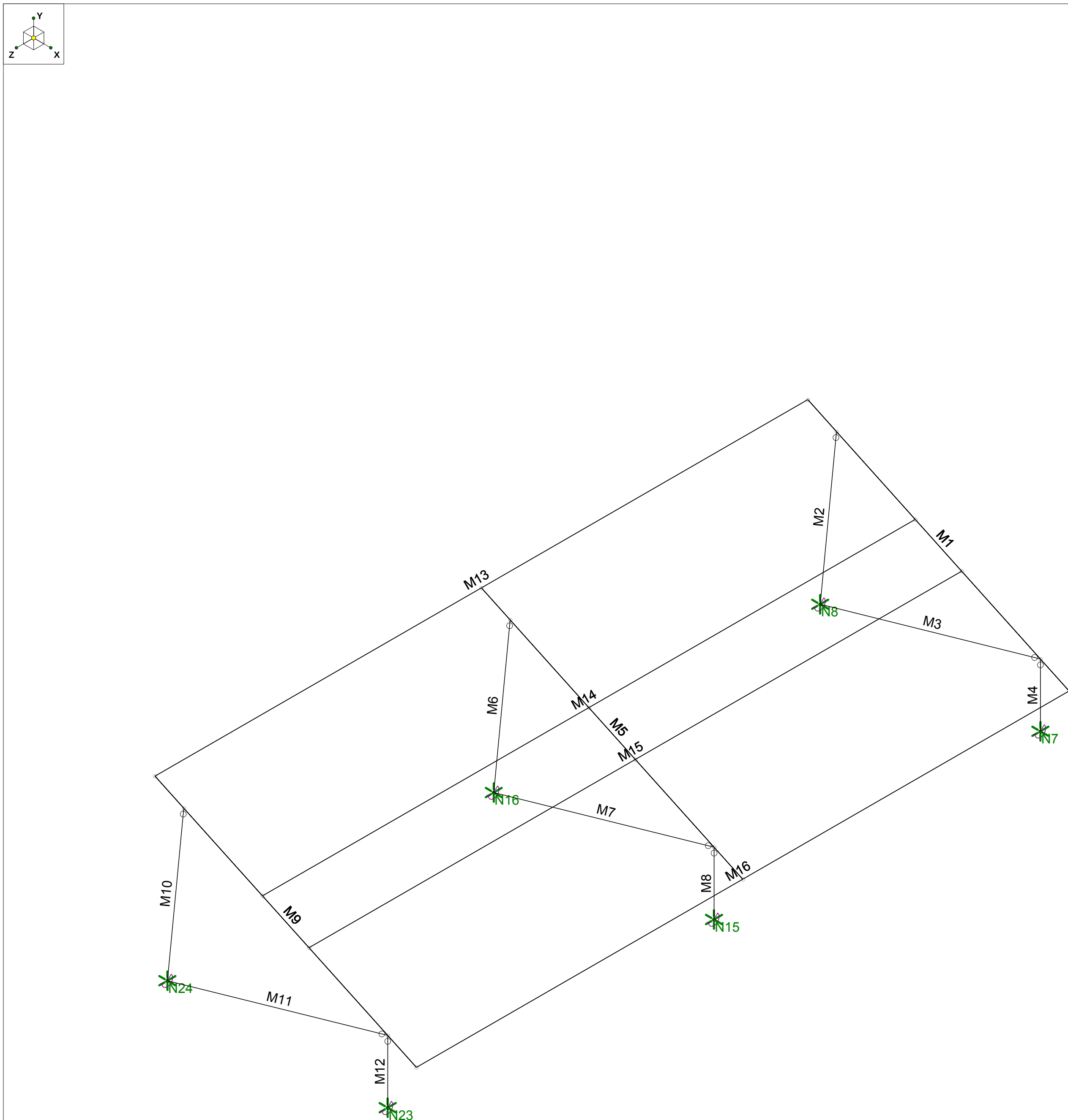


Schletter, Inc.		25° Tilt w/ Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

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.

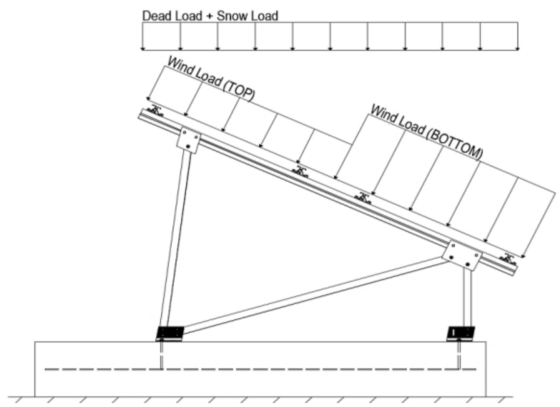
1.2 Construction

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

Modules Per Row = 2
Module Tilt = 25°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - 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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 18.56 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.82
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 110 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.06	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	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

Girders	Location	Rear Struts	Location	Rear Reactions	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

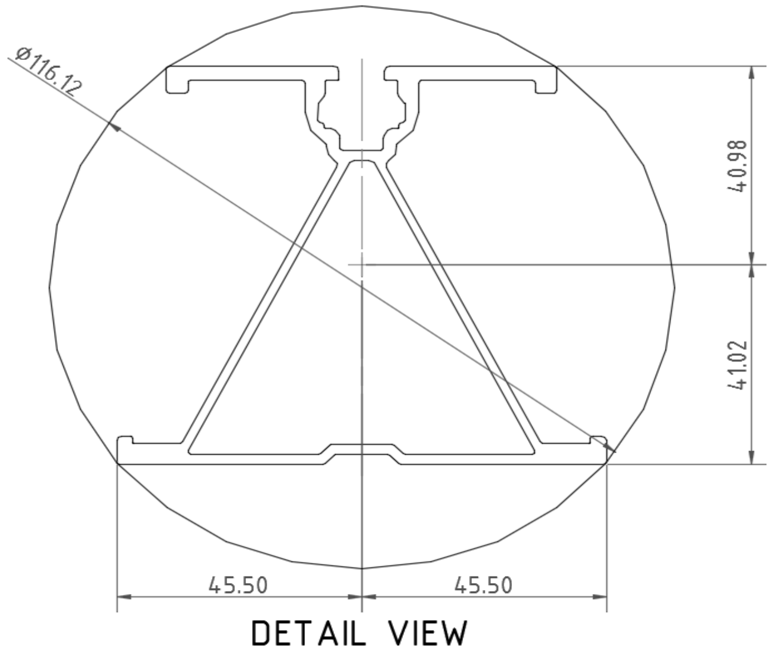
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

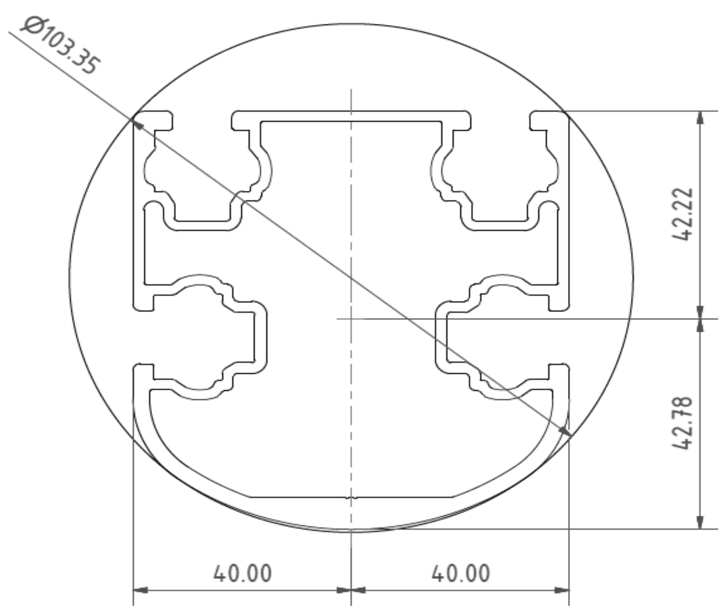
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	129	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.829	k-ft
M_z =	0.379	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	99%	



4.2 Girder Design

Loads from purlins are transferred using an inclined girder, which is connected to a set of aluminum struts. Loads on the girder result from the support reactions of the purlins. See Appendix A.2 for detailed member calculations. Section units are in (mm).

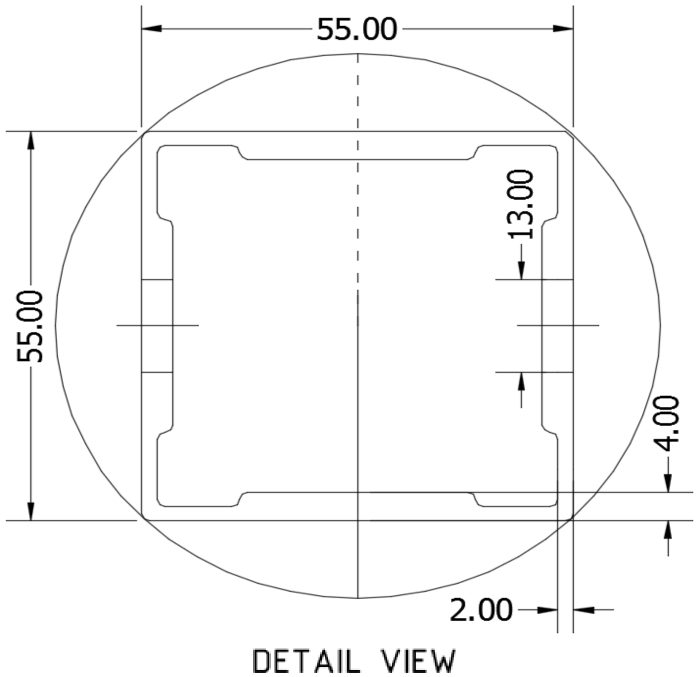
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.716	k-ft
M_z =	0.000	k-ft
P_n =	-0.204	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	79%	



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).

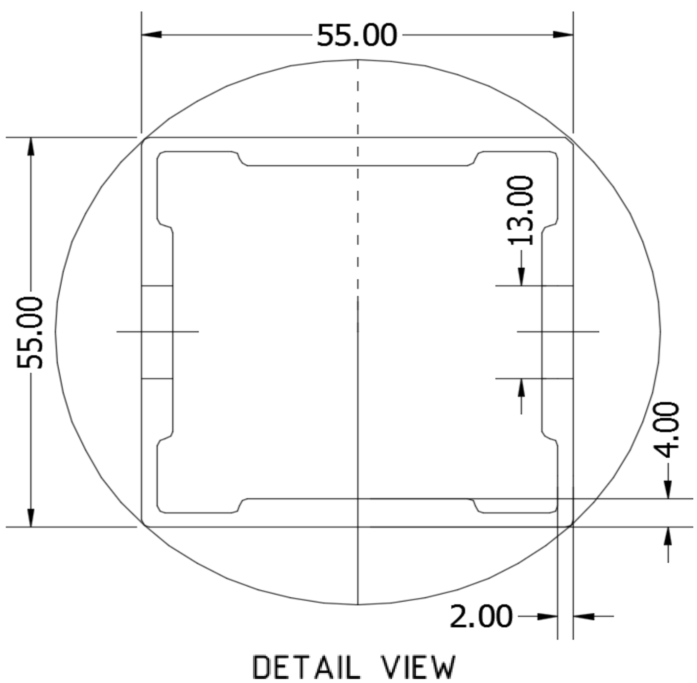
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.566	k-ft
P_n =	0.666	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	43%	



4.4 Diagonal Strut Design

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

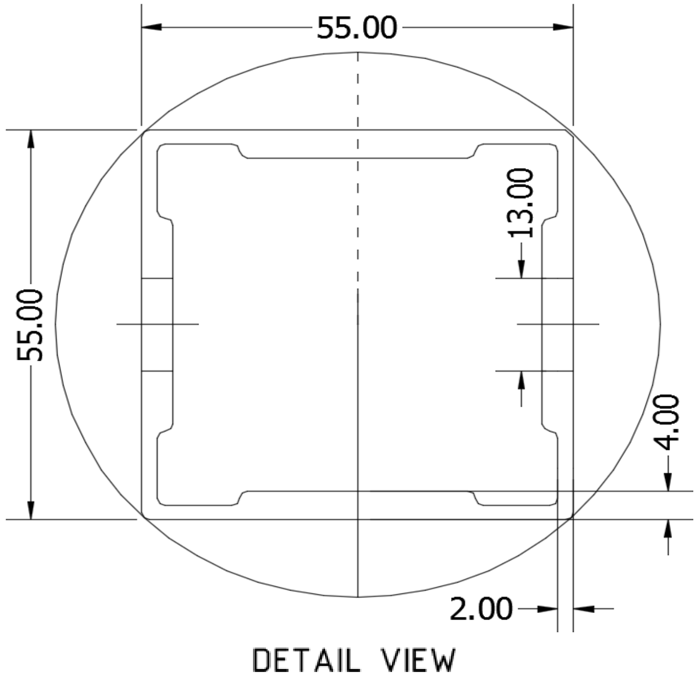
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	1.583	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	22%	



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 =	63.42	in
$\Phi F_{ty\ AXIAL}$ =	12.77	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 =	-0.008	k-ft
M_z =	0.000	k-ft
P_n =	3.121	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	25%	



5. FOUNDATION DESIGN CALCULATIONS

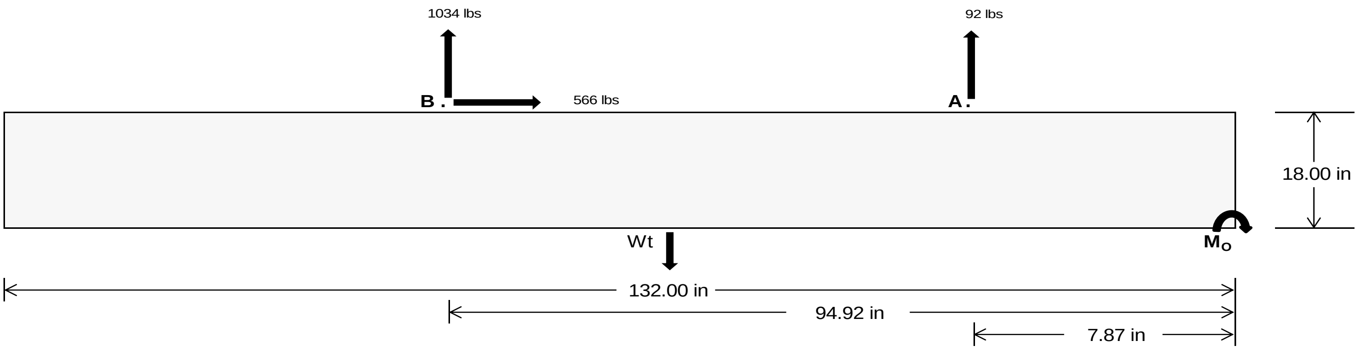
5.1 Helical Pile Foundations

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 =	420.12	4504.12	k
Compressive Load =	3871.71	4350.88	k
Lateral Load =	382.62	2453.53	k
Moment (Weak Axis) =	0.76	0.35	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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

Overturning Check

M_O =	109082.7 in-lbs
Resisting Force Required =	1652.77 lbs
S.F. =	1.67
Weight Required =	2754.61 lbs
Minimum Width =	23 in in
Weight Provided =	4585.63 lbs

A minimum 132in long x 23in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	565.62 lbs
Friction =	0.4
Weight Required =	1414.04 lbs
Resisting Weight =	4585.63 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 23in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	565.62 lbs
Cohesion =	130 psf
Area =	21.08 ft^2
Resisting =	2292.81 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 23in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

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

Shear key is not required.

Bearing Pressure

	Ballast Width			
	23 in	24 in	25 in	26 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(1.92 ft) =	4586 lbs	4785 lbs	4984 lbs	5184 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in
F_A	1489 lbs	1489 lbs	1489 lbs	1489 lbs	1125 lbs	1125 lbs	1125 lbs	1125 lbs	1823 lbs	1823 lbs	1823 lbs	1823 lbs	-183 lbs	-183 lbs	-183 lbs	-183 lbs
F_B	1481 lbs	1481 lbs	1481 lbs	1481 lbs	1575 lbs	1575 lbs	1575 lbs	1575 lbs	2155 lbs	2155 lbs	2155 lbs	2155 lbs	-2069 lbs	-2069 lbs	-2069 lbs	-2069 lbs
F_V	204 lbs	204 lbs	204 lbs	204 lbs	1036 lbs	1036 lbs	1036 lbs	1036 lbs	913 lbs	913 lbs	913 lbs	913 lbs	-1131 lbs	-1131 lbs	-1131 lbs	-1131 lbs
P_{total}	7556 lbs	7755 lbs	7955 lbs	8154 lbs	7286 lbs	7485 lbs	7684 lbs	7884 lbs	8564 lbs	8763 lbs	8962 lbs	9162 lbs	499 lbs	619 lbs	739 lbs	858 lbs
M	3949 lbs-ft	3949 lbs-ft	3949 lbs-ft	3949 lbs-ft	3208 lbs-ft	3208 lbs-ft	3208 lbs-ft	3208 lbs-ft	5003 lbs-ft	5003 lbs-ft	5003 lbs-ft	5003 lbs-ft	2400 lbs-ft	2400 lbs-ft	2400 lbs-ft	2400 lbs-ft
e	0.52 ft	0.51 ft	0.50 ft	0.48 ft	0.44 ft	0.43 ft	0.42 ft	0.41 ft	0.58 ft	0.57 ft	0.56 ft	0.55 ft	4.81 ft	3.88 ft	3.25 ft	2.80 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}	256.2 psf	254.6 psf	253.1 psf	251.7 psf	262.6 psf	260.7 psf	259.0 psf	257.4 psf	276.7 psf	274.3 psf	272.0 psf	269.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	460.6 psf	450.4 psf	441.1 psf	432.5 psf	428.6 psf	419.8 psf	411.7 psf	404.2 psf	535.6 psf	522.4 psf	510.2 psf	498.9 psf	250.8 psf	127.2 psf	105.0 psf	97.7 psf

Maximum Bearing Pressure =	536 psf
Allowable Bearing Pressure =	1500 psf

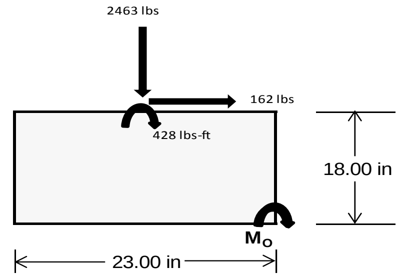
Use a 132in long x 23in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	1689.2 ft-lbs
Resisting Force Required =	1762.60 lbs
S.F. =	1.67
Weight Required =	2937.67 lbs
Minimum Width =	23 in in
Weight Provided =	4585.63 lbs

A minimum 132in long x 23in 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	23 in			23 in			23 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	294 lbs	680 lbs	225 lbs	878 lbs	2463 lbs	825 lbs	110 lbs	199 lbs	42 lbs
F_V	226 lbs	222 lbs	230 lbs	166 lbs	162 lbs	179 lbs	227 lbs	223 lbs	228 lbs
P_{total}	5971 lbs	6357 lbs	5902 lbs	6282 lbs	7868 lbs	6229 lbs	1770 lbs	1859 lbs	1702 lbs
M	896 lbs-ft	887 lbs-ft	908 lbs-ft	671 lbs-ft	672 lbs-ft	713 lbs-ft	895 lbs-ft	885 lbs-ft	899 lbs-ft
e	0.15 ft	0.14 ft	0.15 ft	0.11 ft	0.09 ft	0.11 ft	0.51 ft	0.48 ft	0.53 ft
L/6	0.32 ft	0.32 ft	0.32 ft	0.32 ft	0.32 ft	0.32 ft	0.32 ft	0.32 ft	0.32 ft
f_{min}	150.1 psf	169.9 psf	145.2 psf	198.4 psf	273.4 psf	189.6 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	416.3 psf	433.2 psf	414.7 psf	397.6 psf	472.9 psf	401.3 psf	237.0 psf	233.5 psf	239.8 psf

Maximum Bearing Pressure = 473 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 23in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 23in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

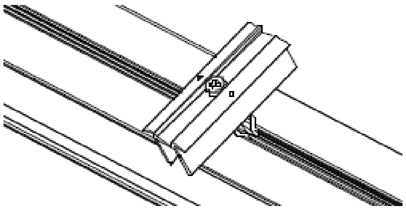
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

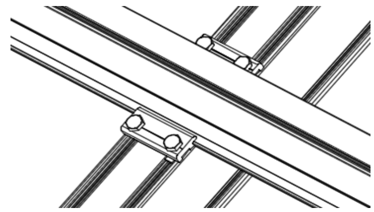
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.441	k
Allowable Uplift =	1.214	k
Utilization =	36%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.673	k
Allowable Uplift =	4.357	k
Utilization =	38%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	2.978	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	40%	

Rear Strut		
Maximum Axial Load =	3.121	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	42%	

Diagonal Strut		
Maximum Axial Load =	1.638	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	22%	

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

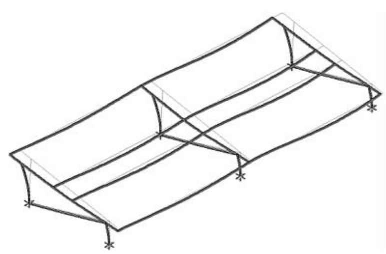
7.1 Seismic Drift

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} =	46.89	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.938	in
Max Drift, Δ_{MAX} =	0.674	in

$0.674 \leq 0.938$, OK.

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:

3.4.14

L_b = 129 in

J = 0.432

356.874

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

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= 27.2 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 129

J = 0.432

226.951

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

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

φF_LSt= 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

φF_LWk= 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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 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 = **<u>55x55</u>**

Strong Axis:

3.4.14

L_b = 63.42 in
J = 0.942
98.9729

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

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= 30.2 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

Weak Axis:

3.4.14

L_b = 63.42
J = 0.942
98.9729

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

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= 30.2

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 = 1.46712

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7854

φF_L= (φccFcy)/(λ^2)

φF_L= 12.7711 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 12.77 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 13.14 kips

APPENDIX B

B.1

The following pages will contain the results from RISA. Please refer back to Section 2 for load information and Section 4-5 for member and foundation design.

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.8			8		

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	-46.9	-46.9	0	0
2	M14	Y	-46.9	-46.9	0	0
3	M15	Y	-46.9	-46.9	0	0
4	M16	Y	-46.9	-46.9	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	-58.278	-58.278	0	0
2	M14	y	-58.278	-58.278	0	0
3	M15	y	-90.067	-90.067	0	0
4	M16	y	-90.067	-90.067	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	132.451	132.451	0	0
2	M14	y	100.663	100.663	0	0
3	M15	y	52.98	52.98	0	0
4	M16	y	52.98	52.98	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M14	Z	6.693	6.693	0	0
3	M15	Z	6.693	6.693	0	0
4	M16	Z	6.693	6.693	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	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												
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	450.782	2	972.701	1	.842	1	.004	1	0	1	0	1
2		min	-596.689	3	-1052.546	3	-50.566	5	-.264	4	0	1	0	1
3	N7	max	.043	9	1117.769	1	-.59	12	-.001	12	0	1	0	1
4		min	-.094	2	-72.855	3	-294.324	4	-.583	4	0	1	0	1
5	N15	max	.031	9	2978.238	1	0	2	0	2	0	1	0	1
6		min	-1.206	2	-323.17	3	-281.107	4	-.566	4	0	1	0	1
7	N16	max	1795.643	2	3346.833	1	0	2	0	2	0	1	0	1
8		min	-1887.328	3	-3464.71	3	-50.257	5	-.266	4	0	1	0	1
9	N23	max	.045	14	1117.769	1	12.377	1	.025	1	0	1	0	1
10		min	-.094	2	-72.855	3	-285.678	4	-.569	4	0	1	0	1
11	N24	max	450.782	2	972.701	1	-.047	12	0	12	0	1	0	1
12		min	-596.689	3	-1052.546	3	-51.213	5	-.266	4	0	1	0	1
13	Totals:	max	2695.812	2	10506.012	1	0	2						
14		min	-3080.926	3	-6038.681	3	-1007.07	5						

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	126.589	1	431.034	1	-8.222	12	0	3	.303	1	0	4
2			min	6.06	12	-514.595	3	-190.156	1	-.011	1	.015	12	0	3
3		2	max	126.589	1	302.174	1	-6.419	12	0	3	.121	4	.524	3
4			min	6.06	12	-362.191	3	-146.298	1	-.011	1	.006	12	-.438	1
5		3	max	126.589	1	173.314	1	-4.615	12	0	3	.063	5	.865	3
6			min	6.06	12	-209.787	3	-102.439	1	-.011	1	-.047	1	-.722	1
7		4	max	126.589	1	44.454	1	-2.812	12	0	3	.032	5	1.025	3
8			min	6.06	12	-57.382	3	-58.581	1	-.011	1	-.143	1	-.852	1
9		5	max	126.589	1	95.022	3	-1.008	12	0	3	.004	5	1.002	3
10			min	6.06	12	-84.406	1	-25.342	4	-.011	1	-.187	1	-.828	1
11		6	max	126.589	1	247.427	3	29.137	1	0	3	-.008	12	.798	3
12			min	3.772	15	-213.266	1	-18.835	5	-.011	1	-.178	1	-.65	1
13		7	max	126.589	1	399.831	3	72.995	1	0	3	-.006	12	.411	3
14			min	-6.317	5	-342.126	1	-16.045	5	-.011	1	-.117	1	-.319	1
15		8	max	126.589	1	552.235	3	116.854	1	0	3	0	10	.167	1
16			min	-18.578	5	-470.986	1	-13.255	5	-.011	1	-.06	4	-.157	3
17		9	max	126.589	1	704.64	3	160.712	1	0	3	.162	1	.807	1
18			min	-30.84	5	-599.846	1	-10.464	5	-.011	1	-.072	5	-.908	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
19		10	max	126.589	1	857.044	3	204.571	1	.011	1	.38	1	1.6	1
20			min	6.06	12	-728.706	1	-120.987	14	0	12	.013	12	-1.841	3
21		11	max	126.589	1	599.846	1	-6.205	12	.011	1	.162	1	.807	1
22			min	6.06	12	-704.64	3	-160.712	1	0	3	.005	12	-.908	3
23		12	max	126.589	1	470.986	1	-4.402	12	.011	1	.058	4	.167	1
24			min	6.06	12	-552.235	3	-116.854	1	0	3	-.004	1	-.157	3
25		13	max	126.589	1	342.126	1	-2.598	12	.011	1	.026	5	.411	3
26			min	6.06	12	-399.831	3	-72.995	1	0	3	-.117	1	-.319	1
27		14	max	126.589	1	213.266	1	-.795	12	.011	1	-.002	15	.798	3
28			min	6.06	12	-247.427	3	-29.281	4	0	3	-.178	1	-.65	1
29		15	max	126.589	1	84.406	1	14.722	1	.011	1	-.008	12	1.002	3
30			min	-2.178	5	-95.022	3	-19.721	5	0	3	-.187	1	-.828	1
31		16	max	126.589	1	57.382	3	58.581	1	.011	1	-.005	12	1.025	3
32			min	-14.439	5	-44.454	1	-16.93	5	0	3	-.143	1	-.852	1
33		17	max	126.589	1	209.787	3	102.439	1	.011	1	0	12	.865	3
34			min	-26.7	5	-173.314	1	-14.14	5	0	3	-.08	4	-.722	1
35		18	max	126.589	1	362.191	3	146.298	1	.011	1	.102	1	.524	3
36			min	-38.961	5	-302.174	1	-11.35	5	0	3	-.084	5	-.438	1
37		19	max	126.589	1	514.595	3	190.156	1	.011	1	.303	1	0	1
38			min	-51.223	5	-431.034	1	-8.56	5	0	3	-.096	5	0	3
39	M14	1	max	64.792	4	451.801	1	-8.443	12	.006	3	.342	1	0	1
40			min	2.554	12	-395.361	3	-195.707	1	-.009	1	.016	12	0	3
41		2	max	56.253	1	322.941	1	-6.639	12	.006	3	.17	4	.404	3
42			min	2.554	12	-280.926	3	-151.848	1	-.009	1	.007	12	-.463	1
43		3	max	56.253	1	194.081	1	-4.836	12	.006	3	.091	5	.671	3
44			min	2.554	12	-166.491	3	-107.99	1	-.009	1	-.021	1	-.771	1
45		4	max	56.253	1	65.221	1	-3.033	12	.006	3	.048	5	.802	3
46			min	2.554	12	-52.055	3	-64.131	1	-.009	1	-.123	1	-.926	1
47		5	max	56.253	1	62.38	3	-1.229	12	.006	3	.008	5	.795	3
48			min	2.203	15	-63.639	1	-37.077	4	-.009	1	-.174	1	-.927	1
49		6	max	56.253	1	176.815	3	23.586	1	.006	3	-.007	12	.653	3
50			min	-8.92	5	-192.499	1	-29.126	5	-.009	1	-.172	1	-.774	1
51		7	max	56.253	1	291.251	3	67.445	1	.006	3	-.006	12	.373	3
52			min	-21.181	5	-321.359	1	-26.336	5	-.009	1	-.117	1	-.467	1
53		8	max	56.253	1	405.686	3	111.303	1	.006	3	0	10	0	9
54			min	-33.442	5	-450.219	1	-23.546	5	-.009	1	-.095	4	-.043	3
55		9	max	56.253	1	520.121	3	155.162	1	.006	3	.149	1	.608	1
56			min	-45.704	5	-579.079	1	-20.756	5	-.009	1	-.117	5	-.596	3
57		10	max	77.119	4	634.557	3	199.021	1	.009	1	.36	1	1.377	1
58			min	2.554	12	-707.939	1	-123.255	14	-.006	3	.013	12	-1.286	3
59		11	max	64.858	4	579.079	1	-5.984	12	.009	1	.171	4	.608	1
60			min	2.554	12	-520.121	3	-155.162	1	-.006	3	.004	12	-.596	3
61		12	max	56.253	1	450.219	1	-4.181	12	.009	1	.089	5	0	9
62			min	2.554	12	-405.686	3	-111.303	1	-.006	3	-.011	1	-.043	3
63		13	max	56.253	1	321.359	1	-2.377	12	.009	1	.046	5	.373	3
64			min	2.554	12	-291.251	3	-67.445	1	-.006	3	-.117	1	-.467	1
65		14	max	56.253	1	192.499	1	-.574	12	.009	1	.006	5	.653	3
66			min	2.554	12	-176.815	3	-37.875	4	-.006	3	-.172	1	-.774	1
67		15	max	56.253	1	63.639	1	20.273	1	.009	1	-.007	12	.795	3
68			min	2.257	15	-62.38	3	-29.306	5	-.006	3	-.174	1	-.927	1
69		16	max	56.253	1	52.055	3	64.131	1	.009	1	-.004	12	.802	3
70			min	-8.837	5	-65.221	1	-26.516	5	-.006	3	-.123	1	-.926	1
71		17	max	56.253	1	166.491	3	107.99	1	.009	1	0	3	.671	3
72			min	-21.098	5	-194.081	1	-23.726	5	-.006	3	-.1	4	-.771	1
73		18	max	56.253	1	280.926	3	151.848	1	.009	1	.135	1	.404	3
74			min	-33.359	5	-322.941	1	-20.936	5	-.006	3	-.121	5	-.463	1
75		19	max	56.253	1	395.361	3	195.707	1	.009	1	.342	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
76			min	-45.621	5	-451.801	1	-18.145	5	-.006	3	-.144	5	0	3
77	M15	1	max	88.74	5	515.848	1	-8.411	12	.009	1	.342	1	0	2
78			min	-59.364	1	-203.274	3	-195.673	1	-.005	3	.016	12	0	12
79		2	max	76.479	5	368.003	1	-6.608	12	.009	1	.208	4	.208	3
80			min	-59.364	1	-145.793	3	-151.814	1	-.005	3	.007	12	-.528	1
81		3	max	64.218	5	220.158	1	-4.805	12	.009	1	.118	5	.348	3
82			min	-59.364	1	-88.313	3	-107.955	1	-.005	3	-.021	1	-.879	1
83		4	max	51.956	5	72.312	1	-3.001	12	.009	1	.065	5	.419	3
84			min	-59.364	1	-30.832	3	-64.097	1	-.005	3	-.123	1	-1.054	1
85		5	max	39.695	5	26.649	3	-1.198	12	.009	1	.014	5	.422	3
86			min	-59.364	1	-75.769	2	-45.877	4	-.005	3	-.174	1	-1.052	1
87		6	max	27.434	5	84.129	3	23.62	1	.009	1	-.007	12	.356	3
88			min	-59.364	1	-223.378	1	-37.899	5	-.005	3	-.172	1	-.873	1
89		7	max	15.173	5	141.61	3	67.479	1	.009	1	-.006	12	.221	3
90			min	-59.364	1	-371.223	1	-35.109	5	-.005	3	-.117	1	-.518	1
91		8	max	2.912	5	199.091	3	111.338	1	.009	1	0	10	.024	2
92			min	-59.364	1	-519.068	1	-32.319	5	-.005	3	-.121	4	0	15
93		9	max	-2.895	12	256.571	3	155.196	1	.009	1	.149	1	.724	2
94			min	-59.364	1	-666.913	1	-29.529	5	-.005	3	-.153	5	-.255	3
95		10	max	-2.895	12	314.052	3	199.055	1	.005	3	.36	1	1.607	1
96			min	-59.364	1	-814.758	1	-127.749	14	-.009	1	.013	12	-.595	3
97		11	max	1.39	5	666.913	1	-6.015	12	.005	3	.207	4	.724	2
98			min	-59.364	1	-256.571	3	-155.196	1	-.009	1	.005	12	-.255	3
99		12	max	-2.895	12	519.068	1	-4.212	12	.005	3	.115	5	.024	2
100			min	-59.364	1	-199.091	3	-111.338	1	-.009	1	-.011	1	0	15
101		13	max	-2.895	12	371.223	1	-2.409	12	.005	3	.061	5	.221	3
102			min	-59.364	1	-141.61	3	-67.479	1	-.009	1	-.117	1	-.518	1
103		14	max	-2.895	12	223.378	1	-.605	12	.005	3	.011	5	.356	3
104			min	-59.364	1	-84.129	3	-46.7	4	-.009	1	-.172	1	-.873	1
105		15	max	-2.895	12	75.769	2	20.238	1	.005	3	-.007	12	.422	3
106			min	-61.419	4	-26.649	3	-38.083	5	-.009	1	-.174	1	-1.052	1
107		16	max	-2.895	12	30.832	3	64.097	1	.005	3	-.004	12	.419	3
108			min	-73.68	4	-72.312	1	-35.293	5	-.009	1	-.123	1	-1.054	1
109		17	max	-2.895	12	88.313	3	107.955	1	.005	3	0	3	.348	3
110			min	-85.941	4	-220.158	1	-32.502	5	-.009	1	-.127	4	-.879	1
111		18	max	-2.895	12	145.793	3	151.814	1	.005	3	.134	1	.208	3
112			min	-98.203	4	-368.003	1	-29.712	5	-.009	1	-.158	5	-.528	1
113		19	max	-2.895	12	203.274	3	195.673	1	.005	3	.342	1	0	2
114			min	-110.464	4	-515.848	1	-26.922	5	-.009	1	-.192	5	0	5
115	M16	1	max	87.04	5	495.206	1	-8.122	12	.01	1	.304	1	0	2
116			min	-135.014	1	-191.398	3	-190.375	1	-.007	3	.014	12	0	3
117		2	max	74.779	5	347.361	1	-6.319	12	.01	1	.158	4	.194	3
118			min	-135.014	1	-133.917	3	-146.517	1	-.007	3	.005	12	-.503	1
119		3	max	62.517	5	199.516	1	-4.516	12	.01	1	.089	5	.32	3
120			min	-135.014	1	-76.437	3	-102.658	1	-.007	3	-.046	1	-.83	1
121		4	max	50.256	5	51.671	1	-2.712	12	.01	1	.048	5	.377	3
122			min	-135.014	1	-18.956	3	-58.799	1	-.007	3	-.143	1	-.98	1
123		5	max	37.995	5	38.525	3	-.909	12	.01	1	.011	5	.365	3
124			min	-135.014	1	-96.174	1	-33.903	4	-.007	3	-.187	1	-.953	1
125		6	max	25.734	5	96.005	3	28.918	1	.01	1	-.008	12	.285	3
126			min	-135.014	1	-244.019	1	-27.275	5	-.007	3	-.178	1	-.75	1
127		7	max	13.473	5	153.486	3	72.777	1	.01	1	-.005	12	.136	3
128			min	-135.014	1	-391.864	1	-24.485	5	-.007	3	-.117	1	-.37	1
129		8	max	1.211	5	210.967	3	116.635	1	.01	1	0	10	.186	1
130			min	-135.014	1	-539.709	1	-21.695	5	-.007	3	-.085	4	-.082	3
131		9	max	-6.263	12	268.447	3	160.494	1	.01	1	.161	1	.919	1
132			min	-135.014	1	-687.554	1	-18.905	5	-.007	3	-.106	5	-.368	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
133		10	max	-6.263	12	325.928	3	204.352	1	.007	3	.379	1	1.829	1
134			min	-135.014	1	-835.4	1	-125.24	14	-.01	1	.014	12	-.723	3
135		11	max	-3.861	15	687.554	1	-6.305	12	.007	3	.164	4	.919	1
136			min	-135.014	1	-268.447	3	-160.494	1	-.01	1	.005	12	-.368	3
137		12	max	-6.263	12	539.709	1	-4.501	12	.007	3	.082	4	.186	1
138			min	-135.014	1	-210.967	3	-116.635	1	-.01	1	-.004	1	-.082	3
139		13	max	-6.263	12	391.864	1	-2.698	12	.007	3	.039	5	.136	3
140			min	-135.014	1	-153.486	3	-72.777	1	-.01	1	-.117	1	-.37	1
141		14	max	-6.263	12	244.019	1	-.894	12	.007	3	0	15	.285	3
142			min	-135.014	1	-96.005	3	-37.751	4	-.01	1	-.178	1	-.75	1
143		15	max	-6.263	12	96.174	1	14.941	1	.007	3	-.008	12	.365	3
144			min	-135.014	1	-38.525	3	-28.146	5	-.01	1	-.187	1	-.953	1
145		16	max	-6.263	12	18.956	3	58.799	1	.007	3	-.005	12	.377	3
146			min	-135.014	1	-51.671	1	-25.356	5	-.01	1	-.143	1	-.98	1
147		17	max	-6.263	12	76.437	3	102.658	1	.007	3	-.001	12	.32	3
148			min	-135.014	1	-199.516	1	-22.565	5	-.01	1	-.107	4	-.83	1
149		18	max	-6.263	12	133.917	3	146.517	1	.007	3	.103	1	.194	3
150			min	-135.014	1	-347.361	1	-19.775	5	-.01	1	-.12	5	-.503	1
151		19	max	-6.263	12	191.398	3	190.375	1	.007	3	.304	1	0	2
152			min	-135.014	1	-495.206	1	-16.985	5	-.01	1	-.142	5	0	5
153	M2	1	max	963.712	1	1.956	4	.814	1	0	12	0	3	0	1
154			min	-924.625	3	.476	15	-48.921	4	0	4	0	1	0	1
155		2	max	964.141	1	1.9	4	.814	1	0	12	0	1	0	15
156			min	-924.303	3	.463	15	-49.294	4	0	4	-.014	4	0	4
157		3	max	964.569	1	1.843	4	.814	1	0	12	0	1	0	15
158			min	-923.982	3	.449	15	-49.667	4	0	4	-.029	4	-.001	4
159		4	max	964.998	1	1.786	4	.814	1	0	12	0	1	0	15
160			min	-923.661	3	.436	15	-50.041	4	0	4	-.043	4	-.002	4
161		5	max	965.426	1	1.729	4	.814	1	0	12	0	1	0	15
162			min	-923.339	3	.423	15	-50.414	4	0	4	-.058	4	-.002	4
163		6	max	965.855	1	1.672	4	.814	1	0	12	.001	1	0	15
164			min	-923.018	3	.409	15	-50.787	4	0	4	-.072	4	-.003	4
165		7	max	966.283	1	1.616	4	.814	1	0	12	.001	1	0	15
166			min	-922.697	3	.396	15	-51.161	4	0	4	-.087	4	-.003	4
167		8	max	966.712	1	1.559	4	.814	1	0	12	.002	1	0	15
168			min	-922.375	3	.383	15	-51.534	4	0	4	-.102	4	-.004	4
169		9	max	967.14	1	1.502	4	.814	1	0	12	.002	1	0	15
170			min	-922.054	3	.369	15	-51.907	4	0	4	-.117	4	-.004	4
171		10	max	967.569	1	1.445	4	.814	1	0	12	.002	1	-.001	15
172			min	-921.732	3	.356	15	-52.281	4	0	4	-.132	4	-.004	4
173		11	max	967.997	1	1.388	4	.814	1	0	12	.002	1	-.001	15
174			min	-921.411	3	.343	15	-52.654	4	0	4	-.147	4	-.005	4
175		12	max	968.426	1	1.332	4	.814	1	0	12	.003	1	-.001	15
176			min	-921.09	3	.329	15	-53.027	4	0	4	-.163	4	-.005	4
177		13	max	968.854	1	1.275	4	.814	1	0	12	.003	1	-.001	15
178			min	-920.768	3	.316	15	-53.401	4	0	4	-.178	4	-.006	4
179		14	max	969.283	1	1.218	4	.814	1	0	12	.003	1	-.001	15
180			min	-920.447	3	.303	15	-53.774	4	0	4	-.194	4	-.006	4
181		15	max	969.711	1	1.161	4	.814	1	0	12	.003	1	-.002	15
182			min	-920.126	3	.289	15	-54.147	4	0	4	-.209	4	-.006	4
183		16	max	970.14	1	1.105	4	.814	1	0	12	.004	1	-.002	15
184			min	-919.804	3	.274	12	-54.52	4	0	4	-.225	4	-.007	4
185		17	max	970.568	1	1.048	4	.814	1	0	12	.004	1	-.002	15
186			min	-919.483	3	.252	12	-54.894	4	0	4	-.241	4	-.007	4
187		18	max	970.997	1	.991	4	.814	1	0	12	.004	1	-.002	15
188			min	-919.162	3	.23	12	-55.267	4	0	4	-.257	4	-.007	4
189		19	max	971.425	1	.934	4	.814	1	0	12	.004	1	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
190			min	-918.84	3	.208	12	-55.64	4	0	4	-.273	4	-.008	4
191	M3	1	max	380.433	2	7.906	4	3.734	4	0	12	0	1	.008	4
192			min	-521.205	3	1.87	15	.008	12	0	4	-.029	4	.002	15
193		2	max	380.263	2	7.139	4	4.273	4	0	12	0	1	.004	4
194			min	-521.333	3	1.689	15	.008	12	0	4	-.028	4	0	12
195		3	max	380.093	2	6.372	4	4.812	4	0	12	0	1	.002	2
196			min	-521.461	3	1.509	15	.008	12	0	4	-.026	4	0	3
197		4	max	379.922	2	5.605	4	5.351	4	0	12	0	1	0	2
198			min	-521.588	3	1.329	15	.008	12	0	4	-.023	4	-.002	3
199		5	max	379.752	2	4.838	4	5.889	4	0	12	0	1	0	15
200			min	-521.716	3	1.148	15	.008	12	0	4	-.021	4	-.003	6
201		6	max	379.582	2	4.07	4	6.428	4	0	12	0	1	-.001	15
202			min	-521.844	3	.968	15	.008	12	0	4	-.019	4	-.005	6
203		7	max	379.411	2	3.303	4	6.967	4	0	12	0	1	-.001	15
204			min	-521.972	3	.788	15	.008	12	0	4	-.016	4	-.007	6
205		8	max	379.241	2	2.536	4	7.506	4	0	12	0	1	-.002	15
206			min	-522.099	3	.607	15	.008	12	0	4	-.013	5	-.008	6
207		9	max	379.071	2	1.769	4	8.044	4	0	12	.001	1	-.002	15
208			min	-522.227	3	.427	15	.008	12	0	4	-.01	5	-.009	6
209		10	max	378.9	2	1.001	4	8.583	4	0	12	.001	1	-.002	15
210			min	-522.355	3	.247	15	.008	12	0	4	-.006	5	-.009	6
211		11	max	378.73	2	.283	2	9.122	4	0	12	.001	1	-.002	15
212			min	-522.483	3	-.042	3	.008	12	0	4	-.003	5	-.01	6
213		12	max	378.559	2	-.114	15	9.661	4	0	12	.002	4	-.002	15
214			min	-522.61	3	-.534	6	.008	12	0	4	0	12	-.009	6
215		13	max	378.389	2	-.294	15	10.199	4	0	12	.006	4	-.002	15
216			min	-522.738	3	-1.301	6	.008	12	0	4	0	12	-.009	6
217		14	max	378.219	2	-.475	15	10.738	4	0	12	.01	4	-.002	15
218			min	-522.866	3	-2.068	6	.008	12	0	4	0	12	-.008	6
219		15	max	378.048	2	-.655	15	11.277	4	0	12	.015	4	-.002	15
220			min	-522.994	3	-2.836	6	.008	12	0	4	0	12	-.007	6
221		16	max	377.878	2	-.835	15	11.816	4	0	12	.02	4	-.001	15
222			min	-523.121	3	-3.603	6	.008	12	0	4	0	12	-.006	6
223		17	max	377.708	2	-1.016	15	12.354	4	0	12	.025	4	-.001	15
224			min	-523.249	3	-4.37	6	.008	12	0	4	0	12	-.004	6
225		18	max	377.537	2	-1.196	15	12.893	4	0	12	.03	4	0	15
226			min	-523.377	3	-5.137	6	.008	12	0	4	0	12	-.002	6
227		19	max	377.367	2	-1.376	15	13.432	4	0	12	.036	4	0	1
228			min	-523.505	3	-5.904	6	.008	12	0	4	0	12	0	1
229	M4	1	max	1114.703	1	0	1	-.589	12	0	1	.026	4	0	1
230			min	-75.155	3	0	1	-293.345	4	0	1	0	12	0	1
231		2	max	1114.873	1	0	1	-.589	12	0	1	0	12	0	1
232			min	-75.027	3	0	1	-293.493	4	0	1	-.008	4	0	1
233		3	max	1115.043	1	0	1	-.589	12	0	1	0	12	0	1
234			min	-74.899	3	0	1	-293.64	4	0	1	-.042	4	0	1
235		4	max	1115.214	1	0	1	-.589	12	0	1	0	12	0	1
236			min	-74.771	3	0	1	-293.788	4	0	1	-.075	4	0	1
237		5	max	1115.384	1	0	1	-.589	12	0	1	0	12	0	1
238			min	-74.644	3	0	1	-293.936	4	0	1	-.109	4	0	1
239		6	max	1115.554	1	0	1	-.589	12	0	1	0	12	0	1
240			min	-74.516	3	0	1	-294.083	4	0	1	-.143	4	0	1
241		7	max	1115.725	1	0	1	-.589	12	0	1	0	12	0	1
242			min	-74.388	3	0	1	-294.231	4	0	1	-.177	4	0	1
243		8	max	1115.895	1	0	1	-.589	12	0	1	0	12	0	1
244			min	-74.26	3	0	1	-294.379	4	0	1	-.211	4	0	1
245		9	max	1116.065	1	0	1	-.589	12	0	1	0	12	0	1
246			min	-74.133	3	0	1	-294.526	4	0	1	-.244	4	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
247		10	max	1116.236	1	0	1	-.589	12	0	1	0	12	0	1
248			min	-74.005	3	0	1	-294.674	4	0	1	-.278	4	0	1
249		11	max	1116.406	1	0	1	-.589	12	0	1	0	12	0	1
250			min	-73.877	3	0	1	-294.821	4	0	1	-.312	4	0	1
251		12	max	1116.576	1	0	1	-.589	12	0	1	0	12	0	1
252			min	-73.749	3	0	1	-294.969	4	0	1	-.346	4	0	1
253		13	max	1116.747	1	0	1	-.589	12	0	1	0	12	0	1
254			min	-73.622	3	0	1	-295.117	4	0	1	-.38	4	0	1
255		14	max	1116.917	1	0	1	-.589	12	0	1	0	12	0	1
256			min	-73.494	3	0	1	-295.264	4	0	1	-.414	4	0	1
257		15	max	1117.088	1	0	1	-.589	12	0	1	0	12	0	1
258			min	-73.366	3	0	1	-295.412	4	0	1	-.448	4	0	1
259		16	max	1117.258	1	0	1	-.589	12	0	1	0	12	0	1
260			min	-73.238	3	0	1	-295.56	4	0	1	-.481	4	0	1
261		17	max	1117.428	1	0	1	-.589	12	0	1	-.001	12	0	1
262			min	-73.111	3	0	1	-295.707	4	0	1	-.515	4	0	1
263		18	max	1117.599	1	0	1	-.589	12	0	1	-.001	12	0	1
264			min	-72.983	3	0	1	-295.855	4	0	1	-.549	4	0	1
265		19	max	1117.769	1	0	1	-.589	12	0	1	-.001	12	0	1
266			min	-72.855	3	0	1	-296.002	4	0	1	-.583	4	0	1
267	M6	1	max	3113.77	1	2.152	2	0	1	0	1	0	4	0	1
268			min	-3042.534	3	.289	12	-49.43	4	0	4	0	1	0	1
269		2	max	3114.198	1	2.107	2	0	1	0	1	0	1	0	12
270			min	-3042.213	3	.267	12	-49.803	4	0	4	-.014	4	0	2
271		3	max	3114.627	1	2.063	2	0	1	0	1	0	1	0	12
272			min	-3041.891	3	.245	12	-50.176	4	0	4	-.029	4	-.001	2
273		4	max	3115.055	1	2.019	2	0	1	0	1	0	1	0	12
274			min	-3041.57	3	.223	12	-50.55	4	0	4	-.044	4	-.002	2
275		5	max	3115.484	1	1.975	2	0	1	0	1	0	1	0	12
276			min	-3041.248	3	.201	12	-50.923	4	0	4	-.058	4	-.002	2
277		6	max	3115.912	1	1.93	2	0	1	0	1	0	1	0	12
278			min	-3040.927	3	.179	12	-51.296	4	0	4	-.073	4	-.003	2
279		7	max	3116.341	1	1.886	2	0	1	0	1	0	1	0	12
280			min	-3040.606	3	.157	12	-51.67	4	0	4	-.088	4	-.004	2
281		8	max	3116.769	1	1.842	2	0	1	0	1	0	1	0	12
282			min	-3040.284	3	.124	3	-52.043	4	0	4	-.103	4	-.004	2
283		9	max	3117.198	1	1.798	2	0	1	0	1	0	1	0	12
284			min	-3039.963	3	.091	3	-52.416	4	0	4	-.118	4	-.005	2
285		10	max	3117.626	1	1.753	2	0	1	0	1	0	1	0	12
286			min	-3039.642	3	.058	3	-52.79	4	0	4	-.134	4	-.005	2
287		11	max	3118.054	1	1.709	2	0	1	0	1	0	1	0	12
288			min	-3039.32	3	.024	3	-53.163	4	0	4	-.149	4	-.006	2
289		12	max	3118.483	1	1.665	2	0	1	0	1	0	1	0	12
290			min	-3038.999	3	-.009	3	-53.536	4	0	4	-.164	4	-.006	2
291		13	max	3118.911	1	1.621	2	0	1	0	1	0	1	0	12
292			min	-3038.678	3	-.042	3	-53.91	4	0	4	-.18	4	-.007	2
293		14	max	3119.34	1	1.576	2	0	1	0	1	0	1	0	3
294			min	-3038.356	3	-.075	3	-54.283	4	0	4	-.196	4	-.007	2
295		15	max	3119.768	1	1.532	2	0	1	0	1	0	1	0	3
296			min	-3038.035	3	-.108	3	-54.656	4	0	4	-.212	4	-.007	2
297		16	max	3120.197	1	1.488	2	0	1	0	1	0	1	0	3
298			min	-3037.713	3	-.142	3	-55.03	4	0	4	-.227	4	-.008	2
299		17	max	3120.625	1	1.444	2	0	1	0	1	0	1	0	3
300			min	-3037.392	3	-.175	3	-55.403	4	0	4	-.244	4	-.008	2
301		18	max	3121.054	1	1.399	2	0	1	0	1	0	1	0	3
302			min	-3037.071	3	-.208	3	-55.776	4	0	4	-.26	4	-.009	2
303		19	max	3121.482	1	1.355	2	0	1	0	1	0	1	0	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
304			min	-3036.749	3	-.241	3	-56.15	4	0	4	-.276	4	-.009	2
305	M7	1	max	1582.574	2	7.92	6	3.51	4	0	1	0	1	.009	2
306			min	-1635.399	3	1.859	15	0	1	0	4	-.029	4	0	3
307		2	max	1582.404	2	7.153	6	4.049	4	0	1	0	1	.007	2
308			min	-1635.526	3	1.679	15	0	1	0	4	-.028	4	-.001	3
309		3	max	1582.234	2	6.386	6	4.588	4	0	1	0	1	.004	2
310			min	-1635.654	3	1.498	15	0	1	0	4	-.026	4	-.003	3
311		4	max	1582.063	2	5.618	6	5.127	4	0	1	0	1	.002	2
312			min	-1635.782	3	1.318	15	0	1	0	4	-.024	4	-.004	3
313		5	max	1581.893	2	4.851	6	5.665	4	0	1	0	1	0	2
314			min	-1635.91	3	1.137	15	0	1	0	4	-.022	4	-.005	3
315		6	max	1581.723	2	4.084	6	6.204	4	0	1	0	1	-.001	15
316			min	-1636.037	3	.957	15	0	1	0	4	-.019	4	-.006	3
317		7	max	1581.552	2	3.317	6	6.743	4	0	1	0	1	-.002	15
318			min	-1636.165	3	.777	15	0	1	0	4	-.017	4	-.007	3
319		8	max	1581.382	2	2.55	6	7.282	4	0	1	0	1	-.002	15
320			min	-1636.293	3	.596	15	0	1	0	4	-.014	4	-.008	4
321		9	max	1581.211	2	1.813	2	7.82	4	0	1	0	1	-.002	15
322			min	-1636.421	3	.362	12	0	1	0	4	-.01	4	-.009	4
323		10	max	1581.041	2	1.215	2	8.359	4	0	1	0	1	-.002	15
324			min	-1636.548	3	.04	3	0	1	0	4	-.007	4	-.009	4
325		11	max	1580.871	2	.617	2	8.898	4	0	1	0	1	-.002	15
326			min	-1636.676	3	-.408	3	0	1	0	4	-.003	4	-.009	4
327		12	max	1580.7	2	.019	2	9.437	4	0	1	0	4	-.002	15
328			min	-1636.804	3	-.857	3	0	1	0	4	0	1	-.009	4
329		13	max	1580.53	2	-.305	15	9.975	4	0	1	.004	4	-.002	15
330			min	-1636.932	3	-1.305	3	0	1	0	4	0	1	-.009	4
331		14	max	1580.36	2	-.486	15	10.514	4	0	1	.009	4	-.002	15
332			min	-1637.059	3	-2.054	4	0	1	0	4	0	1	-.008	4
333		15	max	1580.189	2	-.666	15	11.053	4	0	1	.013	4	-.002	15
334			min	-1637.187	3	-2.821	4	0	1	0	4	0	1	-.007	4
335		16	max	1580.019	2	-.846	15	11.592	4	0	1	.018	4	-.001	15
336			min	-1637.315	3	-3.588	4	0	1	0	4	0	1	-.006	4
337		17	max	1579.849	2	-1.027	15	12.13	4	0	1	.023	4	-.001	15
338			min	-1637.443	3	-4.355	4	0	1	0	4	0	1	-.004	4
339		18	max	1579.678	2	-1.207	15	12.669	4	0	1	.028	4	0	15
340			min	-1637.57	3	-5.123	4	0	1	0	4	0	1	-.002	4
341		19	max	1579.508	2	-1.387	15	13.208	4	0	1	.034	4	0	1
342			min	-1637.698	3	-5.89	4	0	1	0	4	0	1	0	1
343	M8	1	max	2975.172	1	0	1	0	1	0	1	.024	4	0	1
344			min	-325.469	3	0	1	-284.046	4	0	1	0	1	0	1
345		2	max	2975.342	1	0	1	0	1	0	1	0	1	0	1
346			min	-325.342	3	0	1	-284.194	4	0	1	-.008	4	0	1
347		3	max	2975.513	1	0	1	0	1	0	1	0	1	0	1
348			min	-325.214	3	0	1	-284.341	4	0	1	-.041	4	0	1
349		4	max	2975.683	1	0	1	0	1	0	1	0	1	0	1
350			min	-325.086	3	0	1	-284.489	4	0	1	-.074	4	0	1
351		5	max	2975.853	1	0	1	0	1	0	1	0	1	0	1
352			min	-324.958	3	0	1	-284.637	4	0	1	-.106	4	0	1
353		6	max	2976.024	1	0	1	0	1	0	1	0	1	0	1
354			min	-324.831	3	0	1	-284.784	4	0	1	-.139	4	0	1
355		7	max	2976.194	1	0	1	0	1	0	1	0	1	0	1
356			min	-324.703	3	0	1	-284.932	4	0	1	-.172	4	0	1
357		8	max	2976.364	1	0	1	0	1	0	1	0	1	0	1
358			min	-324.575	3	0	1	-285.08	4	0	1	-.204	4	0	1
359		9	max	2976.535	1	0	1	0	1	0	1	0	1	0	1
360			min	-324.447	3	0	1	-285.227	4	0	1	-.237	4	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
361		10	max	2976.705	1	0	1	0	1	0	1	0	1	0	1
362			min	-324.32	3	0	1	-285.375	4	0	1	-.27	4	0	1
363		11	max	2976.875	1	0	1	0	1	0	1	0	1	0	1
364			min	-324.192	3	0	1	-285.522	4	0	1	-.303	4	0	1
365		12	max	2977.046	1	0	1	0	1	0	1	0	1	0	1
366			min	-324.064	3	0	1	-285.67	4	0	1	-.336	4	0	1
367		13	max	2977.216	1	0	1	0	1	0	1	0	1	0	1
368			min	-323.936	3	0	1	-285.818	4	0	1	-.368	4	0	1
369		14	max	2977.386	1	0	1	0	1	0	1	0	1	0	1
370			min	-323.809	3	0	1	-285.965	4	0	1	-.401	4	0	1
371		15	max	2977.557	1	0	1	0	1	0	1	0	1	0	1
372			min	-323.681	3	0	1	-286.113	4	0	1	-.434	4	0	1
373		16	max	2977.727	1	0	1	0	1	0	1	0	1	0	1
374			min	-323.553	3	0	1	-286.261	4	0	1	-.467	4	0	1
375		17	max	2977.897	1	0	1	0	1	0	1	0	1	0	1
376			min	-323.425	3	0	1	-286.408	4	0	1	-.5	4	0	1
377		18	max	2978.068	1	0	1	0	1	0	1	0	1	0	1
378			min	-323.298	3	0	1	-286.556	4	0	1	-.533	4	0	1
379		19	max	2978.238	1	0	1	0	1	0	1	0	1	0	1
380			min	-323.17	3	0	1	-286.704	4	0	1	-.566	4	0	1
381	M10	1	max	963.712	1	1.885	6	-.036	12	0	1	0	1	0	1
382			min	-924.625	3	.428	15	-49.383	4	0	5	0	3	0	1
383		2	max	964.141	1	1.828	6	-.036	12	0	1	0	10	0	15
384			min	-924.303	3	.415	15	-49.756	4	0	5	-.014	4	0	6
385		3	max	964.569	1	1.772	6	-.036	12	0	1	0	12	0	15
386			min	-923.982	3	.402	15	-50.129	4	0	5	-.029	4	-.001	6
387		4	max	964.998	1	1.715	6	-.036	12	0	1	0	12	0	15
388			min	-923.661	3	.388	15	-50.502	4	0	5	-.043	4	-.002	6
389		5	max	965.426	1	1.658	6	-.036	12	0	1	0	12	0	15
390			min	-923.339	3	.375	15	-50.876	4	0	5	-.058	4	-.002	6
391		6	max	965.855	1	1.601	6	-.036	12	0	1	0	12	0	15
392			min	-923.018	3	.362	15	-51.249	4	0	5	-.073	4	-.003	6
393		7	max	966.283	1	1.544	6	-.036	12	0	1	0	12	0	15
394			min	-922.697	3	.348	15	-51.622	4	0	5	-.088	4	-.003	6
395		8	max	966.712	1	1.488	6	-.036	12	0	1	0	12	0	15
396			min	-922.375	3	.335	15	-51.996	4	0	5	-.103	4	-.003	6
397		9	max	967.14	1	1.431	6	-.036	12	0	1	0	12	0	15
398			min	-922.054	3	.322	15	-52.369	4	0	5	-.118	4	-.004	6
399		10	max	967.569	1	1.374	6	-.036	12	0	1	0	12	0	15
400			min	-921.732	3	.308	15	-52.742	4	0	5	-.133	4	-.004	6
401		11	max	967.997	1	1.317	6	-.036	12	0	1	0	12	-.001	15
402			min	-921.411	3	.295	15	-53.116	4	0	5	-.149	4	-.005	6
403		12	max	968.426	1	1.261	6	-.036	12	0	1	0	12	-.001	15
404			min	-921.09	3	.282	15	-53.489	4	0	5	-.164	4	-.005	6
405		13	max	968.854	1	1.204	6	-.036	12	0	1	0	12	-.001	15
406			min	-920.768	3	.268	15	-53.862	4	0	5	-.18	4	-.005	6
407		14	max	969.283	1	1.147	6	-.036	12	0	1	0	12	-.001	15
408			min	-920.447	3	.255	15	-54.236	4	0	5	-.196	4	-.006	6
409		15	max	969.711	1	1.09	6	-.036	12	0	1	0	12	-.001	15
410			min	-920.126	3	.241	15	-54.609	4	0	5	-.211	4	-.006	6
411		16	max	970.14	1	1.033	6	-.036	12	0	1	0	12	-.001	15
412			min	-919.804	3	.228	15	-54.982	4	0	5	-.227	4	-.006	6
413		17	max	970.568	1	.977	6	-.036	12	0	1	0	12	-.001	15
414			min	-919.483	3	.215	15	-55.356	4	0	5	-.243	4	-.007	6
415		18	max	970.997	1	.92	6	-.036	12	0	1	0	12	-.002	15
416			min	-919.162	3	.201	15	-55.729	4	0	5	-.259	4	-.007	6
417		19	max	971.425	1	.873	2	-.036	12	0	1	0	12	-.002	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
418			min	-918.84	3	.188	15	-56.102	4	0	5	-.276	4	-.007	6
419	M11	1	max	380.433	2	7.857	6	3.634	4	0	1	0	12	.007	6
420			min	-521.205	3	1.837	15	-.178	1	0	4	-.029	4	.002	15
421		2	max	380.263	2	7.09	6	4.173	4	0	1	0	12	.004	2
422			min	-521.333	3	1.656	15	-.178	1	0	4	-.028	4	0	15
423		3	max	380.093	2	6.323	6	4.711	4	0	1	0	12	.002	2
424			min	-521.461	3	1.476	15	-.178	1	0	4	-.026	4	0	3
425		4	max	379.922	2	5.556	6	5.25	4	0	1	0	12	0	2
426			min	-521.588	3	1.296	15	-.178	1	0	4	-.024	4	-.002	3
427		5	max	379.752	2	4.788	6	5.789	4	0	1	0	12	0	15
428			min	-521.716	3	1.115	15	-.178	1	0	4	-.022	4	-.003	4
429		6	max	379.582	2	4.021	6	6.328	4	0	1	0	12	-.001	15
430			min	-521.844	3	.935	15	-.178	1	0	4	-.019	4	-.005	4
431		7	max	379.411	2	3.254	6	6.866	4	0	1	0	12	-.002	15
432			min	-521.972	3	.755	15	-.178	1	0	4	-.016	4	-.007	4
433		8	max	379.241	2	2.487	6	7.405	4	0	1	0	12	-.002	15
434			min	-522.099	3	.574	15	-.178	1	0	4	-.013	4	-.008	4
435		9	max	379.071	2	1.719	6	7.944	4	0	1	0	12	-.002	15
436			min	-522.227	3	.394	15	-.178	1	0	4	-.01	4	-.009	4
437		10	max	378.9	2	.952	6	8.483	4	0	1	0	12	-.002	15
438			min	-522.355	3	.214	15	-.178	1	0	4	-.007	4	-.009	4
439		11	max	378.73	2	.283	2	9.021	4	0	1	0	12	-.002	15
440			min	-522.483	3	-.042	3	-.178	1	0	4	-.003	4	-.01	4
441		12	max	378.559	2	-.147	15	9.56	4	0	1	.001	5	-.002	15
442			min	-522.61	3	-.583	4	-.178	1	0	4	-.001	1	-.01	4
443		13	max	378.389	2	-.327	15	10.099	4	0	1	.005	5	-.002	15
444			min	-522.738	3	-1.35	4	-.178	1	0	4	-.001	1	-.009	4
445		14	max	378.219	2	-.508	15	10.637	4	0	1	.01	5	-.002	15
446			min	-522.866	3	-2.118	4	-.178	1	0	4	-.001	1	-.008	4
447		15	max	378.048	2	-.688	15	11.176	4	0	1	.014	5	-.002	15
448			min	-522.994	3	-2.885	4	-.178	1	0	4	-.001	1	-.007	4
449		16	max	377.878	2	-.869	15	11.715	4	0	1	.019	5	-.001	15
450			min	-523.121	3	-3.652	4	-.178	1	0	4	-.002	1	-.006	4
451		17	max	377.708	2	-1.049	15	12.254	4	0	1	.024	5	-.001	15
452			min	-523.249	3	-4.419	4	-.178	1	0	4	-.002	1	-.004	4
453		18	max	377.537	2	-1.229	15	12.792	4	0	1	.029	4	0	15
454			min	-523.377	3	-5.187	4	-.178	1	0	4	-.002	1	-.002	4
455		19	max	377.367	2	-1.41	15	13.331	4	0	1	.035	4	0	1
456			min	-523.505	3	-5.954	4	-.178	1	0	4	-.002	1	0	1
457	M12	1	max	1114.703	1	0	1	12.795	1	0	1	.025	4	0	1
458			min	-75.155	3	0	1	-286.065	4	0	1	-.001	1	0	1
459		2	max	1114.873	1	0	1	12.795	1	0	1	0	1	0	1
460			min	-75.027	3	0	1	-286.212	4	0	1	-.008	4	0	1
461		3	max	1115.043	1	0	1	12.795	1	0	1	.002	1	0	1
462			min	-74.899	3	0	1	-286.36	4	0	1	-.041	4	0	1
463		4	max	1115.214	1	0	1	12.795	1	0	1	.003	1	0	1
464			min	-74.771	3	0	1	-286.508	4	0	1	-.074	4	0	1
465		5	max	1115.384	1	0	1	12.795	1	0	1	.005	1	0	1
466			min	-74.644	3	0	1	-286.655	4	0	1	-.107	4	0	1
467		6	max	1115.554	1	0	1	12.795	1	0	1	.006	1	0	1
468			min	-74.516	3	0	1	-286.803	4	0	1	-.139	4	0	1
469		7	max	1115.725	1	0	1	12.795	1	0	1	.008	1	0	1
470			min	-74.388	3	0	1	-286.951	4	0	1	-.172	4	0	1
471		8	max	1115.895	1	0	1	12.795	1	0	1	.009	1	0	1
472			min	-74.26	3	0	1	-287.098	4	0	1	-.205	4	0	1
473		9	max	1116.065	1	0	1	12.795	1	0	1	.01	1	0	1
474			min	-74.133	3	0	1	-287.246	4	0	1	-.238	4	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
475		10	max	1116.236	1	0	1	12.795	1	0	1	.012	1	0	1
476			min	-74.005	3	0	1	-287.393	4	0	1	-.271	4	0	1
477		11	max	1116.406	1	0	1	12.795	1	0	1	.013	1	0	1
478			min	-73.877	3	0	1	-287.541	4	0	1	-.304	4	0	1
479		12	max	1116.576	1	0	1	12.795	1	0	1	.015	1	0	1
480			min	-73.749	3	0	1	-287.689	4	0	1	-.337	4	0	1
481		13	max	1116.747	1	0	1	12.795	1	0	1	.016	1	0	1
482			min	-73.622	3	0	1	-287.836	4	0	1	-.37	4	0	1
483		14	max	1116.917	1	0	1	12.795	1	0	1	.018	1	0	1
484			min	-73.494	3	0	1	-287.984	4	0	1	-.403	4	0	1
485		15	max	1117.088	1	0	1	12.795	1	0	1	.019	1	0	1
486			min	-73.366	3	0	1	-288.132	4	0	1	-.437	4	0	1
487		16	max	1117.258	1	0	1	12.795	1	0	1	.021	1	0	1
488			min	-73.238	3	0	1	-288.279	4	0	1	-.47	4	0	1
489		17	max	1117.428	1	0	1	12.795	1	0	1	.022	1	0	1
490			min	-73.111	3	0	1	-288.427	4	0	1	-.503	4	0	1
491		18	max	1117.599	1	0	1	12.795	1	0	1	.024	1	0	1
492			min	-72.983	3	0	1	-288.575	4	0	1	-.536	4	0	1
493		19	max	1117.769	1	0	1	12.795	1	0	1	.025	1	0	1
494			min	-72.855	3	0	1	-288.722	4	0	1	-.569	4	0	1
495	M1	1	max	190.162	1	514.579	3	51.195	5	0	1	.303	1	0	3
496			min	-8.56	5	-429.671	1	-126.421	1	0	3	-.096	5	-.011	1
497		2	max	190.767	1	513.605	3	52.437	5	0	1	.236	1	.216	1
498			min	-8.278	5	-430.969	1	-126.421	1	0	3	-.068	5	-.271	3
499		3	max	316.645	3	476.334	1	5.983	5	0	3	.169	1	.433	1
500			min	-191.284	2	-362.105	3	-125.889	1	0	1	-.041	5	-.531	3
501		4	max	317.099	3	475.036	1	7.224	5	0	3	.103	1	.182	1
502			min	-190.679	2	-363.079	3	-125.889	1	0	1	-.037	5	-.34	3
503		5	max	317.553	3	473.738	1	8.466	5	0	3	.036	1	-.003	15
504			min	-190.074	2	-364.052	3	-125.889	1	0	1	-.033	5	-.148	3
505		6	max	318.008	3	472.439	1	9.707	5	0	3	-.001	12	.044	3
506			min	-189.468	2	-365.026	3	-125.889	1	0	1	-.035	4	-.318	1
507		7	max	318.462	3	471.141	1	10.949	5	0	3	-.005	12	.237	3
508			min	-188.863	2	-366	3	-125.889	1	0	1	-.097	1	-.567	1
509		8	max	318.916	3	469.843	1	12.19	5	0	3	-.008	12	.43	3
510			min	-188.258	2	-366.973	3	-125.889	1	0	1	-.163	1	-.816	1
511		9	max	332.097	3	32.828	2	58.952	5	0	9	.095	1	.504	3
512			min	-108.544	2	.392	15	-182.174	1	0	3	-.14	5	-.929	1
513		10	max	332.551	3	31.529	2	60.193	5	0	9	0	12	.489	3
514			min	-107.938	2	0	5	-182.174	1	0	3	-.109	4	-.939	1
515		11	max	333.005	3	30.231	2	61.435	5	0	9	-.005	12	.475	3
516			min	-107.333	2	-1.605	4	-182.174	1	0	3	-.098	4	-.947	1
517		12	max	346.136	3	230.586	3	159.164	5	0	1	.161	1	.413	3
518			min	-65.819	5	-504.383	1	-122.894	1	0	3	-.215	5	-.836	1
519		13	max	346.59	3	229.612	3	160.405	5	0	1	.096	1	.292	3
520			min	-65.536	5	-505.681	1	-122.894	1	0	3	-.13	5	-.57	1
521		14	max	347.044	3	228.639	3	161.647	5	0	1	.031	1	.171	3
522			min	-65.254	5	-506.979	1	-122.894	1	0	3	-.045	5	-.303	1
523		15	max	347.498	3	227.665	3	162.888	5	0	1	.04	5	.05	3
524			min	-64.971	5	-508.278	1	-122.894	1	0	3	-.034	1	-.035	1
525		16	max	347.952	3	226.691	3	164.13	5	0	1	.126	5	.242	2
526			min	-64.689	5	-509.576	1	-122.894	1	0	3	-.098	1	-.069	3
527		17	max	348.406	3	225.718	3	165.371	5	0	1	.213	5	.503	1
528			min	-64.406	5	-510.874	1	-122.894	1	0	3	-.163	1	-.189	3
529		18	max	16.702	5	497.786	1	-6.263	12	0	5	.198	5	.252	1
530			min	-190.976	1	-190.47	3	-136.344	4	0	2	-.233	1	-.094	3
531		19	max	16.985	5	496.487	1	-6.263	12	0	5	.142	5	.007	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
532			min	-190.371	1	-191.444	3	-135.176	1	0	2	-.304	1	-.01	1
533	M5	1	max	409.132	1	1714.029	3	102.308	5	0	1	0	1	.023	1
534			min	16.017	12	-1449.145	1	0	1	0	4	-.219	4	0	3
535		2	max	409.737	1	1713.056	3	103.549	5	0	1	0	1	.788	1
536			min	16.32	12	-1450.443	1	0	1	0	4	-.165	4	-.904	3
537		3	max	1019.76	3	1468.266	1	60.862	4	0	4	0	1	1.518	1
538			min	-703.702	2	-1175.603	3	0	1	0	1	-.111	4	-1.773	3
539		4	max	1020.214	3	1466.968	1	62.104	4	0	4	0	1	.744	1
540			min	-703.096	2	-1176.576	3	0	1	0	1	-.078	4	-1.153	3
541		5	max	1020.668	3	1465.67	1	63.345	4	0	4	0	1	.005	9
542			min	-702.491	2	-1177.55	3	0	1	0	1	-.045	4	-.532	3
543		6	max	1021.122	3	1464.371	1	64.587	4	0	4	0	1	.09	3
544			min	-701.885	2	-1178.524	3	0	1	0	1	-.012	5	-.803	1
545		7	max	1021.576	3	1463.073	1	65.828	4	0	4	.023	4	.712	3
546			min	-701.28	2	-1179.497	3	0	1	0	1	0	1	-1.575	1
547		8	max	1022.03	3	1461.775	1	67.07	4	0	4	.058	4	1.335	3
548			min	-700.675	2	-1180.471	3	0	1	0	1	0	1	-2.347	1
549		9	max	1045.719	3	108.561	2	191.475	4	0	1	0	1	1.54	3
550			min	-537.593	2	.393	15	0	1	0	1	-.201	4	-2.655	1
551		10	max	1046.173	3	107.263	2	192.716	4	0	1	0	1	1.488	3
552			min	-536.988	2	.002	15	0	1	0	1	-.1	4	-2.686	1
553		11	max	1046.627	3	105.964	2	193.958	4	0	1	.002	4	1.436	3
554			min	-536.382	2	-1.408	6	0	1	0	1	0	1	-2.716	1
555		12	max	1070.419	3	739.335	3	229.914	4	0	1	0	1	1.259	3
556			min	-373.31	2	-1578.861	1	0	1	0	4	-.315	4	-2.42	1
557		13	max	1070.873	3	738.361	3	231.156	4	0	1	0	1	.869	3
558			min	-372.705	2	-1580.159	1	0	1	0	4	-.193	4	-1.587	1
559		14	max	1071.327	3	737.388	3	232.397	4	0	1	0	1	.48	3
560			min	-372.099	2	-1581.457	1	0	1	0	4	-.071	4	-.753	1
561		15	max	1071.781	3	736.414	3	233.639	4	0	1	.052	4	.136	2
562			min	-371.494	2	-1582.756	1	0	1	0	4	0	1	-.004	13
563		16	max	1072.235	3	735.44	3	234.88	4	0	1	.176	4	.928	2
564			min	-370.889	2	-1584.054	1	0	1	0	4	0	1	-.297	3
565		17	max	1072.689	3	734.467	3	236.121	4	0	1	.3	4	1.754	1
566			min	-370.283	2	-1585.352	1	0	1	0	4	0	1	-.685	3
567		18	max	-16.518	12	1679.826	1	0	1	0	4	.323	4	.906	1
568			min	-409.318	1	-651.178	3	-30.765	5	0	1	0	1	-.358	3
569		19	max	-16.215	12	1678.528	1	0	1	0	4	.308	4	.02	1
570			min	-408.713	1	-652.152	3	-29.524	5	0	1	0	1	-.014	3
571	M9	1	max	190.162	1	514.579	3	126.421	1	0	3	-.015	12	0	3
572			min	8.222	12	-429.671	1	6.06	12	0	4	-.303	1	-.011	1
573		2	max	190.767	1	513.605	3	126.421	1	0	3	-.011	12	.216	1
574			min	8.524	12	-430.969	1	6.06	12	0	4	-.236	1	-.271	3
575		3	max	316.645	3	476.334	1	125.889	1	0	1	-.008	12	.433	1
576			min	-191.284	2	-362.105	3	6.023	12	0	3	-.169	1	-.531	3
577		4	max	317.099	3	475.036	1	125.889	1	0	1	-.005	12	.182	1
578			min	-190.679	2	-363.079	3	6.023	12	0	3	-.103	1	-.34	3
579		5	max	317.553	3	473.738	1	125.889	1	0	1	-.002	12	-.003	15
580			min	-190.074	2	-364.052	3	6.023	12	0	3	-.046	4	-.148	3
581		6	max	318.008	3	472.439	1	125.889	1	0	1	.03	1	.044	3
582			min	-189.468	2	-365.026	3	6.023	12	0	3	-.025	5	-.318	1
583		7	max	318.462	3	471.141	1	125.889	1	0	1	.097	1	.237	3
584			min	-188.863	2	-366	3	6.023	12	0	3	-.011	5	-.567	1
585		8	max	318.916	3	469.843	1	125.889	1	0	1	.163	1	.43	3
586			min	-188.258	2	-366.973	3	6.023	12	0	3	.002	15	-.816	1
587		9	max	332.097	3	32.828	2	182.174	1	0	3	-.004	12	.504	3
588			min	-108.544	2	.399	15	8.574	12	0	9	-.174	4	-.929	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
589		10	max	332.551	3	31.529	2	182.174	1	0	3	.001	1	.489	3
590			min	-107.938	2	.007	15	8.574	12	0	9	-.109	4	-.939	1
591		11	max	333.005	3	30.231	2	182.174	1	0	3	.097	1	.475	3
592			min	-107.333	2	-1.555	6	8.574	12	0	9	-.064	5	-.947	1
593		12	max	346.136	3	230.586	3	204.462	4	0	3	-.007	12	.413	3
594			min	-62.271	10	-504.383	1	5.682	12	0	1	-.274	4	-.836	1
595		13	max	346.59	3	229.612	3	205.704	4	0	3	-.004	12	.292	3
596			min	-61.767	10	-505.681	1	5.682	12	0	1	-.165	4	-.57	1
597		14	max	347.044	3	228.639	3	206.945	4	0	3	-.001	12	.171	3
598			min	-61.262	10	-506.979	1	5.682	12	0	1	-.057	4	-.303	1
599		15	max	347.498	3	227.665	3	208.187	4	0	3	.053	4	.05	3
600			min	-60.758	10	-508.278	1	5.682	12	0	1	.002	12	-.035	1
601		16	max	347.952	3	226.691	3	209.428	4	0	3	.163	4	.242	2
602			min	-60.253	10	-509.576	1	5.682	12	0	1	.005	12	-.069	3
603		17	max	348.406	3	225.718	3	210.67	4	0	3	.274	4	.503	1
604			min	-59.749	10	-510.874	1	5.682	12	0	1	.008	12	-.189	3
605		18	max	-8.425	12	497.786	1	135.176	1	0	2	.282	4	.252	1
606			min	-190.976	1	-190.47	3	-88.476	5	0	3	.011	12	-.094	3
607		19	max	-8.123	12	496.487	1	135.176	1	0	2	.304	1	.007	3
608			min	-190.371	1	-191.444	3	-87.235	5	0	3	.014	12	-.01	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	.001	1	.092	1	.006	3	7.45e-3	1	NC	1	NC	1
2			min	-.701	4	-.008	3	-.002	2	-7.542e-4	3	NC	1	NC	1
3		2	max	.001	1	.295	3	.054	1	8.634e-3	1	NC	5	NC	2
4			min	-.701	4	-.142	1	-.025	5	-7.601e-4	3	851.483	3	5000.31	1
5		3	max	.001	1	.541	3	.13	1	9.818e-3	1	NC	5	NC	3
6			min	-.701	4	-.327	1	-.029	5	-7.66e-4	3	470.428	3	2026.855	1
7		4	max	0	1	.69	3	.196	1	1.1e-2	1	NC	5	NC	3
8			min	-.701	4	-.433	1	-.02	5	-7.719e-4	3	369.821	3	1334.791	1
9		5	max	0	1	.725	3	.23	1	1.219e-2	1	NC	5	NC	3
10			min	-.701	4	-.444	1	-.002	5	-7.778e-4	3	352.205	3	1132.998	1
11		6	max	0	1	.648	3	.223	1	1.337e-2	1	NC	5	NC	3
12			min	-.701	4	-.362	1	.01	15	-7.837e-4	3	393.494	3	1169.49	1
13		7	max	0	1	.483	3	.176	1	1.455e-2	1	NC	5	NC	3
14			min	-.701	4	-.208	1	.014	10	-7.896e-4	3	526.32	3	1483.349	1
15		8	max	0	1	.272	3	.104	1	1.574e-2	1	NC	4	NC	3
16			min	-.701	4	-.02	1	.005	10	-7.955e-4	3	921.797	3	2540.487	1
17		9	max	0	1	.148	1	.034	4	1.692e-2	1	NC	4	NC	2
18			min	-.701	4	.005	15	-.003	10	-8.014e-4	3	2895.158	3	7552.443	4
19		10	max	0	1	.224	1	.018	3	1.811e-2	1	NC	3	NC	1
20			min	-.701	4	-.005	3	-.012	2	-8.073e-4	3	1966.304	1	NC	1
21		11	max	0	12	.148	1	.032	1	1.692e-2	1	NC	4	NC	2
22			min	-.701	4	.005	15	-.02	5	-8.014e-4	3	2895.158	3	8812.784	1
23		12	max	0	12	.272	3	.104	1	1.574e-2	1	NC	4	NC	3
24			min	-.701	4	-.02	1	-.02	5	-7.955e-4	3	921.797	3	2540.487	1
25		13	max	0	12	.483	3	.176	1	1.455e-2	1	NC	5	NC	3
26			min	-.701	4	-.208	1	-.006	5	-7.896e-4	3	526.32	3	1483.349	1
27		14	max	0	12	.648	3	.223	1	1.337e-2	1	NC	5	NC	3
28			min	-.701	4	-.362	1	.009	15	-7.837e-4	3	393.494	3	1169.49	1
29		15	max	0	12	.725	3	.23	1	1.219e-2	1	NC	5	NC	3
30			min	-.701	4	-.444	1	.016	12	-7.778e-4	3	352.205	3	1132.998	1
31		16	max	0	12	.69	3	.196	1	1.1e-2	1	NC	5	NC	3
32			min	-.701	4	-.433	1	.014	12	-7.719e-4	3	369.821	3	1334.791	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
33		17	max	0	12	.541	3	.13	1	9.818e-3	1	NC	5	NC	3
34			min	-.701	4	-.327	1	.01	12	-7.66e-4	3	470.428	3	2026.855	1
35		18	max	0	12	.295	3	.054	1	8.634e-3	1	NC	5	NC	2
36			min	-.701	4	-.142	1	.004	10	-7.601e-4	3	851.483	3	5000.31	1
37		19	max	0	12	.092	1	.006	3	7.45e-3	1	NC	1	NC	1
38			min	-.701	4	-.008	3	-.002	2	-7.542e-4	3	NC	1	NC	1
39	M14	1	max	0	1	.148	3	.005	3	4.681e-3	1	NC	1	NC	1
40			min	-.524	4	-.305	1	-.002	2	-2.688e-3	3	NC	1	NC	1
41		2	max	0	1	.425	3	.038	1	5.646e-3	1	NC	5	NC	2
42			min	-.524	4	-.652	1	-.036	5	-3.295e-3	3	742.759	1	7237.42	1
43		3	max	0	1	.657	3	.105	1	6.611e-3	1	NC	15	NC	3
44			min	-.524	4	-.949	1	-.043	5	-3.902e-3	3	400.761	1	2506.804	1
45		4	max	0	1	.814	3	.169	1	7.576e-3	1	NC	15	NC	3
46			min	-.524	4	-1.159	1	-.028	5	-4.508e-3	3	301.999	1	1549.419	1
47		5	max	0	1	.882	3	.205	1	8.541e-3	1	9139.988	15	NC	3
48			min	-.524	4	-1.266	1	-.003	5	-5.115e-3	3	268.354	1	1270.647	1
49		6	max	0	1	.861	3	.203	1	9.507e-3	1	9146.024	15	NC	3
50			min	-.524	4	-1.27	1	.015	12	-5.722e-3	3	267.358	1	1283.268	1
51		7	max	0	1	.768	3	.163	1	1.047e-2	1	NC	15	NC	3
52			min	-.524	4	-1.187	1	.013	10	-6.328e-3	3	292.394	1	1602.75	1
53		8	max	0	1	.633	3	.098	1	1.144e-2	1	NC	15	NC	3
54			min	-.524	4	-1.053	1	.005	10	-6.935e-3	3	344.793	1	2710.484	1
55		9	max	0	1	.505	3	.049	4	1.24e-2	1	NC	15	NC	2
56			min	-.525	4	-.92	1	-.003	10	-7.542e-3	3	419.592	1	5259.11	4
57		10	max	0	1	.446	3	.016	3	1.337e-2	1	NC	5	NC	1
58			min	-.525	4	-.857	1	-.01	2	-8.148e-3	3	467.569	1	NC	1
59		11	max	0	12	.505	3	.03	1	1.24e-2	1	NC	15	NC	2
60			min	-.525	4	-.92	1	-.036	5	-7.542e-3	3	419.592	1	7467.482	5
61		12	max	0	12	.633	3	.098	1	1.144e-2	1	NC	15	NC	3
62			min	-.525	4	-1.053	1	-.04	5	-6.935e-3	3	344.793	1	2710.484	1
63		13	max	0	12	.768	3	.163	1	1.047e-2	1	NC	15	NC	3
64			min	-.525	4	-1.187	1	-.025	5	-6.328e-3	3	292.394	1	1602.75	1
65		14	max	0	12	.861	3	.203	1	9.507e-3	1	9145.668	15	NC	3
66			min	-.525	4	-1.27	1	0	15	-5.722e-3	3	267.358	1	1283.268	1
67		15	max	0	12	.882	3	.205	1	8.541e-3	1	9139.544	15	NC	3
68			min	-.525	4	-1.266	1	.014	12	-5.115e-3	3	268.354	1	1270.647	1
69		16	max	0	12	.814	3	.169	1	7.576e-3	1	NC	15	NC	3
70			min	-.525	4	-1.159	1	.012	12	-4.508e-3	3	301.999	1	1549.419	1
71		17	max	0	12	.657	3	.105	1	6.611e-3	1	NC	15	NC	3
72			min	-.525	4	-.949	1	.008	12	-3.902e-3	3	400.761	1	2506.804	1
73		18	max	0	12	.425	3	.051	4	5.646e-3	1	NC	5	NC	2
74			min	-.525	4	-.652	1	.002	10	-3.295e-3	3	742.759	1	5056.37	4
75		19	max	0	12	.148	3	.005	3	4.681e-3	1	NC	1	NC	1
76			min	-.525	4	-.305	1	-.002	2	-2.688e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.152	3	.005	3	2.257e-3	3	NC	1	NC	1
78			min	-.427	4	-.304	1	-.002	2	-4.797e-3	1	NC	1	NC	1
79		2	max	0	12	.316	3	.038	1	2.77e-3	3	NC	5	NC	2
80			min	-.427	4	-.689	1	-.048	5	-5.792e-3	1	670.498	1	5229.098	5
81		3	max	0	12	.458	3	.105	1	3.284e-3	3	NC	15	NC	3
82			min	-.427	4	-1.016	1	-.058	5	-6.788e-3	1	362.623	1	2500.206	1
83		4	max	0	12	.561	3	.169	1	3.798e-3	3	NC	15	NC	3
84			min	-.427	4	-1.245	1	-.04	5	-7.784e-3	1	274.376	1	1546.303	1
85		5	max	0	12	.616	3	.206	1	4.312e-3	3	9152.015	15	NC	3
86			min	-.427	4	-1.356	1	-.008	5	-8.78e-3	1	245.362	1	1268.374	1
87		6	max	0	12	.625	3	.204	1	4.826e-3	3	9160.508	15	NC	3
88			min	-.427	4	-1.35	1	.015	12	-9.776e-3	1	246.823	1	1280.934	1
89		7	max	0	12	.594	3	.164	1	5.34e-3	3	NC	15	NC	3

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
90			min	-.427	4	-1.246	1	.014	10	-1.077e-2	1	273.93	1	1599.254	1
91		8	max	0	12	.539	3	.098	1	5.854e-3	3	NC	15	NC	3
92			min	-.427	4	-1.086	1	.005	10	-1.177e-2	1	330.175	1	2701.12	1
93		9	max	0	12	.482	3	.06	4	6.368e-3	3	NC	15	NC	2
94			min	-.427	4	-.928	1	-.003	10	-1.276e-2	1	413.361	1	4331.419	4
95		10	max	0	1	.455	3	.015	3	6.882e-3	3	NC	5	NC	1
96			min	-.427	4	-.855	1	-.01	2	-1.376e-2	1	468.851	1	NC	1
97		11	max	0	1	.482	3	.031	1	6.368e-3	3	NC	15	NC	2
98			min	-.427	4	-.928	1	-.046	5	-1.276e-2	1	413.361	1	5582.162	5
99		12	max	0	1	.539	3	.098	1	5.854e-3	3	NC	15	NC	3
100			min	-.427	4	-1.086	1	-.053	5	-1.177e-2	1	330.175	1	2701.12	1
101		13	max	0	1	.594	3	.164	1	5.34e-3	3	NC	15	NC	3
102			min	-.427	4	-1.246	1	-.034	5	-1.077e-2	1	273.93	1	1599.254	1
103		14	max	0	1	.625	3	.204	1	4.826e-3	3	9160.239	15	NC	3
104			min	-.427	4	-1.35	1	0	15	-9.776e-3	1	246.823	1	1280.934	1
105		15	max	0	1	.616	3	.206	1	4.312e-3	3	9151.681	15	NC	3
106			min	-.427	4	-1.356	1	.014	12	-8.78e-3	1	245.362	1	1268.374	1
107		16	max	0	1	.561	3	.169	1	3.798e-3	3	NC	15	NC	3
108			min	-.427	4	-1.245	1	.011	12	-7.784e-3	1	274.376	1	1546.303	1
109		17	max	0	1	.458	3	.105	1	3.284e-3	3	NC	15	NC	3
110			min	-.427	4	-1.016	1	.008	12	-6.788e-3	1	362.623	1	2500.206	1
111		18	max	0	1	.316	3	.063	4	2.77e-3	3	NC	5	NC	2
112			min	-.427	4	-.689	1	.002	10	-5.792e-3	1	670.498	1	4103.791	4
113		19	max	0	1	.152	3	.005	3	2.257e-3	3	NC	1	NC	1
114			min	-.427	4	-.304	1	-.002	2	-4.797e-3	1	NC	1	NC	1
115	M16	1	max	0	12	.091	1	.004	3	3.97e-3	3	NC	1	NC	1
116			min	-.153	4	-.05	3	-.002	2	-6.975e-3	1	NC	1	NC	1
117		2	max	0	12	.05	3	.053	1	4.731e-3	3	NC	5	NC	2
118			min	-.153	4	-.193	2	-.037	5	-8.042e-3	1	948.047	1	5035.175	1
119		3	max	0	12	.128	3	.129	1	5.492e-3	3	NC	5	NC	3
120			min	-.153	4	-.41	2	-.045	5	-9.109e-3	1	527.635	1	2034.044	1
121		4	max	0	12	.171	3	.195	1	6.252e-3	3	NC	5	NC	3
122			min	-.153	4	-.536	2	-.033	5	-1.018e-2	1	420.028	2	1337.124	1
123		5	max	0	12	.172	3	.23	1	7.013e-3	3	NC	5	NC	3
124			min	-.153	4	-.554	2	-.01	5	-1.124e-2	1	408.202	2	1133.391	1
125		6	max	0	12	.132	3	.223	1	7.773e-3	3	NC	5	NC	3
126			min	-.153	4	-.466	2	.011	15	-1.231e-2	1	473.617	2	1168.083	1
127		7	max	0	12	.06	3	.177	1	8.534e-3	3	NC	5	NC	3
128			min	-.153	4	-.297	2	.014	12	-1.338e-2	1	688.075	2	1477.932	1
129		8	max	0	12	0	5	.104	1	9.294e-3	3	NC	3	NC	3
130			min	-.153	4	-.087	2	.007	10	-1.444e-2	1	1563.606	2	2516.284	1
131		9	max	0	12	.133	1	.044	4	1.005e-2	3	NC	2	NC	2
132			min	-.153	4	-.103	3	-.002	10	-1.551e-2	1	4854.603	3	5914.511	4
133		10	max	0	1	.219	1	.013	3	1.082e-2	3	NC	5	NC	1
134			min	-.153	4	-.137	3	-.009	2	-1.658e-2	1	2006.311	1	NC	1
135		11	max	0	1	.133	1	.032	1	1.005e-2	3	NC	2	NC	2
136			min	-.153	4	-.103	3	-.03	5	-1.551e-2	1	4854.603	3	8459.055	1
137		12	max	0	1	0	15	.104	1	9.294e-3	3	NC	3	NC	3
138			min	-.153	4	-.087	2	-.031	5	-1.444e-2	1	1563.606	2	2516.284	1
139		13	max	0	1	.06	3	.177	1	8.534e-3	3	NC	5	NC	3
140			min	-.153	4	-.297	2	-.014	5	-1.338e-2	1	688.075	2	1477.932	1
141		14	max	0	1	.132	3	.223	1	7.773e-3	3	NC	5	NC	3
142			min	-.153	4	-.466	2	.008	15	-1.231e-2	1	473.617	2	1168.083	1
143		15	max	0	1	.172	3	.23	1	7.013e-3	3	NC	5	NC	3
144			min	-.152	4	-.554	2	.014	12	-1.124e-2	1	408.202	2	1133.391	1
145		16	max	0	1	.171	3	.195	1	6.252e-3	3	NC	5	NC	3
146			min	-.152	4	-.536	2	.012	12	-1.018e-2	1	420.028	2	1337.124	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
147		17	max	.001	1	.128	3	.129	1	5.492e-3	3	NC	5	NC	3
148			min	-.152	4	-.41	2	.009	12	-9.109e-3	1	527.635	1	2034.044	1
149		18	max	.001	1	.05	3	.057	4	4.731e-3	3	NC	5	NC	2
150			min	-.152	4	-.193	2	.004	10	-8.042e-3	1	948.047	1	4524.833	4
151		19	max	.001	1	.091	1	.004	3	3.97e-3	3	NC	1	NC	1
152			min	-.152	4	-.05	3	-.002	2	-6.975e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.004	2	.01	1	1.529e-3	5	NC	1	NC	2
154			min	-.006	3	-.008	3	-.657	4	-2.726e-4	1	NC	1	95.536	4
155		2	max	.006	1	.003	2	.009	1	1.639e-3	5	NC	1	NC	2
156			min	-.005	3	-.008	3	-.603	4	-2.557e-4	1	NC	1	104.013	4
157		3	max	.005	1	.003	2	.008	1	1.748e-3	5	NC	1	NC	2
158			min	-.005	3	-.008	3	-.55	4	-2.388e-4	1	NC	1	114.077	4
159		4	max	.005	1	.002	2	.007	1	1.857e-3	5	NC	1	NC	2
160			min	-.005	3	-.007	3	-.497	4	-2.218e-4	1	NC	1	126.14	4
161		5	max	.005	1	.001	2	.007	1	1.966e-3	5	NC	1	NC	2
162			min	-.004	3	-.007	3	-.446	4	-2.049e-4	1	NC	1	140.762	4
163		6	max	.004	1	0	2	.006	1	2.075e-3	5	NC	1	NC	1
164			min	-.004	3	-.007	3	-.395	4	-1.88e-4	1	NC	1	158.718	4
165		7	max	.004	1	0	2	.005	1	2.185e-3	5	NC	1	NC	1
166			min	-.004	3	-.007	3	-.346	4	-1.711e-4	1	NC	1	181.107	4
167		8	max	.004	1	0	15	.004	1	2.294e-3	5	NC	1	NC	1
168			min	-.003	3	-.006	3	-.299	4	-1.541e-4	1	NC	1	209.527	4
169		9	max	.003	1	0	15	.004	1	2.403e-3	4	NC	1	NC	1
170			min	-.003	3	-.006	3	-.255	4	-1.372e-4	1	NC	1	246.381	4
171		10	max	.003	1	0	15	.003	1	2.519e-3	4	NC	1	NC	1
172			min	-.003	3	-.006	3	-.212	4	-1.203e-4	1	NC	1	295.416	4
173		11	max	.003	1	0	15	.002	1	2.634e-3	4	NC	1	NC	1
174			min	-.002	3	-.005	3	-.173	4	-1.034e-4	1	NC	1	362.746	4
175		12	max	.002	1	0	15	.002	1	2.749e-3	4	NC	1	NC	1
176			min	-.002	3	-.005	3	-.137	4	-8.644e-5	1	NC	1	458.91	4
177		13	max	.002	1	0	15	.001	1	2.865e-3	4	NC	1	NC	1
178			min	-.002	3	-.004	3	-.104	4	-6.951e-5	1	NC	1	603.393	4
179		14	max	.002	1	0	15	.001	1	2.98e-3	4	NC	1	NC	1
180			min	-.002	3	-.004	3	-.075	4	-5.259e-5	1	NC	1	835.625	4
181		15	max	.001	1	0	15	0	1	3.096e-3	4	NC	1	NC	1
182			min	-.001	3	-.003	3	-.05	4	-3.566e-5	1	NC	1	1245.852	4
183		16	max	0	1	0	15	0	1	3.211e-3	4	NC	1	NC	1
184			min	0	3	-.002	6	-.03	4	-1.873e-5	1	NC	1	2081.017	4
185		17	max	0	1	0	15	0	1	3.327e-3	4	NC	1	NC	1
186			min	0	3	-.002	6	-.015	4	-1.808e-6	1	NC	1	4241.977	4
187		18	max	0	1	0	15	0	1	3.442e-3	4	NC	1	NC	1
188			min	0	3	0	6	-.005	4	5.542e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.557e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	1.379e-6	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.599e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-8.697e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.017	4	1.771e-5	1	NC	1	NC	1
194			min	0	2	-.002	6	0	12	-1.49e-4	5	NC	1	NC	1
195		3	max	0	3	0	15	.032	4	5.762e-4	4	NC	1	NC	1
196			min	0	2	-.003	6	0	12	2.105e-6	12	NC	1	NC	1
197		4	max	0	3	-.001	15	.047	4	1.299e-3	4	NC	1	NC	1
198			min	0	2	-.005	6	0	12	3.388e-6	12	NC	1	8141.528	5
199		5	max	.001	3	-.002	15	.06	4	2.022e-3	4	NC	1	NC	1
200			min	0	2	-.007	6	0	12	4.67e-6	12	NC	1	7172.64	5
201		6	max	.001	3	-.002	15	.073	4	2.745e-3	4	NC	1	NC	1
202			min	0	2	-.009	6	0	12	5.953e-6	12	NC	1	6866.818	5
203		7	max	.002	3	-.002	15	.085	4	3.468e-3	4	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
204			min	-.001	2	-.01	6	0	12	7.235e-6	12	8738.544	6	7007.801	5
205		8	max	.002	3	-.003	15	.095	4	4.191e-3	4	NC	1	NC	1
206			min	-.001	2	-.012	6	0	12	8.518e-6	12	7836.824	6	7576.63	5
207		9	max	.002	3	-.003	15	.106	4	4.914e-3	4	NC	2	NC	1
208			min	-.001	2	-.013	6	0	12	9.8e-6	12	7302.675	6	8699.05	5
209		10	max	.002	3	-.003	15	.116	4	5.637e-3	4	NC	3	NC	1
210			min	-.002	2	-.013	6	0	12	1.108e-5	12	7042.789	6	NC	1
211		11	max	.003	3	-.003	15	.126	4	6.36e-3	4	NC	3	NC	1
212			min	-.002	2	-.013	6	0	12	1.237e-5	12	7018.793	6	NC	1
213		12	max	.003	3	-.003	15	.135	4	7.083e-3	4	NC	3	NC	1
214			min	-.002	2	-.013	6	0	12	1.365e-5	12	7232.524	6	NC	1
215		13	max	.003	3	-.003	15	.145	4	7.806e-3	4	NC	1	NC	1
216			min	-.002	2	-.012	6	0	12	1.493e-5	12	7728.603	6	NC	1
217		14	max	.003	3	-.002	15	.155	4	8.529e-3	4	NC	1	NC	1
218			min	-.002	2	-.011	6	0	12	1.621e-5	12	8617.674	6	NC	1
219		15	max	.004	3	-.002	15	.165	4	9.252e-3	4	NC	1	NC	1
220			min	-.003	2	-.009	6	0	12	1.75e-5	12	NC	1	NC	1
221		16	max	.004	3	-.001	15	.176	4	9.975e-3	4	NC	1	NC	1
222			min	-.003	2	-.008	1	0	12	1.878e-5	12	NC	1	NC	1
223		17	max	.004	3	0	15	.188	4	1.07e-2	4	NC	1	NC	1
224			min	-.003	2	-.006	1	0	12	2.006e-5	12	NC	1	NC	1
225		18	max	.004	3	0	15	.201	4	1.142e-2	4	NC	1	NC	1
226			min	-.003	2	-.005	1	0	12	2.134e-5	12	NC	1	NC	1
227		19	max	.005	3	0	5	.216	4	1.214e-2	4	NC	1	NC	2
228			min	-.003	2	-.003	1	0	12	2.263e-5	12	NC	1	9752.687	1
229	M4	1	max	.003	1	.003	2	0	12	6.629e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.216	4	-4.343e-4	5	NC	1	115.056	4
231		2	max	.003	1	.003	2	0	12	6.629e-5	1	NC	1	NC	3
232			min	0	3	-.004	3	-.198	4	-4.343e-4	5	NC	1	125.134	4
233		3	max	.002	1	.003	2	0	12	6.629e-5	1	NC	1	NC	3
234			min	0	3	-.004	3	-.181	4	-4.343e-4	5	NC	1	137.125	4
235		4	max	.002	1	.002	2	0	12	6.629e-5	1	NC	1	NC	3
236			min	0	3	-.004	3	-.164	4	-4.343e-4	5	NC	1	151.528	4
237		5	max	.002	1	.002	2	0	12	6.629e-5	1	NC	1	NC	3
238			min	0	3	-.004	3	-.147	4	-4.343e-4	5	NC	1	169.019	4
239		6	max	.002	1	.002	2	0	12	6.629e-5	1	NC	1	NC	2
240			min	0	3	-.003	3	-.13	4	-4.343e-4	5	NC	1	190.535	4
241		7	max	.002	1	.002	2	0	12	6.629e-5	1	NC	1	NC	2
242			min	0	3	-.003	3	-.114	4	-4.343e-4	5	NC	1	217.408	4
243		8	max	.002	1	.002	2	0	12	6.629e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.099	4	-4.343e-4	5	NC	1	251.577	4
245		9	max	.001	1	.002	2	0	12	6.629e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.084	4	-4.343e-4	5	NC	1	295.965	4
247		10	max	.001	1	.001	2	0	12	6.629e-5	1	NC	1	NC	2
248			min	0	3	-.002	3	-.07	4	-4.343e-4	5	NC	1	355.139	4
249		11	max	.001	1	.001	2	0	12	6.629e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.057	4	-4.343e-4	5	NC	1	436.571	4
251		12	max	.001	1	.001	2	0	12	6.629e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.045	4	-4.343e-4	5	NC	1	553.186	4
253		13	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.034	4	-4.343e-4	5	NC	1	728.972	4
255		14	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
256			min	0	3	-.001	3	-.024	4	-4.343e-4	5	NC	1	1012.73	4
257		15	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	-.016	4	-4.343e-4	5	NC	1	1516.951	4
259		16	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
260			min	0	3	0	3	-.01	4	-4.343e-4	5	NC	1	2552.578	4

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
261		17	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
262			min	0	3	0	3	-.005	4	-4.343e-4	5	NC	1	5272.415	4
263		18	max	0	1	0	2	0	12	6.629e-5	1	NC	1	NC	1
264			min	0	3	0	3	-.001	4	-4.343e-4	5	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.629e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-4.343e-4	5	NC	1	NC	1
267	M6	1	max	.019	1	.018	2	0	1	1.624e-3	4	NC	3	NC	1
268			min	-.018	3	-.025	3	-.663	4	0	1	3497.834	2	94.638	4
269		2	max	.018	1	.016	2	0	1	1.731e-3	4	NC	3	NC	1
270			min	-.017	3	-.024	3	-.609	4	0	1	3853.061	2	103.037	4
271		3	max	.017	1	.015	2	0	1	1.838e-3	4	NC	3	NC	1
272			min	-.016	3	-.023	3	-.555	4	0	1	4284.7	2	113.008	4
273		4	max	.016	1	.013	2	0	1	1.945e-3	4	NC	3	NC	1
274			min	-.015	3	-.021	3	-.502	4	0	1	4815.495	2	124.961	4
275		5	max	.015	1	.011	2	0	1	2.052e-3	4	NC	1	NC	1
276			min	-.014	3	-.02	3	-.45	4	0	1	5477.633	2	139.45	4
277		6	max	.014	1	.01	2	0	1	2.16e-3	4	NC	1	NC	1
278			min	-.013	3	-.018	3	-.399	4	0	1	6317.898	2	157.243	4
279		7	max	.013	1	.008	2	0	1	2.267e-3	4	NC	1	NC	1
280			min	-.012	3	-.017	3	-.35	4	0	1	7406.461	2	179.429	4
281		8	max	.011	1	.007	2	0	1	2.374e-3	4	NC	1	NC	1
282			min	-.011	3	-.016	3	-.302	4	0	1	8852.603	2	207.593	4
283		9	max	.01	1	.006	2	0	1	2.481e-3	4	NC	1	NC	1
284			min	-.01	3	-.014	3	-.257	4	0	1	NC	1	244.118	4
285		10	max	.009	1	.005	2	0	1	2.588e-3	4	NC	1	NC	1
286			min	-.009	3	-.013	3	-.214	4	0	1	NC	1	292.717	4
287		11	max	.008	1	.004	2	0	1	2.696e-3	4	NC	1	NC	1
288			min	-.008	3	-.012	3	-.174	4	0	1	NC	1	359.454	4
289		12	max	.007	1	.003	2	0	1	2.803e-3	4	NC	1	NC	1
290			min	-.007	3	-.01	3	-.138	4	0	1	NC	1	454.78	4
291		13	max	.006	1	.002	2	0	1	2.91e-3	4	NC	1	NC	1
292			min	-.006	3	-.009	3	-.105	4	0	1	NC	1	598.023	4
293		14	max	.005	1	.001	2	0	1	3.017e-3	4	NC	1	NC	1
294			min	-.005	3	-.007	3	-.076	4	0	1	NC	1	828.297	4
295		15	max	.004	1	0	2	0	1	3.124e-3	4	NC	1	NC	1
296			min	-.004	3	-.006	3	-.051	4	0	1	NC	1	1235.159	4
297		16	max	.003	1	0	2	0	1	3.232e-3	4	NC	1	NC	1
298			min	-.003	3	-.004	3	-.03	4	0	1	NC	1	2063.749	4
299		17	max	.002	1	0	2	0	1	3.339e-3	4	NC	1	NC	1
300			min	-.002	3	-.003	3	-.015	4	0	1	NC	1	4208.898	4
301		18	max	.001	1	0	2	0	1	3.446e-3	4	NC	1	NC	1
302			min	-.001	3	-.001	3	-.005	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	3.553e-3	4	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	-8.675e-4	4	NC	1	NC	1
307		2	max	0	3	0	15	.017	4	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	-1.63e-4	4	NC	1	NC	1
309		3	max	.002	3	0	15	.032	4	5.415e-4	4	NC	1	NC	1
310			min	-.002	2	-.004	3	0	1	0	1	NC	1	9844.906	4
311		4	max	.002	3	-.001	15	.047	4	1.246e-3	4	NC	1	NC	1
312			min	-.002	2	-.006	3	0	1	0	1	NC	1	7544.2	4
313		5	max	.003	3	-.002	15	.06	4	1.951e-3	4	NC	1	NC	1
314			min	-.003	2	-.008	3	0	1	0	1	NC	1	6595.054	4
315		6	max	.004	3	-.002	15	.073	4	2.655e-3	4	NC	1	NC	1
316			min	-.004	2	-.01	3	0	1	0	1	NC	1	6252.916	4
317		7	max	.005	3	-.003	15	.084	4	3.36e-3	4	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
318			min	-.005	2	-.011	3	0	1	0	1	8822.972	4	6302.232	4
319		8	max	.006	3	-.003	15	.095	4	4.064e-3	4	NC	1	NC	1
320			min	-.005	2	-.012	4	0	1	0	1	7906.973	4	6701.593	4
321		9	max	.006	3	-.003	15	.105	4	4.769e-3	4	NC	1	NC	1
322			min	-.006	2	-.013	4	0	1	0	1	7363.742	4	7518.009	4
323		10	max	.007	3	-.003	15	.115	4	5.473e-3	4	NC	1	NC	1
324			min	-.007	2	-.014	4	0	1	0	1	7098.216	4	8958.288	4
325		11	max	.008	3	-.003	15	.124	4	6.178e-3	4	NC	1	NC	1
326			min	-.008	2	-.014	4	0	1	0	1	7071.129	4	NC	1
327		12	max	.009	3	-.003	15	.133	4	6.882e-3	4	NC	1	NC	1
328			min	-.008	2	-.013	4	0	1	0	1	7283.936	4	NC	1
329		13	max	.01	3	-.003	15	.142	4	7.587e-3	4	NC	1	NC	1
330			min	-.009	2	-.013	4	0	1	0	1	7781.287	4	NC	1
331		14	max	.01	3	-.003	15	.152	4	8.291e-3	4	NC	1	NC	1
332			min	-.01	2	-.012	4	0	1	0	1	8674.33	4	NC	1
333		15	max	.011	3	-.002	15	.162	4	8.996e-3	4	NC	1	NC	1
334			min	-.011	2	-.01	4	0	1	0	1	NC	1	NC	1
335		16	max	.012	3	-.002	15	.172	4	9.7e-3	4	NC	1	NC	1
336			min	-.011	2	-.009	1	0	1	0	1	NC	1	NC	1
337		17	max	.013	3	-.001	15	.183	4	1.04e-2	4	NC	1	NC	1
338			min	-.012	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.013	3	0	15	.196	4	1.111e-2	4	NC	1	NC	1
340			min	-.013	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.014	3	0	15	.209	4	1.181e-2	4	NC	1	NC	1
342			min	-.014	2	-.005	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.013	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.015	3	-.209	4	-5.142e-4	4	NC	1	118.616	4
345		2	max	.007	1	.012	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.014	3	-.192	4	-5.142e-4	4	NC	1	129.011	4
347		3	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.013	3	-.175	4	-5.142e-4	4	NC	1	141.38	4
349		4	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.012	3	-.159	4	-5.142e-4	4	NC	1	156.237	4
351		5	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.011	3	-.142	4	-5.142e-4	4	NC	1	174.278	4
353		6	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.011	3	-.126	4	-5.142e-4	4	NC	1	196.471	4
355		7	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.01	3	-.111	4	-5.142e-4	4	NC	1	224.188	4
357		8	max	.004	1	.008	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.009	3	-.096	4	-5.142e-4	4	NC	1	259.431	4
359		9	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.008	3	-.081	4	-5.142e-4	4	NC	1	305.214	4
361		10	max	.004	1	.006	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.007	3	-.068	4	-5.142e-4	4	NC	1	366.249	4
363		11	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.006	3	-.055	4	-5.142e-4	4	NC	1	450.241	4
365		12	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.006	3	-.043	4	-5.142e-4	4	NC	1	570.523	4
367		13	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.005	3	-.033	4	-5.142e-4	4	NC	1	751.839	4
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.004	3	-.024	4	-5.142e-4	4	NC	1	1044.525	4
371		15	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.003	3	-.016	4	-5.142e-4	4	NC	1	1564.617	4
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.002	3	-.009	4	-5.142e-4	4	NC	1	2632.861	4

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
375		17	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	-.005	4	-5.142e-4	4	NC	1	5438.419	4
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	-.001	4	-5.142e-4	4	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	-5.142e-4	4	NC	1	NC	1
381	M10	1	max	.006	1	.004	2	0	12	1.635e-3	4	NC	1	NC	2
382			min	-.006	3	-.008	3	-.662	4	1.346e-5	12	NC	1	94.736	4
383		2	max	.006	1	.003	2	0	12	1.741e-3	4	NC	1	NC	2
384			min	-.005	3	-.008	3	-.608	4	1.264e-5	12	NC	1	103.144	4
385		3	max	.005	1	.003	2	0	12	1.846e-3	4	NC	1	NC	2
386			min	-.005	3	-.008	3	-.554	4	1.181e-5	12	NC	1	113.126	4
387		4	max	.005	1	.002	2	0	12	1.952e-3	4	NC	1	NC	2
388			min	-.005	3	-.007	3	-.501	4	1.099e-5	12	NC	1	125.091	4
389		5	max	.005	1	.001	2	0	12	2.058e-3	4	NC	1	NC	2
390			min	-.004	3	-.007	3	-.449	4	1.016e-5	12	NC	1	139.596	4
391		6	max	.004	1	0	2	0	12	2.164e-3	4	NC	1	NC	1
392			min	-.004	3	-.007	3	-.398	4	9.339e-6	12	NC	1	157.408	4
393		7	max	.004	1	0	2	0	12	2.27e-3	4	NC	1	NC	1
394			min	-.004	3	-.007	3	-.349	4	8.514e-6	12	NC	1	179.619	4
395		8	max	.004	1	0	2	0	12	2.375e-3	4	NC	1	NC	1
396			min	-.003	3	-.006	3	-.302	4	7.69e-6	12	NC	1	207.815	4
397		9	max	.003	1	0	2	0	12	2.481e-3	4	NC	1	NC	1
398			min	-.003	3	-.006	3	-.257	4	6.865e-6	12	NC	1	244.38	4
399		10	max	.003	1	-.001	2	0	12	2.587e-3	4	NC	1	NC	1
400			min	-.003	3	-.006	3	-.214	4	6.041e-6	12	NC	1	293.035	4
401		11	max	.003	1	-.001	15	0	12	2.693e-3	4	NC	1	NC	1
402			min	-.002	3	-.005	3	-.174	4	5.217e-6	12	NC	1	359.849	4
403		12	max	.002	1	-.001	15	0	12	2.798e-3	4	NC	1	NC	1
404			min	-.002	3	-.005	3	-.138	4	4.392e-6	12	NC	1	455.289	4
405		13	max	.002	1	-.001	15	0	12	2.904e-3	4	NC	1	NC	1
406			min	-.002	3	-.004	4	-.105	4	3.568e-6	12	NC	1	598.706	4
407		14	max	.002	1	-.001	15	0	12	3.01e-3	4	NC	1	NC	1
408			min	-.002	3	-.004	4	-.076	4	2.743e-6	12	NC	1	829.272	4
409		15	max	.001	1	0	15	0	12	3.116e-3	4	NC	1	NC	1
410			min	-.001	3	-.003	4	-.051	4	1.919e-6	12	NC	1	1236.675	4
411		16	max	0	1	0	15	0	12	3.222e-3	4	NC	1	NC	1
412			min	0	3	-.003	4	-.03	4	1.095e-6	12	NC	1	2066.443	4
413		17	max	0	1	0	15	0	12	3.327e-3	4	NC	1	NC	1
414			min	0	3	-.002	4	-.015	4	1.272e-7	10	NC	1	4214.984	4
415		18	max	0	1	0	15	0	12	3.433e-3	4	NC	1	NC	1
416			min	0	3	-.001	4	-.005	4	-1.512e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	3.539e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	-3.204e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.054e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-8.637e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.017	4	-8.226e-7	12	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.568e-4	4	NC	1	NC	1
423		3	max	0	3	0	15	.032	4	5.502e-4	5	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-4.596e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	.047	4	1.257e-3	4	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-7.421e-5	1	NC	1	7799.106	4
427		5	max	.001	3	-.002	15	.06	4	1.964e-3	4	NC	1	NC	1
428			min	0	2	-.008	4	0	1	-1.025e-4	1	NC	1	6849.392	4
429		6	max	.001	3	-.002	15	.072	4	2.671e-3	4	NC	1	NC	1
430			min	0	2	-.01	4	-.001	1	-1.307e-4	1	9854.649	4	6531.142	4
431		7	max	.002	3	-.003	15	.084	4	3.378e-3	4	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
432			min	-.001	2	-.011	4	-.001	1	-1.59e-4	1	8466.17	4	6630.418	4
433		8	max	.002	3	-.003	15	.094	4	4.085e-3	4	NC	1	NC	1
434			min	-.001	2	-.012	4	-.002	1	-1.872e-4	1	7609.843	4	7117.934	4
435		9	max	.002	3	-.003	15	.105	4	4.791e-3	4	NC	2	NC	1
436			min	-.001	2	-.013	4	-.002	1	-2.155e-4	1	7104.588	4	8090.333	4
437		10	max	.002	3	-.003	15	.114	4	5.498e-3	4	NC	3	NC	1
438			min	-.002	2	-.014	4	-.003	1	-2.437e-4	1	6862.624	4	9827.487	4
439		11	max	.003	3	-.003	15	.124	4	6.205e-3	4	NC	3	NC	1
440			min	-.002	2	-.014	4	-.003	1	-2.719e-4	1	6848.381	4	NC	1
441		12	max	.003	3	-.003	15	.133	4	6.912e-3	4	NC	3	NC	1
442			min	-.002	2	-.014	4	-.004	1	-3.002e-4	1	7064.871	4	NC	1
443		13	max	.003	3	-.003	15	.142	4	7.619e-3	4	NC	1	NC	1
444			min	-.002	2	-.013	4	-.004	1	-3.284e-4	1	7556.592	4	NC	1
445		14	max	.003	3	-.003	15	.152	4	8.326e-3	4	NC	1	NC	1
446			min	-.002	2	-.012	4	-.005	1	-3.567e-4	1	8432.502	4	NC	1
447		15	max	.004	3	-.003	15	.162	4	9.033e-3	4	NC	1	NC	1
448			min	-.003	2	-.01	4	-.006	1	-3.849e-4	1	9933.716	4	NC	1
449		16	max	.004	3	-.002	15	.173	4	9.74e-3	4	NC	1	NC	1
450			min	-.003	2	-.008	4	-.006	1	-4.132e-4	1	NC	1	NC	1
451		17	max	.004	3	-.002	15	.184	4	1.045e-2	4	NC	1	NC	1
452			min	-.003	2	-.006	1	-.007	1	-4.414e-4	1	NC	1	NC	1
453		18	max	.004	3	-.001	15	.196	4	1.115e-2	4	NC	1	NC	1
454			min	-.003	2	-.005	1	-.008	1	-4.697e-4	1	NC	1	NC	1
455		19	max	.005	3	0	10	.21	4	1.186e-2	4	NC	1	NC	2
456			min	-.003	2	-.003	1	-.009	1	-4.979e-4	1	NC	1	9752.687	1
457	M12	1	max	.003	1	.003	2	.009	1	-3.18e-6	12	NC	1	NC	3
458			min	0	3	-.005	3	-.21	4	-4.644e-4	4	NC	1	117.945	4
459		2	max	.003	1	.003	2	.009	1	-3.18e-6	12	NC	1	NC	3
460			min	0	3	-.004	3	-.193	4	-4.644e-4	4	NC	1	128.276	4
461		3	max	.002	1	.003	2	.008	1	-3.18e-6	12	NC	1	NC	3
462			min	0	3	-.004	3	-.176	4	-4.644e-4	4	NC	1	140.57	4
463		4	max	.002	1	.002	2	.007	1	-3.18e-6	12	NC	1	NC	3
464			min	0	3	-.004	3	-.16	4	-4.644e-4	4	NC	1	155.336	4
465		5	max	.002	1	.002	2	.006	1	-3.18e-6	12	NC	1	NC	3
466			min	0	3	-.004	3	-.143	4	-4.644e-4	4	NC	1	173.267	4
467		6	max	.002	1	.002	2	.006	1	-3.18e-6	12	NC	1	NC	2
468			min	0	3	-.003	3	-.127	4	-4.644e-4	4	NC	1	195.325	4
469		7	max	.002	1	.002	2	.005	1	-3.18e-6	12	NC	1	NC	2
470			min	0	3	-.003	3	-.111	4	-4.644e-4	4	NC	1	222.874	4
471		8	max	.002	1	.002	2	.004	1	-3.18e-6	12	NC	1	NC	2
472			min	0	3	-.003	3	-.096	4	-4.644e-4	4	NC	1	257.903	4
473		9	max	.001	1	.002	2	.004	1	-3.18e-6	12	NC	1	NC	2
474			min	0	3	-.003	3	-.082	4	-4.644e-4	4	NC	1	303.408	4
475		10	max	.001	1	.001	2	.003	1	-3.18e-6	12	NC	1	NC	2
476			min	0	3	-.002	3	-.068	4	-4.644e-4	4	NC	1	364.071	4
477		11	max	.001	1	.001	2	.002	1	-3.18e-6	12	NC	1	NC	1
478			min	0	3	-.002	3	-.055	4	-4.644e-4	4	NC	1	447.553	4
479		12	max	.001	1	.001	2	.002	1	-3.18e-6	12	NC	1	NC	1
480			min	0	3	-.002	3	-.044	4	-4.644e-4	4	NC	1	567.103	4
481		13	max	0	1	0	2	.001	1	-3.18e-6	12	NC	1	NC	1
482			min	0	3	-.002	3	-.033	4	-4.644e-4	4	NC	1	747.313	4
483		14	max	0	1	0	2	.001	1	-3.18e-6	12	NC	1	NC	1
484			min	0	3	-.001	3	-.024	4	-4.644e-4	4	NC	1	1038.213	4
485		15	max	0	1	0	2	0	1	-3.18e-6	12	NC	1	NC	1
486			min	0	3	-.001	3	-.016	4	-4.644e-4	4	NC	1	1555.124	4
487		16	max	0	1	0	2	0	1	-3.18e-6	12	NC	1	NC	1
488			min	0	3	0	3	-.009	4	-4.644e-4	4	NC	1	2616.82	4

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
489		17	max	0	1	0	2	0	1	-3.18e-6	12	NC	1	NC	1
490			min	0	3	0	3	-.005	4	-4.644e-4	4	NC	1	5405.127	4
491		18	max	0	1	0	2	0	1	-3.18e-6	12	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-4.644e-4	4	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.18e-6	12	NC	1	NC	1
494			min	0	1	0	1	0	1	-4.644e-4	4	NC	1	NC	1
495	M1	1	max	.006	3	.092	1	.701	4	1.699e-2	1	NC	1	NC	1
496			min	-.002	2	-.008	3	0	12	-2.192e-2	3	NC	1	NC	1
497		2	max	.006	3	.045	1	.679	4	9.33e-3	4	NC	3	NC	1
498			min	-.002	2	-.002	3	-.007	1	-1.085e-2	3	2407.919	1	NC	1
499		3	max	.006	3	.008	3	.656	4	1.495e-2	4	NC	5	NC	1
500			min	-.002	2	-.007	2	-.01	1	-2.036e-4	1	1151.267	1	6396.007	5
501		4	max	.006	3	.029	3	.633	4	1.312e-2	4	NC	5	NC	1
502			min	-.002	2	-.066	1	-.009	1	-3.771e-3	3	718.651	1	4545.231	5
503		5	max	.006	3	.056	3	.61	4	1.129e-2	4	NC	15	NC	1
504			min	-.002	2	-.13	1	-.006	1	-7.435e-3	3	513.809	1	3614.799	5
505		6	max	.005	3	.087	3	.586	4	1.376e-2	1	NC	15	NC	1
506			min	-.002	2	-.192	1	-.003	1	-1.11e-2	3	401.773	1	3057.863	5
507		7	max	.005	3	.116	3	.561	4	1.841e-2	1	9896.054	15	NC	1
508			min	-.002	2	-.247	1	0	12	-1.476e-2	3	336.033	1	2673.762	4
509		8	max	.005	3	.141	3	.535	4	2.306e-2	1	8786.607	15	NC	1
510			min	-.002	2	-.292	1	0	12	-1.843e-2	3	297.316	1	2398.944	4
511		9	max	.005	3	.157	3	.508	4	2.543e-2	1	8208.642	15	NC	1
512			min	-.002	2	-.319	1	0	1	-1.837e-2	3	277.224	1	2234.621	4
513		10	max	.005	3	.163	3	.479	4	2.628e-2	1	8032.721	15	NC	1
514			min	-.002	2	-.329	1	0	12	-1.584e-2	3	271.207	1	2190.497	4
515		11	max	.005	3	.159	3	.447	4	2.712e-2	1	8208.395	15	NC	1
516			min	-.002	2	-.319	1	0	12	-1.33e-2	3	277.567	1	2247.335	4
517		12	max	.005	3	.145	3	.413	4	2.563e-2	1	8786.044	15	NC	1
518			min	-.002	2	-.291	1	-.001	1	-1.091e-2	3	298.394	1	2421.262	4
519		13	max	.005	3	.124	3	.375	4	2.063e-2	1	9894.982	15	NC	1
520			min	-.002	2	-.245	1	0	1	-8.732e-3	3	338.715	1	2851.37	4
521		14	max	.005	3	.096	3	.335	4	1.563e-2	1	NC	15	NC	1
522			min	-.002	2	-.188	1	0	12	-6.553e-3	3	407.575	1	3737.785	4
523		15	max	.004	3	.065	3	.294	4	1.063e-2	1	NC	15	NC	1
524			min	-.002	2	-.126	1	0	12	-4.373e-3	3	525.84	1	5647.827	4
525		16	max	.004	3	.033	3	.254	4	1.e-2	4	NC	5	NC	1
526			min	-.002	2	-.062	1	0	12	-2.194e-3	3	744.149	1	NC	1
527		17	max	.004	3	.003	3	.216	4	1.113e-2	4	NC	5	NC	1
528			min	-.002	2	-.004	2	0	12	-1.408e-5	3	1209.295	1	NC	1
529		18	max	.004	3	.046	1	.183	4	1.002e-2	1	NC	4	NC	1
530			min	-.002	2	-.024	3	0	12	-3.562e-3	3	2555.858	1	NC	1
531		19	max	.004	3	.091	1	.152	4	1.974e-2	1	NC	1	NC	1
532			min	-.002	2	-.05	3	-.001	1	-7.243e-3	3	NC	1	NC	1
533	M5	1	max	.018	3	.224	1	.701	4	0	1	NC	1	NC	1
534			min	-.012	2	-.005	3	0	1	-4.133e-6	4	NC	1	NC	1
535		2	max	.018	3	.108	1	.683	4	7.676e-3	4	NC	5	NC	1
536			min	-.012	2	.002	3	0	1	0	1	983.466	1	8895.344	4
537		3	max	.018	3	.027	3	.662	4	1.512e-2	4	NC	15	NC	1
538			min	-.012	2	-.024	1	0	1	0	1	460.351	1	5160.489	4
539		4	max	.017	3	.084	3	.639	4	1.232e-2	4	9218.1	15	NC	1
540			min	-.011	2	-.184	1	0	1	0	1	279.819	1	3938.297	4
541		5	max	.017	3	.165	3	.613	4	9.517e-3	4	6455.16	15	NC	1
542			min	-.011	2	-.359	1	0	1	0	1	195.862	1	3341.27	4
543		6	max	.017	3	.257	3	.587	4	6.716e-3	4	4972.198	15	NC	1
544			min	-.011	2	-.533	1	0	1	0	1	150.778	1	2974.917	4
545		7	max	.016	3	.347	3	.561	4	3.916e-3	4	4115.309	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
546			min	-.011	2	-.692	1	0	1	0	1	124.717	1	2696.612	4
547		8	max	.016	3	.422	3	.535	4	1.115e-3	4	3616.861	15	NC	1
548			min	-.01	2	-.818	1	0	1	0	1	109.554	1	2439.937	4
549		9	max	.016	3	.471	3	.509	4	0	1	3361.164	15	NC	1
550			min	-.01	2	-.898	1	0	1	-2.774e-6	5	101.778	1	2230.87	4
551		10	max	.015	3	.489	3	.479	4	0	1	3284.119	15	NC	1
552			min	-.01	2	-.924	1	0	1	-2.677e-6	5	99.462	1	2204.839	4
553		11	max	.015	3	.476	3	.447	4	0	1	3361.245	15	NC	1
554			min	-.01	2	-.897	1	0	1	-2.58e-6	5	101.916	1	2272.363	4
555		12	max	.015	3	.435	3	.414	4	7.916e-4	4	3617.056	15	NC	1
556			min	-.01	2	-.815	1	0	1	0	1	110.009	1	2377.977	4
557		13	max	.014	3	.369	3	.376	4	2.781e-3	4	4115.717	15	NC	1
558			min	-.01	2	-.685	1	0	1	0	1	125.9	1	2807.379	4
559		14	max	.014	3	.286	3	.334	4	4.77e-3	4	4973.013	15	NC	1
560			min	-.01	2	-.522	1	0	1	0	1	153.437	1	3913.808	4
561		15	max	.014	3	.193	3	.291	4	6.759e-3	4	6456.792	15	NC	1
562			min	-.009	2	-.345	1	0	1	0	1	201.615	1	7068.532	4
563		16	max	.013	3	.098	3	.248	4	8.748e-3	4	9221.546	15	NC	1
564			min	-.009	2	-.169	1	0	1	0	1	292.663	1	NC	1
565		17	max	.013	3	.009	3	.21	4	1.074e-2	4	NC	15	NC	1
566			min	-.009	2	-.013	2	0	1	0	1	491.452	1	NC	1
567		18	max	.013	3	.113	1	.178	4	5.452e-3	4	NC	5	NC	1
568			min	-.009	2	-.068	3	0	1	0	1	1066.522	1	NC	1
569		19	max	.013	3	.219	1	.153	4	0	1	NC	1	NC	1
570			min	-.009	2	-.137	3	0	1	-2.294e-6	4	NC	1	NC	1
571	M9	1	max	.006	3	.092	1	.701	4	2.192e-2	3	NC	1	NC	1
572			min	-.002	2	-.008	3	-.001	1	-1.699e-2	1	NC	1	NC	1
573		2	max	.006	3	.045	1	.683	4	1.085e-2	3	NC	3	NC	1
574			min	-.002	2	-.002	3	0	12	-8.238e-3	1	2407.919	1	9101.727	4
575		3	max	.006	3	.008	3	.662	4	1.509e-2	4	NC	5	NC	1
576			min	-.002	2	-.007	2	0	12	-1.074e-5	10	1151.267	1	5234.828	4
577		4	max	.006	3	.029	3	.638	4	1.182e-2	5	NC	5	NC	1
578			min	-.002	2	-.066	1	0	12	-4.45e-3	1	718.651	1	3957.531	4
579		5	max	.006	3	.056	3	.613	4	8.873e-3	5	NC	15	NC	1
580			min	-.002	2	-.13	1	0	12	-9.103e-3	1	513.809	1	3329.53	4
581		6	max	.005	3	.087	3	.587	4	1.11e-2	3	NC	15	NC	1
582			min	-.002	2	-.192	1	0	12	-1.376e-2	1	401.773	1	2947.446	4
583		7	max	.005	3	.116	3	.561	4	1.476e-2	3	9875.526	15	NC	1
584			min	-.002	2	-.247	1	0	1	-1.841e-2	1	336.033	1	2667.719	4
585		8	max	.005	3	.141	3	.535	4	1.843e-2	3	8768.815	15	NC	1
586			min	-.002	2	-.292	1	-.001	1	-2.306e-2	1	297.316	1	2423.834	4
587		9	max	.005	3	.157	3	.508	4	1.837e-2	3	8192.245	15	NC	1
588			min	-.002	2	-.319	1	0	12	-2.543e-2	1	277.224	1	2227.766	4
589		10	max	.005	3	.163	3	.479	4	1.584e-2	3	8016.736	15	NC	1
590			min	-.002	2	-.329	1	0	1	-2.628e-2	1	271.207	1	2191.758	4
591		11	max	.005	3	.159	3	.447	4	1.33e-2	3	8192.016	15	NC	1
592			min	-.002	2	-.319	1	0	1	-2.712e-2	1	277.567	1	2256.359	4
593		12	max	.005	3	.145	3	.413	4	1.091e-2	3	8768.386	15	NC	1
594			min	-.002	2	-.291	1	0	12	-2.563e-2	1	298.394	1	2396.592	4
595		13	max	.005	3	.124	3	.375	4	8.732e-3	3	9874.855	15	NC	1
596			min	-.002	2	-.245	1	0	12	-2.063e-2	1	338.715	1	2853.742	4
597		14	max	.005	3	.096	3	.334	4	6.553e-3	3	NC	15	NC	1
598			min	-.002	2	-.188	1	-.002	1	-1.563e-2	1	407.575	1	3885.128	5
599		15	max	.004	3	.065	3	.291	4	6.341e-3	5	NC	15	NC	1
600			min	-.002	2	-.126	1	-.006	1	-1.063e-2	1	525.84	1	6380.043	5
601		16	max	.004	3	.033	3	.249	4	8.542e-3	5	NC	5	NC	1
602			min	-.002	2	-.062	1	-.009	1	-5.63e-3	1	744.149	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
603		17	max	.004	3	.003	3	.211	4	1.079e-2	4	NC	5	NC	1
604			min	-.002	2	-.004	2	-.009	1	-6.284e-4	1	1209.295	1	NC	1
605		18	max	.004	3	.046	1	.179	4	5.068e-3	5	NC	4	NC	1
606			min	-.002	2	-.024	3	-.006	1	-1.002e-2	1	2555.858	1	NC	1
607		19	max	.004	3	.091	1	.153	4	7.243e-3	3	NC	1	NC	1
608			min	-.002	2	-.05	3	0	12	-1.974e-2	1	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

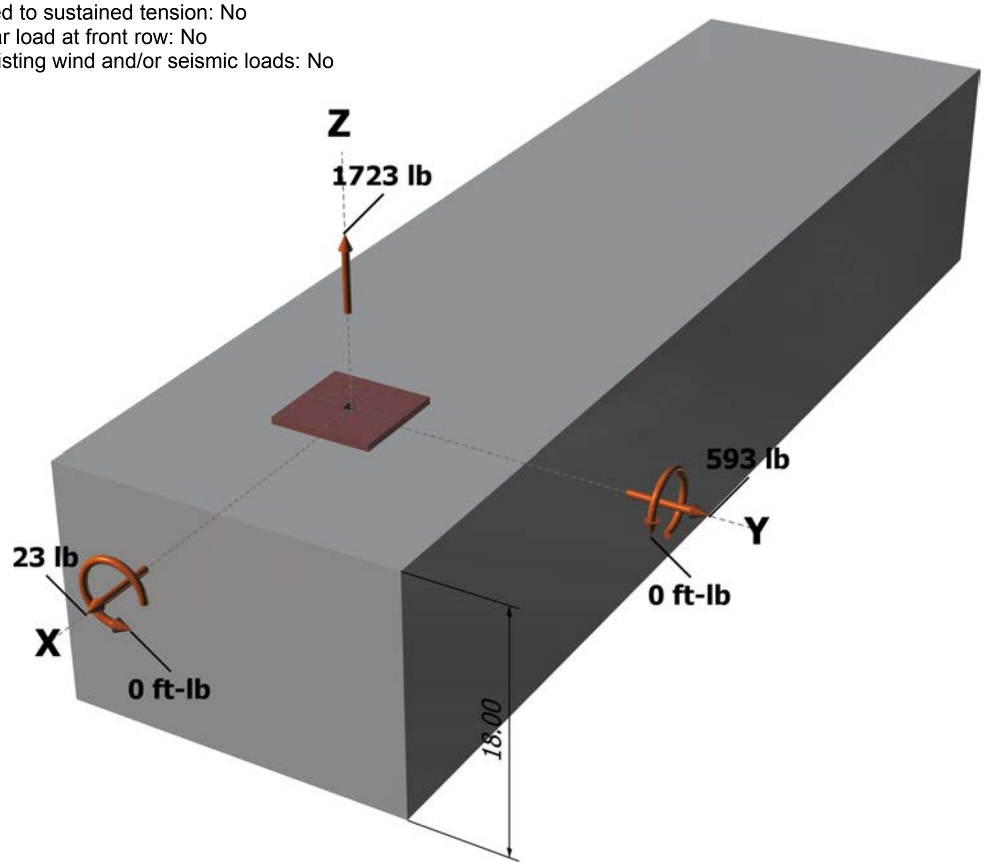
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

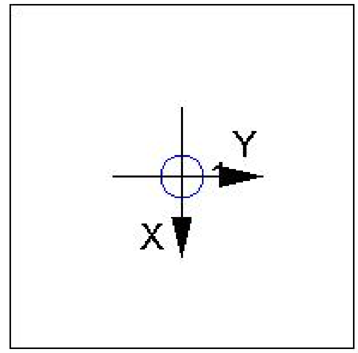
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	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, $øV_n$ (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

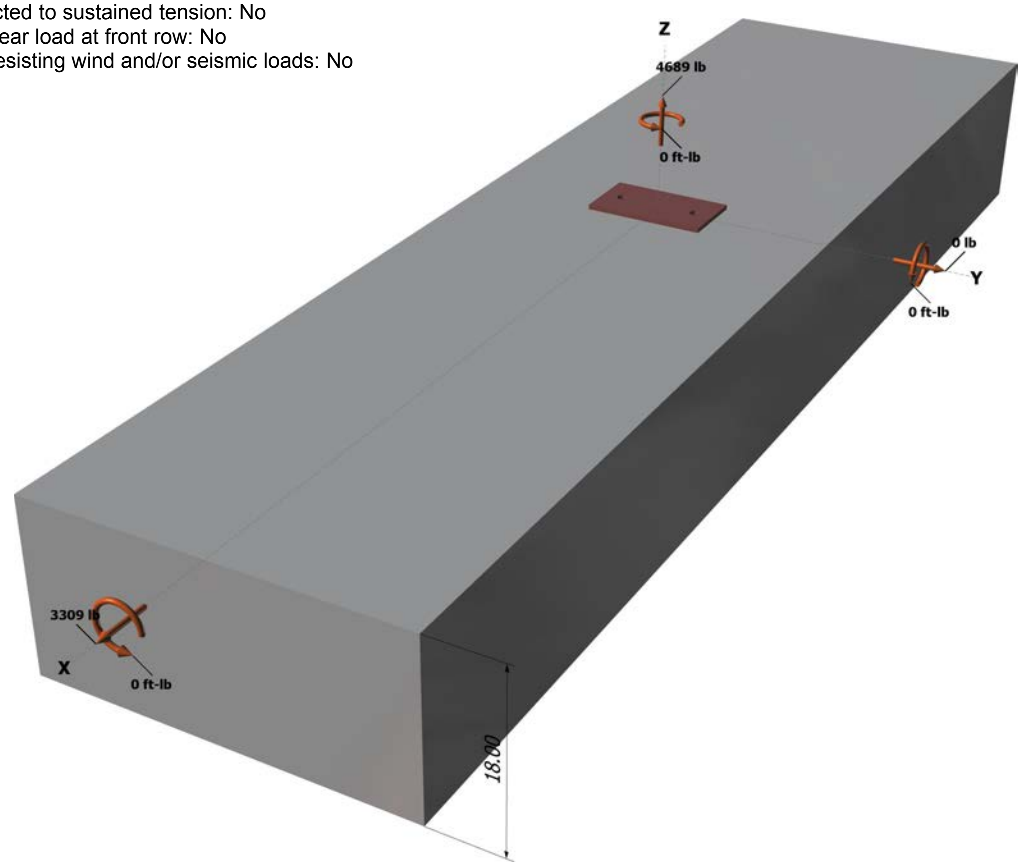
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

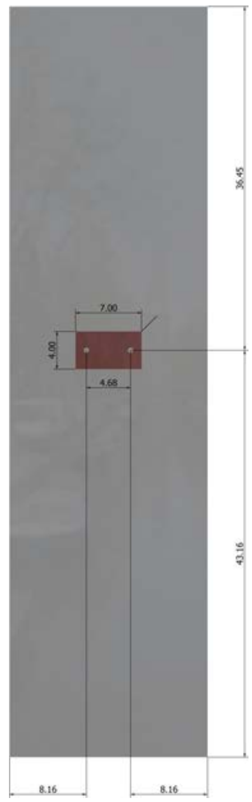
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



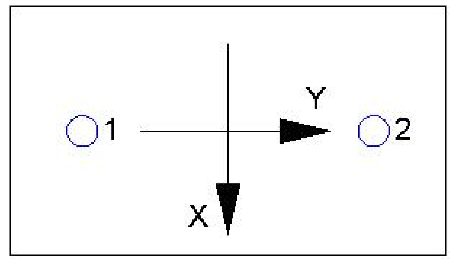
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	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, $øV_n$ (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.