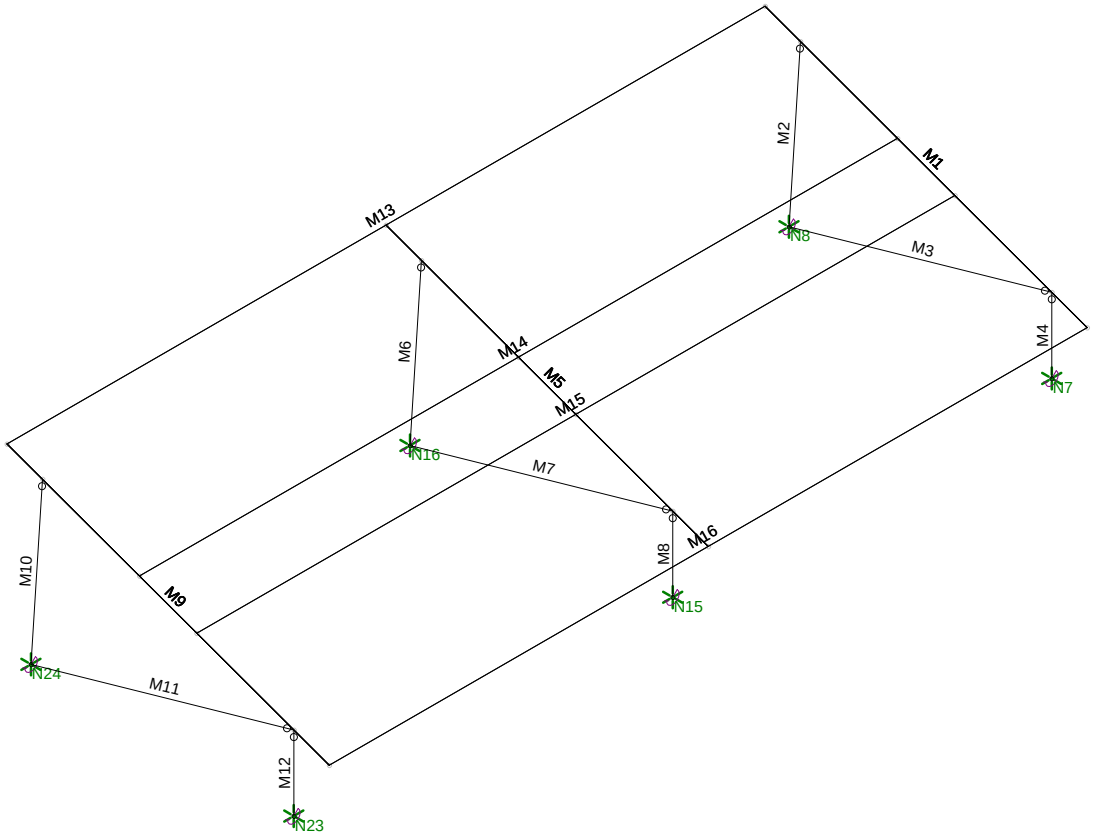


Schletter, Inc.		20ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

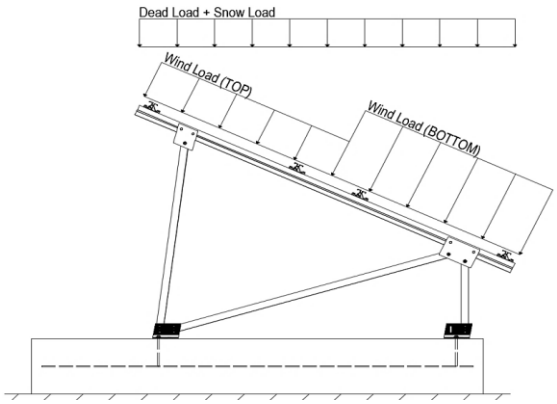
1.2 Construction

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 =	20°
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 =	20.62	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.91		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	130	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	26.53	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.050	*(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.*
$Cf+_{BOTTOM}$ =	1.650		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.400		
$Cf-_{TOP, INNER PURLIN}$ =	-1.840	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.000		

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

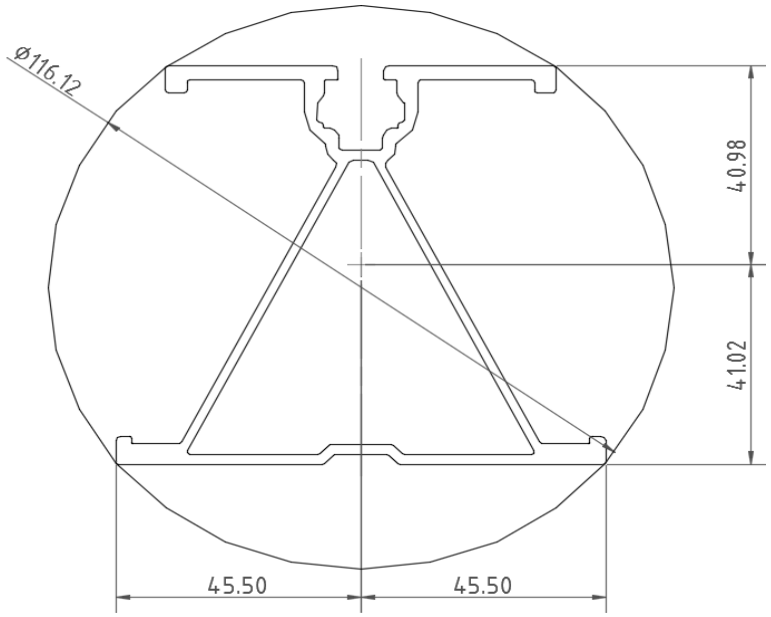
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

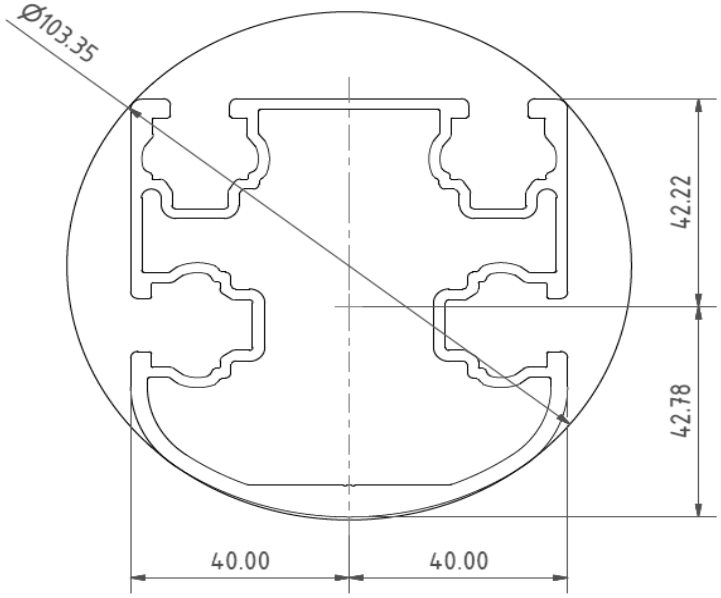
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	120	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.968	k-ft
M_z =	0.302	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	97%	



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).

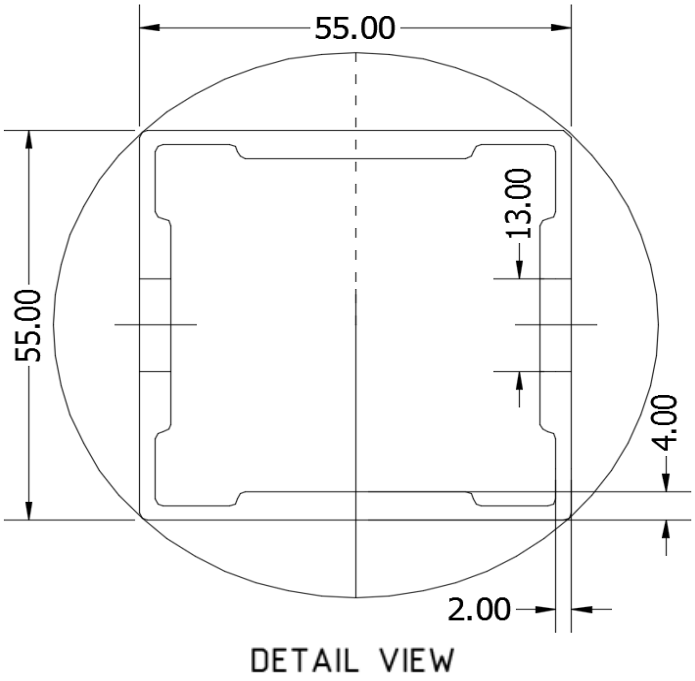
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.076	k-ft
M_z =	0.000	k-ft
P_n =	-0.264	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	89%	



4.3 Front Strut Design

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

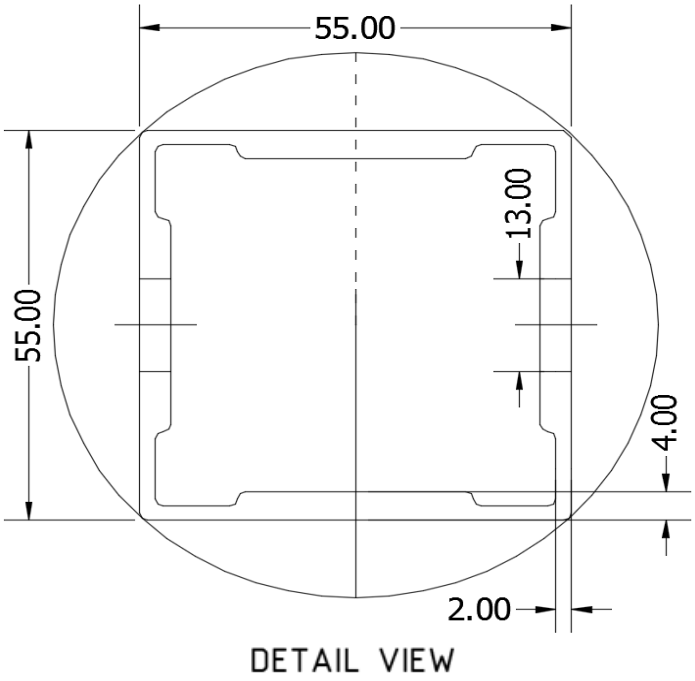
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.417	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	12%	



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).

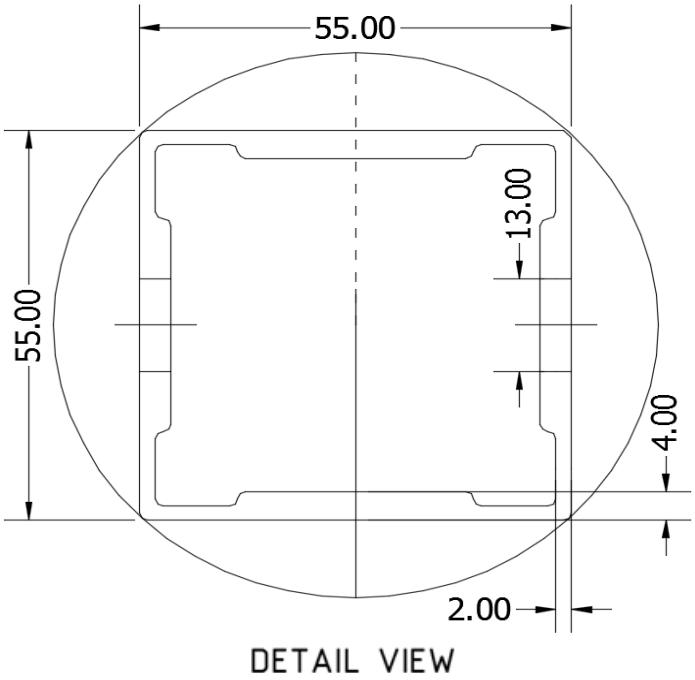
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	1.647	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	23%	



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 =	55.91	in
$\Phi F_{ty\ AXIAL}$ =	15.92	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 =	3.472	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	23%	



5. FOUNDATION DESIGN CALCULATIONS

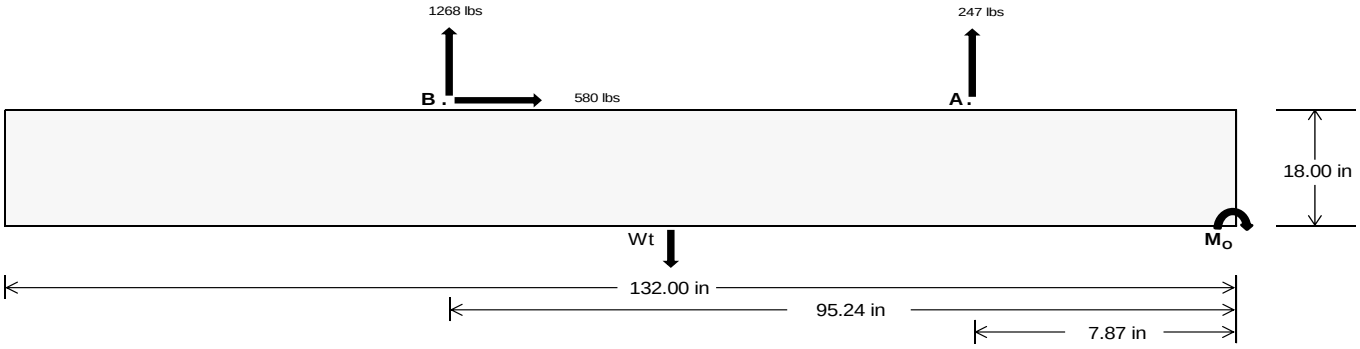
5.1 Helical Pile Foundations

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 =	1091.38	5514.25	k
Compressive Load =	4442.27	4835.31	k
Lateral Load =	12.20	2515.39	k
Moment (Weak Axis) =	0.03	0.01	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	133120.0 in-lbs
Resisting Force Required =	2016.97 lbs
S.F. =	1.67
Weight Required =	3361.62 lbs
Minimum Width =	29 in in
Weight Provided =	5781.88 lbs

Sliding

Force =	580.09 lbs
Friction =	0.4
Weight Required =	1450.23 lbs
Resisting Weight =	5781.88 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	580.09 lbs
Cohesion =	130 psf
Area =	26.58 ft^2
Resisting =	2890.94 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 29in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 29in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 29in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	29 in	30 in	31 in	32 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.42 ft) =	5782 lbs	5981 lbs	6181 lbs	6380 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	29 in	30 in	31 in	32 in	29 in	30 in	31 in	32 in	29 in	30 in	31 in	32 in	29 in	30 in	31 in	32 in
F_A	1553 lbs	1553 lbs	1553 lbs	1553 lbs	1501 lbs	1501 lbs	1501 lbs	1501 lbs	2162 lbs	2162 lbs	2162 lbs	2162 lbs	-494 lbs	-494 lbs	-494 lbs	-494 lbs
F_B	1584 lbs	1584 lbs	1584 lbs	1584 lbs	1805 lbs	1805 lbs	1805 lbs	1805 lbs	2412 lbs	2412 lbs	2412 lbs	2412 lbs	-2535 lbs	-2535 lbs	-2535 lbs	-2535 lbs
F_V	176 lbs	176 lbs	176 lbs	176 lbs	1040 lbs	1040 lbs	1040 lbs	1040 lbs	899 lbs	899 lbs	899 lbs	899 lbs	-1160 lbs	-1160 lbs	-1160 lbs	-1160 lbs
P_{total}	8919 lbs	9119 lbs	9318 lbs	9517 lbs	9088 lbs	9287 lbs	9487 lbs	9686 lbs	10356 lbs	10555 lbs	10754 lbs	10954 lbs	440 lbs	559 lbs	679 lbs	799 lbs
M	3926 lbs-ft	3926 lbs-ft	3926 lbs-ft	3926 lbs-ft	4432 lbs-ft	4432 lbs-ft	4432 lbs-ft	4432 lbs-ft	5944 lbs-ft	5944 lbs-ft	5944 lbs-ft	5944 lbs-ft	2045 lbs-ft	2045 lbs-ft	2045 lbs-ft	2045 lbs-ft
e	0.44 ft	0.43 ft	0.42 ft	0.41 ft	0.49 ft	0.48 ft	0.47 ft	0.46 ft	0.57 ft	0.56 ft	0.55 ft	0.54 ft	4.65 ft	3.66 ft	3.01 ft	2.56 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}	255.0 psf	253.7 psf	252.5 psf	251.4 psf	250.9 psf	249.8 psf	248.8 psf	247.8 psf	267.6 psf	265.9 psf	264.4 psf	262.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	416.1 psf	409.5 psf	403.3 psf	397.5 psf	432.8 psf	425.6 psf	418.9 psf	412.6 psf	511.5 psf	501.7 psf	492.6 psf	484.0 psf	142.6 psf	80.9 psf	70.4 psf	67.9 psf

Maximum Bearing Pressure = 512 psf
Allowable Bearing Pressure = 1500 psf

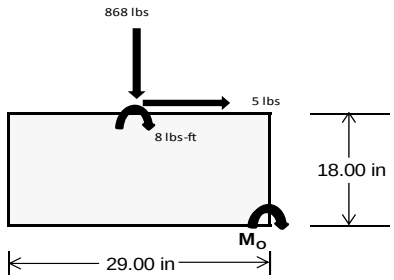
Use a 132in long x 29in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	1033.9 ft-lbs
Resisting Force Required =	855.67 lbs
S.F. =	1.67
Weight Required =	1426.12 lbs
Minimum Width =	29 in in
Weight Provided =	5781.88 lbs

A minimum 132in long x 29in 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	29 in			29 in			29 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	241 lbs	641 lbs	241 lbs	868 lbs	2575 lbs	868 lbs	70 lbs	187 lbs	70 lbs
F_V	1 lbs	0 lbs	1 lbs	5 lbs	0 lbs	5 lbs	0 lbs	0 lbs	0 lbs
P_{total}	7399 lbs	5782 lbs	7399 lbs	7682 lbs	5782 lbs	7682 lbs	2163 lbs	5782 lbs	2163 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	15 lbs-ft	0 lbs-ft	15 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	0.40 ft	0.40 ft	0.40 ft	0.40 ft	0.40 ft	0.40 ft	0.40 ft	0.40 ft	0.40 ft
f_{min}	278.0 psf	217.5 psf	278.0 psf	287.6 psf	217.5 psf	287.6 psf	81.3 psf	217.5 psf	81.3 psf
f_{max}	278.7 psf	217.5 psf	278.7 psf	290.4 psf	217.5 psf	290.4 psf	81.4 psf	217.5 psf	81.4 psf

Maximum Bearing Pressure = 290 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 29in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 29in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

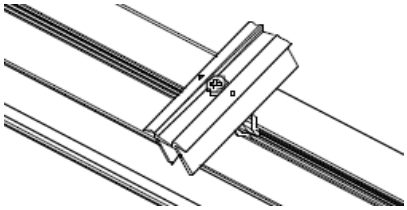
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

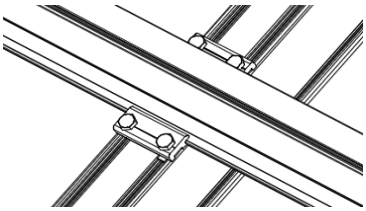
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.597 k
Allowable Uplift	=	1.214 k
Utilization	=	49%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	2.117 k
Allowable Uplift	=	4.357 k
Utilization	=	49%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	3.417 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	46%

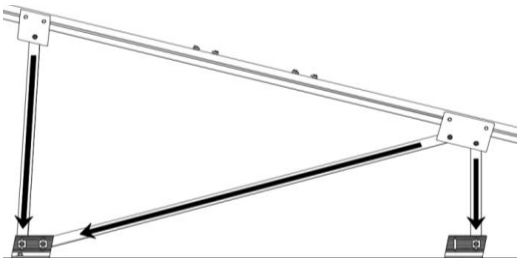
Rear Strut

Maximum Axial Load	=	3.785 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	51%

Diagonal Strut

Maximum Axial Load	=	1.742 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	23%

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

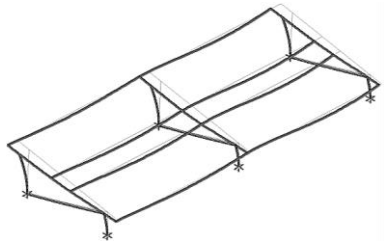
7.1 Seismic Drift - N/A

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}	=	40.12 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.802 in
Max Drift, Δ_{MAX}	=	0.043 in

N/A

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	120 in	L_b =	120
J =	0.432	J =	0.432
	331.976		211.117
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b} Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	27.4 ksi	φF_L=	28.6
3.4.16		**3.4.16**	
b/t =	32.195	b/t =	37.0588
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{1.6Dp}$	
S1 =	12.2	S1 =	12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$		$S2 = \frac{k_1 Bp}{1.6Dp}$	
S2 =	46.7	S2 =	46.7
φF_L=	φb[Bp-1.6Dp*b/t]	φF_L=	φb[Bp-1.6Dp*b/t]
φF_L=	25.1 ksi	φF_L=	23.1 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =		N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b} Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L=	1.17φyFcy		
φF_L=	38.9 ksi		
3.4.18		**3.4.18**	
h/t =	37.0588	h/t =	32.195
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b} 1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	40.985	C_0 =	45.5
Cc =	41.015	Cc =	45.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.2	S2 =	77.3
φF_L=	φb[Bbr-mDbr*h/t]	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
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 = 55.91 in
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.4 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

Weak Axis:

3.4.14

L_b = 55.91
J = 0.942
87.2529

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

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 = 1.29339

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76107

φF_L= (φccFcy)/(λ²)

φF_L= 15.9235 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 = 15.92 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 16.39 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	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	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	-77.697	-77.697	0	0
2	M14	y	-77.697	-77.697	0	0
3	M15	y	-122.096	-122.096	0	0
4	M16	y	-122.096	-122.096	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	177.594	177.594	0	0
2	M14	y	136.155	136.155	0	0
3	M15	y	73.997	73.997	0	0
4	M16	y	73.997	73.997	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	469.783	2	1102.084	1	.86	1	.004	1	0	1	0	1
2		min	-611.492	3	-1295.014	3	.037	15	0	15	0	1	0	1
3	N7	max	.036	9	1209.185	1	-.355	15	0	15	0	1	0	1
4		min	-.126	2	-236.19	3	-9.385	1	-.02	1	0	1	0	1
5	N15	max	.025	9	3417.13	1	0	9	0	9	0	1	0	1
6		min	-1.574	2	-839.521	3	0	3	0	3	0	1	0	1
7	N16	max	1795.589	2	3719.473	1	0	3	0	3	0	1	0	1
8		min	-1934.914	3	-4241.734	3	0	1	0	1	0	1	0	1
9	N23	max	.036	9	1209.185	1	9.385	1	.02	1	0	1	0	1
10		min	-.126	2	-236.19	3	.355	15	0	15	0	1	0	1
11	N24	max	469.783	2	1102.084	1	-.037	15	0	15	0	1	0	1
12		min	-611.492	3	-1295.014	3	-.86	1	-.004	1	0	1	0	1
13	Totals:	max	2733.329	2	11759.14	1	0	9						
14		min	-3158.508	3	-8143.663	3	0	3						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	99.316	1	486.677	1	-5.881	15	0	3	.237	1	0	1
2			min	3.634	15	-647.148	3	-161.474	1	-.013	2	.009	15	0	3
3		2	max	99.316	1	340.883	1	-4.523	15	0	3	.078	1	.613	3
4			min	3.634	15	-455.416	3	-124.12	1	-.013	2	.003	15	-.46	1
5		3	max	99.316	1	195.09	1	-3.165	15	0	3	0	3	1.012	3
6			min	3.634	15	-263.684	3	-86.766	1	-.013	2	-.039	1	-.758	1
7		4	max	99.316	1	49.296	1	-1.807	15	0	3	-.003	12	1.198	3
8			min	3.634	15	-71.953	3	-49.412	1	-.013	2	-.115	1	-.893	1
9		5	max	99.316	1	119.779	3	-.45	15	0	3	-.005	12	1.172	3
10			min	3.634	15	-96.498	1	-12.058	1	-.013	2	-.149	1	-.867	1
11		6	max	99.316	1	311.51	3	25.295	1	0	3	-.005	15	.932	3
12			min	3.634	15	-242.292	1	.398	12	-.013	2	-.142	1	-.679	1
13		7	max	99.316	1	503.242	3	62.649	1	0	3	-.003	15	.48	3
14			min	3.634	15	-388.086	1	1.756	12	-.013	2	-.093	1	-.329	1
15		8	max	99.316	1	694.974	3	100.003	1	0	3	0	10	.184	1
16			min	3.634	15	-533.879	1	3.113	12	-.013	2	-.003	3	-.186	3
17		9	max	99.316	1	886.705	3	137.357	1	0	3	.13	1	.858	1
18			min	3.634	15	-679.673	1	4.471	12	-.013	2	.003	12	-1.065	3
19		10	max	99.316	1	825.467	1	-5.828	12	.013	2	.303	1	1.694	1
20			min	3.634	15	-1078.437	3	-174.711	1	0	3	.008	12	-2.156	3
21		11	max	99.316	1	679.673	1	-4.471	12	.013	2	.13	1	.858	1
22			min	3.634	15	-886.705	3	-137.357	1	0	3	.003	12	-1.065	3
23		12	max	99.316	1	533.879	1	-3.113	12	.013	2	0	10	.184	1
24			min	3.634	15	-694.974	3	-100.003	1	0	3	-.003	3	-.186	3
25		13	max	99.316	1	388.086	1	-1.756	12	.013	2	-.003	15	.48	3
26			min	3.634	15	-503.242	3	-62.649	1	0	3	-.093	1	-.329	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	99.316	1	242.292	1	-.398	12	.013	2	-.005	15	.932	3
28			min	3.634	15	-311.51	3	-25.295	1	0	3	-.142	1	-.679	1
29		15	max	99.316	1	96.498	1	12.058	1	.013	2	-.005	12	1.172	3
30			min	3.634	15	-119.779	3	.45	15	0	3	-.149	1	-.867	1
31		16	max	99.316	1	71.953	3	49.412	1	.013	2	-.003	12	1.198	3
32			min	3.634	15	-49.296	1	1.807	15	0	3	-.115	1	-.893	1
33		17	max	99.316	1	263.684	3	86.766	1	.013	2	0	3	1.012	3
34			min	3.634	15	-195.09	1	3.165	15	0	3	-.039	1	-.758	1
35		18	max	99.316	1	455.416	3	124.12	1	.013	2	.078	1	.613	3
36			min	3.634	15	-340.883	1	4.523	15	0	3	.003	15	-.46	1
37		19	max	99.316	1	647.148	3	161.474	1	.013	2	.237	1	0	1
38			min	3.634	15	-486.677	1	5.881	15	0	3	.009	15	0	3
39	M14	1	max	46.183	1	515.354	1	-6.063	15	.008	3	.27	1	0	1
40			min	1.693	15	-506.136	3	-166.476	1	-.011	1	.01	15	0	3
41		2	max	46.183	1	369.56	1	-4.705	15	.008	3	.106	1	.481	3
42			min	1.693	15	-360.448	3	-129.122	1	-.011	1	.004	15	-.492	1
43		3	max	46.183	1	223.766	1	-3.347	15	.008	3	.001	3	.801	3
44			min	1.693	15	-214.759	3	-91.768	1	-.011	1	-.017	1	-.821	1
45		4	max	46.183	1	77.972	1	-1.989	15	.008	3	-.003	12	.959	3
46			min	1.693	15	-69.071	3	-54.414	1	-.011	1	-.098	1	-.989	1
47		5	max	46.183	1	76.617	3	-.632	15	.008	3	-.005	12	.954	3
48			min	1.693	15	-67.822	1	-17.061	1	-.011	1	-.138	1	-.995	1
49		6	max	46.183	1	222.306	3	20.293	1	.008	3	-.005	15	.788	3
50			min	1.693	15	-213.615	1	.222	12	-.011	1	-.136	1	-.838	1
51		7	max	46.183	1	367.994	3	57.647	1	.008	3	-.003	15	.46	3
52			min	1.693	15	-359.409	1	1.579	12	-.011	1	-.093	1	-.52	1
53		8	max	46.183	1	513.682	3	95.001	1	.008	3	0	10	0	15
54			min	1.693	15	-505.203	1	2.937	12	-.011	1	-.008	1	-.049	2
55		9	max	46.183	1	659.37	3	132.355	1	.008	3	.118	1	.603	1
56			min	1.693	15	-650.997	1	4.295	12	-.011	1	.002	12	-.681	3
57		10	max	46.183	1	796.791	1	-5.652	12	.011	1	.286	1	1.407	1
58			min	1.693	15	-805.059	3	-169.709	1	-.008	3	.008	12	-1.495	3
59		11	max	46.183	1	650.997	1	-4.295	12	.011	1	.118	1	.603	1
60			min	1.693	15	-659.37	3	-132.355	1	-.008	3	.002	12	-.681	3
61		12	max	46.183	1	505.203	1	-2.937	12	.011	1	0	10	0	15
62			min	1.693	15	-513.682	3	-95.001	1	-.008	3	-.008	1	-.049	2
63		13	max	46.183	1	359.409	1	-1.579	12	.011	1	-.003	15	.46	3
64			min	1.693	15	-367.994	3	-57.647	1	-.008	3	-.093	1	-.52	1
65		14	max	46.183	1	213.615	1	-.222	12	.011	1	-.005	15	.788	3
66			min	1.693	15	-222.306	3	-20.293	1	-.008	3	-.136	1	-.838	1
67		15	max	46.183	1	67.822	1	17.061	1	.011	1	-.005	12	.954	3
68			min	1.693	15	-76.617	3	.632	15	-.008	3	-.138	1	-.995	1
69		16	max	46.183	1	69.071	3	54.414	1	.011	1	-.003	12	.959	3
70			min	1.693	15	-77.972	1	1.989	15	-.008	3	-.098	1	-.989	1
71		17	max	46.183	1	214.759	3	91.768	1	.011	1	.001	3	.801	3
72			min	1.693	15	-223.766	1	3.347	15	-.008	3	-.017	1	-.821	1
73		18	max	46.183	1	360.448	3	129.122	1	.011	1	.106	1	.481	3
74			min	1.693	15	-369.56	1	4.705	15	-.008	3	.004	15	-.492	1
75		19	max	46.183	1	506.136	3	166.476	1	.011	1	.27	1	0	1
76			min	1.693	15	-515.354	1	6.063	15	-.008	3	.01	15	0	3
77	M15	1	max	-1.781	15	616.952	2	-6.061	15	.011	1	.27	1	0	2
78			min	-48.54	1	-273.267	3	-166.454	1	-.007	3	.01	15	0	3
79		2	max	-1.781	15	440.716	2	-4.704	15	.011	1	.106	1	.261	3
80			min	-48.54	1	-196.643	3	-129.1	1	-.007	3	.004	15	-.588	2
81		3	max	-1.781	15	264.48	2	-3.346	15	.011	1	.001	3	.437	3
82			min	-48.54	1	-120.02	3	-91.746	1	-.007	3	-.017	1	-.979	2
83		4	max	-1.781	15	88.245	2	-1.988	15	.011	1	-.003	12	.528	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	-48.54	1	-43.396	3	-54.392	1	-.007	3	-.098	1	-1.175	2
85		5	max	-1.781	15	33.228	3	-.63	15	.011	1	-.005	12	.533	3
86			min	-48.54	1	-87.991	2	-17.039	1	-.007	3	-.138	1	-1.175	2
87		6	max	-1.781	15	109.852	3	20.315	1	.011	1	-.005	15	.454	3
88			min	-48.54	1	-264.227	2	.261	12	-.007	3	-.136	1	-.98	2
89		7	max	-1.781	15	186.476	3	57.669	1	.011	1	-.003	15	.289	3
90			min	-48.54	1	-440.463	2	1.619	12	-.007	3	-.093	1	-.588	2
91		8	max	-1.781	15	263.1	3	95.023	1	.011	1	0	10	.04	3
92			min	-48.54	1	-616.698	2	2.976	12	-.007	3	-.008	1	-.015	1
93		9	max	-1.781	15	339.723	3	132.377	1	.011	1	.118	1	.782	2
94			min	-48.54	1	-792.934	2	4.334	12	-.007	3	.002	12	-.295	3
95		10	max	-1.781	15	969.17	2	-5.692	12	.007	3	.286	1	1.761	2
96			min	-48.54	1	-416.347	3	-169.731	1	-.011	1	.008	12	-.715	3
97		11	max	-1.781	15	792.934	2	-4.334	12	.007	3	.118	1	.782	2
98			min	-48.54	1	-339.723	3	-132.377	1	-.011	1	.002	12	-.295	3
99		12	max	-1.781	15	616.698	2	-2.976	12	.007	3	0	10	.04	3
100			min	-48.54	1	-263.1	3	-95.023	1	-.011	1	-.008	1	-.015	1
101		13	max	-1.781	15	440.463	2	-1.619	12	.007	3	-.003	15	.289	3
102			min	-48.54	1	-186.476	3	-57.669	1	-.011	1	-.093	1	-.588	2
103		14	max	-1.781	15	264.227	2	-.261	12	.007	3	-.005	15	.454	3
104			min	-48.54	1	-109.852	3	-20.315	1	-.011	1	-.136	1	-.98	2
105		15	max	-1.781	15	87.991	2	17.039	1	.007	3	-.005	12	.533	3
106			min	-48.54	1	-33.228	3	.63	15	-.011	1	-.138	1	-1.175	2
107		16	max	-1.781	15	43.396	3	54.392	1	.007	3	-.003	12	.528	3
108			min	-48.54	1	-88.245	2	1.988	15	-.011	1	-.098	1	-1.175	2
109		17	max	-1.781	15	120.02	3	91.746	1	.007	3	.001	3	.437	3
110			min	-48.54	1	-264.48	2	3.346	15	-.011	1	-.017	1	-.979	2
111		18	max	-1.781	15	196.643	3	129.1	1	.007	3	.106	1	.261	3
112			min	-48.54	1	-440.716	2	4.704	15	-.011	1	.004	15	-.588	2
113		19	max	-1.781	15	273.267	3	166.454	1	.007	3	.27	1	0	2
114			min	-48.54	1	-616.952	2	6.061	15	-.011	1	.01	15	0	3
115	M16	1	max	-3.864	15	590.409	2	-5.887	15	.012	1	.238	1	0	2
116			min	-105.484	1	-254.541	3	-161.694	1	-.01	3	.009	15	0	3
117		2	max	-3.864	15	414.173	2	-4.529	15	.012	1	.079	1	.24	3
118			min	-105.484	1	-177.917	3	-124.34	1	-.01	3	.003	15	-.558	2
119		3	max	-3.864	15	237.937	2	-3.171	15	.012	1	0	12	.395	3
120			min	-105.484	1	-101.293	3	-86.986	1	-.01	3	-.038	1	-.92	2
121		4	max	-3.864	15	61.702	2	-1.813	15	.012	1	-.004	12	.465	3
122			min	-105.484	1	-24.669	3	-49.632	1	-.01	3	-.114	1	-1.087	2
123		5	max	-3.864	15	51.954	3	-.455	15	.012	1	-.005	12	.45	3
124			min	-105.484	1	-114.534	2	-12.279	1	-.01	3	-.149	1	-1.057	2
125		6	max	-3.864	15	128.578	3	25.075	1	.012	1	-.005	15	.35	3
126			min	-105.484	1	-290.77	2	.528	12	-.01	3	-.142	1	-.832	2
127		7	max	-3.864	15	205.202	3	62.429	1	.012	1	-.003	15	.164	3
128			min	-105.484	1	-467.005	2	1.886	12	-.01	3	-.093	1	-.411	2
129		8	max	-3.864	15	281.826	3	99.783	1	.012	1	0	10	.205	2
130			min	-105.484	1	-643.241	2	3.244	12	-.01	3	-.003	1	-.106	3
131		9	max	-3.864	15	358.45	3	137.137	1	.012	1	.129	1	1.018	2
132			min	-105.484	1	-819.477	2	4.601	12	-.01	3	.003	12	-.462	3
133		10	max	-3.864	15	995.713	2	-5.959	12	.01	3	.302	1	2.027	2
134			min	-105.484	1	-435.074	3	-174.491	1	-.012	1	.009	12	-.903	3
135		11	max	-3.864	15	819.477	2	-4.601	12	.01	3	.129	1	1.018	2
136			min	-105.484	1	-358.45	3	-137.137	1	-.012	1	.003	12	-.462	3
137		12	max	-3.864	15	643.241	2	-3.244	12	.01	3	0	10	.205	2
138			min	-105.484	1	-281.826	3	-99.783	1	-.012	1	-.003	1	-.106	3
139		13	max	-3.864	15	467.005	2	-1.886	12	.01	3	-.003	15	.164	3
140			min	-105.484	1	-205.202	3	-62.429	1	-.012	1	-.093	1	-.411	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	-3.864	15	290.77	2	-.528	12	.01	3	-.005	15	.35	3
142			min	-105.484	1	-128.578	3	-25.075	1	-.012	1	-.142	1	-.832	2
143		15	max	-3.864	15	114.534	2	12.279	1	.01	3	-.005	12	.45	3
144			min	-105.484	1	-51.954	3	.455	15	-.012	1	-.149	1	-1.057	2
145		16	max	-3.864	15	24.669	3	49.632	1	.01	3	-.004	12	.465	3
146			min	-105.484	1	-61.702	2	1.813	15	-.012	1	-.114	1	-1.087	2
147		17	max	-3.864	15	101.293	3	86.986	1	.01	3	0	12	.395	3
148			min	-105.484	1	-237.937	2	3.171	15	-.012	1	-.038	1	-.92	2
149		18	max	-3.864	15	177.917	3	124.34	1	.01	3	.079	1	.24	3
150			min	-105.484	1	-414.173	2	4.529	15	-.012	1	.003	15	-.558	2
151		19	max	-3.864	15	254.541	3	161.694	1	.01	3	.238	1	0	2
152			min	-105.484	1	-590.409	2	5.887	15	-.012	1	.009	15	0	3
153	M2	1	max	1077.007	1	2.026	4	.927	1	0	3	0	3	0	1
154			min	-1156.117	3	.477	15	.034	15	0	1	0	1	0	1
155		2	max	1077.387	1	1.993	4	.927	1	0	3	0	1	0	15
156			min	-1155.833	3	.47	15	.034	15	0	1	0	15	0	4
157		3	max	1077.766	1	1.959	4	.927	1	0	3	0	1	0	15
158			min	-1155.548	3	.462	15	.034	15	0	1	0	15	-.001	4
159		4	max	1078.145	1	1.926	4	.927	1	0	3	0	1	0	15
160			min	-1155.264	3	.454	15	.034	15	0	1	0	15	-.002	4
161		5	max	1078.524	1	1.893	4	.927	1	0	3	0	1	0	15
162			min	-1154.979	3	.446	15	.034	15	0	1	0	15	-.002	4
163		6	max	1078.904	1	1.859	4	.927	1	0	3	.001	1	0	15
164			min	-1154.695	3	.438	15	.034	15	0	1	0	15	-.002	4
165		7	max	1079.283	1	1.826	4	.927	1	0	3	.001	1	0	15
166			min	-1154.41	3	.43	15	.034	15	0	1	0	15	-.003	4
167		8	max	1079.662	1	1.792	4	.927	1	0	3	.002	1	0	15
168			min	-1154.126	3	.422	15	.034	15	0	1	0	15	-.003	4
169		9	max	1080.041	1	1.759	4	.927	1	0	3	.002	1	0	15
170			min	-1153.842	3	.415	15	.034	15	0	1	0	15	-.004	4
171		10	max	1080.421	1	1.726	4	.927	1	0	3	.002	1	-.001	15
172			min	-1153.557	3	.407	15	.034	15	0	1	0	15	-.004	4
173		11	max	1080.8	1	1.692	4	.927	1	0	3	.002	1	-.001	15
174			min	-1153.273	3	.399	15	.034	15	0	1	0	15	-.005	4
175		12	max	1081.179	1	1.659	4	.927	1	0	3	.003	1	-.001	15
176			min	-1152.988	3	.391	15	.034	15	0	1	0	15	-.005	4
177		13	max	1081.558	1	1.626	4	.927	1	0	3	.003	1	-.001	15
178			min	-1152.704	3	.383	15	.034	15	0	1	0	15	-.006	4
179		14	max	1081.938	1	1.592	4	.927	1	0	3	.003	1	-.001	15
180			min	-1152.419	3	.375	15	.034	15	0	1	0	15	-.006	4
181		15	max	1082.317	1	1.559	4	.927	1	0	3	.003	1	-.002	15
182			min	-1152.135	3	.367	15	.034	15	0	1	0	15	-.006	4
183		16	max	1082.696	1	1.525	4	.927	1	0	3	.004	1	-.002	15
184			min	-1151.85	3	.36	15	.034	15	0	1	0	15	-.007	4
185		17	max	1083.075	1	1.492	4	.927	1	0	3	.004	1	-.002	15
186			min	-1151.566	3	.352	15	.034	15	0	1	0	15	-.007	4
187		18	max	1083.455	1	1.459	4	.927	1	0	3	.004	1	-.002	15
188			min	-1151.282	3	.344	15	.034	15	0	1	0	15	-.008	4
189		19	max	1083.834	1	1.425	4	.927	1	0	3	.004	1	-.002	15
190			min	-1150.997	3	.336	15	.034	15	0	1	0	15	-.008	4
191	M3	1	max	419.796	2	7.982	4	.078	1	0	3	0	1	.008	4
192			min	-552.837	3	1.877	15	.003	15	0	1	0	15	.002	15
193		2	max	419.626	2	7.212	4	.078	1	0	3	0	1	.005	2
194			min	-552.965	3	1.696	15	.003	15	0	1	0	15	0	12
195		3	max	419.456	2	6.442	4	.078	1	0	3	0	1	.002	2
196			min	-553.093	3	1.515	15	.003	15	0	1	0	15	0	3
197		4	max	419.285	2	5.672	4	.078	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-553.22	3	1.334	15	.003	15	0	1	0	15	-.002	3
199		5	max	419.115	2	4.902	4	.078	1	0	3	0	1	0	15
200			min	-553.348	3	1.153	15	.003	15	0	1	0	15	-.003	3
201		6	max	418.945	2	4.132	4	.078	1	0	3	0	1	-.001	15
202			min	-553.476	3	.972	15	.003	15	0	1	0	15	-.005	4
203		7	max	418.774	2	3.362	4	.078	1	0	3	0	1	-.001	15
204			min	-553.604	3	.791	15	.003	15	0	1	0	15	-.006	4
205		8	max	418.604	2	2.592	4	.078	1	0	3	0	1	-.002	15
206			min	-553.732	3	.61	15	.003	15	0	1	0	15	-.008	4
207		9	max	418.434	2	1.822	4	.078	1	0	3	0	1	-.002	15
208			min	-553.859	3	.429	15	.003	15	0	1	0	15	-.009	4
209		10	max	418.263	2	1.052	4	.078	1	0	3	0	1	-.002	15
210			min	-553.987	3	.248	15	.003	15	0	1	0	15	-.009	4
211		11	max	418.093	2	.369	2	.078	1	0	3	0	1	-.002	15
212			min	-554.115	3	-.039	3	.003	15	0	1	0	15	-.009	4
213		12	max	417.923	2	-.114	15	.078	1	0	3	0	1	-.002	15
214			min	-554.243	3	-.489	3	.003	15	0	1	0	15	-.009	4
215		13	max	417.752	2	-.295	15	.078	1	0	3	0	1	-.002	15
216			min	-554.37	3	-1.258	4	.003	15	0	1	0	15	-.009	4
217		14	max	417.582	2	-.476	15	.078	1	0	3	0	1	-.002	15
218			min	-554.498	3	-2.028	4	.003	15	0	1	0	15	-.008	4
219		15	max	417.412	2	-.657	15	.078	1	0	3	0	1	-.002	15
220			min	-554.626	3	-2.798	4	.003	15	0	1	0	15	-.007	4
221		16	max	417.241	2	-.838	15	.078	1	0	3	0	1	-.001	15
222			min	-554.754	3	-3.568	4	.003	15	0	1	0	15	-.006	4
223		17	max	417.071	2	-1.019	15	.078	1	0	3	0	1	-.001	15
224			min	-554.881	3	-4.338	4	.003	15	0	1	0	15	-.004	4
225		18	max	416.901	2	-1.2	15	.078	1	0	3	0	1	0	15
226			min	-555.009	3	-5.108	4	.003	15	0	1	0	15	-.002	4
227		19	max	416.73	2	-1.381	15	.078	1	0	3	0	1	0	1
228			min	-555.137	3	-5.878	4	.003	15	0	1	0	15	0	1
229	M4	1	max	1206.119	1	0	1	-.355	15	0	1	0	1	0	1
230			min	-238.49	3	0	1	-9.741	1	0	1	0	15	0	1
231		2	max	1206.289	1	0	1	-.355	15	0	1	0	12	0	1
232			min	-238.362	3	0	1	-9.741	1	0	1	0	1	0	1
233		3	max	1206.459	1	0	1	-.355	15	0	1	0	15	0	1
234			min	-238.234	3	0	1	-9.741	1	0	1	-.002	1	0	1
235		4	max	1206.63	1	0	1	-.355	15	0	1	0	15	0	1
236			min	-238.106	3	0	1	-9.741	1	0	1	-.003	1	0	1
237		5	max	1206.8	1	0	1	-.355	15	0	1	0	15	0	1
238			min	-237.979	3	0	1	-9.741	1	0	1	-.004	1	0	1
239		6	max	1206.97	1	0	1	-.355	15	0	1	0	15	0	1
240			min	-237.851	3	0	1	-9.741	1	0	1	-.005	1	0	1
241		7	max	1207.141	1	0	1	-.355	15	0	1	0	15	0	1
242			min	-237.723	3	0	1	-9.741	1	0	1	-.006	1	0	1
243		8	max	1207.311	1	0	1	-.355	15	0	1	0	15	0	1
244			min	-237.595	3	0	1	-9.741	1	0	1	-.007	1	0	1
245		9	max	1207.481	1	0	1	-.355	15	0	1	0	15	0	1
246			min	-237.468	3	0	1	-9.741	1	0	1	-.008	1	0	1
247		10	max	1207.652	1	0	1	-.355	15	0	1	0	15	0	1
248			min	-237.34	3	0	1	-9.741	1	0	1	-.01	1	0	1
249		11	max	1207.822	1	0	1	-.355	15	0	1	0	15	0	1
250			min	-237.212	3	0	1	-9.741	1	0	1	-.011	1	0	1
251		12	max	1207.992	1	0	1	-.355	15	0	1	0	15	0	1
252			min	-237.084	3	0	1	-9.741	1	0	1	-.012	1	0	1
253		13	max	1208.163	1	0	1	-.355	15	0	1	0	15	0	1
254			min	-236.957	3	0	1	-9.741	1	0	1	-.013	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	1208.333	1	0	1	-.355	15	0	1	0	15	0	1
256			min	-236.829	3	0	1	-9.741	1	0	1	-.014	1	0	1
257		15	max	1208.503	1	0	1	-.355	15	0	1	0	15	0	1
258			min	-236.701	3	0	1	-9.741	1	0	1	-.015	1	0	1
259		16	max	1208.674	1	0	1	-.355	15	0	1	0	15	0	1
260			min	-236.573	3	0	1	-9.741	1	0	1	-.016	1	0	1
261		17	max	1208.844	1	0	1	-.355	15	0	1	0	15	0	1
262			min	-236.446	3	0	1	-9.741	1	0	1	-.017	1	0	1
263		18	max	1209.014	1	0	1	-.355	15	0	1	0	15	0	1
264			min	-236.318	3	0	1	-9.741	1	0	1	-.018	1	0	1
265		19	max	1209.185	1	0	1	-.355	15	0	1	0	15	0	1
266			min	-236.19	3	0	1	-9.741	1	0	1	-.02	1	0	1
267	M6	1	max	3465.142	1	2.479	2	0	1	0	1	0	1	0	1
268			min	-3784.73	3	.108	3	0	1	0	1	0	1	0	1
269		2	max	3465.521	1	2.453	2	0	1	0	1	0	1	0	3
270			min	-3784.446	3	.088	3	0	1	0	1	0	1	0	2
271		3	max	3465.9	1	2.427	2	0	1	0	1	0	1	0	3
272			min	-3784.161	3	.069	3	0	1	0	1	0	1	-.001	2
273		4	max	3466.279	1	2.401	2	0	1	0	1	0	1	0	3
274			min	-3783.877	3	.049	3	0	1	0	1	0	1	-.002	2
275		5	max	3466.659	1	2.375	2	0	1	0	1	0	1	0	3
276			min	-3783.593	3	.03	3	0	1	0	1	0	1	-.002	2
277		6	max	3467.038	1	2.349	2	0	1	0	1	0	1	0	3
278			min	-3783.308	3	.01	3	0	1	0	1	0	1	-.003	2
279		7	max	3467.417	1	2.323	2	0	1	0	1	0	1	0	3
280			min	-3783.024	3	-.009	3	0	1	0	1	0	1	-.004	2
281		8	max	3467.796	1	2.297	2	0	1	0	1	0	1	0	3
282			min	-3782.739	3	-.029	3	0	1	0	1	0	1	-.004	2
283		9	max	3468.176	1	2.271	2	0	1	0	1	0	1	0	3
284			min	-3782.455	3	-.048	3	0	1	0	1	0	1	-.005	2
285		10	max	3468.555	1	2.245	2	0	1	0	1	0	1	0	3
286			min	-3782.17	3	-.068	3	0	1	0	1	0	1	-.005	2
287		11	max	3468.934	1	2.219	2	0	1	0	1	0	1	0	3
288			min	-3781.886	3	-.087	3	0	1	0	1	0	1	-.006	2
289		12	max	3469.313	1	2.193	2	0	1	0	1	0	1	0	3
290			min	-3781.601	3	-.107	3	0	1	0	1	0	1	-.007	2
291		13	max	3469.693	1	2.167	2	0	1	0	1	0	1	0	3
292			min	-3781.317	3	-.126	3	0	1	0	1	0	1	-.007	2
293		14	max	3470.072	1	2.141	2	0	1	0	1	0	1	0	3
294			min	-3781.033	3	-.146	3	0	1	0	1	0	1	-.008	2
295		15	max	3470.451	1	2.115	2	0	1	0	1	0	1	0	3
296			min	-3780.748	3	-.165	3	0	1	0	1	0	1	-.008	2
297		16	max	3470.831	1	2.089	2	0	1	0	1	0	1	0	3
298			min	-3780.464	3	-.185	3	0	1	0	1	0	1	-.009	2
299		17	max	3471.21	1	2.063	2	0	1	0	1	0	1	0	3
300			min	-3780.179	3	-.204	3	0	1	0	1	0	1	-.009	2
301		18	max	3471.589	1	2.037	2	0	1	0	1	0	1	0	3
302			min	-3779.895	3	-.224	3	0	1	0	1	0	1	-.01	2
303		19	max	3471.968	1	2.011	2	0	1	0	1	0	1	0	3
304			min	-3779.61	3	-.243	3	0	1	0	1	0	1	-.01	2
305	M7	1	max	1646.793	2	8.02	4	0	1	0	1	0	1	.01	2
306			min	-1739.255	3	1.882	15	0	1	0	1	0	1	0	3
307		2	max	1646.622	2	7.25	4	0	1	0	1	0	1	.008	2
308			min	-1739.383	3	1.701	15	0	1	0	1	0	1	-.002	3
309		3	max	1646.452	2	6.48	4	0	1	0	1	0	1	.005	2
310			min	-1739.511	3	1.52	15	0	1	0	1	0	1	-.003	3
311		4	max	1646.282	2	5.71	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-1739.639	3	1.339	15	0	1	0	1	0	1	-.005	3
313		5	max	1646.111	2	4.94	4	0	1	0	1	0	1	0	2
314			min	-1739.766	3	1.158	15	0	1	0	1	0	1	-.006	3
315		6	max	1645.941	2	4.17	4	0	1	0	1	0	1	0	2
316			min	-1739.894	3	.977	15	0	1	0	1	0	1	-.006	3
317		7	max	1645.771	2	3.4	4	0	1	0	1	0	1	-.001	15
318			min	-1740.022	3	.796	15	0	1	0	1	0	1	-.007	3
319		8	max	1645.6	2	2.63	4	0	1	0	1	0	1	-.002	15
320			min	-1740.15	3	.615	15	0	1	0	1	0	1	-.007	3
321		9	max	1645.43	2	1.968	2	0	1	0	1	0	1	-.002	15
322			min	-1740.277	3	.317	12	0	1	0	1	0	1	-.008	4
323		10	max	1645.26	2	1.368	2	0	1	0	1	0	1	-.002	15
324			min	-1740.405	3	-.041	3	0	1	0	1	0	1	-.009	4
325		11	max	1645.089	2	.768	2	0	1	0	1	0	1	-.002	15
326			min	-1740.533	3	-.491	3	0	1	0	1	0	1	-.009	4
327		12	max	1644.919	2	.168	2	0	1	0	1	0	1	-.002	15
328			min	-1740.661	3	-.941	3	0	1	0	1	0	1	-.009	4
329		13	max	1644.749	2	-.29	15	0	1	0	1	0	1	-.002	15
330			min	-1740.788	3	-1.391	3	0	1	0	1	0	1	-.009	4
331		14	max	1644.578	2	-.471	15	0	1	0	1	0	1	-.002	15
332			min	-1740.916	3	-1.99	4	0	1	0	1	0	1	-.008	4
333		15	max	1644.408	2	-.652	15	0	1	0	1	0	1	-.002	15
334			min	-1741.044	3	-2.76	4	0	1	0	1	0	1	-.007	4
335		16	max	1644.238	2	-.833	15	0	1	0	1	0	1	-.001	15
336			min	-1741.172	3	-3.53	4	0	1	0	1	0	1	-.006	4
337		17	max	1644.067	2	-1.014	15	0	1	0	1	0	1	-.001	15
338			min	-1741.299	3	-4.3	4	0	1	0	1	0	1	-.004	4
339		18	max	1643.897	2	-1.195	15	0	1	0	1	0	1	0	15
340			min	-1741.427	3	-5.07	4	0	1	0	1	0	1	-.002	4
341		19	max	1643.727	2	-1.376	15	0	1	0	1	0	1	0	1
342			min	-1741.555	3	-5.84	4	0	1	0	1	0	1	0	1
343	M8	1	max	3414.064	1	0	1	0	1	0	1	0	1	0	1
344			min	-841.82	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3414.234	1	0	1	0	1	0	1	0	1	0	1
346			min	-841.692	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3414.405	1	0	1	0	1	0	1	0	1	0	1
348			min	-841.565	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3414.575	1	0	1	0	1	0	1	0	1	0	1
350			min	-841.437	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3414.745	1	0	1	0	1	0	1	0	1	0	1
352			min	-841.309	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3414.916	1	0	1	0	1	0	1	0	1	0	1
354			min	-841.181	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3415.086	1	0	1	0	1	0	1	0	1	0	1
356			min	-841.054	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3415.256	1	0	1	0	1	0	1	0	1	0	1
358			min	-840.926	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3415.427	1	0	1	0	1	0	1	0	1	0	1
360			min	-840.798	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3415.597	1	0	1	0	1	0	1	0	1	0	1
362			min	-840.67	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3415.767	1	0	1	0	1	0	1	0	1	0	1
364			min	-840.543	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3415.938	1	0	1	0	1	0	1	0	1	0	1
366			min	-840.415	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3416.108	1	0	1	0	1	0	1	0	1	0	1
368			min	-840.287	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3416.278	1	0	1	0	1	0	1	0	1	0	1
370			min	-840.159	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3416.449	1	0	1	0	1	0	1	0	1	0	1
372			min	-840.032	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3416.619	1	0	1	0	1	0	1	0	1	0	1
374			min	-839.904	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3416.789	1	0	1	0	1	0	1	0	1	0	1
376			min	-839.776	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3416.96	1	0	1	0	1	0	1	0	1	0	1
378			min	-839.648	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3417.13	1	0	1	0	1	0	1	0	1	0	1
380			min	-839.521	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1077.007	1	2.026	4	-.034	15	0	1	0	1	0	1
382			min	-1156.117	3	.477	15	-.927	1	0	3	0	3	0	1
383		2	max	1077.387	1	1.993	4	-.034	15	0	1	0	15	0	15
384			min	-1155.833	3	.47	15	-.927	1	0	3	0	1	0	4
385		3	max	1077.766	1	1.959	4	-.034	15	0	1	0	15	0	15
386			min	-1155.548	3	.462	15	-.927	1	0	3	0	1	-.001	4
387		4	max	1078.145	1	1.926	4	-.034	15	0	1	0	15	0	15
388			min	-1155.264	3	.454	15	-.927	1	0	3	0	1	-.002	4
389		5	max	1078.524	1	1.893	4	-.034	15	0	1	0	15	0	15
390			min	-1154.979	3	.446	15	-.927	1	0	3	0	1	-.002	4
391		6	max	1078.904	1	1.859	4	-.034	15	0	1	0	15	0	15
392			min	-1154.695	3	.438	15	-.927	1	0	3	-.001	1	-.002	4
393		7	max	1079.283	1	1.826	4	-.034	15	0	1	0	15	0	15
394			min	-1154.41	3	.43	15	-.927	1	0	3	-.001	1	-.003	4
395		8	max	1079.662	1	1.792	4	-.034	15	0	1	0	15	0	15
396			min	-1154.126	3	.422	15	-.927	1	0	3	-.002	1	-.003	4
397		9	max	1080.041	1	1.759	4	-.034	15	0	1	0	15	0	15
398			min	-1153.842	3	.415	15	-.927	1	0	3	-.002	1	-.004	4
399		10	max	1080.421	1	1.726	4	-.034	15	0	1	0	15	-.001	15
400			min	-1153.557	3	.407	15	-.927	1	0	3	-.002	1	-.004	4
401		11	max	1080.8	1	1.692	4	-.034	15	0	1	0	15	-.001	15
402			min	-1153.273	3	.399	15	-.927	1	0	3	-.002	1	-.005	4
403		12	max	1081.179	1	1.659	4	-.034	15	0	1	0	15	-.001	15
404			min	-1152.988	3	.391	15	-.927	1	0	3	-.003	1	-.005	4
405		13	max	1081.558	1	1.626	4	-.034	15	0	1	0	15	-.001	15
406			min	-1152.704	3	.383	15	-.927	1	0	3	-.003	1	-.006	4
407		14	max	1081.938	1	1.592	4	-.034	15	0	1	0	15	-.001	15
408			min	-1152.419	3	.375	15	-.927	1	0	3	-.003	1	-.006	4
409		15	max	1082.317	1	1.559	4	-.034	15	0	1	0	15	-.002	15
410			min	-1152.135	3	.367	15	-.927	1	0	3	-.003	1	-.006	4
411		16	max	1082.696	1	1.525	4	-.034	15	0	1	0	15	-.002	15
412			min	-1151.85	3	.36	15	-.927	1	0	3	-.004	1	-.007	4
413		17	max	1083.075	1	1.492	4	-.034	15	0	1	0	15	-.002	15
414			min	-1151.566	3	.352	15	-.927	1	0	3	-.004	1	-.007	4
415		18	max	1083.455	1	1.459	4	-.034	15	0	1	0	15	-.002	15
416			min	-1151.282	3	.344	15	-.927	1	0	3	-.004	1	-.008	4
417		19	max	1083.834	1	1.425	4	-.034	15	0	1	0	15	-.002	15
418			min	-1150.997	3	.336	15	-.927	1	0	3	-.004	1	-.008	4
419	M11	1	max	419.796	2	7.982	4	-.003	15	0	1	0	15	.008	4
420			min	-552.837	3	1.877	15	-.078	1	0	3	0	1	.002	15
421		2	max	419.626	2	7.212	4	-.003	15	0	1	0	15	.005	2
422			min	-552.965	3	1.696	15	-.078	1	0	3	0	1	0	12
423		3	max	419.456	2	6.442	4	-.003	15	0	1	0	15	.002	2
424			min	-553.093	3	1.515	15	-.078	1	0	3	0	1	0	3
425		4	max	419.285	2	5.672	4	-.003	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-553.22	3	1.334	15	-.078	1	0	3	0	1	-.002	3
427		5	max	419.115	2	4.902	4	-.003	15	0	1	0	15	0	15
428			min	-553.348	3	1.153	15	-.078	1	0	3	0	1	-.003	3
429		6	max	418.945	2	4.132	4	-.003	15	0	1	0	15	-.001	15
430			min	-553.476	3	.972	15	-.078	1	0	3	0	1	-.005	4
431		7	max	418.774	2	3.362	4	-.003	15	0	1	0	15	-.001	15
432			min	-553.604	3	.791	15	-.078	1	0	3	0	1	-.006	4
433		8	max	418.604	2	2.592	4	-.003	15	0	1	0	15	-.002	15
434			min	-553.732	3	.61	15	-.078	1	0	3	0	1	-.008	4
435		9	max	418.434	2	1.822	4	-.003	15	0	1	0	15	-.002	15
436			min	-553.859	3	.429	15	-.078	1	0	3	0	1	-.009	4
437		10	max	418.263	2	1.052	4	-.003	15	0	1	0	15	-.002	15
438			min	-553.987	3	.248	15	-.078	1	0	3	0	1	-.009	4
439		11	max	418.093	2	.369	2	-.003	15	0	1	0	15	-.002	15
440			min	-554.115	3	-.039	3	-.078	1	0	3	0	1	-.009	4
441		12	max	417.923	2	-.114	15	-.003	15	0	1	0	15	-.002	15
442			min	-554.243	3	-.489	3	-.078	1	0	3	0	1	-.009	4
443		13	max	417.752	2	-.295	15	-.003	15	0	1	0	15	-.002	15
444			min	-554.37	3	-1.258	4	-.078	1	0	3	0	1	-.009	4
445		14	max	417.582	2	-.476	15	-.003	15	0	1	0	15	-.002	15
446			min	-554.498	3	-2.028	4	-.078	1	0	3	0	1	-.008	4
447		15	max	417.412	2	-.657	15	-.003	15	0	1	0	15	-.002	15
448			min	-554.626	3	-2.798	4	-.078	1	0	3	0	1	-.007	4
449		16	max	417.241	2	-.838	15	-.003	15	0	1	0	15	-.001	15
450			min	-554.754	3	-3.568	4	-.078	1	0	3	0	1	-.006	4
451		17	max	417.071	2	-1.019	15	-.003	15	0	1	0	15	-.001	15
452			min	-554.881	3	-4.338	4	-.078	1	0	3	0	1	-.004	4
453		18	max	416.901	2	-1.2	15	-.003	15	0	1	0	15	0	15
454			min	-555.009	3	-5.108	4	-.078	1	0	3	0	1	-.002	4
455		19	max	416.73	2	-1.381	15	-.003	15	0	1	0	15	0	1
456			min	-555.137	3	-5.878	4	-.078	1	0	3	0	1	0	1
457	M12	1	max	1206.119	1	0	1	9.741	1	0	1	0	15	0	1
458			min	-238.49	3	0	1	.355	15	0	1	0	1	0	1
459		2	max	1206.289	1	0	1	9.741	1	0	1	0	1	0	1
460			min	-238.362	3	0	1	.355	15	0	1	0	12	0	1
461		3	max	1206.459	1	0	1	9.741	1	0	1	.002	1	0	1
462			min	-238.234	3	0	1	.355	15	0	1	0	15	0	1
463		4	max	1206.63	1	0	1	9.741	1	0	1	.003	1	0	1
464			min	-238.106	3	0	1	.355	15	0	1	0	15	0	1
465		5	max	1206.8	1	0	1	9.741	1	0	1	.004	1	0	1
466			min	-237.979	3	0	1	.355	15	0	1	0	15	0	1
467		6	max	1206.97	1	0	1	9.741	1	0	1	.005	1	0	1
468			min	-237.851	3	0	1	.355	15	0	1	0	15	0	1
469		7	max	1207.141	1	0	1	9.741	1	0	1	.006	1	0	1
470			min	-237.723	3	0	1	.355	15	0	1	0	15	0	1
471		8	max	1207.311	1	0	1	9.741	1	0	1	.007	1	0	1
472			min	-237.595	3	0	1	.355	15	0	1	0	15	0	1
473		9	max	1207.481	1	0	1	9.741	1	0	1	.008	1	0	1
474			min	-237.468	3	0	1	.355	15	0	1	0	15	0	1
475		10	max	1207.652	1	0	1	9.741	1	0	1	.01	1	0	1
476			min	-237.34	3	0	1	.355	15	0	1	0	15	0	1
477		11	max	1207.822	1	0	1	9.741	1	0	1	.011	1	0	1
478			min	-237.212	3	0	1	.355	15	0	1	0	15	0	1
479		12	max	1207.992	1	0	1	9.741	1	0	1	.012	1	0	1
480			min	-237.084	3	0	1	.355	15	0	1	0	15	0	1
481		13	max	1208.163	1	0	1	9.741	1	0	1	.013	1	0	1
482			min	-236.957	3	0	1	.355	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	1208.333	1	0	1	9.741	1	0	1	.014	1	0	1
484			min	-236.829	3	0	1	.355	15	0	1	0	15	0	1
485		15	max	1208.503	1	0	1	9.741	1	0	1	.015	1	0	1
486			min	-236.701	3	0	1	.355	15	0	1	0	15	0	1
487		16	max	1208.674	1	0	1	9.741	1	0	1	.016	1	0	1
488			min	-236.573	3	0	1	.355	15	0	1	0	15	0	1
489		17	max	1208.844	1	0	1	9.741	1	0	1	.017	1	0	1
490			min	-236.446	3	0	1	.355	15	0	1	0	15	0	1
491		18	max	1209.014	1	0	1	9.741	1	0	1	.018	1	0	1
492			min	-236.318	3	0	1	.355	15	0	1	0	15	0	1
493		19	max	1209.185	1	0	1	9.741	1	0	1	.02	1	0	1
494			min	-236.19	3	0	1	.355	15	0	1	0	15	0	1
495	M1	1	max	161.478	1	647.127	3	-3.634	15	0	1	.237	1	0	3
496			min	5.881	15	-485.32	1	-99.205	1	0	3	.009	15	-.013	2
497		2	max	161.968	1	646.118	3	-3.634	15	0	1	.184	1	.243	1
498			min	6.029	15	-486.666	1	-99.205	1	0	3	.007	15	-.341	3
499		3	max	331.185	3	544.527	1	-3.6	15	0	3	.132	1	.488	1
500			min	-200.742	2	-467.429	3	-98.507	1	0	1	.005	15	-.668	3
501		4	max	331.552	3	543.181	1	-3.6	15	0	3	.08	1	.201	1
502			min	-200.253	2	-468.439	3	-98.507	1	0	1	.003	15	-.421	3
503		5	max	331.92	3	541.835	1	-3.6	15	0	3	.028	1	-.004	15
504			min	-199.763	2	-469.448	3	-98.507	1	0	1	.001	15	-.174	3
505		6	max	332.287	3	540.489	1	-3.6	15	0	3	0	15	.074	3
506			min	-199.273	2	-470.458	3	-98.507	1	0	1	-.024	1	-.371	1
507		7	max	332.655	3	539.143	1	-3.6	15	0	3	-.003	15	.323	3
508			min	-198.783	2	-471.467	3	-98.507	1	0	1	-.076	1	-.656	1
509		8	max	333.022	3	537.797	1	-3.6	15	0	3	-.005	15	.572	3
510			min	-198.293	2	-472.477	3	-98.507	1	0	1	-.128	1	-.94	1
511		9	max	343.322	3	42.102	2	-5.293	15	0	9	.075	1	.668	3
512			min	-132.489	2	.409	15	-144.72	1	0	3	.003	15	-1.071	1
513		10	max	343.689	3	40.756	2	-5.293	15	0	9	0	15	.65	3
514			min	-131.999	2	.003	15	-144.72	1	0	3	0	1	-1.083	1
515		11	max	344.057	3	39.41	2	-5.293	15	0	9	-.003	15	.633	3
516			min	-131.509	2	-1.655	4	-144.72	1	0	3	-.077	1	-1.094	1
517		12	max	354.292	3	306.794	3	-3.512	15	0	2	.126	1	.551	3
518			min	-78.506	10	-582.275	1	-96.228	1	0	3	.005	15	-.966	1
519		13	max	354.659	3	305.784	3	-3.512	15	0	2	.076	1	.39	3
520			min	-78.097	10	-583.621	1	-96.228	1	0	3	.003	15	-.659	1
521		14	max	355.027	3	304.775	3	-3.512	15	0	2	.025	1	.229	3
522			min	-77.689	10	-584.967	1	-96.228	1	0	3	0	15	-.35	1
523		15	max	355.394	3	303.765	3	-3.512	15	0	2	0	15	.068	3
524			min	-77.281	10	-586.313	1	-96.228	1	0	3	-.026	1	-.041	1
525		16	max	355.761	3	302.756	3	-3.512	15	0	2	-.003	15	.292	2
526			min	-76.873	10	-587.659	1	-96.228	1	0	3	-.077	1	-.092	3
527		17	max	356.129	3	301.746	3	-3.512	15	0	2	-.005	15	.601	2
528			min	-76.464	10	-589.005	1	-96.228	1	0	3	-.128	1	-.251	3
529		18	max	-6.035	15	592.215	2	-3.865	15	0	3	-.007	15	.302	2
530			min	-162.18	1	-253.579	3	-105.592	1	0	2	-.182	1	-.124	3
531		19	max	-5.887	15	590.869	2	-3.865	15	0	3	-.009	15	.01	3
532			min	-161.69	1	-254.588	3	-105.592	1	0	2	-.238	1	-.012	1
533	M5	1	max	349.412	1	2156.806	3	0	1	0	1	0	1	.027	2
534			min	11.658	12	-1642.986	1	0	1	0	1	0	1	0	3
535		2	max	349.902	1	2155.796	3	0	1	0	1	0	1	.894	1
536			min	11.903	12	-1644.332	1	0	1	0	1	0	1	-1.139	3
537		3	max	1064.477	3	1660.035	1	0	1	0	1	0	1	1.722	1
538			min	-715.035	2	-1499.392	3	0	1	0	1	0	1	-2.232	3
539		4	max	1064.845	3	1658.689	1	0	1	0	1	0	1	.846	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-714.545	2	-1500.402	3	0	1	0	1	0	1	-1.44	3
541		5	max	1065.212	3	1657.343	1	0	1	0	1	0	1	.011	9
542			min	-714.055	2	-1501.412	3	0	1	0	1	0	1	-.649	3
543		6	max	1065.58	3	1655.997	1	0	1	0	1	0	1	.144	3
544			min	-713.565	2	-1502.421	3	0	1	0	1	0	1	-.903	1
545		7	max	1065.947	3	1654.651	1	0	1	0	1	0	1	.937	3
546			min	-713.075	2	-1503.431	3	0	1	0	1	0	1	-1.776	1
547		8	max	1066.314	3	1653.305	1	0	1	0	1	0	1	1.731	3
548			min	-712.585	2	-1504.44	3	0	1	0	1	0	1	-2.649	1
549		9	max	1083.473	3	140.264	2	0	1	0	1	0	1	1.993	3
550			min	-576.907	2	.407	15	0	1	0	1	0	1	-2.998	1
551		10	max	1083.84	3	138.918	2	0	1	0	1	0	1	1.929	3
552			min	-576.417	2	0	15	0	1	0	1	0	1	-3.037	1
553		11	max	1084.208	3	137.572	2	0	1	0	1	0	1	1.866	3
554			min	-575.927	2	-1.522	4	0	1	0	1	0	1	-3.076	1
555		12	max	1101.496	3	970.042	3	0	1	0	1	0	1	1.638	3
556			min	-440.283	2	-1802.201	1	0	1	0	1	0	1	-2.742	1
557		13	max	1101.863	3	969.033	3	0	1	0	1	0	1	1.126	3
558			min	-439.793	2	-1803.547	1	0	1	0	1	0	1	-1.791	1
559		14	max	1102.231	3	968.023	3	0	1	0	1	0	1	.615	3
560			min	-439.303	2	-1804.893	1	0	1	0	1	0	1	-.838	1
561		15	max	1102.598	3	967.014	3	0	1	0	1	0	1	.185	2
562			min	-438.813	2	-1806.239	1	0	1	0	1	0	1	-.004	13
563		16	max	1102.966	3	966.004	3	0	1	0	1	0	1	1.132	2
564			min	-438.323	2	-1807.585	1	0	1	0	1	0	1	-.405	3
565		17	max	1103.333	3	964.995	3	0	1	0	1	0	1	2.08	2
566			min	-437.833	2	-1808.931	1	0	1	0	1	0	1	-.915	3
567		18	max	-12.162	12	1995.379	2	0	1	0	1	0	1	1.073	2
568			min	-349.478	1	-869.417	3	0	1	0	1	0	1	-.478	3
569		19	max	-11.917	12	1994.033	2	0	1	0	1	0	1	.023	1
570			min	-348.988	1	-870.426	3	0	1	0	1	0	1	-.019	3
571	M9	1	max	161.478	1	647.127	3	99.205	1	0	3	-.009	15	0	3
572			min	5.881	15	-485.32	1	3.634	15	0	1	-.237	1	-.013	2
573		2	max	161.968	1	646.118	3	99.205	1	0	3	-.007	15	.243	1
574			min	6.029	15	-486.666	1	3.634	15	0	1	-.184	1	-.341	3
575		3	max	331.185	3	544.527	1	98.507	1	0	1	-.005	15	.488	1
576			min	-200.742	2	-467.429	3	3.6	15	0	3	-.132	1	-.668	3
577		4	max	331.552	3	543.181	1	98.507	1	0	1	-.003	15	.201	1
578			min	-200.253	2	-468.439	3	3.6	15	0	3	-.08	1	-.421	3
579		5	max	331.92	3	541.835	1	98.507	1	0	1	-.001	15	-.004	15
580			min	-199.763	2	-469.448	3	3.6	15	0	3	-.028	1	-.174	3
581		6	max	332.287	3	540.489	1	98.507	1	0	1	.024	1	.074	3
582			min	-199.273	2	-470.458	3	3.6	15	0	3	0	15	-.371	1
583		7	max	332.655	3	539.143	1	98.507	1	0	1	.076	1	.323	3
584			min	-198.783	2	-471.467	3	3.6	15	0	3	.003	15	-.656	1
585		8	max	333.022	3	537.797	1	98.507	1	0	1	.128	1	.572	3
586			min	-198.293	2	-472.477	3	3.6	15	0	3	.005	15	-.94	1
587		9	max	343.322	3	42.102	2	144.72	1	0	3	-.003	15	.668	3
588			min	-132.489	2	.409	15	5.293	15	0	9	-.075	1	-1.071	1
589		10	max	343.689	3	40.756	2	144.72	1	0	3	0	1	.65	3
590			min	-131.999	2	.003	15	5.293	15	0	9	0	15	-1.083	1
591		11	max	344.057	3	39.41	2	144.72	1	0	3	.077	1	.633	3
592			min	-131.509	2	-1.655	4	5.293	15	0	9	.003	15	-1.094	1
593		12	max	354.292	3	306.794	3	96.228	1	0	3	-.005	15	.551	3
594			min	-78.506	10	-582.275	1	3.512	15	0	2	-.126	1	-.966	1
595		13	max	354.659	3	305.784	3	96.228	1	0	3	-.003	15	.39	3
596			min	-78.097	10	-583.621	1	3.512	15	0	2	-.076	1	-.659	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	355.027	3	304.775	3	96.228	1	0	3	0	15	.229	3
598			min	-77.689	10	-584.967	1	3.512	15	0	2	-.025	1	-.35	1
599		15	max	355.394	3	303.765	3	96.228	1	0	3	.026	1	.068	3
600			min	-77.281	10	-586.313	1	3.512	15	0	2	0	15	-.041	1
601		16	max	355.761	3	302.756	3	96.228	1	0	3	.077	1	.292	2
602			min	-76.873	10	-587.659	1	3.512	15	0	2	.003	15	-.092	3
603		17	max	356.129	3	301.746	3	96.228	1	0	3	.128	1	.601	2
604			min	-76.464	10	-589.005	1	3.512	15	0	2	.005	15	-.251	3
605		18	max	-6.035	15	592.215	2	105.592	1	0	2	.182	1	.302	2
606			min	-162.18	1	-253.579	3	3.865	15	0	3	.007	15	-.124	3
607		19	max	-5.887	15	590.869	2	105.592	1	0	2	.238	1	.01	3
608			min	-161.69	1	-254.588	3	3.865	15	0	3	.009	15	-.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.109	1	.006	3	8.714e-3	1	NC	1	NC	1
2			min	0	15	-.017	3	-.003	2	-1.418e-3	3	NC	1	NC	1
3		2	max	0	1	.288	3	.038	1	1.001e-2	1	NC	5	NC	2
4			min	0	15	-.1	1	.001	10	-1.457e-3	3	785.028	3	6646.298	1
5		3	max	0	1	.536	3	.09	1	1.131e-2	1	NC	5	NC	3
6			min	0	15	-.265	1	.003	15	-1.497e-3	3	433.86	3	2719.217	1
7		4	max	0	1	.686	3	.135	1	1.261e-2	1	NC	5	NC	3
8			min	0	15	-.357	1	.005	15	-1.536e-3	3	341.287	3	1799.258	1
9		5	max	0	1	.72	3	.158	1	1.39e-2	1	NC	5	NC	3
10			min	0	15	-.363	1	.006	15	-1.575e-3	3	325.384	3	1532.563	1
11		6	max	0	1	.642	3	.153	1	1.52e-2	1	NC	5	NC	3
12			min	0	15	-.285	1	.006	15	-1.615e-3	3	364.25	3	1587.57	1
13		7	max	0	1	.473	3	.12	1	1.65e-2	1	NC	5	NC	3
14			min	0	15	-.142	1	.005	15	-1.654e-3	3	489.21	3	2024.325	1
15		8	max	0	1	.26	3	.07	1	1.779e-2	1	NC	4	NC	2
16			min	0	15	0	15	0	10	-1.694e-3	3	866.322	3	3510.363	1
17		9	max	0	1	.192	2	.02	1	1.909e-2	1	NC	4	NC	1
18			min	0	15	.005	15	-.005	10	-1.733e-3	3	2811.565	2	NC	1
19		10	max	0	1	.255	1	.019	3	2.039e-2	1	NC	3	NC	1
20			min	0	1	-.021	3	-.012	2	-1.772e-3	3	1637.628	1	NC	1
21		11	max	0	15	.192	2	.02	1	1.909e-2	1	NC	4	NC	1
22			min	0	1	.005	15	-.005	10	-1.733e-3	3	2811.565	2	NC	1
23		12	max	0	15	.26	3	.07	1	1.779e-2	1	NC	4	NC	2
24			min	0	1	0	15	0	10	-1.694e-3	3	866.322	3	3510.363	1
25		13	max	0	15	.473	3	.12	1	1.65e-2	1	NC	5	NC	3
26			min	0	1	-.142	1	.005	15	-1.654e-3	3	489.21	3	2024.325	1
27		14	max	0	15	.642	3	.153	1	1.52e-2	1	NC	5	NC	3
28			min	0	1	-.285	1	.006	15	-1.615e-3	3	364.25	3	1587.57	1
29		15	max	0	15	.72	3	.158	1	1.39e-2	1	NC	5	NC	3
30			min	0	1	-.363	1	.006	15	-1.575e-3	3	325.384	3	1532.563	1
31		16	max	0	15	.686	3	.135	1	1.261e-2	1	NC	5	NC	3
32			min	0	1	-.357	1	.005	15	-1.536e-3	3	341.287	3	1799.258	1
33		17	max	0	15	.536	3	.09	1	1.131e-2	1	NC	5	NC	3
34			min	0	1	-.265	1	.003	15	-1.497e-3	3	433.86	3	2719.217	1
35		18	max	0	15	.288	3	.038	1	1.001e-2	1	NC	5	NC	2
36			min	0	1	-.1	1	.001	10	-1.457e-3	3	785.028	3	6646.298	1
37		19	max	0	15	.109	1	.006	3	8.714e-3	1	NC	1	NC	1
38			min	0	1	-.017	3	-.003	2	-1.418e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.198	3	.005	3	5.407e-3	1	NC	1	NC	1
40			min	0	15	-.352	1	-.002	2	-3.561e-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	.493	3	.026	1	6.489e-3	1	NC	5	NC	2
42			min	0	15	-.687	1	0	10	-4.337e-3	3	717.145	1	9763.545	1
43		3	max	0	1	.743	3	.072	1	7.571e-3	1	NC	15	NC	3
44			min	0	15	-.974	1	.003	15	-5.114e-3	3	385.554	1	3396.647	1
45		4	max	0	1	.916	3	.116	1	8.652e-3	1	NC	15	NC	3
46			min	0	15	-1.183	1	.004	15	-5.89e-3	3	288.751	1	2103.914	1
47		5	max	0	1	.996	3	.141	1	9.734e-3	1	NC	15	NC	3
48			min	0	15	-1.296	1	.005	15	-6.666e-3	3	254.157	1	1728.608	1
49		6	max	0	1	.983	3	.139	1	1.082e-2	1	NC	15	NC	3
50			min	0	15	-1.313	1	.005	15	-7.442e-3	3	249.657	1	1750.008	1
51		7	max	0	1	.895	3	.111	1	1.19e-2	1	NC	15	NC	3
52			min	0	15	-1.25	1	.004	15	-8.218e-3	3	267.395	1	2195.128	1
53		8	max	0	1	.763	3	.066	1	1.298e-2	1	NC	15	NC	2
54			min	0	15	-1.136	1	0	10	-8.995e-3	3	306.053	1	3753.738	1
55		9	max	0	1	.636	3	.019	1	1.406e-2	1	NC	15	NC	1
56			min	0	15	-1.02	1	-.005	10	-9.771e-3	3	359.141	1	NC	1
57		10	max	0	1	.576	3	.017	3	1.514e-2	1	NC	5	NC	1
58			min	0	1	-.965	1	-.011	2	-1.055e-2	3	391.69	1	NC	1
59		11	max	0	15	.636	3	.019	1	1.406e-2	1	NC	15	NC	1
60			min	0	1	-1.02	1	-.005	10	-9.771e-3	3	359.141	1	NC	1
61		12	max	0	15	.763	3	.066	1	1.298e-2	1	NC	15	NC	2
62			min	0	1	-1.136	1	0	10	-8.995e-3	3	306.053	1	3753.738	1
63		13	max	0	15	.895	3	.111	1	1.19e-2	1	NC	15	NC	3
64			min	0	1	-1.25	1	.004	15	-8.218e-3	3	267.395	1	2195.128	1
65		14	max	0	15	.983	3	.139	1	1.082e-2	1	NC	15	NC	3
66			min	0	1	-1.313	1	.005	15	-7.442e-3	3	249.657	1	1750.008	1
67		15	max	0	15	.996	3	.141	1	9.734e-3	1	NC	15	NC	3
68			min	0	1	-1.296	1	.005	15	-6.666e-3	3	254.157	1	1728.608	1
69		16	max	0	15	.916	3	.116	1	8.652e-3	1	NC	15	NC	3
70			min	0	1	-1.183	1	.004	15	-5.89e-3	3	288.751	1	2103.914	1
71		17	max	0	15	.743	3	.072	1	7.571e-3	1	NC	15	NC	3
72			min	0	1	-.974	1	.003	15	-5.114e-3	3	385.554	1	3396.647	1
73		18	max	0	15	.493	3	.026	1	6.489e-3	1	NC	5	NC	2
74			min	0	1	-.687	1	0	10	-4.337e-3	3	717.145	1	9763.545	1
75		19	max	0	15	.198	3	.005	3	5.407e-3	1	NC	1	NC	1
76			min	0	1	-.352	1	-.002	2	-3.561e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.202	3	.005	3	3.01e-3	3	NC	1	NC	1
78			min	0	1	-.351	1	-.002	2	-5.529e-3	1	NC	1	NC	1
79		2	max	0	15	.389	3	.026	1	3.669e-3	3	NC	5	NC	2
80			min	0	1	-.725	1	0	10	-6.64e-3	1	634.687	2	9716.744	1
81		3	max	0	15	.55	3	.073	1	4.329e-3	3	NC	15	NC	3
82			min	0	1	-1.045	1	.003	15	-7.752e-3	1	342.704	2	3386.825	1
83		4	max	0	15	.67	3	.116	1	4.988e-3	3	NC	15	NC	3
84			min	0	1	-1.273	1	.004	15	-8.864e-3	1	258.583	2	2099.05	1
85		5	max	0	15	.738	3	.141	1	5.647e-3	3	NC	15	NC	3
86			min	0	1	-1.39	1	.005	15	-9.976e-3	1	230.235	2	1724.862	1
87		6	max	0	15	.755	3	.139	1	6.306e-3	3	NC	15	NC	3
88			min	0	1	-1.397	1	.005	15	-1.109e-2	1	229.522	1	1745.921	1
89		7	max	0	15	.728	3	.111	1	6.965e-3	3	NC	15	NC	3
90			min	0	1	-1.312	1	.004	15	-1.22e-2	1	249.956	1	2188.563	1
91		8	max	0	15	.674	3	.066	1	7.625e-3	3	NC	15	NC	2
92			min	0	1	-1.171	1	0	10	-1.331e-2	1	292.94	1	3734.639	1
93		9	max	0	15	.616	3	.02	1	8.284e-3	3	NC	15	NC	1
94			min	0	1	-1.03	1	-.004	10	-1.442e-2	1	353.759	1	NC	1
95		10	max	0	1	.588	3	.016	3	8.943e-3	3	NC	5	NC	1
96			min	0	1	-.963	1	-.01	2	-1.553e-2	1	392.398	1	NC	1
97		11	max	0	1	.616	3	.02	1	8.284e-3	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.03	1	-.004	10	-1.442e-2	1	353.759	1	NC	1
99		12	max	0	1	.674	3	.066	1	7.625e-3	3	NC	15	NC	2
100			min	0	15	-1.171	1	0	10	-1.331e-2	1	292.94	1	3734.639	1
101		13	max	0	1	.728	3	.111	1	6.965e-3	3	NC	15	NC	3
102			min	0	15	-1.312	1	.004	15	-1.22e-2	1	249.956	1	2188.563	1
103		14	max	0	1	.755	3	.139	1	6.306e-3	3	NC	15	NC	3
104			min	0	15	-1.397	1	.005	15	-1.109e-2	1	229.522	1	1745.921	1
105		15	max	0	1	.738	3	.141	1	5.647e-3	3	NC	15	NC	3
106			min	0	15	-1.39	1	.005	15	-9.976e-3	1	230.235	2	1724.862	1
107		16	max	0	1	.67	3	.116	1	4.988e-3	3	NC	15	NC	3
108			min	0	15	-1.273	1	.004	15	-8.864e-3	1	258.583	2	2099.05	1
109		17	max	0	1	.55	3	.073	1	4.329e-3	3	NC	15	NC	3
110			min	0	15	-1.045	1	.003	15	-7.752e-3	1	342.704	2	3386.825	1
111		18	max	0	1	.389	3	.026	1	3.669e-3	3	NC	5	NC	2
112			min	0	15	-.725	1	0	10	-6.64e-3	1	634.687	2	9716.744	1
113		19	max	0	1	.202	3	.005	3	3.01e-3	3	NC	1	NC	1
114			min	0	15	-.351	1	-.002	2	-5.529e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.105	1	.004	3	5.31e-3	3	NC	1	NC	1
116			min	-.001	1	-.067	3	-.002	2	-8.068e-3	1	NC	1	NC	1
117		2	max	0	15	.037	3	.037	1	6.254e-3	3	NC	5	NC	2
118			min	0	1	-.167	2	.001	15	-9.209e-3	1	917.69	2	6686.934	1
119		3	max	0	15	.119	3	.089	1	7.197e-3	3	NC	5	NC	3
120			min	0	1	-.375	2	.003	15	-1.035e-2	1	510.665	2	2726.403	1
121		4	max	0	15	.162	3	.135	1	8.141e-3	3	NC	5	NC	3
122			min	0	1	-.495	2	.005	15	-1.149e-2	1	406.879	2	1800.443	1
123		5	max	0	15	.161	3	.158	1	9.084e-3	3	NC	5	NC	3
124			min	0	1	-.51	2	.006	15	-1.263e-2	1	396.787	2	1530.93	1
125		6	max	0	15	.116	3	.153	1	1.003e-2	3	NC	5	NC	3
126			min	0	1	-.423	2	.006	15	-1.377e-2	1	463.447	2	1582.507	1
127		7	max	0	15	.037	3	.121	1	1.097e-2	3	NC	5	NC	3
128			min	0	1	-.256	2	.005	15	-1.491e-2	1	683.924	2	2010.523	1
129		8	max	0	15	.009	9	.071	1	1.191e-2	3	NC	3	NC	2
130			min	0	1	-.057	3	.002	10	-1.605e-2	1	1652.048	2	3454.306	1
131		9	max	0	15	.163	1	.021	1	1.286e-2	3	NC	4	NC	1
132			min	0	1	-.14	3	-.004	10	-1.719e-2	1	3292.486	3	NC	1
133		10	max	0	1	.244	1	.014	3	1.38e-2	3	NC	5	NC	1
134			min	0	1	-.177	3	-.01	2	-1.833e-2	1	1727.747	1	NC	1
135		11	max	0	1	.163	1	.021	1	1.286e-2	3	NC	4	NC	1
136			min	0	15	-.14	3	-.004	10	-1.719e-2	1	3292.486	3	NC	1
137		12	max	0	1	.009	9	.071	1	1.191e-2	3	NC	3	NC	2
138			min	0	15	-.057	3	.002	10	-1.605e-2	1	1652.048	2	3454.306	1
139		13	max	0	1	.037	3	.121	1	1.097e-2	3	NC	5	NC	3
140			min	0	15	-.256	2	.005	15	-1.491e-2	1	683.924	2	2010.523	1
141		14	max	0	1	.116	3	.153	1	1.003e-2	3	NC	5	NC	3
142			min	0	15	-.423	2	.006	15	-1.377e-2	1	463.447	2	1582.507	1
143		15	max	0	1	.161	3	.158	1	9.084e-3	3	NC	5	NC	3
144			min	0	15	-.51	2	.006	15	-1.263e-2	1	396.787	2	1530.93	1
145		16	max	0	1	.162	3	.135	1	8.141e-3	3	NC	5	NC	3
146			min	0	15	-.495	2	.005	15	-1.149e-2	1	406.879	2	1800.443	1
147		17	max	0	1	.119	3	.089	1	7.197e-3	3	NC	5	NC	3
148			min	0	15	-.375	2	.003	15	-1.035e-2	1	510.665	2	2726.403	1
149		18	max	0	1	.037	3	.037	1	6.254e-3	3	NC	5	NC	2
150			min	0	15	-.167	2	.001	15	-9.209e-3	1	917.69	2	6686.934	1
151		19	max	.001	1	.105	1	.004	3	5.31e-3	3	NC	1	NC	1
152			min	0	15	-.067	3	-.002	2	-8.068e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.004	2	.008	1	-7.452e-6	15	NC	1	NC	2
154			min	-.006	3	-.008	3	0	15	-2.041e-4	1	NC	1	7229.464	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	.005	1	.004	2	.007	1	-6.953e-6	15	NC	1	NC	2
156			min	-.006	3	-.008	3	0	15	-1.904e-4	1	NC	1	7886.077	1
157		3	max	.005	1	.003	2	.006	1	-6.454e-6	15	NC	1	NC	2
158			min	-.005	3	-.007	3	0	15	-1.767e-4	1	NC	1	8668.84	1
159		4	max	.005	1	.002	2	.006	1	-5.954e-6	15	NC	1	NC	2
160			min	-.005	3	-.007	3	0	15	-1.63e-4	1	NC	1	9611.263	1
161		5	max	.004	1	.002	2	.005	1	-5.455e-6	15	NC	1	NC	1
162			min	-.005	3	-.007	3	0	15	-1.493e-4	1	NC	1	NC	1
163		6	max	.004	1	.001	2	.005	1	-4.955e-6	15	NC	1	NC	1
164			min	-.004	3	-.007	3	0	15	-1.356e-4	1	NC	1	NC	1
165		7	max	.004	1	0	2	.004	1	-4.456e-6	15	NC	1	NC	1
166			min	-.004	3	-.006	3	0	15	-1.219e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.003	1	-3.956e-6	15	NC	1	NC	1
168			min	-.004	3	-.006	3	0	15	-1.083e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.003	1	-3.457e-6	15	NC	1	NC	1
170			min	-.003	3	-.006	3	0	15	-9.456e-5	1	NC	1	NC	1
171		10	max	.003	1	0	2	.002	1	-2.958e-6	15	NC	1	NC	1
172			min	-.003	3	-.005	3	0	15	-8.088e-5	1	NC	1	NC	1
173		11	max	.003	1	0	15	.002	1	-2.458e-6	15	NC	1	NC	1
174			min	-.003	3	-.005	3	0	15	-6.719e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.002	1	-1.959e-6	15	NC	1	NC	1
176			min	-.002	3	-.004	3	0	15	-5.35e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	.001	1	-1.459e-6	15	NC	1	NC	1
178			min	-.002	3	-.004	3	0	15	-3.982e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-9.598e-7	15	NC	1	NC	1
180			min	-.002	3	-.003	3	0	15	-2.613e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-4.604e-7	15	NC	1	NC	1
182			min	-.001	3	-.003	3	0	15	-1.244e-5	1	NC	1	NC	1
183		16	max	0	1	0	15	0	1	1.245e-6	1	NC	1	NC	1
184			min	-.001	3	-.002	3	0	15	-3.741e-7	3	NC	1	NC	1
185		17	max	0	1	0	15	0	1	1.493e-5	1	NC	1	NC	1
186			min	0	3	-.001	4	0	15	4.289e-7	12	NC	1	NC	1
187		18	max	0	1	0	15	0	1	2.862e-5	1	NC	1	NC	1
188			min	0	3	0	4	0	15	1.038e-6	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	4.231e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.537e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.851e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.334e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	9.951e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	3.636e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	3.324e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	1.212e-6	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	5.654e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	2.061e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	7.983e-5	1	NC	1	NC	1
200			min	0	2	-.007	4	0	15	2.91e-6	15	NC	1	NC	1
201		6	max	.001	3	-.002	15	.001	1	1.031e-4	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	3.759e-6	15	NC	1	NC	1
203		7	max	.002	3	-.002	15	.002	1	1.264e-4	1	NC	1	NC	1
204			min	-.001	2	-.01	4	0	15	4.607e-6	15	8925.85	4	NC	1
205		8	max	.002	3	-.003	15	.002	1	1.497e-4	1	NC	1	NC	1
206			min	-.001	2	-.012	4	0	15	5.456e-6	15	7986.175	4	NC	1
207		9	max	.002	3	-.003	15	.002	1	1.73e-4	1	NC	2	NC	1
208			min	-.002	2	-.013	4	0	15	6.305e-6	15	7427.502	4	NC	1
209		10	max	.002	3	-.003	15	.003	1	1.963e-4	1	NC	2	NC	1
210			min	-.002	2	-.013	4	0	15	7.154e-6	15	7151.637	4	NC	1
211		11	max	.003	3	-.003	15	.003	1	2.196e-4	1	NC	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
212			min	-.002	2	-.013	4	0	15	8.002e-6	15	7117.631	4	NC	1
213		12	max	.003	3	-.003	15	.003	1	2.429e-4	1	NC	2	NC	1
214			min	-.002	2	-.013	4	0	15	8.851e-6	15	7326.029	4	NC	1
215		13	max	.003	3	-.003	15	.004	1	2.662e-4	1	NC	1	NC	1
216			min	-.002	2	-.012	4	0	15	9.7e-6	15	7821.058	4	NC	1
217		14	max	.003	3	-.003	15	.004	1	2.895e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	1.055e-5	15	8713.861	4	NC	1
219		15	max	.004	3	-.002	15	.005	1	3.128e-4	1	NC	1	NC	1
220			min	-.003	2	-.009	4	0	15	1.14e-5	15	NC	1	NC	1
221		16	max	.004	3	-.002	15	.005	1	3.361e-4	1	NC	1	NC	1
222			min	-.003	2	-.008	1	0	15	1.225e-5	15	NC	1	NC	1
223		17	max	.004	3	-.001	15	.006	1	3.593e-4	1	NC	1	NC	1
224			min	-.003	2	-.006	1	0	15	1.309e-5	15	NC	1	NC	1
225		18	max	.005	3	0	15	.007	1	3.826e-4	1	NC	1	NC	1
226			min	-.003	2	-.005	1	0	15	1.394e-5	15	NC	1	NC	1
227		19	max	.005	3	0	15	.007	1	4.059e-4	1	NC	1	NC	1
228			min	-.004	2	-.003	1	0	15	1.479e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.003	2	0	15	2.065e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.007	1	7.626e-7	15	NC	1	3394.419	1
231		2	max	.003	1	.003	2	0	15	2.065e-5	1	NC	1	NC	3
232			min	0	3	-.005	3	-.007	1	7.626e-7	15	NC	1	3694.365	1
233		3	max	.003	1	.003	2	0	15	2.065e-5	1	NC	1	NC	2
234			min	0	3	-.004	3	-.006	1	7.626e-7	15	NC	1	4051.167	1
235		4	max	.002	1	.003	2	0	15	2.065e-5	1	NC	1	NC	2
236			min	0	3	-.004	3	-.006	1	7.626e-7	15	NC	1	4479.628	1
237		5	max	.002	1	.002	2	0	15	2.065e-5	1	NC	1	NC	2
238			min	0	3	-.004	3	-.005	1	7.626e-7	15	NC	1	4999.862	1
239		6	max	.002	1	.002	2	0	15	2.065e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.004	1	7.626e-7	15	NC	1	5639.765	1
241		7	max	.002	1	.002	2	0	15	2.065e-5	1	NC	1	NC	2
242			min	0	3	-.003	3	-.004	1	7.626e-7	15	NC	1	6438.933	1
243		8	max	.002	1	.002	2	0	15	2.065e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.003	1	7.626e-7	15	NC	1	7455.124	1
245		9	max	.002	1	.002	2	0	15	2.065e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.003	1	7.626e-7	15	NC	1	8775.291	1
247		10	max	.001	1	.002	2	0	15	2.065e-5	1	NC	1	NC	1
248			min	0	3	-.002	3	-.002	1	7.626e-7	15	NC	1	NC	1
249		11	max	.001	1	.001	2	0	15	2.065e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.002	1	7.626e-7	15	NC	1	NC	1
251		12	max	.001	1	.001	2	0	15	2.065e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	7.626e-7	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	2.065e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	7.626e-7	15	NC	1	NC	1
255		14	max	0	1	0	2	0	15	2.065e-5	1	NC	1	NC	1
256			min	0	3	-.001	3	0	1	7.626e-7	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	2.065e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	7.626e-7	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	2.065e-5	1	NC	1	NC	1
260			min	0	3	0	3	0	1	7.626e-7	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	2.065e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	7.626e-7	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	2.065e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	7.626e-7	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.065e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.626e-7	15	NC	1	NC	1
267	M6	1	max	.018	1	.018	2	0	1	0	1	NC	3	NC	1
268			min	-.02	3	-.025	3	0	1	0	1	3145.971	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.017	1	.016	2	0	1	0	1	NC	3	NC	1
270			min	-.019	3	-.024	3	0	1	0	1	3444.264	2	NC	1
271		3	max	.016	1	.015	2	0	1	0	1	NC	3	NC	1
272			min	-.018	3	-.022	3	0	1	0	1	3802.281	2	NC	1
273		4	max	.015	1	.013	2	0	1	0	1	NC	3	NC	1
274			min	-.017	3	-.021	3	0	1	0	1	4236.516	2	NC	1
275		5	max	.014	1	.012	2	0	1	0	1	NC	3	NC	1
276			min	-.016	3	-.02	3	0	1	0	1	4769.763	2	NC	1
277		6	max	.013	1	.01	2	0	1	0	1	NC	1	NC	1
278			min	-.015	3	-.018	3	0	1	0	1	5434.234	2	NC	1
279		7	max	.012	1	.009	2	0	1	0	1	NC	1	NC	1
280			min	-.013	3	-.017	3	0	1	0	1	6276.677	2	NC	1
281		8	max	.011	1	.008	2	0	1	0	1	NC	1	NC	1
282			min	-.012	3	-.015	3	0	1	0	1	7367.047	2	NC	1
283		9	max	.01	1	.006	2	0	1	0	1	NC	1	NC	1
284			min	-.011	3	-.014	3	0	1	0	1	8813.932	2	NC	1
285		10	max	.009	1	.005	2	0	1	0	1	NC	1	NC	1
286			min	-.01	3	-.013	3	0	1	0	1	NC	1	NC	1
287		11	max	.008	1	.004	2	0	1	0	1	NC	1	NC	1
288			min	-.009	3	-.011	3	0	1	0	1	NC	1	NC	1
289		12	max	.007	1	.003	2	0	1	0	1	NC	1	NC	1
290			min	-.008	3	-.01	3	0	1	0	1	NC	1	NC	1
291		13	max	.006	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.007	3	-.008	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.006	3	-.007	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.001	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	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.004	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
313		5	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.003	2	-.008	3	0	1	0	1	NC	1	NC	1
315		6	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.004	2	-.01	3	0	1	0	1	9807.042	3	NC	1
317		7	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.005	2	-.011	3	0	1	0	1	8709.276	3	NC	1
319		8	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.006	2	-.012	3	0	1	0	1	8052.067	3	NC	1
321		9	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.006	2	-.013	3	0	1	0	1	7596.243	4	NC	1
323		10	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.007	2	-.013	4	0	1	0	1	7304.168	4	NC	1
325		11	max	.008	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	-.008	2	-.013	4	0	1	0	1	7261.159	4	NC	1
327		12	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.009	2	-.013	4	0	1	0	1	7466.619	4	NC	1
329		13	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.01	2	-.012	4	0	1	0	1	7964.777	4	NC	1
331		14	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.01	2	-.011	4	0	1	0	1	8868.107	4	NC	1
333		15	max	.012	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.011	2	-.01	1	0	1	0	1	NC	1	NC	1
335		16	max	.013	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.012	2	-.009	1	0	1	0	1	NC	1	NC	1
337		17	max	.014	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.013	2	-.009	1	0	1	0	1	NC	1	NC	1
339		18	max	.014	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.014	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.015	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.014	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.013	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.015	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	1	.012	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.014	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.011	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.014	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.011	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.013	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.012	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.009	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.011	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.009	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.007	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.006	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.004	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	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	.006	1	.004	2	0	15	2.041e-4	1	NC	1	NC	2
382			min	-.006	3	-.008	3	-.008	1	7.452e-6	15	NC	1	7229.464	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	.005	1	.004	2	0	15	1.904e-4	1	NC	1	NC	2
384			min	-.006	3	-.008	3	-.007	1	6.953e-6	15	NC	1	7886.077	1
385		3	max	.005	1	.003	2	0	15	1.767e-4	1	NC	1	NC	2
386			min	-.005	3	-.007	3	-.006	1	6.454e-6	15	NC	1	8668.84	1
387		4	max	.005	1	.002	2	0	15	1.63e-4	1	NC	1	NC	2
388			min	-.005	3	-.007	3	-.006	1	5.954e-6	15	NC	1	9611.263	1
389		5	max	.004	1	.002	2	0	15	1.493e-4	1	NC	1	NC	1
390			min	-.005	3	-.007	3	-.005	1	5.455e-6	15	NC	1	NC	1
391		6	max	.004	1	.001	2	0	15	1.356e-4	1	NC	1	NC	1
392			min	-.004	3	-.007	3	-.005	1	4.955e-6	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	1.219e-4	1	NC	1	NC	1
394			min	-.004	3	-.006	3	-.004	1	4.456e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.083e-4	1	NC	1	NC	1
396			min	-.004	3	-.006	3	-.003	1	3.956e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	9.456e-5	1	NC	1	NC	1
398			min	-.003	3	-.006	3	-.003	1	3.457e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	8.088e-5	1	NC	1	NC	1
400			min	-.003	3	-.005	3	-.002	1	2.958e-6	15	NC	1	NC	1
401		11	max	.003	1	0	15	0	15	6.719e-5	1	NC	1	NC	1
402			min	-.003	3	-.005	3	-.002	1	2.458e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	5.35e-5	1	NC	1	NC	1
404			min	-.002	3	-.004	3	-.002	1	1.959e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	3.982e-5	1	NC	1	NC	1
406			min	-.002	3	-.004	3	-.001	1	1.459e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	2.613e-5	1	NC	1	NC	1
408			min	-.002	3	-.003	3	0	1	9.598e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	1.244e-5	1	NC	1	NC	1
410			min	-.001	3	-.003	3	0	1	4.604e-7	15	NC	1	NC	1
411		16	max	0	1	0	15	0	15	3.741e-7	3	NC	1	NC	1
412			min	-.001	3	-.002	3	0	1	-1.245e-6	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-4.289e-7	12	NC	1	NC	1
414			min	0	3	-.001	4	0	1	-1.493e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-1.038e-6	15	NC	1	NC	1
416			min	0	3	0	4	0	1	-2.862e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.537e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-4.231e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.334e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	4.851e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-3.636e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-9.951e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.212e-6	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-3.324e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-2.061e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-5.654e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-2.91e-6	15	NC	1	NC	1
428			min	0	2	-.007	4	0	1	-7.983e-5	1	NC	1	NC	1
429		6	max	.001	3	-.002	15	0	15	-3.759e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	-.001	1	-1.031e-4	1	NC	1	NC	1
431		7	max	.002	3	-.002	15	0	15	-4.607e-6	15	NC	1	NC	1
432			min	-.001	2	-.01	4	-.002	1	-1.264e-4	1	8925.85	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-5.456e-6	15	NC	1	NC	1
434			min	-.001	2	-.012	4	-.002	1	-1.497e-4	1	7986.175	4	NC	1
435		9	max	.002	3	-.003	15	0	15	-6.305e-6	15	NC	2	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.73e-4	1	7427.502	4	NC	1
437		10	max	.002	3	-.003	15	0	15	-7.154e-6	15	NC	2	NC	1
438			min	-.002	2	-.013	4	-.003	1	-1.963e-4	1	7151.637	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-8.002e-6	15	NC	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
440			min	-.002	2	-.013	4	-.003	1	-2.196e-4	1	7117.631	4	NC	1
441		12	max	.003	3	-.003	15	0	15	-8.851e-6	15	NC	2	NC	1
442			min	-.002	2	-.013	4	-.003	1	-2.429e-4	1	7326.029	4	NC	1
443		13	max	.003	3	-.003	15	0	15	-9.7e-6	15	NC	1	NC	1
444			min	-.002	2	-.012	4	-.004	1	-2.662e-4	1	7821.058	4	NC	1
445		14	max	.003	3	-.003	15	0	15	-1.055e-5	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-2.895e-4	1	8713.861	4	NC	1
447		15	max	.004	3	-.002	15	0	15	-1.14e-5	15	NC	1	NC	1
448			min	-.003	2	-.009	4	-.005	1	-3.128e-4	1	NC	1	NC	1
449		16	max	.004	3	-.002	15	0	15	-1.225e-5	15	NC	1	NC	1
450			min	-.003	2	-.008	1	-.005	1	-3.361e-4	1	NC	1	NC	1
451		17	max	.004	3	-.001	15	0	15	-1.309e-5	15	NC	1	NC	1
452			min	-.003	2	-.006	1	-.006	1	-3.593e-4	1	NC	1	NC	1
453		18	max	.005	3	0	15	0	15	-1.394e-5	15	NC	1	NC	1
454			min	-.003	2	-.005	1	-.007	1	-3.826e-4	1	NC	1	NC	1
455		19	max	.005	3	0	15	0	15	-1.479e-5	15	NC	1	NC	1
456			min	-.004	2	-.003	1	-.007	1	-4.059e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.003	2	.007	1	-7.626e-7	15	NC	1	NC	3
458			min	0	3	-.005	3	0	15	-2.065e-5	1	NC	1	3394.419	1
459		2	max	.003	1	.003	2	.007	1	-7.626e-7	15	NC	1	NC	3
460			min	0	3	-.005	3	0	15	-2.065e-5	1	NC	1	3694.365	1
461		3	max	.003	1	.003	2	.006	1	-7.626e-7	15	NC	1	NC	2
462			min	0	3	-.004	3	0	15	-2.065e-5	1	NC	1	4051.167	1
463		4	max	.002	1	.003	2	.006	1	-7.626e-7	15	NC	1	NC	2
464			min	0	3	-.004	3	0	15	-2.065e-5	1	NC	1	4479.628	1
465		5	max	.002	1	.002	2	.005	1	-7.626e-7	15	NC	1	NC	2
466			min	0	3	-.004	3	0	15	-2.065e-5	1	NC	1	4999.862	1
467		6	max	.002	1	.002	2	.004	1	-7.626e-7	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-2.065e-5	1	NC	1	5639.765	1
469		7	max	.002	1	.002	2	.004	1	-7.626e-7	15	NC	1	NC	2
470			min	0	3	-.003	3	0	15	-2.065e-5	1	NC	1	6438.933	1
471		8	max	.002	1	.002	2	.003	1	-7.626e-7	15	NC	1	NC	2
472			min	0	3	-.003	3	0	15	-2.065e-5	1	NC	1	7455.124	1
473		9	max	.002	1	.002	2	.003	1	-7.626e-7	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-2.065e-5	1	NC	1	8775.291	1
475		10	max	.001	1	.002	2	.002	1	-7.626e-7	15	NC	1	NC	1
476			min	0	3	-.002	3	0	15	-2.065e-5	1	NC	1	NC	1
477		11	max	.001	1	.001	2	.002	1	-7.626e-7	15	NC	1	NC	1
478			min	0	3	-.002	3	0	15	-2.065e-5	1	NC	1	NC	1
479		12	max	.001	1	.001	2	.002	1	-7.626e-7	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-2.065e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	.001	1	-7.626e-7	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-2.065e-5	1	NC	1	NC	1
483		14	max	0	1	0	2	0	1	-7.626e-7	15	NC	1	NC	1
484			min	0	3	-.001	3	0	15	-2.065e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-7.626e-7	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-2.065e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-7.626e-7	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-2.065e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.626e-7	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-2.065e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.626e-7	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-2.065e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.626e-7	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.065e-5	1	NC	1	NC	1
495	M1	1	max	.006	3	.109	1	0	1	1.63e-2	1	NC	1	NC	1
496			min	-.003	2	-.017	3	0	15	-2.379e-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	.006	3	.053	1	0	15	7.926e-3	1	NC	4	NC	1
498			min	-.003	2	-.008	3	-.005	1	-1.177e-2	3	2063.184	1	NC	1
499		3	max	.006	3	.009	3	0	15	2.455e-5	10	NC	5	NC	1
500			min	-.003	2	-.008	2	-.008	1	-1.462e-4	1	987.933	1	NC	1
501		4	max	.006	3	.037	3	0	15	4.656e-3	1	NC	5	NC	1
502			min	-.003	2	-.076	1	-.007	1	-4.324e-3	3	617.986	1	NC	1
503		5	max	.006	3	.075	3	0	15	9.458e-3	1	NC	15	NC	1
504			min	-.003	2	-.15	1	-.005	1	-8.532e-3	3	442.605	1	NC	1
505		6	max	.006	3	.115	3	0	15	1.426e-2	1	NC	15	NC	1
506			min	-.003	2	-.221	1	-.002	1	-1.274e-2	3	346.548	1	NC	1
507		7	max	.006	3	.155	3	0	1	1.906e-2	1	9962.484	15	NC	1
508			min	-.002	2	-.285	1	0	12	-1.695e-2	3	290.119	1	NC	1
509		8	max	.005	3	.188	3	0	1	2.386e-2	1	8852.06	15	NC	1
510			min	-.002	2	-.337	1	0	15	-2.116e-2	3	256.858	1	NC	1
511		9	max	.005	3	.209	3	0	15	2.635e-2	1	8273.091	15	NC	1
512			min	-.002	2	-.369	1	0	1	-2.124e-2	3	239.586	1	NC	1
513		10	max	.005	3	.217	3	0	1	2.731e-2	1	8096.751	15	NC	1
514			min	-.002	2	-.379	1	0	12	-1.859e-2	3	234.422	1	NC	1
515		11	max	.005	3	.211	3	0	1	2.826e-2	1	8272.872	15	NC	1
516			min	-.002	2	-.369	1	0	15	-1.594e-2	3	239.927	1	NC	1
517		12	max	.005	3	.194	3	0	15	2.704e-2	2	8851.6	15	NC	1
518			min	-.002	2	-.336	1	0	1	-1.329e-2	3	257.92	1	NC	1
519		13	max	.005	3	.165	3	0	15	2.169e-2	2	9961.67	15	NC	1
520			min	-.002	2	-.283	1	0	1	-1.064e-2	3	292.738	1	NC	1
521		14	max	.005	3	.128	3	.002	1	1.634e-2	2	NC	15	NC	1
522			min	-.002	2	-.218	1	0	15	-7.988e-3	3	352.182	1	NC	1
523		15	max	.005	3	.087	3	.005	1	1.101e-2	1	NC	15	NC	1
524			min	-.002	2	-.145	1	0	15	-5.336e-3	3	454.242	1	NC	1
525		16	max	.005	3	.044	3	.007	1	5.771e-3	1	NC	5	NC	1
526			min	-.002	2	-.072	1	0	15	-2.685e-3	3	642.56	1	NC	1
527		17	max	.004	3	.003	3	.007	1	5.286e-4	1	NC	5	NC	1
528			min	-.002	2	-.005	2	0	15	-3.337e-5	3	1043.659	1	NC	1
529		18	max	.004	3	.053	1	.005	1	1.016e-2	2	NC	4	NC	1
530			min	-.002	2	-.033	3	0	15	-4.018e-3	3	2204.953	1	NC	1
531		19	max	.004	3	.105	1	0	15	2.04e-2	2	NC	1	NC	1
532			min	-.002	2	-.067	3	-.001	1	-8.156e-3	3	NC	1	NC	1
533	M5	1	max	.019	3	.255	1	0	1	0	1	NC	1	NC	1
534			min	-.012	2	-.021	3	0	1	0	1	NC	1	NC	1
535		2	max	.019	3	.125	1	0	1	0	1	NC	5	NC	1
536			min	-.012	2	-.008	3	0	1	0	1	875.82	1	NC	1
537		3	max	.019	3	.028	3	0	1	0	1	NC	5	NC	1
538			min	-.012	2	-.024	2	0	1	0	1	409.682	1	NC	1
539		4	max	.018	3	.105	3	0	1	0	1	9622.18	15	NC	1
540			min	-.012	2	-.205	1	0	1	0	1	248.807	1	NC	1
541		5	max	.018	3	.212	3	0	1	0	1	6733.791	15	NC	1
542			min	-.012	2	-.402	1	0	1	0	1	174.037	1	NC	1
543		6	max	.018	3	.331	3	0	1	0	1	5184.522	15	NC	1
544			min	-.012	2	-.599	1	0	1	0	1	133.911	1	NC	1
545		7	max	.017	3	.448	3	0	1	0	1	4289.788	15	NC	1
546			min	-.011	2	-.778	1	0	1	0	1	110.727	1	NC	1
547		8	max	.017	3	.546	3	0	1	0	1	3769.533	15	NC	1
548			min	-.011	2	-.921	1	0	1	0	1	97.243	1	NC	1
549		9	max	.017	3	.609	3	0	1	0	1	3502.728	15	NC	1
550			min	-.011	2	-1.012	1	0	1	0	1	90.33	1	NC	1
551		10	max	.016	3	.631	3	0	1	0	1	3422.34	15	NC	1
552			min	-.011	2	-1.042	1	0	1	0	1	88.276	1	NC	1
553		11	max	.016	3	.616	3	0	1	0	1	3502.807	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	-.011	2	-1.011	1	0	1	0	1	90.469	1	NC	1
555		12	max	.015	3	.562	3	0	1	0	1	3769.72	15	NC	1
556			min	-.01	2	-.918	1	0	1	0	1	97.7	1	NC	1
557		13	max	.015	3	.477	3	0	1	0	1	4290.174	15	NC	1
558			min	-.01	2	-.771	1	0	1	0	1	111.916	1	NC	1
559		14	max	.015	3	.368	3	0	1	0	1	5185.281	15	NC	1
560			min	-.01	2	-.588	1	0	1	0	1	136.586	1	NC	1
561		15	max	.014	3	.247	3	0	1	0	1	6735.3	15	NC	1
562			min	-.01	2	-.388	1	0	1	0	1	179.839	1	NC	1
563		16	max	.014	3	.124	3	0	1	0	1	9625.344	15	NC	1
564			min	-.01	2	-.19	1	0	1	0	1	261.805	1	NC	1
565		17	max	.014	3	.01	3	0	1	0	1	NC	5	NC	1
566			min	-.01	2	-.015	2	0	1	0	1	441.3	1	NC	1
567		18	max	.014	3	.126	1	0	1	0	1	NC	5	NC	1
568			min	-.01	2	-.088	3	0	1	0	1	960.55	1	NC	1
569		19	max	.014	3	.244	1	0	1	0	1	NC	1	NC	1
570			min	-.01	2	-.177	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.006	3	.109	1	0	15	2.379e-2	3	NC	1	NC	1
572			min	-.003	2	-.017	3	0	1	-1.63e-2	1	NC	1	NC	1
573		2	max	.006	3	.053	1	.005	1	1.177e-2	3	NC	4	NC	1
574			min	-.003	2	-.008	3	0	15	-7.926e-3	1	2063.184	1	NC	1
575		3	max	.006	3	.009	3	.008	1	1.462e-4	1	NC	5	NC	1
576			min	-.003	2	-.008	2	0	15	-2.455e-5	10	987.933	1	NC	1
577		4	max	.006	3	.037	3	.007	1	4.324e-3	3	NC	5	NC	1
578			min	-.003	2	-.076	1	0	15	-4.656e-3	1	617.986	1	NC	1
579		5	max	.006	3	.075	3	.005	1	8.532e-3	3	NC	15	NC	1
580			min	-.003	2	-.15	1	0	15	-9.458e-3	1	442.605	1	NC	1
581		6	max	.006	3	.115	3	.002	1	1.274e-2	3	NC	15	NC	1
582			min	-.003	2	-.221	1	0	15	-1.426e-2	1	346.548	1	NC	1
583		7	max	.006	3	.155	3	0	12	1.695e-2	3	9962.484	15	NC	1
584			min	-.002	2	-.285	1	0	1	-1.906e-2	1	290.119	1	NC	1
585		8	max	.005	3	.188	3	0	15	2.116e-2	3	8852.06	15	NC	1
586			min	-.002	2	-.337	1	0	1	-2.386e-2	1	256.858	1	NC	1
587		9	max	.005	3	.209	3	0	1	2.124e-2	3	8273.091	15	NC	1
588			min	-.002	2	-.369	1	0	15	-2.635e-2	1	239.586	1	NC	1
589		10	max	.005	3	.217	3	0	12	1.859e-2	3	8096.751	15	NC	1
590			min	-.002	2	-.379	1	0	1	-2.731e-2	1	234.422	1	NC	1
591		11	max	.005	3	.211	3	0	15	1.594e-2	3	8272.872	15	NC	1
592			min	-.002	2	-.369	1	0	1	-2.826e-2	1	239.927	1	NC	1
593		12	max	.005	3	.194	3	0	1	1.329e-2	3	8851.6	15	NC	1
594			min	-.002	2	-.336	1	0	15	-2.704e-2	2	257.92	1	NC	1
595		13	max	.005	3	.165	3	0	1	1.064e-2	3	9961.67	15	NC	1
596			min	-.002	2	-.283	1	0	15	-2.169e-2	2	292.738	1	NC	1
597		14	max	.005	3	.128	3	0	15	7.988e-3	3	NC	15	NC	1
598			min	-.002	2	-.218	1	-.002	1	-1.634e-2	2	352.182	1	NC	1
599		15	max	.005	3	.087	3	0	15	5.336e-3	3	NC	15	NC	1
600			min	-.002	2	-.145	1	-.005	1	-1.101e-2	1	454.242	1	NC	1
601		16	max	.005	3	.044	3	0	15	2.685e-3	3	NC	5	NC	1
602			min	-.002	2	-.072	1	-.007	1	-5.771e-3	1	642.56	1	NC	1
603		17	max	.004	3	.003	3	0	15	3.337e-5	3	NC	5	NC	1
604			min	-.002	2	-.005	2	-.007	1	-5.286e-4	1	1043.659	1	NC	1
605		18	max	.004	3	.053	1	0	15	4.018e-3	3	NC	4	NC	1
606			min	-.002	2	-.033	3	-.005	1	-1.016e-2	2	2204.953	1	NC	1
607		19	max	.004	3	.105	1	.001	1	8.156e-3	3	NC	1	NC	1
608			min	-.002	2	-.067	3	0	15	-2.04e-2	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

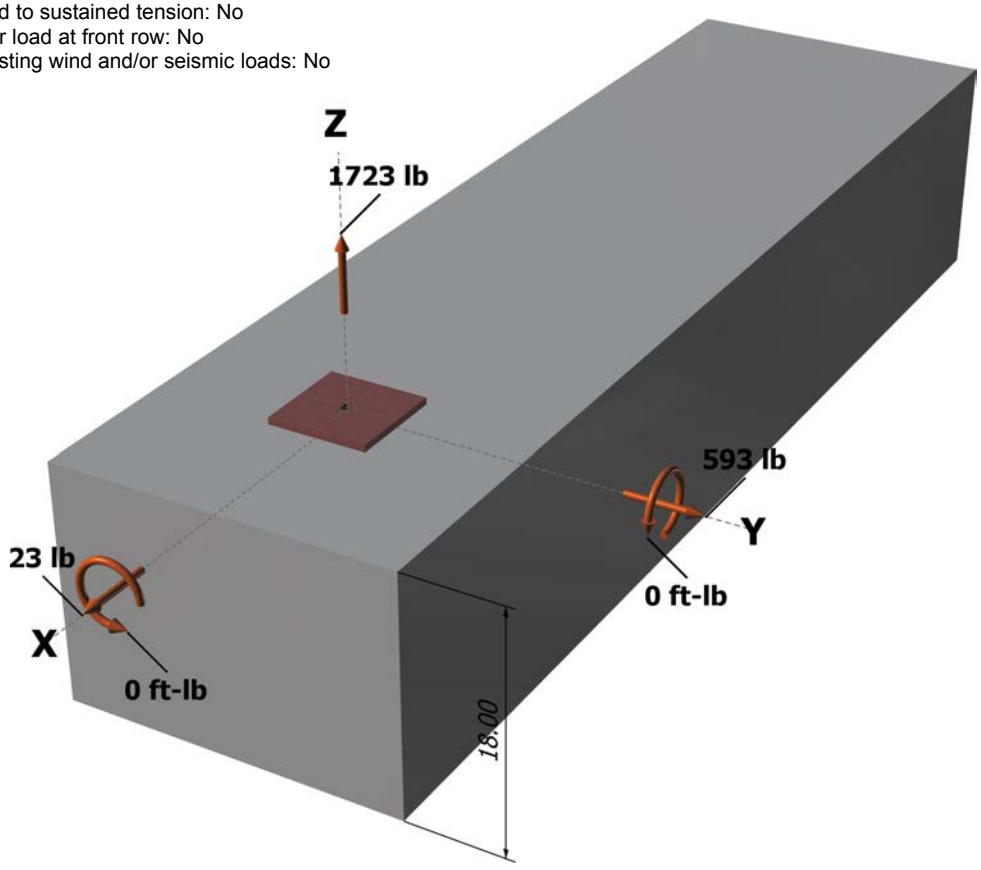
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

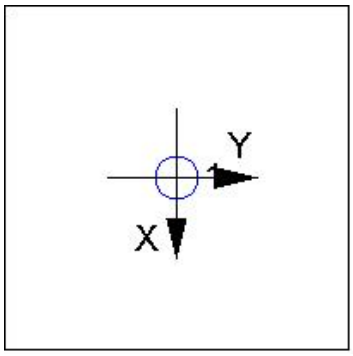
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

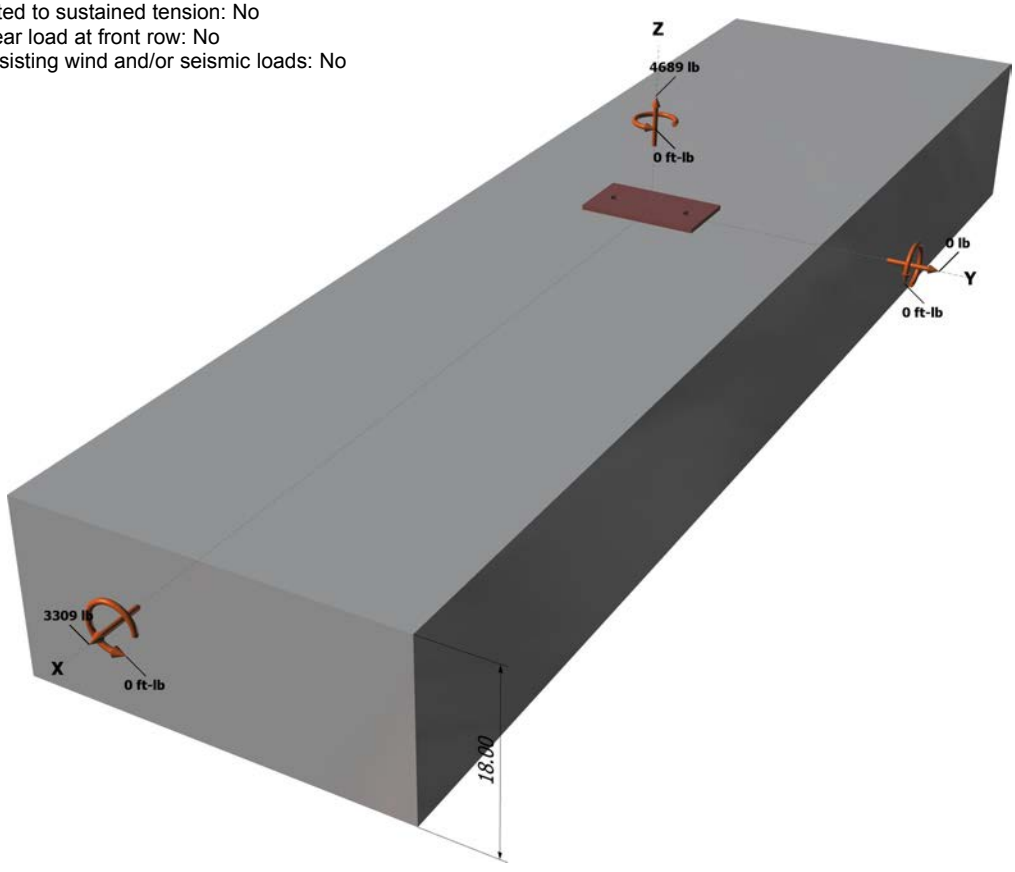
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

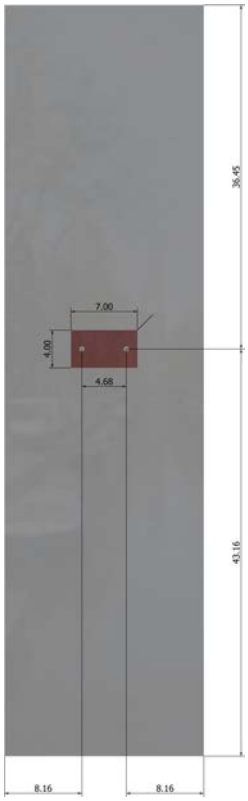
<Figure 1>

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>



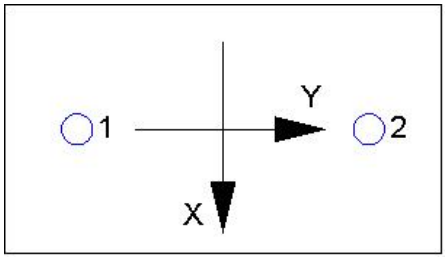
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2344.5	1654.5	0.0	1654.5
2	2344.5	1654.5	0.0	1654.5
Sum	4689.0	3309.0	0.0	3309.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4689
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)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

A_{Na} (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)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2345	6071	0.39	Pass
Concrete breakout	4689	9208	0.51	Pass
Adhesive	**4689**	**8093**	**0.58**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1655	3156	0.52	Pass
T Concrete breakout x+	**3309**	**5323**	**0.62**	**Pass (Governs)**
|| Concrete breakout y-	**1655**	**12241**	**0.14**	**Pass (Governs)**
Pryout	3309	19833	0.17	Pass

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

Sec. D.7.3	0.58	0.62	120.1 %	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.