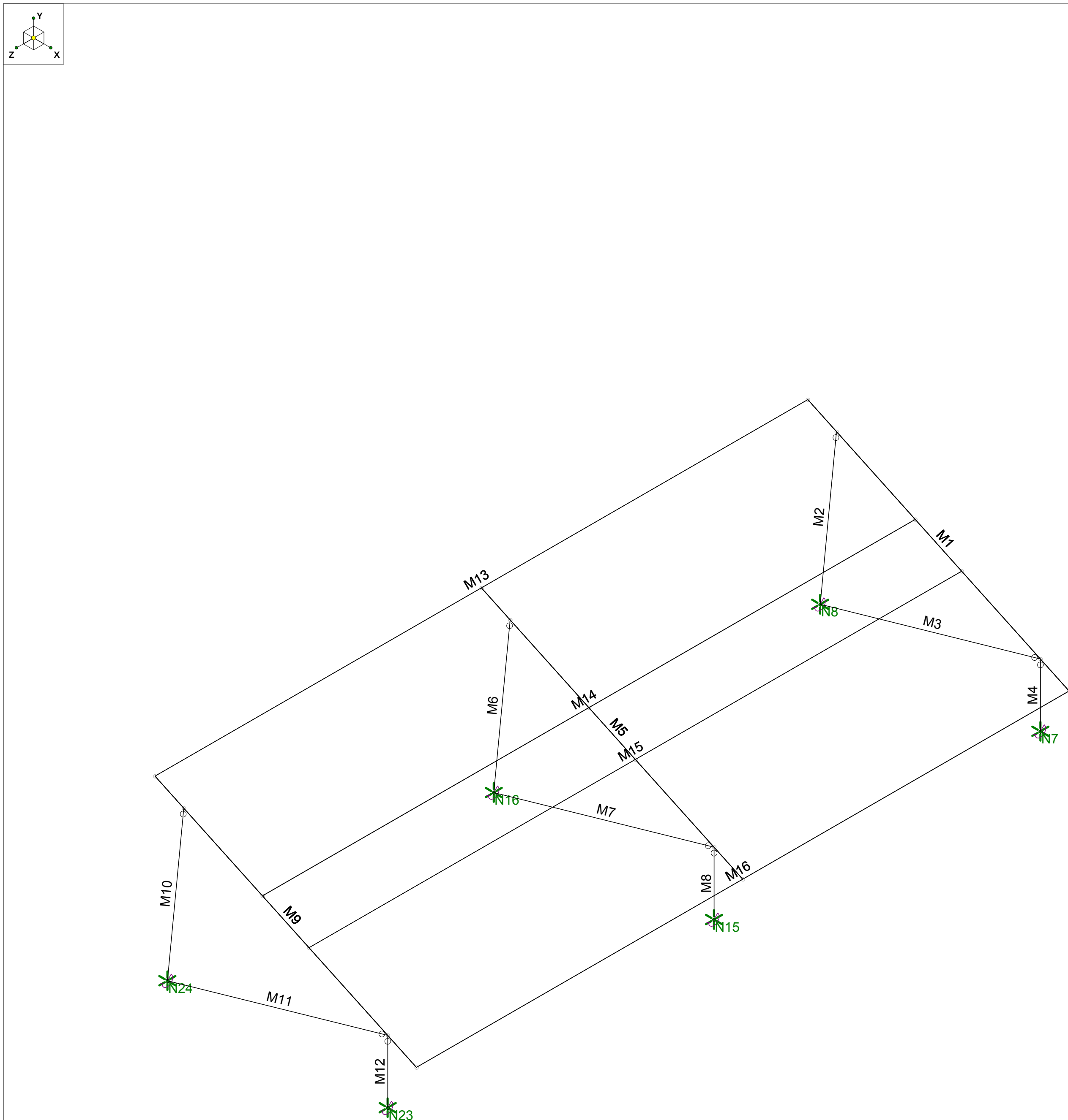


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

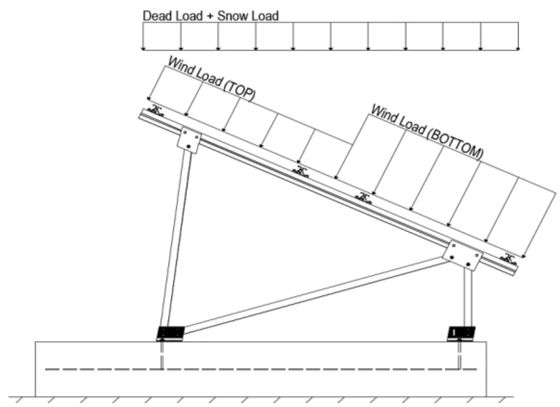
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

1.2 Construction
Photovoltaic modules are attached to aluminum purlins using clamp fasteners. Purlins are clamped to inclined aluminum girders, which are then connected to aluminum struts. Each support structure is equally spaced.

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	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 7-05 - Chapter 6, Wind Loads
- ASCE 7-05 - Chapter 7, Snow Loads
- ASCE 7-05 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2003, 2006, 2009
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 120 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 22.61 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M14	Mid-Top	M7	Inner	N15	Inner
M15	Mid-Bottom	M11	Outer	N23	Outer
M16	Bottom				

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

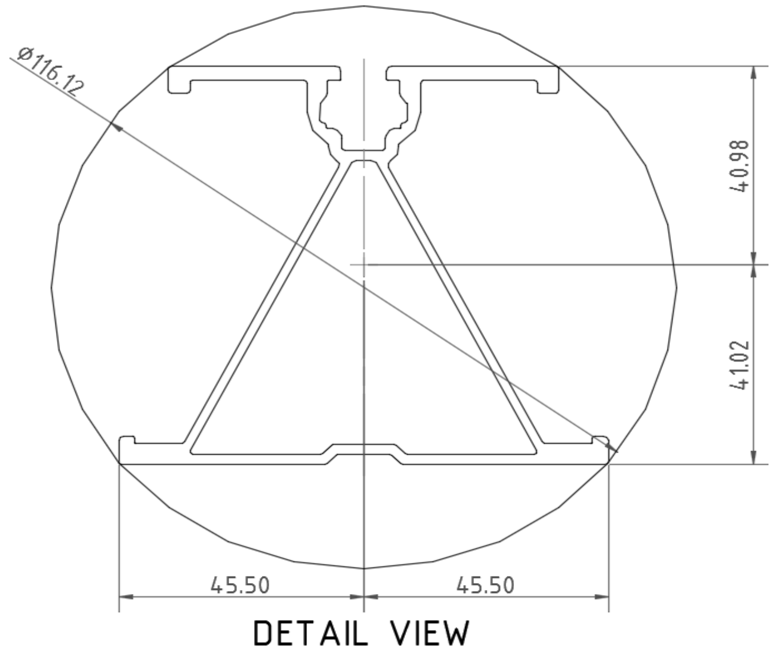
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

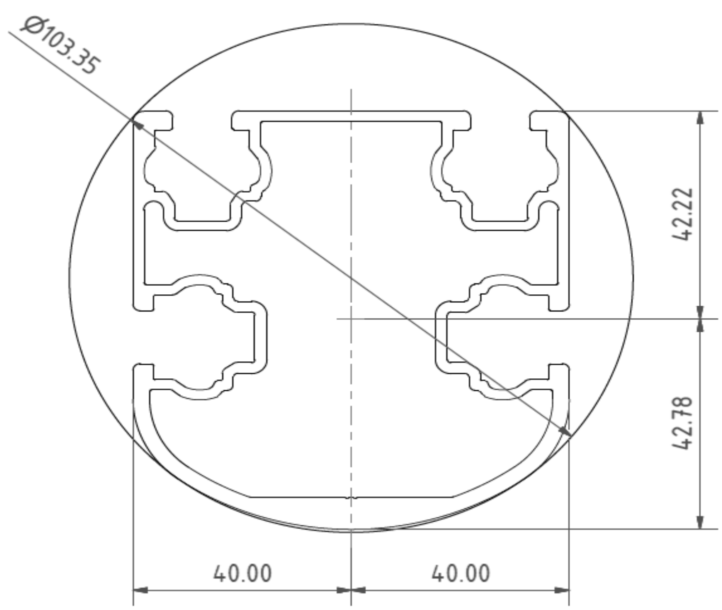
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	108	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-2.497	k-ft
M_z =	0.008	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	91%	



4.2 Girder Design

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

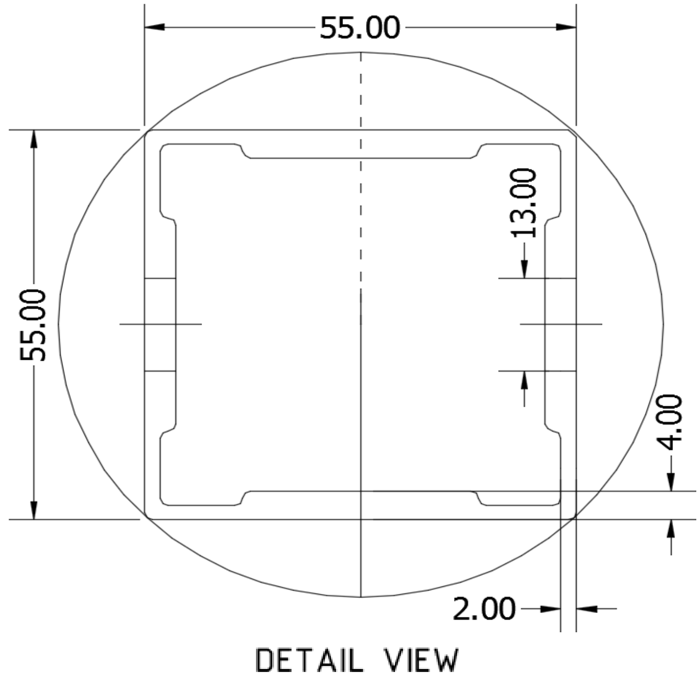
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.319	k-ft
M_z =	0.000	k-ft
P_n =	-0.872	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	97%	



4.3 Front Strut Design

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

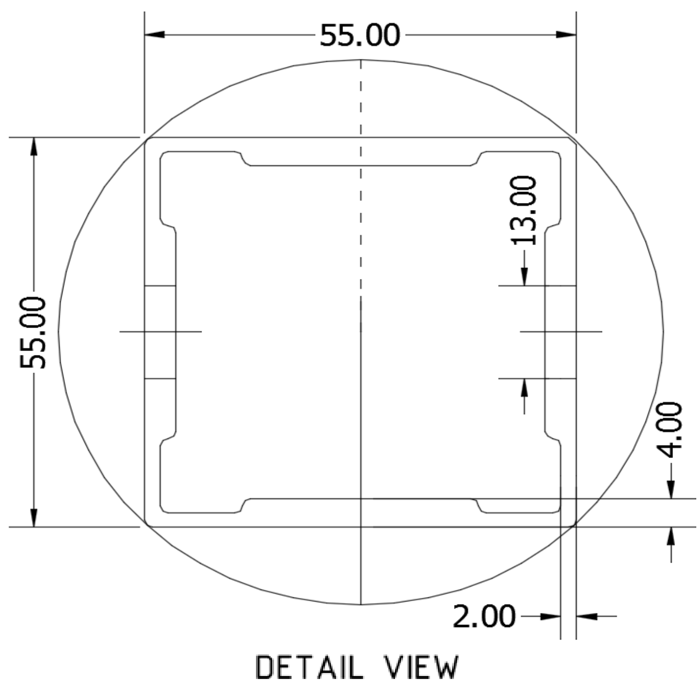
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.037	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



4.4 Diagonal Strut Design

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

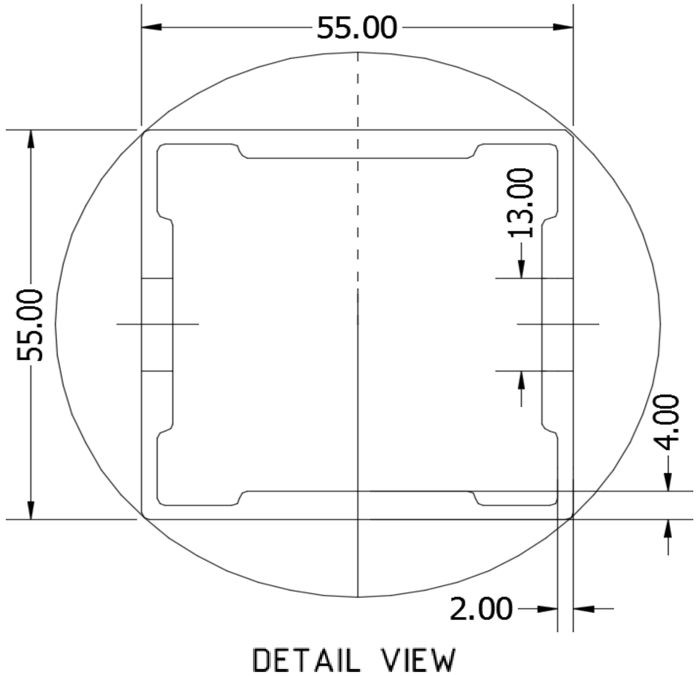
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.477	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	34%	



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 =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.550	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	29%	



5. FOUNDATION DESIGN CALCULATIONS

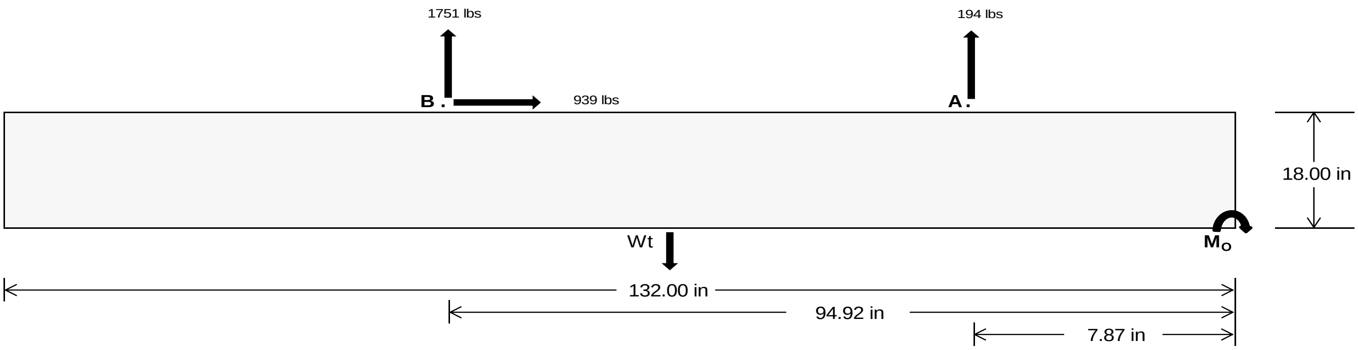
5.1 Helical Pile Foundations

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 =	818.31	7293.56	k
Compressive Load =	3948.07	5481.53	k
Lateral Load =	11.13	3905.45	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (3) #5 rebar.

Overturning Check

M_O = 184621.9 in-lbs
Resisting Force Required = 2797.30 lbs
S.F. = 1.67
Weight Required = 4662.17 lbs
Minimum Width = 39 in in
Weight Provided = 7775.63 lbs

A minimum 132in long x 39in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 938.71 lbs
Friction = 0.4
Weight Required = 2346.76 lbs
Resisting Weight = 7775.63 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 39in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 938.71 lbs
Cohesion = 130 psf
Area = 35.75 ft^2
Resisting = 3887.81 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 39in 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			
	39 in	40 in	41 in	42 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.25 ft) =	7776 lbs	7975 lbs	8174 lbs	8374 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	39 in	40 in	41 in	42 in	39 in	40 in	41 in	42 in	39 in	40 in	41 in	42 in	39 in	40 in	41 in	42 in
F_A	1249 lbs	1249 lbs	1249 lbs	1249 lbs	1640 lbs	1640 lbs	1640 lbs	1640 lbs	2049 lbs	2049 lbs	2049 lbs	2049 lbs	-388 lbs	-388 lbs	-388 lbs	-388 lbs
F_B	1235 lbs	1235 lbs	1235 lbs	1235 lbs	2378 lbs	2378 lbs	2378 lbs	2378 lbs	2595 lbs	2595 lbs	2595 lbs	2595 lbs	-3502 lbs	-3502 lbs	-3502 lbs	-3502 lbs
F_V	163 lbs	163 lbs	163 lbs	163 lbs	1680 lbs	1680 lbs	1680 lbs	1680 lbs	1368 lbs	1368 lbs	1368 lbs	1368 lbs	-1877 lbs	-1877 lbs	-1877 lbs	-1877 lbs
P_{total}	10259 lbs	10459 lbs	10658 lbs	10857 lbs	11794 lbs	11993 lbs	12193 lbs	12392 lbs	12420 lbs	12619 lbs	12818 lbs	13018 lbs	776 lbs	896 lbs	1015 lbs	1135 lbs
M	3318 lbs-ft	3318 lbs-ft	3318 lbs-ft	3318 lbs-ft	4731 lbs-ft	4731 lbs-ft	4731 lbs-ft	4731 lbs-ft	5725 lbs-ft	5725 lbs-ft	5725 lbs-ft	5725 lbs-ft	3746 lbs-ft	3746 lbs-ft	3746 lbs-ft	3746 lbs-ft
e	0.32 ft	0.32 ft	0.31 ft	0.31 ft	0.40 ft	0.39 ft	0.39 ft	0.38 ft	0.46 ft	0.45 ft	0.45 ft	0.44 ft	4.83 ft	4.18 ft	3.69 ft	3.30 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}	236.3 psf	235.9 psf	235.4 psf	235.0 psf	257.7 psf	256.7 psf	255.8 psf	254.8 psf	260.1 psf	259.0 psf	258.0 psf	257.0 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	337.6 psf	334.6 psf	331.7 psf	329.0 psf	402.1 psf	397.5 psf	393.1 psf	388.9 psf	434.8 psf	429.3 psf	424.2 psf	419.2 psf	236.8 psf	136.0 psf	109.4 psf	98.3 psf

Maximum Bearing Pressure = 435 psf
Allowable Bearing Pressure = 1500 psf

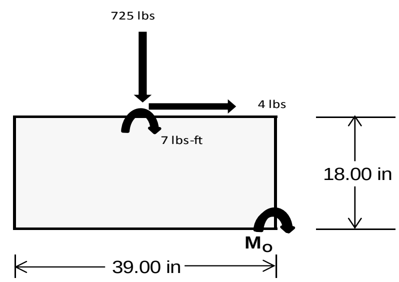
Use a 132in long x 39in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1164.0 ft-lbs
Resisting Force Required = 716.30 lbs
S.F. = 1.67
Weight Required = 1193.84 lbs
Minimum Width = 39 in in
Weight Provided = 7775.63 lbs

A minimum 132in long x 39in 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	39 in			39 in			39 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	226 lbs	575 lbs	226 lbs	725 lbs	2062 lbs	725 lbs	66 lbs	168 lbs	66 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9852 lbs	7776 lbs	9852 lbs	9888 lbs	7776 lbs	9888 lbs	2881 lbs	7776 lbs	2881 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	14 lbs-ft	0 lbs-ft	14 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.54 ft	0.54 ft	0.54 ft	0.54 ft	0.54 ft	0.54 ft	0.54 ft	0.54 ft	0.54 ft
f_{min}	275.4 psf	217.5 psf	275.4 psf	275.9 psf	217.5 psf	275.9 psf	80.6 psf	217.5 psf	80.6 psf
f_{max}	275.8 psf	217.5 psf	275.8 psf	277.3 psf	217.5 psf	277.3 psf	80.6 psf	217.5 psf	80.6 psf

Maximum Bearing Pressure = 277 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 39in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 39in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

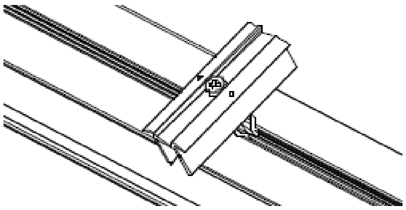
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

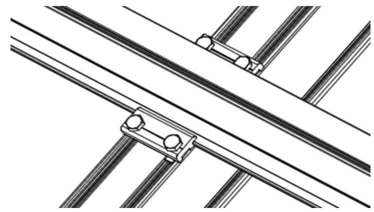
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.854	k
Allowable Uplift =	1.214	k
Utilization =	70%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.748	k
Allowable Uplift =	4.357	k
Utilization =	63%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	3.037	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	41%	

Rear Strut		
Maximum Axial Load =	4.936	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	67%	

Diagonal Strut		
Maximum Axial Load =	2.594	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	35%	

Bolt and bearing capacities are accounting for double shear. (ASCE 8-02, Eq. 5.3.4-1)

Struts under compression are shown to demonstrate the load transfer from the girder. Single M12 bolts are located at each end of the strut and are subjected to double shear.

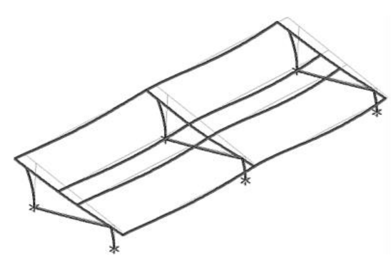
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

The racking structure has been analyzed under seismic loading. The allowable story drift of the structure must fall within the limits provided by (ASCE 7, Table 12.12-1).

Mean Height, h_{sx} =	46.89	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.938	in
Max Drift, Δ_{MAX} =	0.034	in
N/A		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 108 in

J = 0.432

298.779

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

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= 27.7 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 = 108

J = 0.432

190.005

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.9

3.4.16

b/t = 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 in^3

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 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

b/t = 24.5
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

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

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.50 ksi
A = 663.99 mm^2
1.03 in^2
$P_{max} =$ 7.72 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

$L_b =$ 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
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

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)/(λ²)

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

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 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								

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	-69.356	-69.356	0	0
2	M14	y	-69.356	-69.356	0	0
3	M15	y	-107.187	-107.187	0	0
4	M16	y	-107.187	-107.187	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	157.628	157.628	0	0
2	M14	y	119.797	119.797	0	0
3	M15	y	63.051	63.051	0	0
4	M16	y	63.051	63.051	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1														
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75														
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	777.798	2	1309.647	2	.597	1	.003	1	0	1	0	1
2		min	-953.306	3	-1731.328	3	.029	15	0	15	0	1	0	1
3	N7	max	.03	9	1105.644	1	-.367	15	0	15	0	1	0	1
4		min	-.226	2	-168.407	3	-8.558	1	-.017	1	0	1	0	1
5	N15	max	.025	9	3036.978	2	0	3	0	3	0	1	0	1
6		min	-2.491	2	-629.466	3	0	14	0	14	0	1	0	1
7	N16	max	2744.9	2	4216.565	2	0	1	0	1	0	1	0	1
8		min	-3004.192	3	-5610.427	3	0	3	0	12	0	1	0	1
9	N23	max	.03	9	1105.644	1	8.558	1	.017	1	0	1	0	1
10		min	-.226	2	-168.407	3	.367	15	0	15	0	1	0	1
11	N24	max	777.798	2	1309.647	2	-.029	15	0	15	0	1	0	1
12		min	-953.306	3	-1731.328	3	-.597	1	-.003	1	0	1	0	1
13	Totals:	max	4297.553	2	11900.692	2	0	3						
14		min	-4911.491	3	-10039.363	3	0	11						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	85.895	1	475.01	2	-6.518	15	0	15	.205	1	0	2
2			min	3.58	15	-835.595	3	-157.851	1	-.015	2	.009	15	0	3
3		2	max	85.895	1	332.053	2	-5.008	15	0	15	.065	1	.712	3
4			min	3.58	15	-588.247	3	-121.132	1	-.015	2	.003	15	-.404	2
5		3	max	85.895	1	189.096	2	-3.498	15	0	15	.002	3	1.176	3
6			min	3.58	15	-340.899	3	-84.413	1	-.015	2	-.038	1	-.664	2
7		4	max	85.895	1	46.139	2	-1.988	15	0	15	-.003	12	1.394	3
8			min	3.58	15	-93.551	3	-47.695	1	-.015	2	-.104	1	-.782	2
9		5	max	85.895	1	153.797	3	-.478	15	0	15	-.005	12	1.364	3
10			min	3.58	15	-96.818	2	-10.976	1	-.015	2	-.133	1	-.756	2
11		6	max	85.895	1	401.145	3	25.743	1	0	15	-.005	15	1.086	3
12			min	3.58	15	-239.775	2	-.168	3	-.015	2	-.126	1	-.588	2
13		7	max	85.895	1	648.494	3	62.462	1	0	15	-.003	15	.561	3
14			min	3.58	15	-382.732	2	1.468	12	-.015	2	-.081	1	-.277	2
15		8	max	85.895	1	895.842	3	99.181	1	0	15	.002	2	.177	2
16			min	3.58	15	-525.689	2	2.978	12	-.015	2	-.005	3	-.211	3
17		9	max	85.895	1	1143.19	3	135.9	1	0	15	.117	1	.775	2
18			min	3.58	15	-668.646	2	4.488	12	-.015	2	0	3	-1.23	3
19		10	max	85.895	1	1390.538	3	172.618	1	0	12	.271	1	1.515	2
20			min	3.58	15	-811.603	2	5.998	12	-.015	2	.006	12	-2.497	3
21		11	max	85.895	1	668.646	2	-4.488	12	.015	2	.117	1	.775	2
22			min	3.58	15	-1143.19	3	-135.9	1	0	15	0	3	-1.23	3
23		12	max	85.895	1	525.689	2	-2.978	12	.015	2	.002	2	.177	2
24			min	3.58	15	-895.842	3	-99.181	1	0	15	-.005	3	-.211	3
25		13	max	85.895	1	382.732	2	-1.468	12	.015	2	-.003	15	.561	3
26			min	3.58	15	-648.494	3	-62.462	1	0	15	-.081	1	-.277	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	85.895	1	239.775	2	.168	3	.015	2	-.005	15	1.086	3
28			min	3.58	15	-401.145	3	-25.743	1	0	15	-.126	1	-.588	2
29		15	max	85.895	1	96.818	2	10.976	1	.015	2	-.005	12	1.364	3
30			min	3.58	15	-153.797	3	.478	15	0	15	-.133	1	-.756	2
31		16	max	85.895	1	93.551	3	47.695	1	.015	2	-.003	12	1.394	3
32			min	3.58	15	-46.139	2	1.988	15	0	15	-.104	1	-.782	2
33		17	max	85.895	1	340.899	3	84.413	1	.015	2	.002	3	1.176	3
34			min	3.58	15	-189.096	2	3.498	15	0	15	-.038	1	-.664	2
35		18	max	85.895	1	588.247	3	121.132	1	.015	2	.065	1	.712	3
36			min	3.58	15	-332.053	2	5.008	15	0	15	.003	15	-.404	2
37		19	max	85.895	1	835.595	3	157.851	1	.015	2	.205	1	0	2
38			min	3.58	15	-475.01	2	6.518	15	0	15	.009	15	0	3
39	M14	1	max	42.574	1	515.503	2	-6.738	15	.011	3	.237	1	0	1
40			min	1.774	15	-655.142	3	-163.184	1	-.013	2	.01	15	0	3
41		2	max	42.574	1	372.546	2	-5.228	15	.011	3	.092	1	.562	3
42			min	1.774	15	-468.324	3	-126.465	1	-.013	2	.004	15	-.444	2
43		3	max	42.574	1	229.589	2	-3.718	15	.011	3	.003	3	.937	3
44			min	1.774	15	-281.505	3	-89.747	1	-.013	2	-.016	1	-.745	2
45		4	max	42.574	1	86.632	2	-2.208	15	.011	3	-.002	12	1.125	3
46			min	1.774	15	-94.687	3	-53.028	1	-.013	2	-.088	1	-.903	2
47		5	max	42.574	1	92.132	3	-.698	15	.011	3	-.005	12	1.126	3
48			min	1.774	15	-56.325	2	-16.309	1	-.013	2	-.122	1	-.918	2
49		6	max	42.574	1	278.95	3	20.41	1	.011	3	-.005	15	.94	3
50			min	1.774	15	-199.282	2	-.491	3	-.013	2	-.12	1	-.791	2
51		7	max	42.574	1	465.769	3	57.129	1	.011	3	-.003	15	.568	3
52			min	1.774	15	-342.239	2	1.252	12	-.013	2	-.082	1	-.52	2
53		8	max	42.574	1	652.587	3	93.848	1	.011	3	.001	10	.009	3
54			min	1.774	15	-485.196	2	2.762	12	-.013	2	-.006	1	-.106	2
55		9	max	42.574	1	839.406	3	130.566	1	.011	3	.106	1	.451	2
56			min	1.774	15	-628.153	2	4.272	12	-.013	2	0	3	-.737	3
57		10	max	42.574	1	1026.224	3	167.285	1	.011	3	.255	1	1.15	2
58			min	1.774	15	-771.11	2	5.782	12	-.013	2	.006	12	-1.67	3
59		11	max	42.574	1	628.153	2	-4.272	12	.013	2	.106	1	.451	2
60			min	1.774	15	-839.406	3	-130.566	1	-.011	3	0	3	-.737	3
61		12	max	42.574	1	485.196	2	-2.762	12	.013	2	.001	10	.009	3
62			min	1.774	15	-652.587	3	-93.848	1	-.011	3	-.006	1	-.106	2
63		13	max	42.574	1	342.239	2	-1.252	12	.013	2	-.003	15	.568	3
64			min	1.774	15	-465.769	3	-57.129	1	-.011	3	-.082	1	-.52	2
65		14	max	42.574	1	199.282	2	.491	3	.013	2	-.005	15	.94	3
66			min	1.774	15	-278.95	3	-20.41	1	-.011	3	-.12	1	-.791	2
67		15	max	42.574	1	56.325	2	16.309	1	.013	2	-.005	12	1.126	3
68			min	1.774	15	-92.132	3	.698	15	-.011	3	-.122	1	-.918	2
69		16	max	42.574	1	94.687	3	53.028	1	.013	2	-.002	12	1.125	3
70			min	1.774	15	-86.632	2	2.208	15	-.011	3	-.088	1	-.903	2
71		17	max	42.574	1	281.505	3	89.747	1	.013	2	.003	3	.937	3
72			min	1.774	15	-229.589	2	3.718	15	-.011	3	-.016	1	-.745	2
73		18	max	42.574	1	468.324	3	126.465	1	.013	2	.092	1	.562	3
74			min	1.774	15	-372.546	2	5.228	15	-.011	3	.004	15	-.444	2
75		19	max	42.574	1	655.142	3	163.184	1	.013	2	.237	1	0	1
76			min	1.774	15	-515.503	2	6.738	15	-.011	3	.01	15	0	3
77	M15	1	max	-1.859	15	719.836	2	-6.736	15	.013	2	.236	1	0	2
78			min	-44.479	1	-349.076	3	-163.178	1	-.009	3	.01	15	0	3
79		2	max	-1.859	15	516.349	2	-5.226	15	.013	2	.092	1	.301	3
80			min	-44.479	1	-253.051	3	-126.459	1	-.009	3	.004	15	-.618	2
81		3	max	-1.859	15	312.863	2	-3.716	15	.013	2	.003	3	.506	3
82			min	-44.479	1	-157.026	3	-89.74	1	-.009	3	-.016	1	-1.033	2
83		4	max	-1.859	15	109.376	2	-2.206	15	.013	2	-.002	12	.615	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-44.479	1	-61.001	3	-53.021	1	-.009	3	-.088	1	-1.244	2
85		5	max	-1.859	15	35.023	3	-.696	15	.013	2	-.005	12	.628	3
86			min	-44.479	1	-94.111	2	-16.302	1	-.009	3	-.122	1	-1.251	2
87		6	max	-1.859	15	131.048	3	20.417	1	.013	2	-.005	15	.545	3
88			min	-44.479	1	-297.597	2	-.357	3	-.009	3	-.12	1	-1.056	2
89		7	max	-1.859	15	227.073	3	57.135	1	.013	2	-.003	15	.366	3
90			min	-44.479	1	-501.084	2	1.337	12	-.009	3	-.082	1	-.656	2
91		8	max	-1.859	15	323.098	3	93.854	1	.013	2	.001	10	.091	3
92			min	-44.479	1	-704.57	2	2.846	12	-.009	3	-.006	1	-.058	1
93		9	max	-1.859	15	419.123	3	130.573	1	.013	2	.106	1	.753	2
94			min	-44.479	1	-908.057	2	4.356	12	-.009	3	0	12	-.28	3
95		10	max	-1.859	15	515.148	3	167.292	1	.013	2	.255	1	1.763	2
96			min	-44.479	1	-1111.543	2	5.866	12	-.009	3	.006	12	-.747	3
97		11	max	-1.859	15	908.057	2	-4.356	12	.009	3	.106	1	.753	2
98			min	-44.479	1	-419.123	3	-130.573	1	-.013	2	0	12	-.28	3
99		12	max	-1.859	15	704.57	2	-2.846	12	.009	3	.001	10	.091	3
100			min	-44.479	1	-323.098	3	-93.854	1	-.013	2	-.006	1	-.058	1
101		13	max	-1.859	15	501.084	2	-1.337	12	.009	3	-.003	15	.366	3
102			min	-44.479	1	-227.073	3	-57.135	1	-.013	2	-.082	1	-.656	2
103		14	max	-1.859	15	297.597	2	.357	3	.009	3	-.005	15	.545	3
104			min	-44.479	1	-131.048	3	-20.417	1	-.013	2	-.12	1	-1.056	2
105		15	max	-1.859	15	94.111	2	16.302	1	.009	3	-.005	12	.628	3
106			min	-44.479	1	-35.023	3	.696	15	-.013	2	-.122	1	-1.251	2
107		16	max	-1.859	15	61.001	3	53.021	1	.009	3	-.002	12	.615	3
108			min	-44.479	1	-109.376	2	2.206	15	-.013	2	-.088	1	-1.244	2
109		17	max	-1.859	15	157.026	3	89.74	1	.009	3	.003	3	.506	3
110			min	-44.479	1	-312.863	2	3.716	15	-.013	2	-.016	1	-1.033	2
111		18	max	-1.859	15	253.051	3	126.459	1	.009	3	.092	1	.301	3
112			min	-44.479	1	-516.349	2	5.226	15	-.013	2	.004	15	-.618	2
113		19	max	-1.859	15	349.076	3	163.178	1	.009	3	.236	1	0	2
114			min	-44.479	1	-719.836	2	6.736	15	-.013	2	.01	15	0	3
115	M16	1	max	-3.832	15	680.818	2	-6.525	15	.011	2	.206	1	0	2
116			min	-91.951	1	-317.33	3	-158.146	1	-.013	3	.009	15	0	3
117		2	max	-3.832	15	477.331	2	-5.015	15	.011	2	.066	1	.269	3
118			min	-91.951	1	-221.305	3	-121.427	1	-.013	3	.003	15	-.579	2
119		3	max	-3.832	15	273.845	2	-3.505	15	.011	2	0	3	.443	3
120			min	-91.951	1	-125.28	3	-84.708	1	-.013	3	-.037	1	-.955	2
121		4	max	-3.832	15	70.358	2	-1.995	15	.011	2	-.003	12	.52	3
122			min	-91.951	1	-29.255	3	-47.989	1	-.013	3	-.103	1	-1.127	2
123		5	max	-3.832	15	66.77	3	-.485	15	.011	2	-.005	12	.501	3
124			min	-91.951	1	-133.129	2	-11.27	1	-.013	3	-.133	1	-1.095	2
125		6	max	-3.832	15	162.795	3	25.448	1	.011	2	-.005	15	.386	3
126			min	-91.951	1	-336.615	2	.242	12	-.013	3	-.126	1	-.86	2
127		7	max	-3.832	15	258.82	3	62.167	1	.011	2	-.003	15	.176	3
128			min	-91.951	1	-540.102	2	1.752	12	-.013	3	-.082	1	-.422	2
129		8	max	-3.832	15	354.845	3	98.886	1	.011	2	.002	2	.22	2
130			min	-91.951	1	-743.588	2	3.262	12	-.013	3	-.004	3	-.131	3
131		9	max	-3.832	15	450.87	3	135.605	1	.011	2	.116	1	1.065	2
132			min	-91.951	1	-947.075	2	4.772	12	-.013	3	.002	12	-.534	3
133		10	max	-3.832	15	546.895	3	172.324	1	.011	2	.27	1	2.114	2
134			min	-91.951	1	-1150.562	2	6.281	12	-.013	3	.007	12	-1.033	3
135		11	max	-3.832	15	947.075	2	-4.772	12	.013	3	.116	1	1.065	2
136			min	-91.951	1	-450.87	3	-135.605	1	-.011	2	.002	12	-.534	3
137		12	max	-3.832	15	743.588	2	-3.262	12	.013	3	.002	2	.22	2
138			min	-91.951	1	-354.845	3	-98.886	1	-.011	2	-.004	3	-.131	3
139		13	max	-3.832	15	540.102	2	-1.752	12	.013	3	-.003	15	.176	3
140			min	-91.951	1	-258.82	3	-62.167	1	-.011	2	-.082	1	-.422	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-3.832	15	336.615	2	-.242	12	.013	3	-.005	15	.386	3
142			min	-91.951	1	-162.795	3	-25.448	1	-.011	2	-.126	1	-.86	2
143		15	max	-3.832	15	133.129	2	11.27	1	.013	3	-.005	12	.501	3
144			min	-91.951	1	-66.77	3	.485	15	-.011	2	-.133	1	-1.095	2
145		16	max	-3.832	15	29.255	3	47.989	1	.013	3	-.003	12	.52	3
146			min	-91.951	1	-70.358	2	1.995	15	-.011	2	-.103	1	-1.127	2
147		17	max	-3.832	15	125.28	3	84.708	1	.013	3	0	3	.443	3
148			min	-91.951	1	-273.845	2	3.505	15	-.011	2	-.037	1	-.955	2
149		18	max	-3.832	15	221.305	3	121.427	1	.013	3	.066	1	.269	3
150			min	-91.951	1	-477.331	2	5.015	15	-.011	2	.003	15	-.579	2
151		19	max	-3.832	15	317.33	3	158.146	1	.013	3	.206	1	0	2
152			min	-91.951	1	-680.818	2	6.525	15	-.011	2	.009	15	0	3
153	M2	1	max	1112.776	2	1.922	4	.555	1	0	3	0	3	0	1
154			min	-1522.489	3	.453	15	.023	15	0	1	0	2	0	1
155		2	max	1113.204	2	1.865	4	.555	1	0	3	0	1	0	15
156			min	-1522.167	3	.439	15	.023	15	0	1	0	15	0	4
157		3	max	1113.633	2	1.809	4	.555	1	0	3	0	1	0	15
158			min	-1521.846	3	.426	15	.023	15	0	1	0	15	-.001	4
159		4	max	1114.061	2	1.752	4	.555	1	0	3	0	1	0	15
160			min	-1521.524	3	.412	15	.023	15	0	1	0	15	-.002	4
161		5	max	1114.489	2	1.695	4	.555	1	0	3	0	1	0	15
162			min	-1521.203	3	.399	15	.023	15	0	1	0	15	-.002	4
163		6	max	1114.918	2	1.638	4	.555	1	0	3	0	1	0	15
164			min	-1520.882	3	.386	15	.023	15	0	1	0	15	-.003	4
165		7	max	1115.346	2	1.582	4	.555	1	0	3	0	1	0	15
166			min	-1520.56	3	.372	15	.023	15	0	1	0	15	-.003	4
167		8	max	1115.775	2	1.525	4	.555	1	0	3	.001	1	0	15
168			min	-1520.239	3	.354	12	.023	15	0	1	0	15	-.004	4
169		9	max	1116.203	2	1.468	4	.555	1	0	3	.001	1	0	15
170			min	-1519.918	3	.332	12	.023	15	0	1	0	15	-.004	4
171		10	max	1116.632	2	1.411	4	.555	1	0	3	.001	1	-.001	15
172			min	-1519.596	3	.31	12	.023	15	0	1	0	15	-.004	4
173		11	max	1117.06	2	1.354	4	.555	1	0	3	.002	1	-.001	15
174			min	-1519.275	3	.288	12	.023	15	0	1	0	15	-.005	4
175		12	max	1117.489	2	1.298	4	.555	1	0	3	.002	1	-.001	15
176			min	-1518.954	3	.265	12	.023	15	0	1	0	15	-.005	4
177		13	max	1117.917	2	1.251	2	.555	1	0	3	.002	1	-.001	15
178			min	-1518.632	3	.243	12	.023	15	0	1	0	15	-.006	4
179		14	max	1118.346	2	1.206	2	.555	1	0	3	.002	1	-.001	12
180			min	-1518.311	3	.221	12	.023	15	0	1	0	15	-.006	4
181		15	max	1118.774	2	1.162	2	.555	1	0	3	.002	1	-.001	12
182			min	-1517.989	3	.199	12	.023	15	0	1	0	15	-.006	4
183		16	max	1119.203	2	1.118	2	.555	1	0	3	.002	1	-.001	12
184			min	-1517.668	3	.177	12	.023	15	0	1	0	15	-.007	4
185		17	max	1119.631	2	1.074	2	.555	1	0	3	.003	1	-.002	12
186			min	-1517.347	3	.155	12	.023	15	0	1	0	15	-.007	4
187		18	max	1120.06	2	1.029	2	.555	1	0	3	.003	1	-.002	12
188			min	-1517.025	3	.133	12	.023	15	0	1	0	15	-.007	4
189		19	max	1120.488	2	.985	2	.555	1	0	3	.003	1	-.002	12
190			min	-1516.704	3	.111	12	.023	15	0	1	0	15	-.007	4
191	M3	1	max	690.003	2	7.883	4	.138	1	0	3	0	1	.007	4
192			min	-827.835	3	1.853	15	.006	15	0	1	0	15	.002	12
193		2	max	689.833	2	7.116	4	.138	1	0	3	0	1	.005	2
194			min	-827.963	3	1.673	15	.006	15	0	1	0	15	0	12
195		3	max	689.662	2	6.348	4	.138	1	0	3	0	1	.002	2
196			min	-828.091	3	1.493	15	.006	15	0	1	0	15	0	3
197		4	max	689.492	2	5.581	4	.138	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-828.219	3	1.312	15	.006	15	0	1	0	15	-.002	3
199		5	max	689.321	2	4.814	4	.138	1	0	3	0	1	0	15
200			min	-828.347	3	1.132	15	.006	15	0	1	0	15	-.003	3
201		6	max	689.151	2	4.047	4	.138	1	0	3	0	1	-.001	15
202			min	-828.474	3	.952	15	.006	15	0	1	0	15	-.005	4
203		7	max	688.981	2	3.28	4	.138	1	0	3	0	1	-.002	15
204			min	-828.602	3	.771	15	.006	15	0	1	0	15	-.007	4
205		8	max	688.81	2	2.512	4	.138	1	0	3	0	1	-.002	15
206			min	-828.73	3	.591	15	.006	15	0	1	0	15	-.008	4
207		9	max	688.64	2	1.745	4	.138	1	0	3	0	1	-.002	15
208			min	-828.858	3	.411	15	.006	15	0	1	0	15	-.009	4
209		10	max	688.47	2	.978	4	.138	1	0	3	0	1	-.002	15
210			min	-828.985	3	.215	12	.006	15	0	1	0	15	-.009	4
211		11	max	688.299	2	.361	2	.138	1	0	3	0	1	-.002	15
212			min	-829.113	3	-.143	3	.006	15	0	1	0	15	-.01	4
213		12	max	688.129	2	-.13	15	.138	1	0	3	0	1	-.002	15
214			min	-829.241	3	-.592	3	.006	15	0	1	0	15	-.01	4
215		13	max	687.959	2	-.311	15	.138	1	0	3	.001	1	-.002	15
216			min	-829.369	3	-1.324	4	.006	15	0	1	0	15	-.009	4
217		14	max	687.788	2	-.491	15	.138	1	0	3	.001	1	-.002	15
218			min	-829.496	3	-2.091	4	.006	15	0	1	0	15	-.008	4
219		15	max	687.618	2	-.671	15	.138	1	0	3	.001	1	-.002	15
220			min	-829.624	3	-2.858	4	.006	15	0	1	0	15	-.007	4
221		16	max	687.448	2	-.852	15	.138	1	0	3	.001	1	-.001	15
222			min	-829.752	3	-3.625	4	.006	15	0	1	0	15	-.006	4
223		17	max	687.277	2	-1.032	15	.138	1	0	3	.001	1	-.001	15
224			min	-829.88	3	-4.393	4	.006	15	0	1	0	15	-.004	4
225		18	max	687.107	2	-1.212	15	.138	1	0	3	.001	1	0	15
226			min	-830.007	3	-5.16	4	.006	15	0	1	0	15	-.002	4
227		19	max	686.937	2	-1.393	15	.138	1	0	3	.001	1	0	1
228			min	-830.135	3	-5.927	4	.006	15	0	1	0	15	0	1
229	M4	1	max	1102.578	1	0	1	-.367	15	0	1	0	1	0	1
230			min	-170.707	3	0	1	-8.842	1	0	1	0	15	0	1
231		2	max	1102.748	1	0	1	-.367	15	0	1	0	3	0	1
232			min	-170.579	3	0	1	-8.842	1	0	1	0	1	0	1
233		3	max	1102.918	1	0	1	-.367	15	0	1	0	15	0	1
234			min	-170.452	3	0	1	-8.842	1	0	1	-.001	1	0	1
235		4	max	1103.089	1	0	1	-.367	15	0	1	0	15	0	1
236			min	-170.324	3	0	1	-8.842	1	0	1	-.002	1	0	1
237		5	max	1103.259	1	0	1	-.367	15	0	1	0	15	0	1
238			min	-170.196	3	0	1	-8.842	1	0	1	-.003	1	0	1
239		6	max	1103.429	1	0	1	-.367	15	0	1	0	15	0	1
240			min	-170.068	3	0	1	-8.842	1	0	1	-.004	1	0	1
241		7	max	1103.6	1	0	1	-.367	15	0	1	0	15	0	1
242			min	-169.941	3	0	1	-8.842	1	0	1	-.005	1	0	1
243		8	max	1103.77	1	0	1	-.367	15	0	1	0	15	0	1
244			min	-169.813	3	0	1	-8.842	1	0	1	-.006	1	0	1
245		9	max	1103.94	1	0	1	-.367	15	0	1	0	15	0	1
246			min	-169.685	3	0	1	-8.842	1	0	1	-.007	1	0	1
247		10	max	1104.111	1	0	1	-.367	15	0	1	0	15	0	1
248			min	-169.557	3	0	1	-8.842	1	0	1	-.008	1	0	1
249		11	max	1104.281	1	0	1	-.367	15	0	1	0	15	0	1
250			min	-169.43	3	0	1	-8.842	1	0	1	-.009	1	0	1
251		12	max	1104.451	1	0	1	-.367	15	0	1	0	15	0	1
252			min	-169.302	3	0	1	-8.842	1	0	1	-.01	1	0	1
253		13	max	1104.622	1	0	1	-.367	15	0	1	0	15	0	1
254			min	-169.174	3	0	1	-8.842	1	0	1	-.011	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1104.792	1	0	1	-.367	15	0	1	0	15	0	1
256			min	-169.046	3	0	1	-8.842	1	0	1	-.012	1	0	1
257		15	max	1104.962	1	0	1	-.367	15	0	1	0	15	0	1
258			min	-168.919	3	0	1	-8.842	1	0	1	-.013	1	0	1
259		16	max	1105.133	1	0	1	-.367	15	0	1	0	15	0	1
260			min	-168.791	3	0	1	-8.842	1	0	1	-.014	1	0	1
261		17	max	1105.303	1	0	1	-.367	15	0	1	0	15	0	1
262			min	-168.663	3	0	1	-8.842	1	0	1	-.015	1	0	1
263		18	max	1105.473	1	0	1	-.367	15	0	1	0	15	0	1
264			min	-168.535	3	0	1	-8.842	1	0	1	-.016	1	0	1
265		19	max	1105.644	1	0	1	-.367	15	0	1	0	15	0	1
266			min	-168.407	3	0	1	-8.842	1	0	1	-.017	1	0	1
267	M6	1	max	3542.399	2	2.479	2	0	1	0	1	0	1	0	1
268			min	-4936.127	3	-.102	3	0	1	0	1	0	1	0	1
269		2	max	3542.828	2	2.434	2	0	1	0	1	0	1	0	3
270			min	-4935.806	3	-.135	3	0	1	0	1	0	1	0	2
271		3	max	3543.256	2	2.39	2	0	1	0	1	0	1	0	3
272			min	-4935.484	3	-.168	3	0	1	0	1	0	1	-.001	2
273		4	max	3543.685	2	2.346	2	0	1	0	1	0	1	0	3
274			min	-4935.163	3	-.202	3	0	1	0	1	0	1	-.002	2
275		5	max	3544.113	2	2.302	2	0	1	0	1	0	1	0	3
276			min	-4934.841	3	-.235	3	0	1	0	1	0	1	-.003	2
277		6	max	3544.541	2	2.257	2	0	1	0	1	0	1	0	3
278			min	-4934.52	3	-.268	3	0	1	0	1	0	1	-.003	2
279		7	max	3544.97	2	2.213	2	0	1	0	1	0	1	0	3
280			min	-4934.199	3	-.301	3	0	1	0	1	0	1	-.004	2
281		8	max	3545.398	2	2.169	2	0	1	0	1	0	1	0	3
282			min	-4933.877	3	-.334	3	0	1	0	1	0	1	-.005	2
283		9	max	3545.827	2	2.125	2	0	1	0	1	0	1	0	3
284			min	-4933.556	3	-.367	3	0	1	0	1	0	1	-.005	2
285		10	max	3546.255	2	2.08	2	0	1	0	1	0	1	0	3
286			min	-4933.235	3	-.401	3	0	1	0	1	0	1	-.006	2
287		11	max	3546.684	2	2.036	2	0	1	0	1	0	1	0	3
288			min	-4932.913	3	-.434	3	0	1	0	1	0	1	-.007	2
289		12	max	3547.112	2	1.992	2	0	1	0	1	0	1	0	3
290			min	-4932.592	3	-.467	3	0	1	0	1	0	1	-.007	2
291		13	max	3547.541	2	1.948	2	0	1	0	1	0	1	.001	3
292			min	-4932.271	3	-.5	3	0	1	0	1	0	1	-.008	2
293		14	max	3547.969	2	1.903	2	0	1	0	1	0	1	.001	3
294			min	-4931.949	3	-.533	3	0	1	0	1	0	1	-.008	2
295		15	max	3548.398	2	1.859	2	0	1	0	1	0	1	.001	3
296			min	-4931.628	3	-.567	3	0	1	0	1	0	1	-.009	2
297		16	max	3548.826	2	1.815	2	0	1	0	1	0	1	.002	3
298			min	-4931.306	3	-.6	3	0	1	0	1	0	1	-.009	2
299		17	max	3549.255	2	1.771	2	0	1	0	1	0	1	.002	3
300			min	-4930.985	3	-.633	3	0	1	0	1	0	1	-.01	2
301		18	max	3549.683	2	1.726	2	0	1	0	1	0	1	.002	3
302			min	-4930.664	3	-.666	3	0	1	0	1	0	1	-.01	2
303		19	max	3550.112	2	1.682	2	0	1	0	1	0	1	.002	3
304			min	-4930.342	3	-.699	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2476.792	2	7.914	4	0	1	0	1	0	1	.011	2
306			min	-2592.067	3	1.858	15	0	1	0	1	0	1	-.002	3
307		2	max	2476.621	2	7.147	4	0	1	0	1	0	1	.008	2
308			min	-2592.195	3	1.678	15	0	1	0	1	0	1	-.004	3
309		3	max	2476.451	2	6.38	4	0	1	0	1	0	1	.006	2
310			min	-2592.322	3	1.497	15	0	1	0	1	0	1	-.005	3
311		4	max	2476.281	2	5.612	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2592.45	3	1.317	15	0	1	0	1	0	1	-.006	3
313		5	max	2476.11	2	4.845	4	0	1	0	1	0	1	.001	2
314			min	-2592.578	3	1.137	15	0	1	0	1	0	1	-.007	3
315		6	max	2475.94	2	4.078	4	0	1	0	1	0	1	0	2
316			min	-2592.706	3	.956	15	0	1	0	1	0	1	-.008	3
317		7	max	2475.77	2	3.311	4	0	1	0	1	0	1	-.002	15
318			min	-2592.834	3	.747	12	0	1	0	1	0	1	-.008	3
319		8	max	2475.599	2	2.637	2	0	1	0	1	0	1	-.002	15
320			min	-2592.961	3	.448	12	0	1	0	1	0	1	-.009	3
321		9	max	2475.429	2	2.039	2	0	1	0	1	0	1	-.002	15
322			min	-2593.089	3	.149	12	0	1	0	1	0	1	-.009	3
323		10	max	2475.259	2	1.442	2	0	1	0	1	0	1	-.002	15
324			min	-2593.217	3	-.278	3	0	1	0	1	0	1	-.009	4
325		11	max	2475.088	2	.844	2	0	1	0	1	0	1	-.002	15
326			min	-2593.345	3	-.726	3	0	1	0	1	0	1	-.009	4
327		12	max	2474.918	2	.246	2	0	1	0	1	0	1	-.002	15
328			min	-2593.472	3	-1.174	3	0	1	0	1	0	1	-.009	4
329		13	max	2474.748	2	-.306	15	0	1	0	1	0	1	-.002	15
330			min	-2593.6	3	-1.623	3	0	1	0	1	0	1	-.009	4
331		14	max	2474.577	2	-.487	15	0	1	0	1	0	1	-.002	15
332			min	-2593.728	3	-2.071	3	0	1	0	1	0	1	-.008	4
333		15	max	2474.407	2	-.667	15	0	1	0	1	0	1	-.002	15
334			min	-2593.856	3	-2.827	4	0	1	0	1	0	1	-.007	4
335		16	max	2474.237	2	-.847	15	0	1	0	1	0	1	-.001	15
336			min	-2593.983	3	-3.594	4	0	1	0	1	0	1	-.006	4
337		17	max	2474.066	2	-1.028	15	0	1	0	1	0	1	-.001	15
338			min	-2594.111	3	-4.361	4	0	1	0	1	0	1	-.004	4
339		18	max	2473.896	2	-1.208	15	0	1	0	1	0	1	0	15
340			min	-2594.239	3	-5.129	4	0	1	0	1	0	1	-.002	4
341		19	max	2473.726	2	-1.388	15	0	1	0	1	0	1	0	1
342			min	-2594.367	3	-5.896	4	0	1	0	1	0	1	0	1
343	M8	1	max	3033.912	2	0	1	0	1	0	1	0	1	0	1
344			min	-631.766	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3034.082	2	0	1	0	1	0	1	0	1	0	1
346			min	-631.638	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3034.253	2	0	1	0	1	0	1	0	1	0	1
348			min	-631.51	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3034.423	2	0	1	0	1	0	1	0	1	0	1
350			min	-631.382	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3034.594	2	0	1	0	1	0	1	0	1	0	1
352			min	-631.255	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3034.764	2	0	1	0	1	0	1	0	1	0	1
354			min	-631.127	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3034.934	2	0	1	0	1	0	1	0	1	0	1
356			min	-630.999	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3035.105	2	0	1	0	1	0	1	0	1	0	1
358			min	-630.871	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3035.275	2	0	1	0	1	0	1	0	1	0	1
360			min	-630.744	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3035.445	2	0	1	0	1	0	1	0	1	0	1
362			min	-630.616	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3035.616	2	0	1	0	1	0	1	0	1	0	1
364			min	-630.488	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3035.786	2	0	1	0	1	0	1	0	1	0	1
366			min	-630.36	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3035.956	2	0	1	0	1	0	1	0	1	0	1
368			min	-630.233	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3036.127	2	0	1	0	1	0	1	0	1	0	1
370			min	-630.105	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3036.297	2	0	1	0	1	0	1	0	1	0	1
372			min	-629.977	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3036.467	2	0	1	0	1	0	1	0	1	0	1
374			min	-629.849	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3036.638	2	0	1	0	1	0	1	0	1	0	1
376			min	-629.721	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3036.808	2	0	1	0	1	0	1	0	1	0	1
378			min	-629.594	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3036.978	2	0	1	0	1	0	1	0	1	0	1
380			min	-629.466	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1112.776	2	1.922	4	-.023	15	0	1	0	2	0	1
382			min	-1522.489	3	.453	15	-.555	1	0	3	0	3	0	1
383		2	max	1113.204	2	1.865	4	-.023	15	0	1	0	15	0	15
384			min	-1522.167	3	.439	15	-.555	1	0	3	0	1	0	4
385		3	max	1113.633	2	1.809	4	-.023	15	0	1	0	15	0	15
386			min	-1521.846	3	.426	15	-.555	1	0	3	0	1	-.001	4
387		4	max	1114.061	2	1.752	4	-.023	15	0	1	0	15	0	15
388			min	-1521.524	3	.412	15	-.555	1	0	3	0	1	-.002	4
389		5	max	1114.489	2	1.695	4	-.023	15	0	1	0	15	0	15
390			min	-1521.203	3	.399	15	-.555	1	0	3	0	1	-.002	4
391		6	max	1114.918	2	1.638	4	-.023	15	0	1	0	15	0	15
392			min	-1520.882	3	.386	15	-.555	1	0	3	0	1	-.003	4
393		7	max	1115.346	2	1.582	4	-.023	15	0	1	0	15	0	15
394			min	-1520.56	3	.372	15	-.555	1	0	3	0	1	-.003	4
395		8	max	1115.775	2	1.525	4	-.023	15	0	1	0	15	0	15
396			min	-1520.239	3	.354	12	-.555	1	0	3	-.001	1	-.004	4
397		9	max	1116.203	2	1.468	4	-.023	15	0	1	0	15	0	15
398			min	-1519.918	3	.332	12	-.555	1	0	3	-.001	1	-.004	4
399		10	max	1116.632	2	1.411	4	-.023	15	0	1	0	15	-.001	15
400			min	-1519.596	3	.31	12	-.555	1	0	3	-.001	1	-.004	4
401		11	max	1117.06	2	1.354	4	-.023	15	0	1	0	15	-.001	15
402			min	-1519.275	3	.288	12	-.555	1	0	3	-.002	1	-.005	4
403		12	max	1117.489	2	1.298	4	-.023	15	0	1	0	15	-.001	15
404			min	-1518.954	3	.265	12	-.555	1	0	3	-.002	1	-.005	4
405		13	max	1117.917	2	1.251	2	-.023	15	0	1	0	15	-.001	15
406			min	-1518.632	3	.243	12	-.555	1	0	3	-.002	1	-.006	4
407		14	max	1118.346	2	1.206	2	-.023	15	0	1	0	15	-.001	12
408			min	-1518.311	3	.221	12	-.555	1	0	3	-.002	1	-.006	4
409		15	max	1118.774	2	1.162	2	-.023	15	0	1	0	15	-.001	12
410			min	-1517.989	3	.199	12	-.555	1	0	3	-.002	1	-.006	4
411		16	max	1119.203	2	1.118	2	-.023	15	0	1	0	15	-.001	12
412			min	-1517.668	3	.177	12	-.555	1	0	3	-.002	1	-.007	4
413		17	max	1119.631	2	1.074	2	-.023	15	0	1	0	15	-.002	12
414			min	-1517.347	3	.155	12	-.555	1	0	3	-.003	1	-.007	4
415		18	max	1120.06	2	1.029	2	-.023	15	0	1	0	15	-.002	12
416			min	-1517.025	3	.133	12	-.555	1	0	3	-.003	1	-.007	4
417		19	max	1120.488	2	.985	2	-.023	15	0	1	0	15	-.002	12
418			min	-1516.704	3	.111	12	-.555	1	0	3	-.003	1	-.007	4
419	M11	1	max	690.003	2	7.883	4	-.006	15	0	1	0	15	.007	4
420			min	-827.835	3	1.853	15	-.138	1	0	3	0	1	.002	12
421		2	max	689.833	2	7.116	4	-.006	15	0	1	0	15	.005	2
422			min	-827.963	3	1.673	15	-.138	1	0	3	0	1	0	12
423		3	max	689.662	2	6.348	4	-.006	15	0	1	0	15	.002	2
424			min	-828.091	3	1.493	15	-.138	1	0	3	0	1	0	3
425		4	max	689.492	2	5.581	4	-.006	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-828.219	3	1.312	15	-.138	1	0	3	0	1	-.002	3
427		5	max	689.321	2	4.814	4	-.006	15	0	1	0	15	0	15
428			min	-828.347	3	1.132	15	-.138	1	0	3	0	1	-.003	3
429		6	max	689.151	2	4.047	4	-.006	15	0	1	0	15	-.001	15
430			min	-828.474	3	.952	15	-.138	1	0	3	0	1	-.005	4
431		7	max	688.981	2	3.28	4	-.006	15	0	1	0	15	-.002	15
432			min	-828.602	3	.771	15	-.138	1	0	3	0	1	-.007	4
433		8	max	688.81	2	2.512	4	-.006	15	0	1	0	15	-.002	15
434			min	-828.73	3	.591	15	-.138	1	0	3	0	1	-.008	4
435		9	max	688.64	2	1.745	4	-.006	15	0	1	0	15	-.002	15
436			min	-828.858	3	.411	15	-.138	1	0	3	0	1	-.009	4
437		10	max	688.47	2	.978	4	-.006	15	0	1	0	15	-.002	15
438			min	-828.985	3	.215	12	-.138	1	0	3	0	1	-.009	4
439		11	max	688.299	2	.361	2	-.006	15	0	1	0	15	-.002	15
440			min	-829.113	3	-.143	3	-.138	1	0	3	0	1	-.01	4
441		12	max	688.129	2	-.13	15	-.006	15	0	1	0	15	-.002	15
442			min	-829.241	3	-.592	3	-.138	1	0	3	0	1	-.01	4
443		13	max	687.959	2	-.311	15	-.006	15	0	1	0	15	-.002	15
444			min	-829.369	3	-1.324	4	-.138	1	0	3	-.001	1	-.009	4
445		14	max	687.788	2	-.491	15	-.006	15	0	1	0	15	-.002	15
446			min	-829.496	3	-2.091	4	-.138	1	0	3	-.001	1	-.008	4
447		15	max	687.618	2	-.671	15	-.006	15	0	1	0	15	-.002	15
448			min	-829.624	3	-2.858	4	-.138	1	0	3	-.001	1	-.007	4
449		16	max	687.448	2	-.852	15	-.006	15	0	1	0	15	-.001	15
450			min	-829.752	3	-3.625	4	-.138	1	0	3	-.001	1	-.006	4
451		17	max	687.277	2	-1.032	15	-.006	15	0	1	0	15	-.001	15
452			min	-829.88	3	-4.393	4	-.138	1	0	3	-.001	1	-.004	4
453		18	max	687.107	2	-1.212	15	-.006	15	0	1	0	15	0	15
454			min	-830.007	3	-5.16	4	-.138	1	0	3	-.001	1	-.002	4
455		19	max	686.937	2	-1.393	15	-.006	15	0	1	0	15	0	1
456			min	-830.135	3	-5.927	4	-.138	1	0	3	-.001	1	0	1
457	M12	1	max	1102.578	1	0	1	8.842	1	0	1	0	15	0	1
458			min	-170.707	3	0	1	.367	15	0	1	0	1	0	1
459		2	max	1102.748	1	0	1	8.842	1	0	1	0	1	0	1
460			min	-170.579	3	0	1	.367	15	0	1	0	3	0	1
461		3	max	1102.918	1	0	1	8.842	1	0	1	.001	1	0	1
462			min	-170.452	3	0	1	.367	15	0	1	0	15	0	1
463		4	max	1103.089	1	0	1	8.842	1	0	1	.002	1	0	1
464			min	-170.324	3	0	1	.367	15	0	1	0	15	0	1
465		5	max	1103.259	1	0	1	8.842	1	0	1	.003	1	0	1
466			min	-170.196	3	0	1	.367	15	0	1	0	15	0	1
467		6	max	1103.429	1	0	1	8.842	1	0	1	.004	1	0	1
468			min	-170.068	3	0	1	.367	15	0	1	0	15	0	1
469		7	max	1103.6	1	0	1	8.842	1	0	1	.005	1	0	1
470			min	-169.941	3	0	1	.367	15	0	1	0	15	0	1
471		8	max	1103.77	1	0	1	8.842	1	0	1	.006	1	0	1
472			min	-169.813	3	0	1	.367	15	0	1	0	15	0	1
473		9	max	1103.94	1	0	1	8.842	1	0	1	.007	1	0	1
474			min	-169.685	3	0	1	.367	15	0	1	0	15	0	1
475		10	max	1104.111	1	0	1	8.842	1	0	1	.008	1	0	1
476			min	-169.557	3	0	1	.367	15	0	1	0	15	0	1
477		11	max	1104.281	1	0	1	8.842	1	0	1	.009	1	0	1
478			min	-169.43	3	0	1	.367	15	0	1	0	15	0	1
479		12	max	1104.451	1	0	1	8.842	1	0	1	.01	1	0	1
480			min	-169.302	3	0	1	.367	15	0	1	0	15	0	1
481		13	max	1104.622	1	0	1	8.842	1	0	1	.011	1	0	1
482			min	-169.174	3	0	1	.367	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1104.792	1	0	1	8.842	1	0	1	.012	1	0	1
484			min	-169.046	3	0	1	.367	15	0	1	0	15	0	1
485		15	max	1104.962	1	0	1	8.842	1	0	1	.013	1	0	1
486			min	-168.919	3	0	1	.367	15	0	1	0	15	0	1
487		16	max	1105.133	1	0	1	8.842	1	0	1	.014	1	0	1
488			min	-168.791	3	0	1	.367	15	0	1	0	15	0	1
489		17	max	1105.303	1	0	1	8.842	1	0	1	.015	1	0	1
490			min	-168.663	3	0	1	.367	15	0	1	0	15	0	1
491		18	max	1105.473	1	0	1	8.842	1	0	1	.016	1	0	1
492			min	-168.535	3	0	1	.367	15	0	1	0	15	0	1
493		19	max	1105.644	1	0	1	8.842	1	0	1	.017	1	0	1
494			min	-168.407	3	0	1	.367	15	0	1	0	15	0	1
495	M1	1	max	157.857	1	835.562	3	-3.58	15	0	2	.205	1	0	15
496			min	6.518	15	-474.382	2	-85.802	1	0	3	.009	15	-.015	2
497		2	max	158.462	1	834.588	3	-3.58	15	0	2	.159	1	.235	2
498			min	6.7	15	-475.68	2	-85.802	1	0	3	.007	15	-.441	3
499		3	max	511.091	3	571.063	2	-3.557	15	0	3	.114	1	.474	2
500			min	-298.321	2	-608.562	3	-85.414	1	0	2	.005	15	-.864	3
501		4	max	511.545	3	569.765	2	-3.557	15	0	3	.069	1	.176	1
502			min	-297.716	2	-609.536	3	-85.414	1	0	2	.003	15	-.542	3
503		5	max	511.999	3	568.467	2	-3.557	15	0	3	.024	1	-.003	15
504			min	-297.11	2	-610.509	3	-85.414	1	0	2	0	15	-.221	3
505		6	max	512.453	3	567.169	2	-3.557	15	0	3	0	15	.102	3
506			min	-296.505	2	-611.483	3	-85.414	1	0	2	-.021	1	-.427	2
507		7	max	512.907	3	565.871	2	-3.557	15	0	3	-.003	15	.425	3
508			min	-295.9	2	-612.457	3	-85.414	1	0	2	-.066	1	-.726	2
509		8	max	513.362	3	564.572	2	-3.557	15	0	3	-.005	15	.748	3
510			min	-295.294	2	-613.43	3	-85.414	1	0	2	-.111	1	-1.024	2
511		9	max	525.63	3	51.192	2	-5.331	15	0	9	.067	1	.874	3
512			min	-229.445	2	.395	15	-128.024	1	0	3	.003	15	-1.172	2
513		10	max	526.084	3	49.894	2	-5.331	15	0	9	0	15	.851	3
514			min	-228.839	2	.004	15	-128.024	1	0	3	0	1	-1.199	2
515		11	max	526.538	3	48.596	2	-5.331	15	0	9	-.003	15	.829	3
516			min	-228.234	2	-1.597	4	-128.024	1	0	3	-.068	1	-1.225	2
517		12	max	538.672	3	394.756	3	-3.472	15	0	2	.11	1	.723	3
518			min	-162.334	2	-670.834	2	-83.576	1	0	3	.005	15	-1.086	2
519		13	max	539.126	3	393.782	3	-3.472	15	0	2	.066	1	.515	3
520			min	-161.728	2	-672.132	2	-83.576	1	0	3	.003	15	-.731	2
521		14	max	539.58	3	392.809	3	-3.472	15	0	2	.022	1	.307	3
522			min	-161.123	2	-673.43	2	-83.576	1	0	3	0	15	-.376	2
523		15	max	540.035	3	391.835	3	-3.472	15	0	2	0	15	.1	3
524			min	-160.517	2	-674.728	2	-83.576	1	0	3	-.022	1	-.041	1
525		16	max	540.489	3	390.861	3	-3.472	15	0	2	-.003	15	.336	2
526			min	-159.912	2	-676.026	2	-83.576	1	0	3	-.066	1	-.106	3
527		17	max	540.943	3	389.888	3	-3.472	15	0	2	-.005	15	.693	2
528			min	-159.307	2	-677.325	2	-83.576	1	0	3	-.111	1	-.312	3
529		18	max	-6.707	15	682.662	2	-3.833	15	0	3	-.007	15	.349	2
530			min	-158.746	1	-316.431	3	-92.042	1	0	2	-.158	1	-.154	3
531		19	max	-6.525	15	681.364	2	-3.833	15	0	3	-.009	15	.013	3
532			min	-158.141	1	-317.405	3	-92.042	1	0	2	-.206	1	-.011	2
533	M5	1	max	345.225	1	2780.999	3	0	1	0	1	0	1	.031	2
534			min	11.996	12	-1619.685	2	0	1	0	1	0	1	0	15
535		2	max	345.83	1	2780.025	3	0	1	0	1	0	1	.886	2
536			min	12.299	12	-1620.984	2	0	1	0	1	0	1	-1.466	3
537		3	max	1631.143	3	1692.472	2	0	1	0	1	0	1	1.702	2
538			min	-1015.041	2	-1919.06	3	0	1	0	1	0	1	-2.877	3
539		4	max	1631.597	3	1691.174	2	0	1	0	1	0	1	.809	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1014.436	2	-1920.033	3	0	1	0	1	0	1	-1.864	3
541		5	max	1632.052	3	1689.876	2	0	1	0	1	0	1	.013	9
542			min	-1013.83	2	-1921.007	3	0	1	0	1	0	1	-.85	3
543		6	max	1632.506	3	1688.577	2	0	1	0	1	0	1	.164	3
544			min	-1013.225	2	-1921.981	3	0	1	0	1	0	1	-.974	2
545		7	max	1632.96	3	1687.279	2	0	1	0	1	0	1	1.178	3
546			min	-1012.62	2	-1922.954	3	0	1	0	1	0	1	-1.865	2
547		8	max	1633.414	3	1685.981	2	0	1	0	1	0	1	2.193	3
548			min	-1012.014	2	-1923.928	3	0	1	0	1	0	1	-2.755	2
549		9	max	1651.004	3	171.748	2	0	1	0	1	0	1	2.526	3
550			min	-873.409	2	.391	15	0	1	0	1	0	1	-3.139	2
551		10	max	1651.458	3	170.45	2	0	1	0	1	0	1	2.442	3
552			min	-872.804	2	0	15	0	1	0	1	0	1	-3.229	2
553		11	max	1651.912	3	169.151	2	0	1	0	1	0	1	2.359	3
554			min	-872.199	2	-1.499	4	0	1	0	1	0	1	-3.319	2
555		12	max	1669.769	3	1223.594	3	0	1	0	1	0	1	2.07	3
556			min	-733.696	2	-2033.574	2	0	1	0	1	0	1	-2.971	2
557		13	max	1670.223	3	1222.62	3	0	1	0	1	0	1	1.424	3
558			min	-733.091	2	-2034.872	2	0	1	0	1	0	1	-1.898	2
559		14	max	1670.677	3	1221.647	3	0	1	0	1	0	1	.779	3
560			min	-732.486	2	-2036.17	2	0	1	0	1	0	1	-.824	2
561		15	max	1671.131	3	1220.673	3	0	1	0	1	0	1	.251	2
562			min	-731.88	2	-2037.469	2	0	1	0	1	0	1	-.003	13
563		16	max	1671.585	3	1219.699	3	0	1	0	1	0	1	1.327	2
564			min	-731.275	2	-2038.767	2	0	1	0	1	0	1	-.509	3
565		17	max	1672.039	3	1218.726	3	0	1	0	1	0	1	2.403	2
566			min	-730.67	2	-2040.065	2	0	1	0	1	0	1	-1.152	3
567		18	max	-12.865	12	2305.286	2	0	1	0	1	0	1	1.238	2
568			min	-345.263	1	-1093.193	3	0	1	0	1	0	1	-.603	3
569		19	max	-12.562	12	2303.987	2	0	1	0	1	0	1	.022	2
570			min	-344.657	1	-1094.166	3	0	1	0	1	0	1	-.026	3
571	M9	1	max	157.857	1	835.562	3	85.802	1	0	3	-.009	15	0	15
572			min	6.518	15	-474.382	2	3.58	15	0	2	-.205	1	-.015	2
573		2	max	158.462	1	834.588	3	85.802	1	0	3	-.007	15	.235	2
574			min	6.7	15	-475.68	2	3.58	15	0	2	-.159	1	-.441	3
575		3	max	511.091	3	571.063	2	85.414	1	0	2	-.005	15	.474	2
576			min	-298.321	2	-608.562	3	3.557	15	0	3	-.114	1	-.864	3
577		4	max	511.545	3	569.765	2	85.414	1	0	2	-.003	15	.176	1
578			min	-297.716	2	-609.536	3	3.557	15	0	3	-.069	1	-.542	3
579		5	max	511.999	3	568.467	2	85.414	1	0	2	0	15	-.003	15
580			min	-297.11	2	-610.509	3	3.557	15	0	3	-.024	1	-.221	3
581		6	max	512.453	3	567.169	2	85.414	1	0	2	.021	1	.102	3
582			min	-296.505	2	-611.483	3	3.557	15	0	3	0	15	-.427	2
583		7	max	512.907	3	565.871	2	85.414	1	0	2	.066	1	.425	3
584			min	-295.9	2	-612.457	3	3.557	15	0	3	.003	15	-.726	2
585		8	max	513.362	3	564.572	2	85.414	1	0	2	.111	1	.748	3
586			min	-295.294	2	-613.43	3	3.557	15	0	3	.005	15	-1.024	2
587		9	max	525.63	3	51.192	2	128.024	1	0	3	-.003	15	.874	3
588			min	-229.445	2	.395	15	5.331	15	0	9	-.067	1	-1.172	2
589		10	max	526.084	3	49.894	2	128.024	1	0	3	0	1	.851	3
590			min	-228.839	2	.004	15	5.331	15	0	9	0	15	-1.199	2
591		11	max	526.538	3	48.596	2	128.024	1	0	3	.068	1	.829	3
592			min	-228.234	2	-1.597	4	5.331	15	0	9	.003	15	-1.225	2
593		12	max	538.672	3	394.756	3	83.576	1	0	3	-.005	15	.723	3
594			min	-162.334	2	-670.834	2	3.472	15	0	2	-.11	1	-1.086	2
595		13	max	539.126	3	393.782	3	83.576	1	0	3	-.003	15	.515	3
596			min	-161.728	2	-672.132	2	3.472	15	0	2	-.066	1	-.731	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	539.58	3	392.809	3	83.576	1	0	3	0	15	.307	3
598			min	-161.123	2	-673.43	2	3.472	15	0	2	-.022	1	-.376	2
599		15	max	540.035	3	391.835	3	83.576	1	0	3	.022	1	.1	3
600			min	-160.517	2	-674.728	2	3.472	15	0	2	0	15	-.041	1
601		16	max	540.489	3	390.861	3	83.576	1	0	3	.066	1	.336	2
602			min	-159.912	2	-676.026	2	3.472	15	0	2	.003	15	-.106	3
603		17	max	540.943	3	389.888	3	83.576	1	0	3	.111	1	.693	2
604			min	-159.307	2	-677.325	2	3.472	15	0	2	.005	15	-.312	3
605		18	max	-6.707	15	682.662	2	92.042	1	0	2	.158	1	.349	2
606			min	-158.746	1	-316.431	3	3.833	15	0	3	.007	15	-.154	3
607		19	max	-6.525	15	681.364	2	92.042	1	0	2	.206	1	.013	3
608			min	-158.141	1	-317.405	3	3.833	15	0	3	.009	15	-.011	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.123	2	.009	3	1.017e-2	2	NC	1	NC	1
2			min	0	15	-.022	3	-.005	2	-1.964e-3	3	NC	1	NC	1
3		2	max	0	1	.268	3	.027	1	1.153e-2	2	NC	5	NC	2
4			min	0	15	-.03	1	-.001	10	-1.933e-3	3	745.562	3	8114.981	1
5		3	max	0	1	.503	3	.064	1	1.289e-2	2	NC	5	NC	3
6			min	0	15	-.136	1	.002	10	-1.901e-3	3	411.765	3	3368.818	1
7		4	max	0	1	.646	3	.096	1	1.425e-2	2	NC	5	NC	3
8			min	0	15	-.194	1	.004	15	-1.87e-3	3	323.496	3	2247.356	1
9		5	max	0	1	.68	3	.112	1	1.561e-2	2	NC	5	NC	3
10			min	0	15	-.194	1	.005	15	-1.838e-3	3	307.746	3	1927.338	1
11		6	max	0	1	.608	3	.108	1	1.697e-2	2	NC	5	NC	3
12			min	0	15	-.138	1	.004	10	-1.807e-3	3	343.142	3	2012.745	1
13		7	max	0	1	.451	3	.083	1	1.832e-2	2	NC	5	NC	3
14			min	0	15	-.04	1	0	10	-1.775e-3	3	457.118	3	2601.668	1
15		8	max	0	1	.251	3	.047	1	1.968e-2	2	NC	2	NC	2
16			min	0	15	.002	15	-.005	10	-1.744e-3	3	792.171	3	4672.659	1
17		9	max	0	1	.221	2	.028	3	2.104e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.012	2	-1.713e-3	3	2212.193	2	NC	1
19		10	max	0	1	.271	2	.028	3	2.24e-2	2	NC	3	NC	1
20			min	0	1	-.013	3	-.019	2	-1.681e-3	3	1460.41	2	NC	1
21		11	max	0	15	.221	2	.028	3	2.104e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.012	2	-1.713e-3	3	2212.193	2	NC	1
23		12	max	0	15	.251	3	.047	1	1.968e-2	2	NC	2	NC	2
24			min	0	1	.002	15	-.005	10	-1.744e-3	3	792.171	3	4672.659	1
25		13	max	0	15	.451	3	.083	1	1.832e-2	2	NC	5	NC	3
26			min	0	1	-.04	1	0	10	-1.775e-3	3	457.118	3	2601.668	1
27		14	max	0	15	.608	3	.108	1	1.697e-2	2	NC	5	NC	3
28			min	0	1	-.138	1	.004	10	-1.807e-3	3	343.142	3	2012.745	1
29		15	max	0	15	.68	3	.112	1	1.561e-2	2	NC	5	NC	3
30			min	0	1	-.194	1	.005	15	-1.838e-3	3	307.746	3	1927.338	1
31		16	max	0	15	.646	3	.096	1	1.425e-2	2	NC	5	NC	3
32			min	0	1	-.194	1	.004	15	-1.87e-3	3	323.496	3	2247.356	1
33		17	max	0	15	.503	3	.064	1	1.289e-2	2	NC	5	NC	3
34			min	0	1	-.136	1	.002	10	-1.901e-3	3	411.765	3	3368.818	1
35		18	max	0	15	.268	3	.027	1	1.153e-2	2	NC	5	NC	2
36			min	0	1	-.03	1	-.001	10	-1.933e-3	3	745.562	3	8114.981	1
37		19	max	0	15	.123	2	.009	3	1.017e-2	2	NC	1	NC	1
38			min	0	1	-.022	3	-.005	2	-1.964e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.262	3	.008	3	5.933e-3	2	NC	1	NC	1
40			min	0	15	-.392	2	-.005	2	-4.65e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.557	3	.018	1	7.048e-3	2	NC	5	NC	1
42			min	0	15	-.664	2	-.002	10	-5.614e-3	3	730.251	3	NC	1
43		3	max	0	1	.81	3	.051	1	8.163e-3	2	NC	5	NC	2
44			min	0	15	-.902	2	.001	10	-6.578e-3	3	393.99	3	4273.333	1
45		4	max	0	1	.989	3	.082	1	9.277e-3	2	NC	15	NC	3
46			min	0	15	-1.081	2	.004	15	-7.542e-3	3	296.869	3	2658.268	1
47		5	max	0	1	1.08	3	.099	1	1.039e-2	2	NC	15	NC	3
48			min	0	15	-1.189	2	.004	15	-8.505e-3	3	263.758	3	2193.741	1
49		6	max	0	1	1.084	3	.097	1	1.151e-2	2	NC	15	NC	3
50			min	0	15	-1.226	2	.003	10	-9.469e-3	3	259.092	2	2235.186	1
51		7	max	0	1	1.013	3	.077	1	1.262e-2	2	NC	15	NC	3
52			min	0	15	-1.201	2	0	10	-1.043e-2	3	267.156	2	2838.153	1
53		8	max	0	1	.899	3	.044	1	1.374e-2	2	NC	15	NC	2
54			min	0	15	-1.135	2	-.005	10	-1.14e-2	3	290.694	2	5017.146	1
55		9	max	0	1	.786	3	.025	3	1.485e-2	2	NC	5	NC	1
56			min	0	15	-1.063	2	-.011	2	-1.236e-2	3	322.335	2	NC	1
57		10	max	0	1	.732	3	.025	3	1.597e-2	2	NC	5	NC	1
58			min	0	1	-1.026	2	-.018	2	-1.332e-2	3	340.762	2	NC	1
59		11	max	0	15	.786	3	.025	3	1.485e-2	2	NC	5	NC	1
60			min	0	1	-1.063	2	-.011	2	-1.236e-2	3	322.335	2	NC	1
61		12	max	0	15	.899	3	.044	1	1.374e-2	2	NC	15	NC	2
62			min	0	1	-1.135	2	-.005	10	-1.14e-2	3	290.694	2	5017.146	1
63		13	max	0	15	1.013	3	.077	1	1.262e-2	2	NC	15	NC	3
64			min	0	1	-1.201	2	0	10	-1.043e-2	3	267.156	2	2838.153	1
65		14	max	0	15	1.084	3	.097	1	1.151e-2	2	NC	15	NC	3
66			min	0	1	-1.226	2	.003	10	-9.469e-3	3	259.092	2	2235.186	1
67		15	max	0	15	1.08	3	.099	1	1.039e-2	2	NC	15	NC	3
68			min	0	1	-1.189	2	.004	15	-8.505e-3	3	263.758	3	2193.741	1
69		16	max	0	15	.989	3	.082	1	9.277e-3	2	NC	15	NC	3
70			min	0	1	-1.081	2	.004	15	-7.542e-3	3	296.869	3	2658.268	1
71		17	max	0	15	.81	3	.051	1	8.163e-3	2	NC	5	NC	2
72			min	0	1	-.902	2	.001	10	-6.578e-3	3	393.99	3	4273.333	1
73		18	max	0	15	.557	3	.018	1	7.048e-3	2	NC	5	NC	1
74			min	0	1	-.664	2	-.002	10	-5.614e-3	3	730.251	3	NC	1
75		19	max	0	15	.262	3	.008	3	5.933e-3	2	NC	1	NC	1
76			min	0	1	-.392	2	-.005	2	-4.65e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.267	3	.008	3	3.949e-3	3	NC	1	NC	1
78			min	0	1	-.392	2	-.004	2	-6.171e-3	2	NC	1	NC	1
79		2	max	0	15	.459	3	.018	1	4.77e-3	3	NC	5	NC	1
80			min	0	1	-.734	2	-.001	10	-7.335e-3	2	631.262	2	NC	1
81		3	max	0	15	.627	3	.051	1	5.591e-3	3	NC	5	NC	2
82			min	0	1	-1.028	2	.002	10	-8.5e-3	2	339.281	2	4258.661	1
83		4	max	0	15	.756	3	.082	1	6.413e-3	3	NC	15	NC	3
84			min	0	1	-1.242	2	.004	15	-9.664e-3	2	253.966	2	2650.453	1
85		5	max	0	15	.836	3	.099	1	7.234e-3	3	NC	15	NC	3
86			min	0	1	-1.359	2	.004	15	-1.083e-2	2	223.368	2	2187.253	1
87		6	max	0	15	.868	3	.097	1	8.056e-3	3	NC	15	NC	3
88			min	0	1	-1.377	2	.004	10	-1.199e-2	2	219.164	2	2227.52	1
89		7	max	0	15	.857	3	.077	1	8.877e-3	3	NC	15	NC	3
90			min	0	1	-1.313	2	0	10	-1.316e-2	2	234.352	2	2824.708	1
91		8	max	0	15	.817	3	.044	1	9.698e-3	3	NC	15	NC	2
92			min	0	1	-1.199	2	-.004	10	-1.432e-2	2	267.63	2	4973.008	1
93		9	max	0	15	.771	3	.024	3	1.052e-2	3	NC	5	NC	1
94			min	0	1	-1.081	2	-.01	2	-1.549e-2	2	313.231	2	NC	1
95		10	max	0	1	.747	3	.023	3	1.134e-2	3	NC	5	NC	1
96			min	0	1	-1.025	2	-.017	2	-1.665e-2	2	341.135	2	NC	1
97		11	max	0	1	.771	3	.024	3	1.052e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.081	2	-.01	2	-1.549e-2	2	313.231	2	NC	1
99		12	max	0	1	.817	3	.044	1	9.698e-3	3	NC	15	NC	2
100			min	0	15	-1.199	2	-.004	10	-1.432e-2	2	267.63	2	4973.008	1
101		13	max	0	1	.857	3	.077	1	8.877e-3	3	NC	15	NC	3
102			min	0	15	-1.313	2	0	10	-1.316e-2	2	234.352	2	2824.708	1
103		14	max	0	1	.868	3	.097	1	8.056e-3	3	NC	15	NC	3
104			min	0	15	-1.377	2	.004	10	-1.199e-2	2	219.164	2	2227.52	1
105		15	max	0	1	.836	3	.099	1	7.234e-3	3	NC	15	NC	3
106			min	0	15	-1.359	2	.004	15	-1.083e-2	2	223.368	2	2187.253	1
107		16	max	0	1	.756	3	.082	1	6.413e-3	3	NC	15	NC	3
108			min	0	15	-1.242	2	.004	15	-9.664e-3	2	253.966	2	2650.453	1
109		17	max	0	1	.627	3	.051	1	5.591e-3	3	NC	5	NC	2
110			min	0	15	-1.028	2	.002	10	-8.5e-3	2	339.281	2	4258.661	1
111		18	max	0	1	.459	3	.018	1	4.77e-3	3	NC	5	NC	1
112			min	0	15	-.734	2	-.001	10	-7.335e-3	2	631.262	2	NC	1
113		19	max	0	1	.267	3	.008	3	3.949e-3	3	NC	1	NC	1
114			min	0	15	-.392	2	-.004	2	-6.171e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.11	2	.007	3	7.158e-3	3	NC	1	NC	1
116			min	0	1	-.089	3	-.004	2	-8.544e-3	2	NC	1	NC	1
117		2	max	0	15	.002	12	.027	1	8.31e-3	3	NC	5	NC	2
118			min	0	1	-.107	2	0	10	-9.522e-3	2	994.53	2	8156.834	1
119		3	max	0	15	.07	3	.064	1	9.461e-3	3	NC	5	NC	3
120			min	0	1	-.28	2	.003	15	-1.05e-2	2	554.173	2	3373.085	1
121		4	max	0	15	.104	3	.097	1	1.061e-2	3	NC	5	NC	3
122			min	0	1	-.378	2	.004	15	-1.148e-2	2	442.676	2	2244.566	1
123		5	max	0	15	.098	3	.113	1	1.176e-2	3	NC	5	NC	3
124			min	0	1	-.388	2	.005	15	-1.246e-2	2	433.695	2	1920.174	1
125		6	max	0	15	.053	3	.108	1	1.292e-2	3	NC	5	NC	3
126			min	0	1	-.313	2	.005	15	-1.344e-2	2	511.155	2	1998.443	1
127		7	max	0	15	0	15	.084	1	1.407e-2	3	NC	5	NC	3
128			min	0	1	-.17	2	.002	10	-1.442e-2	2	770.987	2	2566.977	1
129		8	max	0	15	.033	1	.048	1	1.522e-2	3	NC	3	NC	2
130			min	0	1	-.11	3	-.003	10	-1.539e-2	2	2045.544	2	4532.14	1
131		9	max	0	15	.16	2	.021	3	1.637e-2	3	NC	4	NC	1
132			min	0	1	-.188	3	-.008	2	-1.637e-2	2	2192.594	3	NC	1
133		10	max	0	1	.23	2	.02	3	1.752e-2	3	NC	4	NC	1
134			min	0	1	-.222	3	-.015	2	-1.735e-2	2	1625.564	3	NC	1
135		11	max	0	1	.16	2	.021	3	1.637e-2	3	NC	4	NC	1
136			min	0	15	-.188	3	-.008	2	-1.637e-2	2	2192.594	3	NC	1
137		12	max	0	1	.033	1	.048	1	1.522e-2	3	NC	3	NC	2
138			min	0	15	-.11	3	-.003	10	-1.539e-2	2	2045.544	2	4532.14	1
139		13	max	0	1	0	15	.084	1	1.407e-2	3	NC	5	NC	3
140			min	0	15	-.17	2	.002	10	-1.442e-2	2	770.987	2	2566.977	1
141		14	max	0	1	.053	3	.108	1	1.292e-2	3	NC	5	NC	3
142			min	0	15	-.313	2	.005	15	-1.344e-2	2	511.155	2	1998.443	1
143		15	max	0	1	.098	3	.113	1	1.176e-2	3	NC	5	NC	3
144			min	0	15	-.388	2	.005	15	-1.246e-2	2	433.695	2	1920.174	1
145		16	max	0	1	.104	3	.097	1	1.061e-2	3	NC	5	NC	3
146			min	0	15	-.378	2	.004	15	-1.148e-2	2	442.676	2	2244.566	1
147		17	max	0	1	.07	3	.064	1	9.461e-3	3	NC	5	NC	3
148			min	0	15	-.28	2	.003	15	-1.05e-2	2	554.173	2	3373.085	1
149		18	max	0	1	.002	12	.027	1	8.31e-3	3	NC	5	NC	2
150			min	0	15	-.107	2	0	10	-9.522e-3	2	994.53	2	8156.834	1
151		19	max	0	1	.11	2	.007	3	7.158e-3	3	NC	1	NC	1
152			min	0	15	-.089	3	-.004	2	-8.544e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.007	1	-7.458e-6	15	NC	1	NC	2
154			min	-.009	3	-.013	3	0	15	-1.79e-4	1	8140.005	2	9409.621	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	2	.007	2	.006	1	-7.e-6	15	NC	1	NC	1
156			min	-.009	3	-.012	3	0	15	-1.68e-4	1	9299.251	2	NC	1
157		3	max	.006	2	.006	2	.006	1	-6.542e-6	15	NC	1	NC	1
158			min	-.008	3	-.012	3	0	15	-1.57e-4	1	NC	1	NC	1
159		4	max	.006	2	.005	2	.005	1	-6.085e-6	15	NC	1	NC	1
160			min	-.008	3	-.011	3	0	15	-1.46e-4	1	NC	1	NC	1
161		5	max	.005	2	.004	2	.004	1	-5.627e-6	15	NC	1	NC	1
162			min	-.007	3	-.011	3	0	15	-1.35e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.004	1	-5.17e-6	15	NC	1	NC	1
164			min	-.007	3	-.01	3	0	15	-1.24e-4	1	NC	1	NC	1
165		7	max	.004	2	.002	2	.003	1	-4.712e-6	15	NC	1	NC	1
166			min	-.006	3	-.009	3	0	15	-1.13e-4	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.003	1	-4.255e-6	15	NC	1	NC	1
168			min	-.006	3	-.009	3	0	15	-1.02e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-3.797e-6	15	NC	1	NC	1
170			min	-.005	3	-.008	3	0	15	-9.102e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-3.34e-6	15	NC	1	NC	1
172			min	-.005	3	-.008	3	0	15	-8.003e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.002	1	-2.882e-6	15	NC	1	NC	1
174			min	-.004	3	-.007	3	0	15	-6.903e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	.001	1	-2.425e-6	15	NC	1	NC	1
176			min	-.004	3	-.006	3	0	15	-5.804e-5	1	NC	1	NC	1
177		13	max	.002	2	0	2	0	1	-1.967e-6	15	NC	1	NC	1
178			min	-.003	3	-.005	3	0	15	-4.704e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-1.51e-6	15	NC	1	NC	1
180			min	-.003	3	-.005	3	0	15	-3.605e-5	1	NC	1	NC	1
181		15	max	.001	2	0	15	0	1	-1.052e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-2.505e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-5.945e-7	15	NC	1	NC	1
184			min	-.002	3	-.003	3	0	15	-1.405e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.172e-7	10	NC	1	NC	1
186			min	-.001	3	-.002	3	0	15	-3.058e-6	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	7.937e-6	1	NC	1	NC	1
188			min	0	3	-.001	3	0	15	1.086e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.893e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	7.781e-7	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.629e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-6.381e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.281e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	5.327e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	3.201e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	15	1.328e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	5.12e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	2.124e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	7.04e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	2.919e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	8.96e-5	1	NC	1	NC	1
202			min	-.002	2	-.009	4	0	15	3.715e-6	15	NC	1	NC	1
203		7	max	.002	3	-.003	15	0	1	1.088e-4	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	4.511e-6	15	8611.263	4	NC	1
205		8	max	.003	3	-.003	15	.001	1	1.28e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	5.306e-6	15	7730.884	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	1.472e-4	1	NC	2	NC	1
208			min	-.003	2	-.013	4	0	15	6.102e-6	15	7210.314	4	NC	1
209		10	max	.004	3	-.003	15	.002	1	1.664e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	6.897e-6	15	6958.855	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	1.856e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.013	4	0	15	7.693e-6	15	6939.46	4	NC	1
213		12	max	.004	3	-.003	15	.002	1	2.048e-4	1	NC	2	NC	1
214			min	-.004	2	-.013	4	0	15	8.489e-6	15	7154.522	4	NC	1
215		13	max	.005	3	-.003	15	.003	1	2.24e-4	1	NC	1	NC	1
216			min	-.004	2	-.012	4	0	15	9.284e-6	15	7648.614	4	NC	1
217		14	max	.005	3	-.003	15	.003	1	2.432e-4	1	NC	1	NC	1
218			min	-.004	2	-.011	4	0	15	1.008e-5	15	8531.601	4	NC	1
219		15	max	.006	3	-.002	15	.004	1	2.624e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	1.088e-5	15	NC	1	NC	1
221		16	max	.006	3	-.002	15	.004	1	2.815e-4	1	NC	1	NC	1
222			min	-.005	2	-.008	4	0	15	1.167e-5	15	NC	1	NC	1
223		17	max	.006	3	-.001	15	.005	1	3.007e-4	1	NC	1	NC	1
224			min	-.005	2	-.006	1	0	15	1.247e-5	15	NC	1	NC	1
225		18	max	.007	3	0	15	.006	1	3.199e-4	1	NC	1	NC	1
226			min	-.006	2	-.004	1	0	15	1.326e-5	15	NC	1	NC	1
227		19	max	.007	3	0	15	.006	1	3.391e-4	1	NC	1	NC	1
228			min	-.006	2	-.002	1	0	15	1.406e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.006	2	0	15	5.214e-5	1	NC	1	NC	3
230			min	0	3	-.007	3	-.006	1	2.175e-6	15	NC	1	3892.914	1
231		2	max	.002	1	.005	2	0	15	5.214e-5	1	NC	1	NC	2
232			min	0	3	-.007	3	-.006	1	2.175e-6	15	NC	1	4232.039	1
233		3	max	.002	1	.005	2	0	15	5.214e-5	1	NC	1	NC	2
234			min	0	3	-.007	3	-.005	1	2.175e-6	15	NC	1	4635.723	1
235		4	max	.002	1	.005	2	0	15	5.214e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.005	1	2.175e-6	15	NC	1	5120.723	1
237		5	max	.002	1	.004	2	0	15	5.214e-5	1	NC	1	NC	2
238			min	0	3	-.006	3	-.004	1	2.175e-6	15	NC	1	5709.812	1
239		6	max	.002	1	.004	2	0	15	5.214e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.004	1	2.175e-6	15	NC	1	6434.576	1
241		7	max	.002	1	.004	2	0	15	5.214e-5	1	NC	1	NC	2
242			min	0	3	-.005	3	-.003	1	2.175e-6	15	NC	1	7339.844	1
243		8	max	.002	1	.003	2	0	15	5.214e-5	1	NC	1	NC	2
244			min	0	3	-.005	3	-.003	1	2.175e-6	15	NC	1	8491.001	1
245		9	max	.001	1	.003	2	0	15	5.214e-5	1	NC	1	NC	2
246			min	0	3	-.004	3	-.002	1	2.175e-6	15	NC	1	9986.474	1
247		10	max	.001	1	.003	2	0	15	5.214e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.002	1	2.175e-6	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	5.214e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.002	1	2.175e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	5.214e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	2.175e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	5.214e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.175e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	5.214e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.175e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	5.214e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	2.175e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	5.214e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.175e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	5.214e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.175e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	5.214e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.175e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.214e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.175e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.028	2	0	1	0	1	NC	4	NC	1
268			min	-.03	3	-.04	3	0	1	0	1	1570.999	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.026	2	0	1	0	1	NC	4	NC	1
270			min	-.028	3	-.038	3	0	1	0	1	1667.157	3	NC	1
271		3	max	.019	2	.023	2	0	1	0	1	NC	4	NC	1
272			min	-.026	3	-.035	3	0	1	0	1	1775.815	3	NC	1
273		4	max	.018	2	.021	2	0	1	0	1	NC	4	NC	1
274			min	-.025	3	-.033	3	0	1	0	1	1899.527	3	NC	1
275		5	max	.017	2	.019	2	0	1	0	1	NC	4	NC	1
276			min	-.023	3	-.031	3	0	1	0	1	2041.575	3	NC	1
277		6	max	.015	2	.017	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.028	3	0	1	0	1	2206.258	3	NC	1
279		7	max	.014	2	.015	2	0	1	0	1	NC	4	NC	1
280			min	-.02	3	-.026	3	0	1	0	1	2399.308	3	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.018	3	-.024	3	0	1	0	1	2628.546	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.022	3	0	1	0	1	2904.929	3	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.019	3	0	1	0	1	3244.289	3	NC	1
287		11	max	.01	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.013	3	-.017	3	0	1	0	1	3670.383	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.015	3	0	1	0	1	4220.556	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.013	3	0	1	0	1	4957.064	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.01	3	0	1	0	1	5991.992	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.008	3	0	1	0	1	7549.537	3	NC	1
297		16	max	.004	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8516.867	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.014	3	0	1	0	1	7614.889	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.015	3	0	1	0	1	7082.417	3	NC	1
321		9	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.01	2	-.015	3	0	1	0	1	6809.29	3	NC	1
323		10	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6746.271	3	NC	1
325		11	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.012	2	-.016	3	0	1	0	1	6881.301	3	NC	1
327		12	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.013	2	-.015	3	0	1	0	1	7233.987	3	NC	1
329		13	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.014	2	-.015	3	0	1	0	1	7759.416	4	NC	1
331		14	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.016	2	-.014	3	0	1	0	1	8650.814	4	NC	1
333		15	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.017	2	-.012	3	0	1	0	1	NC	1	NC	1
335		16	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.018	2	-.011	3	0	1	0	1	NC	1	NC	1
337		17	max	.02	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.019	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.021	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.02	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.023	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.022	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	2	.02	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.023	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	2	.019	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.022	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	2	.018	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.02	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	2	.017	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.019	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	2	.016	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.018	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	2	.015	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.017	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	2	.014	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.015	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	2	.012	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	2	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	2	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.008	2	0	15	1.79e-4	1	NC	1	NC	2
382			min	-.009	3	-.013	3	-.007	1	7.458e-6	15	8140.005	2	9409.621	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	2	.007	2	0	15	1.68e-4	1	NC	1	NC	1
384			min	-.009	3	-.012	3	-.006	1	7.e-6	15	9299.251	2	NC	1
385		3	max	.006	2	.006	2	0	15	1.57e-4	1	NC	1	NC	1
386			min	-.008	3	-.012	3	-.006	1	6.542e-6	15	NC	1	NC	1
387		4	max	.006	2	.005	2	0	15	1.46e-4	1	NC	1	NC	1
388			min	-.008	3	-.011	3	-.005	1	6.085e-6	15	NC	1	NC	1
389		5	max	.005	2	.004	2	0	15	1.35e-4	1	NC	1	NC	1
390			min	-.007	3	-.011	3	-.004	1	5.627e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.24e-4	1	NC	1	NC	1
392			min	-.007	3	-.01	3	-.004	1	5.17e-6	15	NC	1	NC	1
393		7	max	.004	2	.002	2	0	15	1.13e-4	1	NC	1	NC	1
394			min	-.006	3	-.009	3	-.003	1	4.712e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	1.02e-4	1	NC	1	NC	1
396			min	-.006	3	-.009	3	-.003	1	4.255e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	9.102e-5	1	NC	1	NC	1
398			min	-.005	3	-.008	3	-.003	1	3.797e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	8.003e-5	1	NC	1	NC	1
400			min	-.005	3	-.008	3	-.002	1	3.34e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	6.903e-5	1	NC	1	NC	1
402			min	-.004	3	-.007	3	-.002	1	2.882e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	5.804e-5	1	NC	1	NC	1
404			min	-.004	3	-.006	3	-.001	1	2.425e-6	15	NC	1	NC	1
405		13	max	.002	2	0	2	0	15	4.704e-5	1	NC	1	NC	1
406			min	-.003	3	-.005	3	0	1	1.967e-6	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	3.605e-5	1	NC	1	NC	1
408			min	-.003	3	-.005	3	0	1	1.51e-6	15	NC	1	NC	1
409		15	max	.001	2	0	15	0	15	2.505e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	1.052e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.405e-5	1	NC	1	NC	1
412			min	-.002	3	-.003	3	0	1	5.945e-7	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	3.058e-6	1	NC	1	NC	1
414			min	-.001	3	-.002	3	0	1	1.172e-7	10	NC	1	NC	1
415		18	max	0	2	0	15	0	15	-1.086e-7	12	NC	1	NC	1
416			min	0	3	-.001	3	0	1	-7.937e-6	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-7.781e-7	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.893e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	6.381e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.629e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-5.327e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.281e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.328e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-3.201e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-2.124e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-5.12e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	15	-2.919e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-7.04e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-3.715e-6	15	NC	1	NC	1
430			min	-.002	2	-.009	4	0	1	-8.96e-5	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	0	15	-4.511e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-1.088e-4	1	8611.263	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-5.306e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.28e-4	1	7730.884	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-6.102e-6	15	NC	2	NC	1
436			min	-.003	2	-.013	4	-.001	1	-1.472e-4	1	7210.314	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-6.897e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.002	1	-1.664e-4	1	6958.855	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-7.693e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.013	4	-.002	1	-1.856e-4	1	6939.46	4	NC	1
441		12	max	.004	3	-.003	15	0	15	-8.489e-6	15	NC	2	NC	1
442			min	-.004	2	-.013	4	-.002	1	-2.048e-4	1	7154.522	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-9.284e-6	15	NC	1	NC	1
444			min	-.004	2	-.012	4	-.003	1	-2.24e-4	1	7648.614	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-1.008e-5	15	NC	1	NC	1
446			min	-.004	2	-.011	4	-.003	1	-2.432e-4	1	8531.601	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-1.088e-5	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.004	1	-2.624e-4	1	NC	1	NC	1
449		16	max	.006	3	-.002	15	0	15	-1.167e-5	15	NC	1	NC	1
450			min	-.005	2	-.008	4	-.004	1	-2.815e-4	1	NC	1	NC	1
451		17	max	.006	3	-.001	15	0	15	-1.247e-5	15	NC	1	NC	1
452			min	-.005	2	-.006	1	-.005	1	-3.007e-4	1	NC	1	NC	1
453		18	max	.007	3	0	15	0	15	-1.326e-5	15	NC	1	NC	1
454			min	-.006	2	-.004	1	-.006	1	-3.199e-4	1	NC	1	NC	1
455		19	max	.007	3	0	15	0	15	-1.406e-5	15	NC	1	NC	1
456			min	-.006	2	-.002	1	-.006	1	-3.391e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.006	2	.006	1	-2.175e-6	15	NC	1	NC	3
458			min	0	3	-.007	3	0	15	-5.214e-5	1	NC	1	3892.914	1
459		2	max	.002	1	.005	2	.006	1	-2.175e-6	15	NC	1	NC	2
460			min	0	3	-.007	3	0	15	-5.214e-5	1	NC	1	4232.039	1
461		3	max	.002	1	.005	2	.005	1	-2.175e-6	15	NC	1	NC	2
462			min	0	3	-.007	3	0	15	-5.214e-5	1	NC	1	4635.723	1
463		4	max	.002	1	.005	2	.005	1	-2.175e-6	15	NC	1	NC	2
464			min	0	3	-.006	3	0	15	-5.214e-5	1	NC	1	5120.723	1
465		5	max	.002	1	.004	2	.004	1	-2.175e-6	15	NC	1	NC	2
466			min	0	3	-.006	3	0	15	-5.214e-5	1	NC	1	5709.812	1
467		6	max	.002	1	.004	2	.004	1	-2.175e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-5.214e-5	1	NC	1	6434.576	1
469		7	max	.002	1	.004	2	.003	1	-2.175e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-5.214e-5	1	NC	1	7339.844	1
471		8	max	.002	1	.003	2	.003	1	-2.175e-6	15	NC	1	NC	2
472			min	0	3	-.005	3	0	15	-5.214e-5	1	NC	1	8491.001	1
473		9	max	.001	1	.003	2	.002	1	-2.175e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-5.214e-5	1	NC	1	9986.474	1
475		10	max	.001	1	.003	2	.002	1	-2.175e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-5.214e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.002	1	-2.175e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-5.214e-5	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.001	1	-2.175e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-5.214e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-2.175e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-5.214e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-2.175e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-5.214e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-2.175e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-5.214e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.175e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-5.214e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.175e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-5.214e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.175e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-5.214e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.175e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.214e-5	1	NC	1	NC	1
495	M1	1	max	.009	3	.123	2	0	1	1.236e-2	2	NC	1	NC	1
496			min	-.005	2	-.022	3	0	15	-2.505e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.009	3	.059	2	0	15	6.067e-3	2	NC	4	NC	1
498			min	-.005	2	-.008	3	-.005	1	-1.239e-2	3	1782.838	2	NC	1
499		3	max	.009	3	.014	3	0	15	3.408e-5	10	NC	5	NC	1
500			min	-.005	2	-.011	2	-.007	1	-1.284e-4	3	859.658	2	NC	1
501		4	max	.009	3	.052	3	0	15	4.312e-3	2	NC	5	NC	1
502			min	-.005	2	-.089	2	-.006	1	-4.802e-3	3	543.043	2	NC	1
503		5	max	.009	3	.101	3	0	15	8.606e-3	2	NC	5	NC	1
504			min	-.005	2	-.17	2	-.004	1	-9.475e-3	3	392.151	2	NC	1
505		6	max	.008	3	.154	3	0	15	1.29e-2	2	NC	15	NC	1
506			min	-.005	2	-.249	2	-.002	1	-1.415e-2	3	308.995	2	NC	1
507		7	max	.008	3	.205	3	0	1	1.719e-2	2	NC	15	NC	1
508			min	-.005	2	-.32	2	0	3	-1.882e-2	3	259.893	2	NC	1
509		8	max	.008	3	.248	3	0	1	2.149e-2	2	9752.557	15	NC	1
510			min	-.005	2	-.375	2	0	15	-2.349e-2	3	230.842	2	NC	1
511		9	max	.008	3	.276	3	0	15	2.435e-2	2	9119.992	15	NC	1
512			min	-.004	2	-.411	2	0	1	-2.367e-2	3	215.716	2	NC	1
513		10	max	.008	3	.286	3	0	1	2.625e-2	2	8927.097	15	NC	1
514			min	-.004	2	-.423	2	0	15	-2.085e-2	3	211.277	2	NC	1
515		11	max	.008	3	.279	3	0	1	2.815e-2	2	9119.62	15	NC	1
516			min	-.004	2	-.411	2	0	15	-1.803e-2	3	216.428	2	NC	1
517		12	max	.007	3	.256	3	0	15	2.715e-2	2	9751.765	15	NC	1
518			min	-.004	2	-.374	2	0	1	-1.513e-2	3	233.003	2	NC	1
519		13	max	.007	3	.218	3	0	15	2.177e-2	2	NC	15	NC	1
520			min	-.004	2	-.315	2	0	1	-1.211e-2	3	265.139	2	NC	1
521		14	max	.007	3	.17	3	.002	1	1.639e-2	2	NC	15	NC	1
522			min	-.004	2	-.242	2	0	15	-9.095e-3	3	320.177	2	NC	1
523		15	max	.007	3	.115	3	.004	1	1.102e-2	2	NC	5	NC	1
524			min	-.004	2	-.162	2	0	15	-6.076e-3	3	415.106	2	NC	1
525		16	max	.007	3	.059	3	.006	1	5.638e-3	2	NC	5	NC	1
526			min	-.004	2	-.08	2	0	15	-3.057e-3	3	591.303	2	NC	1
527		17	max	.007	3	.005	3	.006	1	4.556e-4	1	NC	5	NC	1
528			min	-.004	2	-.006	2	0	15	-3.808e-5	3	968.755	2	NC	1
529		18	max	.007	3	.055	2	.004	1	9.383e-3	2	NC	4	NC	1
530			min	-.004	2	-.044	3	0	15	-3.857e-3	3	2060.07	2	NC	1
531		19	max	.007	3	.11	2	0	15	1.884e-2	2	NC	1	NC	1
532			min	-.004	2	-.089	3	0	1	-7.835e-3	3	NC	1	NC	1
533	M5	1	max	.028	3	.271	2	0	1	0	1	NC	1	NC	1
534			min	-.019	2	-.013	3	0	1	0	1	NC	1	NC	1
535		2	max	.028	3	.128	2	0	1	0	1	NC	5	NC	1
536			min	-.019	2	0	3	0	1	0	1	806.883	2	NC	1
537		3	max	.028	3	.043	3	0	1	0	1	NC	5	NC	1
538			min	-.019	2	-.033	2	0	1	0	1	379.561	2	NC	1
539		4	max	.027	3	.139	3	0	1	0	1	NC	15	NC	1
540			min	-.019	2	-.226	2	0	1	0	1	232.266	2	NC	1
541		5	max	.027	3	.273	3	0	1	0	1	7846.72	15	NC	1
542			min	-.019	2	-.435	2	0	1	0	1	163.45	2	NC	1
543		6	max	.026	3	.423	3	0	1	0	1	6036.75	15	NC	1
544			min	-.018	2	-.642	2	0	1	0	1	126.324	2	NC	1
545		7	max	.026	3	.57	3	0	1	0	1	4992.397	15	NC	1
546			min	-.018	2	-.83	2	0	1	0	1	104.783	2	NC	1
547		8	max	.025	3	.694	3	0	1	0	1	4385.557	15	NC	1
548			min	-.018	2	-.981	2	0	1	0	1	92.217	2	NC	1
549		9	max	.025	3	.774	3	0	1	0	1	4074.508	15	NC	1
550			min	-.017	2	-1.076	2	0	1	0	1	85.759	2	NC	1
551		10	max	.024	3	.802	3	0	1	0	1	3980.824	15	NC	1
552			min	-.017	2	-1.108	2	0	1	0	1	83.868	2	NC	1
553		11	max	.024	3	.782	3	0	1	0	1	4074.657	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.017	2	-1.076	2	0	1	0	1	86.057	2	NC	1
555		12	max	.023	3	.715	3	0	1	0	1	4385.904	15	NC	1
556			min	-.017	2	-.977	2	0	1	0	1	93.195	2	NC	1
557		13	max	.022	3	.606	3	0	1	0	1	4993.094	15	NC	1
558			min	-.016	2	-.818	2	0	1	0	1	107.322	2	NC	1
559		14	max	.022	3	.468	3	0	1	0	1	6038.095	15	NC	1
560			min	-.016	2	-.621	2	0	1	0	1	132.054	2	NC	1
561		15	max	.021	3	.315	3	0	1	0	1	7849.356	15	NC	1
562			min	-.016	2	-.408	2	0	1	0	1	175.956	2	NC	1
563		16	max	.021	3	.16	3	0	1	0	1	NC	15	NC	1
564			min	-.016	2	-.2	2	0	1	0	1	260.567	2	NC	1
565		17	max	.02	3	.014	3	0	1	0	1	NC	5	NC	1
566			min	-.015	2	-.019	2	0	1	0	1	449.435	2	NC	1
567		18	max	.02	3	.118	2	0	1	0	1	NC	5	NC	1
568			min	-.015	2	-.11	3	0	1	0	1	996.474	2	NC	1
569		19	max	.02	3	.23	2	0	1	0	1	NC	1	NC	1
570			min	-.015	2	-.222	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.009	3	.123	2	0	15	2.505e-2	3	NC	1	NC	1
572			min	-.005	2	-.022	3	0	1	-1.236e-2	2	NC	1	NC	1
573		2	max	.009	3	.059	2	.005	1	1.239e-2	3	NC	4	NC	1
574			min	-.005	2	-.008	3	0	15	-6.067e-3	2	1782.838	2	NC	1
575		3	max	.009	3	.014	3	.007	1	1.284e-4	3	NC	5	NC	1
576			min	-.005	2	-.011	2	0	15	-3.408e-5	10	859.658	2	NC	1
577		4	max	.009	3	.052	3	.006	1	4.802e-3	3	NC	5	NC	1
578			min	-.005	2	-.089	2	0	15	-4.312e-3	2	543.043	2	NC	1
579		5	max	.009	3	.101	3	.004	1	9.475e-3	3	NC	5	NC	1
580			min	-.005	2	-.17	2	0	15	-8.606e-3	2	392.151	2	NC	1
581		6	max	.008	3	.154	3	.002	1	1.415e-2	3	NC	15	NC	1
582			min	-.005	2	-.249	2	0	15	-1.29e-2	2	308.995	2	NC	1
583		7	max	.008	3	.205	3	0	3	1.882e-2	3	NC	15	NC	1
584			min	-.005	2	-.32	2	0	1	-1.719e-2	2	259.893	2	NC	1
585		8	max	.008	3	.248	3	0	15	2.349e-2	3	9752.557	15	NC	1
586			min	-.005	2	-.375	2	0	1	-2.149e-2	2	230.842	2	NC	1
587		9	max	.008	3	.276	3	0	1	2.367e-2	3	9119.992	15	NC	1
588			min	-.004	2	-.411	2	0	15	-2.435e-2	2	215.716	2	NC	1
589		10	max	.008	3	.286	3	0	15	2.085e-2	3	8927.097	15	NC	1
590			min	-.004	2	-.423	2	0	1	-2.625e-2	2	211.277	2	NC	1
591		11	max	.008	3	.279	3	0	15	1.803e-2	3	9119.62	15	NC	1
592			min	-.004	2	-.411	2	0	1	-2.815e-2	2	216.428	2	NC	1
593		12	max	.007	3	.256	3	0	1	1.513e-2	3	9751.765	15	NC	1
594			min	-.004	2	-.374	2	0	15	-2.715e-2	2	233.003	2	NC	1
595		13	max	.007	3	.218	3	0	1	1.211e-2	3	NC	15	NC	1
596			min	-.004	2	-.315	2	0	15	-2.177e-2	2	265.139	2	NC	1
597		14	max	.007	3	.17	3	0	15	9.095e-3	3	NC	15	NC	1
598			min	-.004	2	-.242	2	-.002	1	-1.639e-2	2	320.177	2	NC	1
599		15	max	.007	3	.115	3	0	15	6.076e-3	3	NC	5	NC	1
600			min	-.004	2	-.162	2	-.004	1	-1.102e-2	2	415.106	2	NC	1
601		16	max	.007	3	.059	3	0	15	3.057e-3	3	NC	5	NC	1
602			min	-.004	2	-.08	2	-.006	1	-5.638e-3	2	591.303	2	NC	1
603		17	max	.007	3	.005	3	0	15	3.808e-5	3	NC	5	NC	1
604			min	-.004	2	-.006	2	-.006	1	-4.556e-4	1	968.755	2	NC	1
605		18	max	.007	3	.055	2	0	15	3.857e-3	3	NC	4	NC	1
606			min	-.004	2	-.044	3	-.004	1	-9.383e-3	2	2060.07	2	NC	1
607		19	max	.007	3	.11	2	0	1	7.835e-3	3	NC	1	NC	1
608			min	-.004	2	-.089	3	0	15	-1.884e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

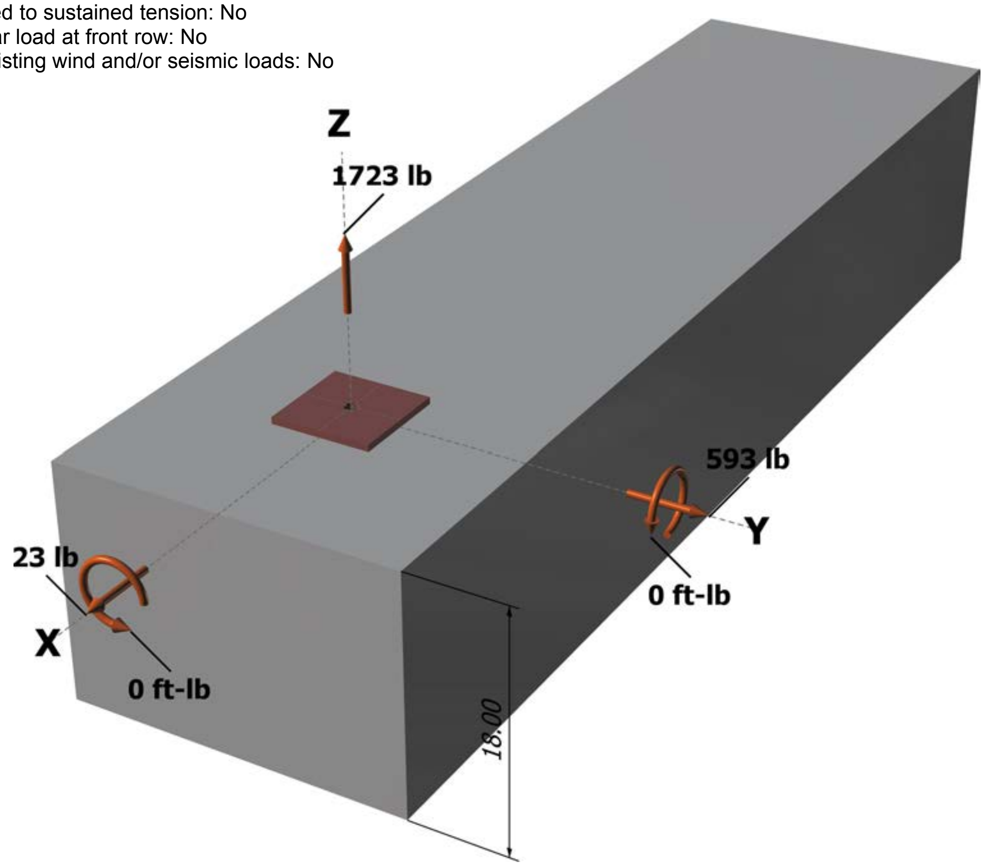
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

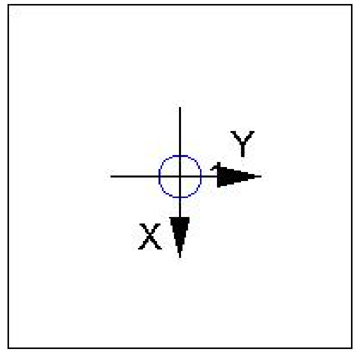
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1723.0	23.0	593.0	593.4
Sum	1723.0	23.0	593.0	593.4

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1723
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

A_{Nc} (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

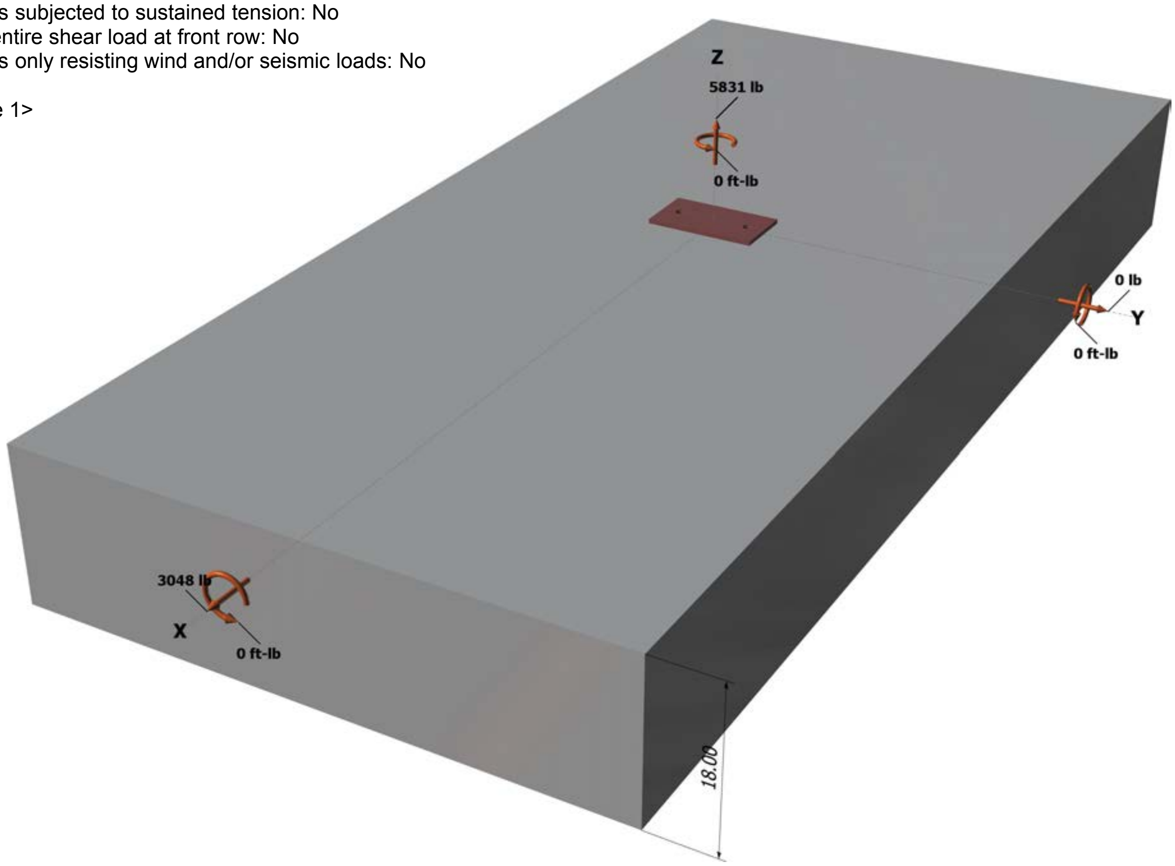
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

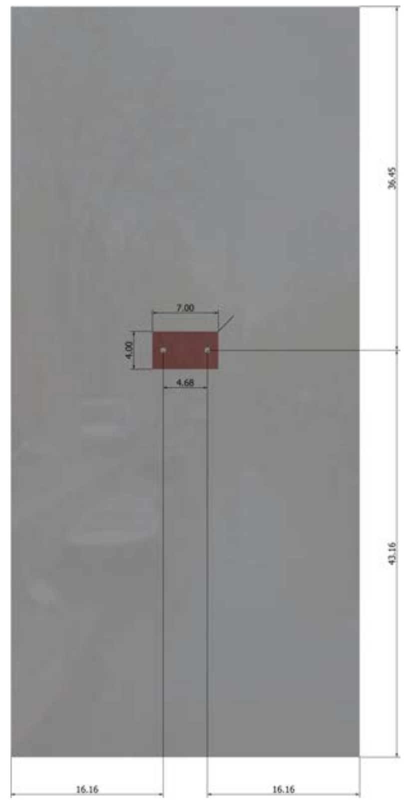
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout 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>



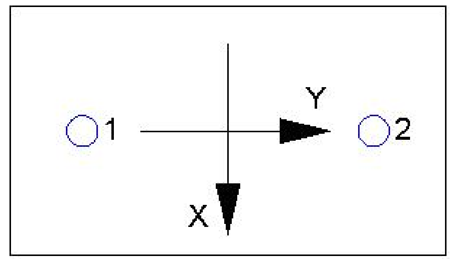
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2915.5	1524.0	0.0	1524.0
2	2915.5	1524.0	0.0	1524.0
Sum	5831.0	3048.0	0.0	3048.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5831
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
666.00	648.00	1.000	0.969	1.000	1.000	15593	0.70	10875

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	16.16	24369

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
872.64	1175.16	1.000	1.000	1.000	24369	0.70	25334

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2916	6071	0.48	Pass
Concrete breakout	5831	10231	0.57	Pass
Adhesive	**5831**	**8093**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1524**	**3156**	**0.48**	**Pass (Governs)**
T Concrete breakout x+	3048	10875	0.28	Pass
|| Concrete breakout y-	1524	25334	0.06	Pass
Pryout	3048	20601	0.15	Pass

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

Sec. D.7.3	0.72	0.48	120.3 %	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.