC	1
524			min	-.005	2	-.15	2	0	15	-4.194e-3	3	445.909	2	NC	1
525		16	max	.007	3	.063	3	.003	1	3.151e-3	2	NC	5	NC	1
526			min	-.005	2	-.076	2	0	15	-2.105e-3	3	630.784	2	NC	1
527		17	max	.007	3	.006	3	.003	1	2.071e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-1.612e-5	3	1024.606	2	NC	1
529		18	max	.007	3	.051	2	.002	1	3.782e-3	2	NC	4	NC	1
530			min	-.005	2	-.046	3	0	15	-1.458e-3	3	2165.864	2	NC	1
531		19	max	.007	3	.103	2	0	15	7.592e-3	2	NC	1	NC	1
532			min	-.005	2	-.094	3	0	1	-2.983e-3	3	NC	1	NC	1
533	M5	1	max	.03	3	.182	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	.003	15	0	1	0	1	NC	1	NC	1
535		2	max	.03	3	.08	2	0	1	0	1	NC	4	NC	1
536			min	-.021	2	.001	15	0	1	0	1	1142.05	2	NC	1
537		3	max	.03	3	.05	3	0	1	0	1	NC	5	NC	1
538			min	-.021	2	-.036	2	0	1	0	1	534.396	2	NC	1
539		4	max	.029	3	.129	3	0	1	0	1	NC	5	NC	1
540			min	-.021	2	-.176	2	0	1	0	1	324.719	2	NC	1
541		5	max	.028	3	.238	3	0	1	0	1	NC	15	NC	1
542			min	-.021	2	-.328	2	0	1	0	1	227.234	2	NC	1
543		6	max	.028	3	.362	3	0	1	0	1	NC	15	NC	1
544			min	-.02	2	-.481	2	0	1	0	1	174.898	2	NC	1
545		7	max	.027	3	.483	3	0	1	0	1	8436.893	15	NC	1
546			min	-.02	2	-.619	2	0	1	0	1	144.651	2	NC	1
547		8	max	.027	3	.585	3	0	1	0	1	7398.832	15	NC	1
548			min	-.02	2	-.731	2	0	1	0	1	127.053	2	NC	1
549		9	max	.026	3	.649	3	0	1	0	1	6868.097	15	NC	1
550			min	-.019	2	-.801	2	0	1	0	1	118.023	2	NC	1
551		10	max	.025	3	.672	3	0	1	0	1	6708.587	15	NC	1
552			min	-.019	2	-.825	2	0	1	0	1	115.402	2	NC	1
553		11	max	.025	3	.654	3	0	1	0	1	6868.989	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	-.801	2	0	1	0	1	118.562	2	NC	1
555		12	max	.024	3	.596	3	0	1	0	1	7400.865	15	NC	1
556			min	-.018	2	-.727	2	0	1	0	1	128.871	2	NC	1
557		13	max	.023	3	.504	3	0	1	0	1	8440.802	15	NC	1
558			min	-.018	2	-.607	2	0	1	0	1	149.486	2	NC	1
559		14	max	.023	3	.389	3	0	1	0	1	NC	15	NC	1
560			min	-.018	2	-.459	2	0	1	0	1	186.05	2	NC	1
561		15	max	.022	3	.262	3	0	1	0	1	NC	15	NC	1
562			min	-.017	2	-.301	2	0	1	0	1	252.196	2	NC	1
563		16	max	.022	3	.134	3	0	1	0	1	NC	5	NC	1
564			min	-.017	2	-.148	2	0	1	0	1	383.146	2	NC	1
565		17	max	.021	3	.017	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.02	2	0	1	0	1	685.252	2	NC	1
567		18	max	.021	3	.072	2	0	1	0	1	NC	4	NC	1
568			min	-.017	2	-.08	3	0	1	0	1	1497.936	3	NC	1
569		19	max	.021	3	.142	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.166	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.116	2	0	15	1.092e-2	3	NC	1	NC	1
572			min	-.007	2	-.035	3	0	1	-4.031e-3	2	NC	1	NC	1
573		2	max	.01	3	.054	2	.002	1	5.411e-3	3	NC	4	NC	1
574			min	-.007	2	-.013	3	0	15	-1.978e-3	2	1846.93	2	NC	1
575		3	max	.01	3	.017	3	.003	1	8.404e-5	3	NC	5	NC	1
576			min	-.007	2	-.012	2	0	15	-2.887e-5	2	897.337	2	NC	1
577		4	max	.01	3	.06	3	.003	1	2.779e-3	3	NC	5	NC	1
578			min	-.006	2	-.085	2	0	15	-2.51e-3	2	573.229	2	NC	1
579		5	max	.01	3	.112	3	.002	1	5.474e-3	3	NC	5	NC	1
580			min	-.006	2	-.16	2	0	15	-4.99e-3	2	417.969	2	NC	1
581		6	max	.01	3	.167	3	0	1	8.169e-3	3	NC	5	NC	1
582			min	-.006	2	-.231	2	0	15	-7.471e-3	2	331.837	2	NC	1
583		7	max	.009	3	.219	3	0	3	1.086e-2	3	NC	15	NC	1
584			min	-.006	2	-.294	2	0	1	-9.951e-3	2	280.689	2	NC	1
585		8	max	.009	3	.262	3	0	15	1.356e-2	3	NC	15	NC	1
586			min	-.006	2	-.344	2	0	1	-1.243e-2	2	250.299	2	NC	1
587		9	max	.009	3	.289	3	0	1	1.401e-2	3	NC	15	NC	1
588			min	-.006	2	-.376	2	0	15	-1.399e-2	2	234.427	2	NC	1
589		10	max	.009	3	.299	3	0	10	1.296e-2	3	NC	15	NC	1
590			min	-.006	2	-.386	2	0	1	-1.494e-2	2	229.807	2	NC	1
591		11	max	.009	3	.291	3	0	15	1.192e-2	3	NC	15	NC	1
592			min	-.006	2	-.375	2	0	1	-1.588e-2	2	235.375	2	NC	1
593		12	max	.008	3	.267	3	0	1	1.046e-2	3	NC	15	NC	1
594			min	-.006	2	-.342	2	0	15	-1.525e-2	2	253.097	2	NC	1
595		13	max	.008	3	.228	3	0	1	8.371e-3	3	NC	15	NC	1
596			min	-.006	2	-.289	2	0	10	-1.222e-2	2	287.32	2	NC	1
597		14	max	.008	3	.178	3	0	15	6.282e-3	3	NC	5	NC	1
598			min	-.005	2	-.223	2	0	1	-9.199e-3	2	345.703	2	NC	1
599		15	max	.008	3	.122	3	0	15	4.194e-3	3	NC	5	NC	1
600			min	-.005	2	-.15	2	-.002	1	-6.175e-3	2	445.909	2	NC	1
601		16	max	.007	3	.063	3	0	15	2.105e-3	3	NC	5	NC	1
602			min	-.005	2	-.076	2	-.003	1	-3.151e-3	2	630.784	2	NC	1
603		17	max	.007	3	.006	3	0	15	1.612e-5	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.003	1	-2.071e-4	1	1024.606	2	NC	1
605		18	max	.007	3	.051	2	0	15	1.458e-3	3	NC	4	NC	1
606			min	-.005	2	-.046	3	-.002	1	-3.782e-3	2	2165.864	2	NC	1
607		19	max	.007	3	.103	2	0	1	2.983e-3	3	NC	1	NC	1
608			min	-.005	2	-.094	3	0	15	-7.592e-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

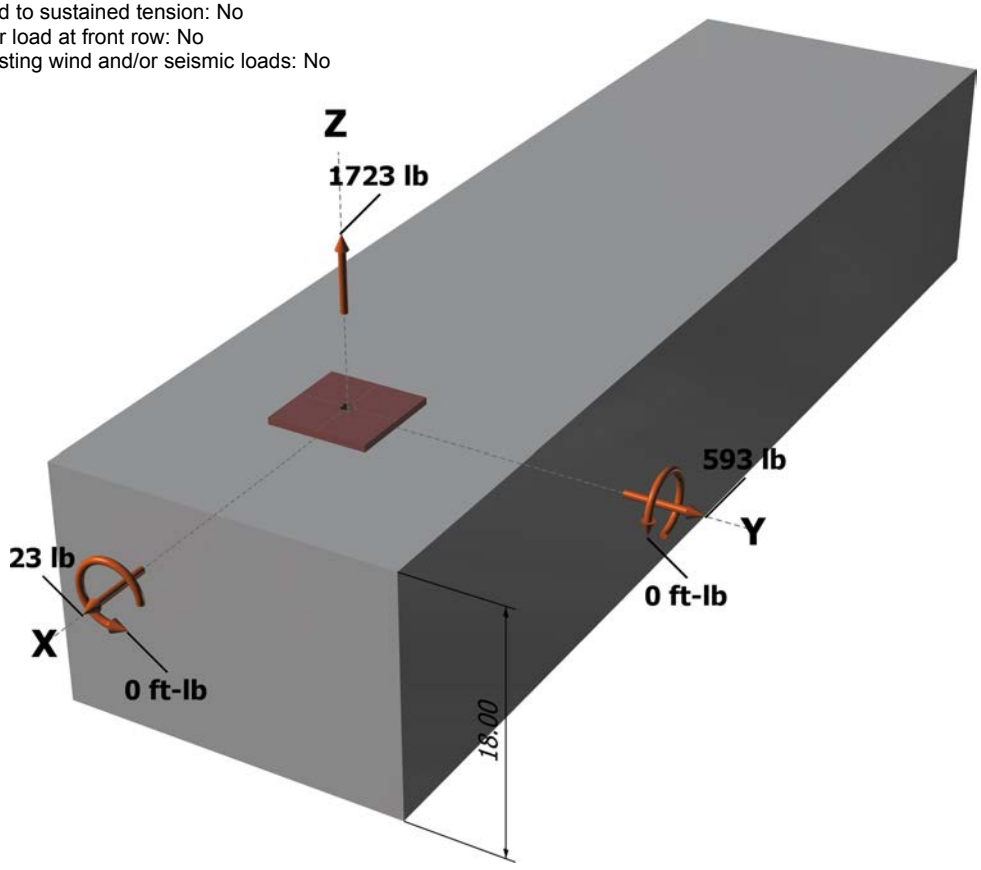
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

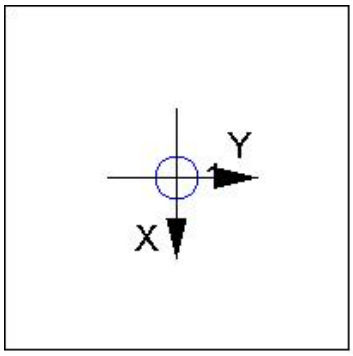
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
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} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**593**	**3156**	**0.19**	**Pass (Governs)**
T Concrete breakout y+	593	3934	0.15	Pass
T Concrete breakout x+	23	3018	0.01	Pass
|| Concrete breakout y+	23	8508	0.00	Pass
|| Concrete breakout x+	593	6875	0.09	Pass
Concrete breakout, combined	-	-	0.15	Pass
Pryout	593	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.32	0.00	32.1 %	1.0	Pass

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

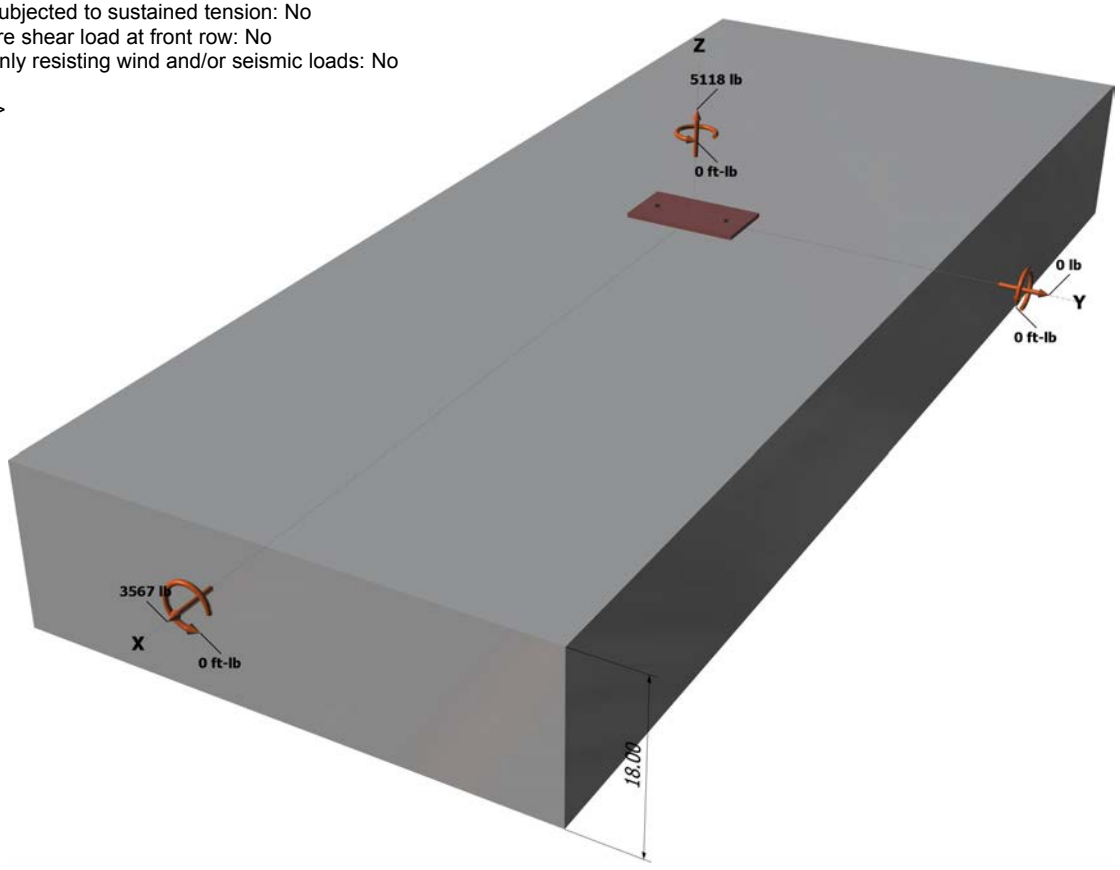
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

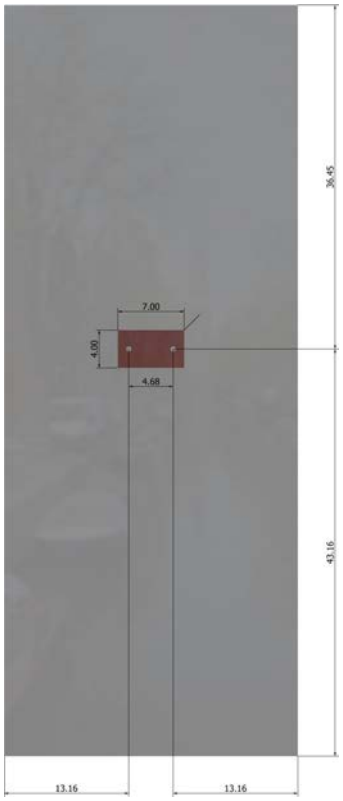
<Figure 1>

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

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



<Figure 2>



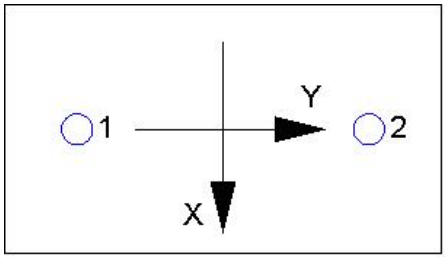
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
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} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	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)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

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	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status

Sec. D.7.3	0.63	0.57	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.