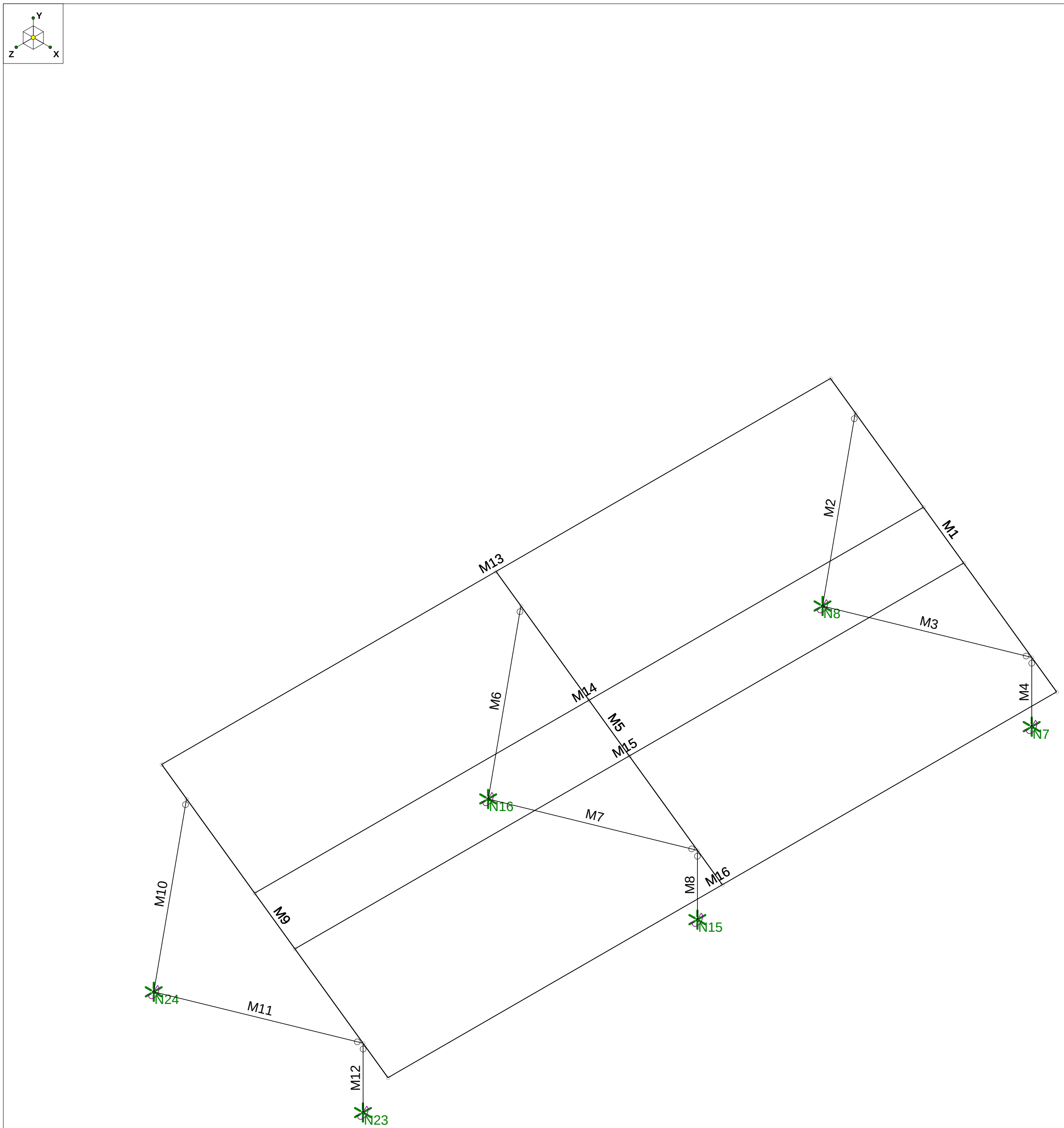


Schletter, Inc.		35ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

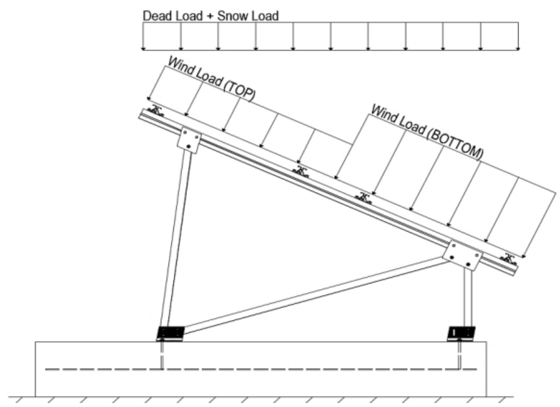
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum			Minimum	
Height =	1700	mm	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 = 35°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - Chapter 26-31, Wind Loads
- ASCE 7-10 - Chapter 7, Snow Loads
- ASCE 7-10 - Chapter 2, Combination of Loads
- International Building Code, IBC, 2012, 2015
- Aluminum Design Manual, Eighth Edition, 2005

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
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 =	14.43	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	0.64		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V = 150 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

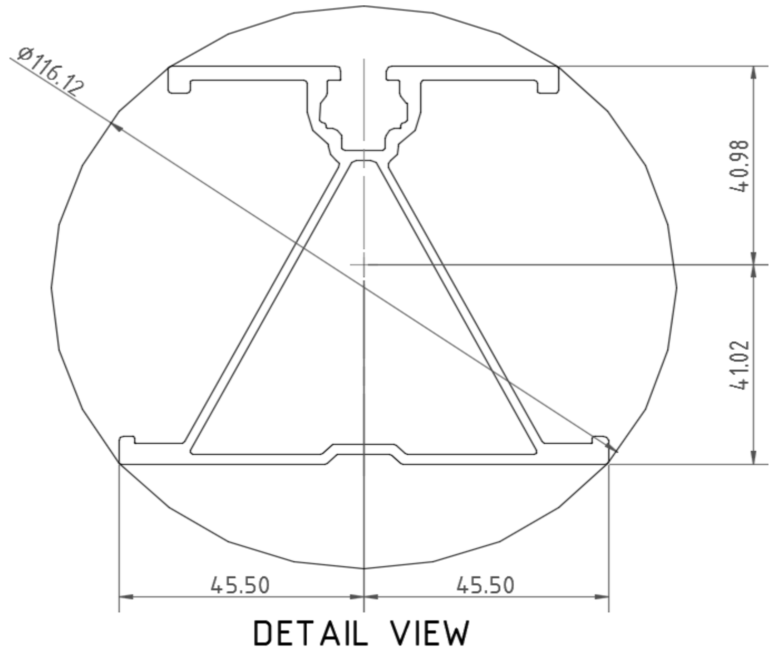
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

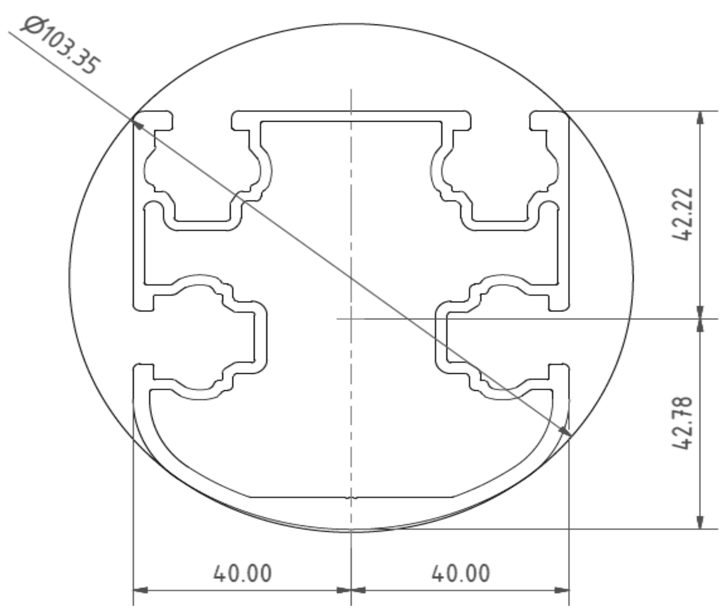
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.698	k-ft
M_z =	0.002	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	61%	



4.2 Girder Design

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

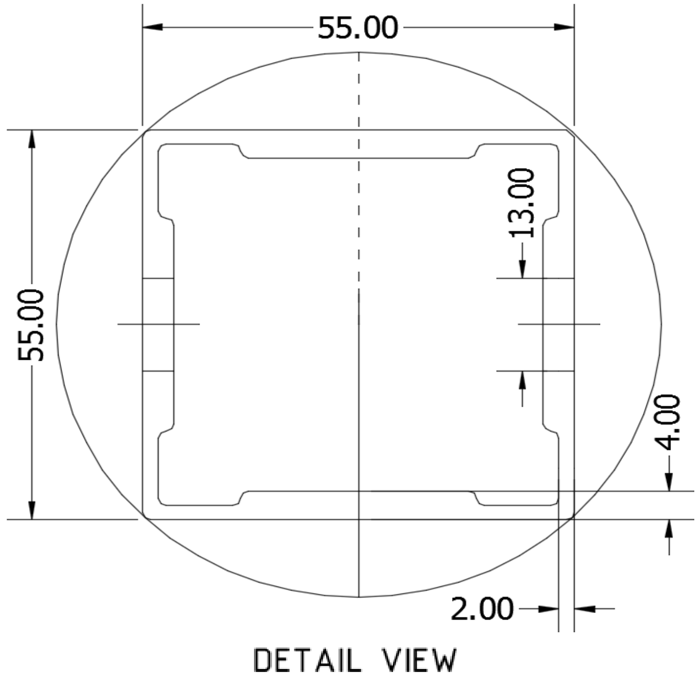
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.692	k-ft
M_z =	0.000	k-ft
P_n =	-0.981	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	79%	



4.3 Front Strut Design

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

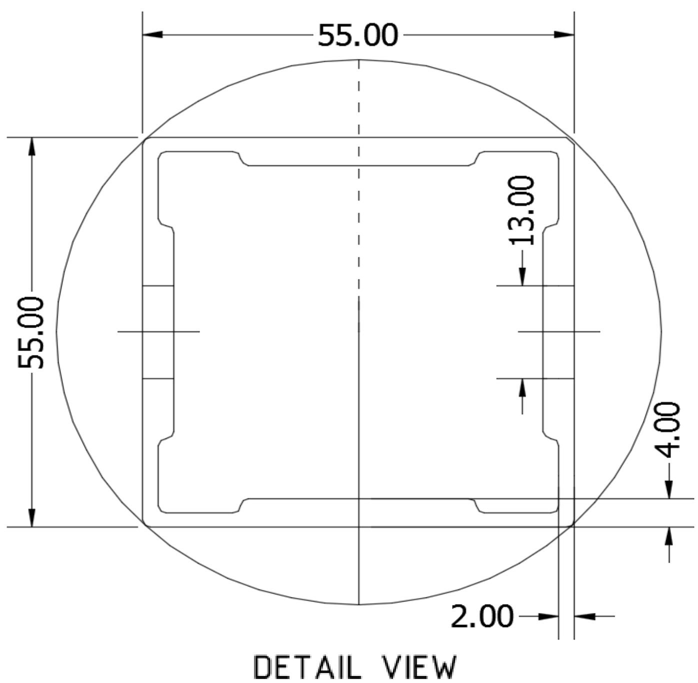
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.871	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	7%	



4.4 Diagonal Strut Design

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

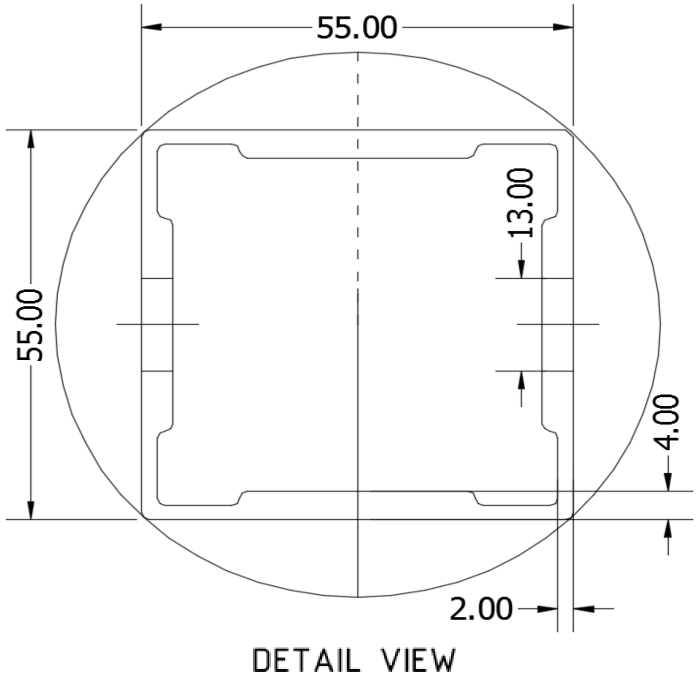
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.852	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	39%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.960	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	34%	



5. FOUNDATION DESIGN CALCULATIONS

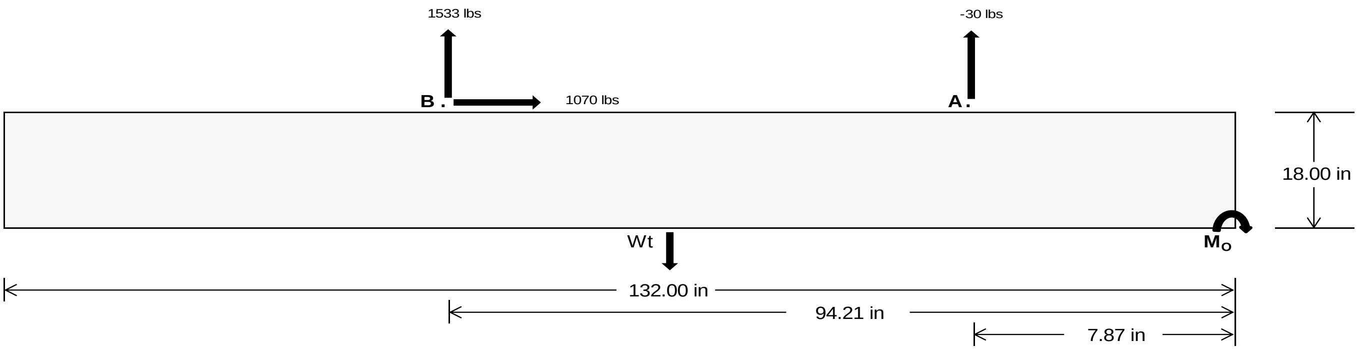
5.1 Helical Pile Foundations

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 =	70.92	6653.07	k
Compressive Load =	2432.07	4820.18	k
Lateral Load =	7.86	4637.67	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O = 163405.0 in-lbs
Resisting Force Required = 2475.83 lbs
S.F. = 1.67
Weight Required = 4126.39 lbs
Minimum Width = 32 in in
Weight Provided = 6380.00 lbs

A minimum 132in long x 32in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 1070.08 lbs
Friction = 0.4
Weight Required = 2675.21 lbs
Resisting Weight = 6380.00 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 32in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 1070.08 lbs
Cohesion = 130 psf
Area = 29.33 ft^2
Resisting = 3190.00 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 32in 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			
	32 in	33 in	34 in	35 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.67 ft) =	6380 lbs	6579 lbs	6779 lbs	6978 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	32 in	33 in	34 in	35 in	32 in	33 in	34 in	35 in	32 in	33 in	34 in	35 in	32 in	33 in	34 in	35 in
F_A	786 lbs	786 lbs	786 lbs	786 lbs	1002 lbs	1002 lbs	1002 lbs	1002 lbs	1242 lbs	1242 lbs	1242 lbs	1242 lbs	61 lbs	61 lbs	61 lbs	61 lbs
F_B	692 lbs	692 lbs	692 lbs	692 lbs	2117 lbs	2117 lbs	2117 lbs	2117 lbs	2020 lbs	2020 lbs	2020 lbs	2020 lbs	-3065 lbs	-3065 lbs	-3065 lbs	-3065 lbs
F_V	112 lbs	112 lbs	112 lbs	112 lbs	1935 lbs	1935 lbs	1935 lbs	1935 lbs	1522 lbs	1522 lbs	1522 lbs	1522 lbs	-2140 lbs	-2140 lbs	-2140 lbs	-2140 lbs
P_{total}	7859 lbs	8058 lbs	8257 lbs	8457 lbs	9499 lbs	9698 lbs	9898 lbs	10097 lbs	9642 lbs	9841 lbs	10041 lbs	10240 lbs	824 lbs	943 lbs	1063 lbs	1182 lbs
M	2347 lbs-ft	2347 lbs-ft	2347 lbs-ft	2347 lbs-ft	2776 lbs-ft	2776 lbs-ft	2776 lbs-ft	2776 lbs-ft	3549 lbs-ft	3549 lbs-ft	3549 lbs-ft	3549 lbs-ft	4289 lbs-ft	4289 lbs-ft	4289 lbs-ft	4289 lbs-ft
e	0.30 ft	0.29 ft	0.28 ft	0.28 ft	0.29 ft	0.29 ft	0.28 ft	0.27 ft	0.37 ft	0.36 ft	0.35 ft	0.35 ft	5.21 ft	4.55 ft	4.04 ft	3.63 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}	224.3 psf	224.1 psf	223.9 psf	223.7 psf	272.2 psf	270.6 psf	269.0 psf	267.5 psf	262.7 psf	261.3 psf	260.0 psf	258.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	311.5 psf	308.7 psf	306.0 psf	303.5 psf	375.4 psf	370.7 psf	366.2 psf	361.9 psf	394.7 psf	389.3 psf	384.3 psf	379.5 psf	705.5 psf	240.1 psf	170.8 psf	144.3 psf

Maximum Bearing Pressure = 706 psf
Allowable Bearing Pressure = 1500 psf

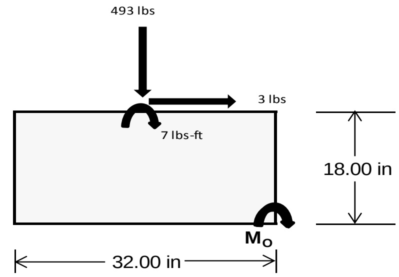
Use a 132in long x 32in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 645.5 ft-lbs
Resisting Force Required = 484.16 lbs
S.F. = 1.67
Weight Required = 806.94 lbs
Minimum Width = 32 in in
Weight Provided = 6380.00 lbs

A minimum 132in long x 32in 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	32 in			32 in			32 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	200 lbs	461 lbs	200 lbs	493 lbs	1269 lbs	493 lbs	59 lbs	135 lbs	59 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	8099 lbs	6380 lbs	8099 lbs	8012 lbs	6380 lbs	8012 lbs	2368 lbs	6380 lbs	2368 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	12 lbs-ft	0 lbs-ft	12 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.44 ft	0.44 ft	0.44 ft	0.44 ft	0.44 ft	0.44 ft	0.44 ft	0.44 ft	0.44 ft
f_{min}	275.8 psf	217.5 psf	275.8 psf	272.2 psf	217.5 psf	272.2 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.4 psf	217.5 psf	276.4 psf	274.1 psf	217.5 psf	274.1 psf	80.8 psf	217.5 psf	80.8 psf

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

Use a 132in long x 32in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 32in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

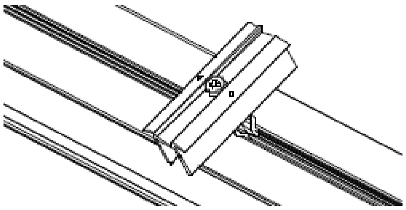
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

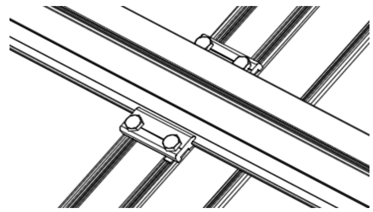
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

Fastening of Modules to Purlins		
Maximum Uplifting Force =	0.901	k
Allowable Uplift =	1.214	k
Utilization =	74%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.345	k
Allowable Uplift =	4.357	k
Utilization =	54%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	1.871	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	25%	

Rear Strut		
Maximum Axial Load =	4.394	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	59%	

Diagonal Strut		
Maximum Axial Load =	2.910	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	39%	

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

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

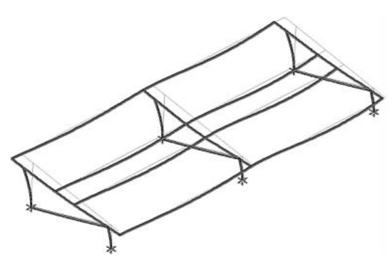
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	53.78	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.076	in
Max Drift, Δ_{MAX} =	0.018	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 = 87 in

J = 0.432

240.683

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

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= 28.3 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 = 87

J = 0.432

153.06

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 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

$\varphi F_L = \varphi b[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi c[Bt-Dt*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 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:			Weak Axis:		
3.4.14			**3.4.14**		
L_b =	24.8	in	L_b =	24.8	
J =	0.942		J =	0.942	
	38.7028			38.7028	

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

S1 =	0.51461		S1 =	0.51461	

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

S2 =	1701.56		S2 =	1701.56	
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]		φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	
φF_L=	31.4	ksi	φF_L=	31.4	

3.4.16			**3.4.16**		
b/t =	24.5		b/t =	24.5	

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

S1 =	12.2		S1 =	12.2	

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18			**3.4.18**		
h/t =	24.5		h/t =	24.5	

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

S1 =	36.9		S1 =	36.9	
m =	0.65		m =	0.65	
C_0 =	27.5		C_0 =	27.5	
Cc =	27.5		Cc =	27.5	

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

S2 =	77.3		S2 =	77.3	
φF_L=	1.3φyFcy		φF_L=	1.3φyFcy	
φF_L=	43.2	ksi	φF_L=	43.2	ksi

φF_LSt=	28.2	ksi	φF_LWk=	28.2	ksi
Ix =	279836	mm^4	Iy =	279836	mm^4
	0.672	in^4		0.672	in^4
y =	27.5	mm	x =	27.5	mm
Sx =	0.621	in^3	Sy =	0.621	in^3
M_{max}St =	1.460	k-ft	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

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

3.4.16

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

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.00335

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

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

$\varphi F_L =$ 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 kips

APPENDIX B

B.1

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

Basic Load Cases

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

Member Distributed Loads (BLC 1 : Dead Load, Max)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

Member Distributed Loads (BLC 2 : Dead Load, Min)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-4.45	-4.45	0	0
2	M14	Y	-4.45	-4.45	0	0
3	M15	Y	-4.45	-4.45	0	0
4	M16	Y	-4.45	-4.45	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	0	0

Member Distributed Loads (BLC 4 : Wind Load - Pressure)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-118.221	-118.221	0	0
2	M14	y	-118.221	-118.221	0	0
3	M15	y	-197.035	-197.035	0	0
4	M16	y	-197.035	-197.035	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	265.997	265.997	0	0
2	M14	y	206.886	206.886	0	0
3	M15	y	118.221	118.221	0	0
4	M16	y	118.221	118.221	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65..	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	994.497	2	1196.031	2	.334	1	.001	1	0	1	0	1
2		min	-1166.084	3	-1624.947	3	.02	15	0	15	0	1	0	1
3	N7	max	.033	3	733.721	1	-.35	15	0	15	0	1	0	1
4		min	-.192	2	35.265	15	-6.049	1	-.011	1	0	1	0	1
5	N15	max	.186	3	1870.826	2	0	2	0	2	0	1	0	1
6		min	-1.836	2	71.228	15	0	1	0	1	0	1	0	1
7	N16	max	3257.103	2	3707.832	2	0	10	0	2	0	1	0	1
8		min	-3567.438	3	-5117.748	3	0	3	0	3	0	1	0	1
9	N23	max	.033	3	733.721	1	6.049	1	.011	1	0	1	0	1
10		min	-.192	2	35.265	15	.35	15	0	15	0	1	0	1
11	N24	max	994.497	2	1196.031	2	-.02	15	0	15	0	1	0	1
12		min	-1166.084	3	-1624.947	3	-.334	1	-.001	1	0	1	0	1
13	Totals:	max	5243.879	2	9280.551	2	0	2						
14		min	-5899.356	3	-8003.028	3	0	1						

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	53.285	1	375.655	2	-7.074	15	0	15	.127	1	0	2
2			min	3.05	15	-714.085	3	-126.575	1	-.013	2	.007	15	0	3
3		2	max	53.285	1	261.727	2	-5.423	15	0	15	.037	1	.49	3
4			min	3.05	15	-503.346	3	-96.729	1	-.013	2	.002	10	-.257	2
5		3	max	53.285	1	147.8	2	-3.772	15	0	15	.004	3	.811	3
6			min	3.05	15	-292.607	3	-66.882	1	-.013	2	-.029	1	-.422	2
7		4	max	53.285	1	33.873	2	-2.121	15	0	15	-.002	12	.962	3
8			min	3.05	15	-81.868	3	-37.036	1	-.013	2	-.071	1	-.495	2
9		5	max	53.285	1	128.872	3	.278	10	0	15	-.005	12	.943	3
10			min	3.05	15	-80.054	2	-7.189	1	-.013	2	-.089	1	-.476	2
11		6	max	53.285	1	339.611	3	22.657	1	0	15	-.005	15	.754	3
12			min	3.05	15	-193.982	2	-1.653	3	-.013	2	-.083	1	-.366	2
13		7	max	53.285	1	550.35	3	52.504	1	0	15	-.003	15	.396	3
14			min	3.05	15	-307.909	2	.775	12	-.013	2	-.052	1	-.164	2
15		8	max	53.285	1	761.09	3	82.35	1	0	15	.005	2	.13	2
16			min	3.05	15	-421.836	2	2.425	12	-.013	2	-.008	3	-.133	3
17		9	max	53.285	1	971.829	3	112.197	1	0	15	.08	1	.516	2
18			min	3.05	15	-535.763	2	4.076	12	-.013	2	-.004	3	-.831	3
19		10	max	53.285	1	1182.568	3	142.043	1	.001	3	.183	1	.993	2
20			min	3.05	15	-649.69	2	5.727	12	-.013	2	.002	3	-1.698	3
21		11	max	53.285	1	535.763	2	-4.076	12	.013	2	.08	1	.516	2
22			min	3.05	15	-971.829	3	-112.197	1	0	15	-.004	3	-.831	3
23		12	max	53.285	1	421.836	2	-2.425	12	.013	2	.005	2	.13	2
24			min	3.05	15	-761.09	3	-82.35	1	0	15	-.008	3	-.133	3
25		13	max	53.285	1	307.909	2	-.775	12	.013	2	-.003	15	.396	3
26			min	3.05	15	-550.35	3	-52.504	1	0	15	-.052	1	-.164	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	53.285	1	193.982	2	1.653	3	.013	2	-.005	15	.754	3
28			min	3.05	15	-339.611	3	-22.657	1	0	15	-.083	1	-.366	2
29		15	max	53.285	1	80.054	2	7.189	1	.013	2	-.005	12	.943	3
30			min	3.05	15	-128.872	3	-.278	10	0	15	-.089	1	-.476	2
31		16	max	53.285	1	81.868	3	37.036	1	.013	2	-.002	12	.962	3
32			min	3.05	15	-33.873	2	2.121	15	0	15	-.071	1	-.495	2
33		17	max	53.285	1	292.607	3	66.882	1	.013	2	.004	3	.811	3
34			min	3.05	15	-147.8	2	3.772	15	0	15	-.029	1	-.422	2
35		18	max	53.285	1	503.346	3	96.729	1	.013	2	.037	1	.49	3
36			min	3.05	15	-261.727	2	5.423	15	0	15	.002	10	-.257	2
37		19	max	53.285	1	714.085	3	126.575	1	.013	2	.127	1	0	2
38			min	3.05	15	-375.655	2	7.074	15	0	15	.007	15	0	3
39	M14	1	max	30.35	1	431.637	2	-7.357	15	.011	3	.151	1	0	2
40			min	1.726	15	-589.765	3	-131.638	1	-.012	2	.009	15	0	3
41		2	max	30.35	1	317.71	2	-5.707	15	.011	3	.057	1	.409	3
42			min	1.726	15	-426.643	3	-101.791	1	-.012	2	.003	15	-.302	2
43		3	max	30.35	1	203.783	2	-4.056	15	.011	3	.006	3	.687	3
44			min	1.726	15	-263.521	3	-71.945	1	-.012	2	-.013	1	-.512	2
45		4	max	30.35	1	89.856	2	-2.405	15	.011	3	0	3	.834	3
46			min	1.726	15	-100.399	3	-42.098	1	-.012	2	-.059	1	-.63	2
47		5	max	30.35	1	62.723	3	-.431	10	.011	3	-.004	12	.849	3
48			min	1.726	15	-24.072	2	-12.252	1	-.012	2	-.081	1	-.657	2
49		6	max	30.35	1	225.845	3	17.595	1	.011	3	-.004	15	.733	3
50			min	1.726	15	-137.999	2	-2.119	3	-.012	2	-.079	1	-.591	2
51		7	max	30.35	1	388.967	3	47.441	1	.011	3	-.003	15	.485	3
52			min	1.726	15	-251.926	2	.357	3	-.012	2	-.053	1	-.434	2
53		8	max	30.35	1	552.09	3	77.288	1	.011	3	.003	2	.106	3
54			min	1.726	15	-365.853	2	2.117	12	-.012	2	-.008	3	-.185	2
55		9	max	30.35	1	715.212	3	107.134	1	.011	3	.072	1	.155	2
56			min	1.726	15	-479.781	2	3.768	12	-.012	2	-.004	3	-.404	3
57		10	max	30.35	1	878.334	3	136.981	1	.011	3	.17	1	.588	2
58			min	1.726	15	-593.708	2	5.418	12	-.012	2	.001	3	-1.046	3
59		11	max	30.35	1	479.781	2	-3.768	12	.012	2	.072	1	.155	2
60			min	1.726	15	-715.212	3	-107.134	1	-.011	3	-.004	3	-.404	3
61		12	max	30.35	1	365.853	2	-2.117	12	.012	2	.003	2	.106	3
62			min	1.726	15	-552.09	3	-77.288	1	-.011	3	-.008	3	-.185	2
63		13	max	30.35	1	251.926	2	-.357	3	.012	2	-.003	15	.485	3
64			min	1.726	15	-388.967	3	-47.441	1	-.011	3	-.053	1	-.434	2
65		14	max	30.35	1	137.999	2	2.119	3	.012	2	-.004	15	.733	3
66			min	1.726	15	-225.845	3	-17.595	1	-.011	3	-.079	1	-.591	2
67		15	max	30.35	1	24.072	2	12.252	1	.012	2	-.004	12	.849	3
68			min	1.726	15	-62.723	3	.431	10	-.011	3	-.081	1	-.657	2
69		16	max	30.35	1	100.399	3	42.098	1	.012	2	0	3	.834	3
70			min	1.726	15	-89.856	2	2.405	15	-.011	3	-.059	1	-.63	2
71		17	max	30.35	1	263.521	3	71.945	1	.012	2	.006	3	.687	3
72			min	1.726	15	-203.783	2	4.056	15	-.011	3	-.013	1	-.512	2
73		18	max	30.35	1	426.643	3	101.791	1	.012	2	.057	1	.409	3
74			min	1.726	15	-317.71	2	5.707	15	-.011	3	.003	15	-.302	2
75		19	max	30.35	1	589.765	3	131.638	1	.012	2	.151	1	0	2
76			min	1.726	15	-431.637	2	7.357	15	-.011	3	.009	15	0	3
77	M15	1	max	-1.795	15	645.972	2	-7.355	15	.013	2	.151	1	0	2
78			min	-31.255	1	-349.024	3	-131.671	1	-.01	3	.009	15	0	3
79		2	max	-1.795	15	468.556	2	-5.704	15	.013	2	.057	1	.244	3
80			min	-31.255	1	-257.326	3	-101.825	1	-.01	3	.003	15	-.449	2
81		3	max	-1.795	15	291.14	2	-4.053	15	.013	2	.005	3	.415	3
82			min	-31.255	1	-165.629	3	-71.978	1	-.01	3	-.013	1	-.755	2
83		4	max	-1.795	15	113.724	2	-2.402	15	.013	2	0	12	.511	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	-31.255	1	-73.931	3	-42.132	1	-.01	3	-.059	1	-.918	2
85		5	max	-1.795	15	17.766	3	-.518	10	.013	2	-.004	12	.534	3
86			min	-31.255	1	-63.693	2	-12.285	1	-.01	3	-.081	1	-.938	2
87		6	max	-1.795	15	109.464	3	17.561	1	.013	2	-.004	15	.482	3
88			min	-31.255	1	-241.109	2	-1.832	3	-.01	3	-.079	1	-.815	2
89		7	max	-1.795	15	201.161	3	47.408	1	.013	2	-.003	15	.357	3
90			min	-31.255	1	-418.525	2	.639	12	-.01	3	-.053	1	-.55	2
91		8	max	-1.795	15	292.859	3	77.254	1	.013	2	.003	2	.158	3
92			min	-31.255	1	-595.941	2	2.29	12	-.01	3	-.007	3	-.141	2
93		9	max	-1.795	15	384.557	3	107.101	1	.013	2	.072	1	.41	2
94			min	-31.255	1	-773.358	2	3.94	12	-.01	3	-.003	3	-.114	3
95		10	max	-1.795	15	476.254	3	136.947	1	.013	2	.17	1	1.105	2
96			min	-31.255	1	-950.774	2	5.591	12	-.01	3	.002	3	-.461	3
97		11	max	-1.795	15	773.358	2	-3.94	12	.01	3	.072	1	.41	2
98			min	-31.255	1	-384.557	3	-107.101	1	-.013	2	-.003	3	-.114	3
99		12	max	-1.795	15	595.941	2	-2.29	12	.01	3	.003	2	.158	3
100			min	-31.255	1	-292.859	3	-77.254	1	-.013	2	-.007	3	-.141	2
101		13	max	-1.795	15	418.525	2	-.639	12	.01	3	-.003	15	.357	3
102			min	-31.255	1	-201.161	3	-47.408	1	-.013	2	-.053	1	-.55	2
103		14	max	-1.795	15	241.109	2	1.832	3	.01	3	-.004	15	.482	3
104			min	-31.255	1	-109.464	3	-17.561	1	-.013	2	-.079	1	-.815	2
105		15	max	-1.795	15	63.693	2	12.285	1	.01	3	-.004	12	.534	3
106			min	-31.255	1	-17.766	3	.518	10	-.013	2	-.081	1	-.938	2
107		16	max	-1.795	15	73.931	3	42.132	1	.01	3	0	12	.511	3
108			min	-31.255	1	-113.724	2	2.402	15	-.013	2	-.059	1	-.918	2
109		17	max	-1.795	15	165.629	3	71.978	1	.01	3	.005	3	.415	3
110			min	-31.255	1	-291.14	2	4.053	15	-.013	2	-.013	1	-.755	2
111		18	max	-1.795	15	257.326	3	101.825	1	.01	3	.057	1	.244	3
112			min	-31.255	1	-468.556	2	5.704	15	-.013	2	.003	15	-.449	2
113		19	max	-1.795	15	349.024	3	131.671	1	.01	3	.151	1	0	2
114			min	-31.255	1	-645.972	2	7.355	15	-.013	2	.009	15	0	3
115	M16	1	max	-3.311	15	592.722	2	-7.082	15	.007	2	.128	1	0	2
116			min	-58.095	1	-300.357	3	-126.984	1	-.012	3	.007	15	0	3
117		2	max	-3.311	15	415.306	2	-5.431	15	.007	2	.038	1	.205	3
118			min	-58.095	1	-208.66	3	-97.137	1	-.012	3	.002	15	-.406	2
119		3	max	-3.311	15	237.89	2	-3.78	15	.007	2	.002	3	.336	3
120			min	-58.095	1	-116.962	3	-67.291	1	-.012	3	-.028	1	-.669	2
121		4	max	-3.311	15	60.474	2	-2.13	15	.007	2	-.002	12	.393	3
122			min	-58.095	1	-25.265	3	-37.444	1	-.012	3	-.07	1	-.789	2
123		5	max	-3.311	15	66.433	3	-.059	10	.007	2	-.005	12	.377	3
124			min	-58.095	1	-116.943	2	-7.598	1	-.012	3	-.089	1	-.767	2
125		6	max	-3.311	15	158.13	3	22.249	1	.007	2	-.005	15	.286	3
126			min	-58.095	1	-294.359	2	-.7	3	-.012	3	-.083	1	-.601	2
127		7	max	-3.311	15	249.828	3	52.095	1	.007	2	-.003	15	.122	3
128			min	-58.095	1	-471.775	2	1.346	12	-.012	3	-.053	1	-.292	2
129		8	max	-3.311	15	341.525	3	81.942	1	.007	2	.004	2	.159	2
130			min	-58.095	1	-649.192	2	2.997	12	-.012	3	-.006	3	-.116	3
131		9	max	-3.311	15	433.223	3	111.788	1	.007	2	.079	1	.754	2
132			min	-58.095	1	-826.608	2	4.647	12	-.012	3	-.001	3	-.428	3
133		10	max	-3.311	15	524.92	3	141.635	1	.007	2	.181	1	1.491	2
134			min	-58.095	1	-1004.024	2	6.298	12	-.012	3	.004	12	-.814	3
135		11	max	-3.311	15	826.608	2	-4.647	12	.012	3	.079	1	.754	2
136			min	-58.095	1	-433.223	3	-111.788	1	-.007	2	-.001	3	-.428	3
137		12	max	-3.311	15	649.192	2	-2.997	12	.012	3	.004	2	.159	2
138			min	-58.095	1	-341.525	3	-81.942	1	-.007	2	-.006	3	-.116	3
139		13	max	-3.311	15	471.775	2	-1.346	12	.012	3	-.003	15	.122	3
140			min	-58.095	1	-249.828	3	-52.095	1	-.007	2	-.053	1	-.292	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	-3.311	15	294.359	2	.7	3	.012	3	-.005	15	.286	3
142			min	-58.095	1	-158.13	3	-22.249	1	-.007	2	-.083	1	-.601	2
143		15	max	-3.311	15	116.943	2	7.598	1	.012	3	-.005	12	.377	3
144			min	-58.095	1	-66.433	3	.059	10	-.007	2	-.089	1	-.767	2
145		16	max	-3.311	15	25.265	3	37.444	1	.012	3	-.002	12	.393	3
146			min	-58.095	1	-60.474	2	2.13	15	-.007	2	-.07	1	-.789	2
147		17	max	-3.311	15	116.962	3	67.291	1	.012	3	.002	3	.336	3
148			min	-58.095	1	-237.89	2	3.78	15	-.007	2	-.028	1	-.669	2
149		18	max	-3.311	15	208.66	3	97.137	1	.012	3	.038	1	.205	3
150			min	-58.095	1	-415.306	2	5.431	15	-.007	2	.002	15	-.406	2
151		19	max	-3.311	15	300.357	3	126.984	1	.012	3	.128	1	0	2
152			min	-58.095	1	-592.722	2	7.082	15	-.007	2	.007	15	0	3
153	M2	1	max	958.183	2	2.019	4	.179	1	0	3	0	3	0	1
154			min	-1392.854	3	.475	15	.01	15	0	1	0	2	0	1
155		2	max	958.704	2	1.9	4	.179	1	0	3	0	1	0	15
156			min	-1392.464	3	.447	15	.01	15	0	1	0	10	0	4
157		3	max	959.224	2	1.782	4	.179	1	0	3	0	1	0	15
158			min	-1392.073	3	.419	15	.01	15	0	1	0	15	-.001	4
159		4	max	959.745	2	1.663	4	.179	1	0	3	0	1	0	15
160			min	-1391.683	3	.391	15	.01	15	0	1	0	15	-.002	4
161		5	max	960.266	2	1.544	4	.179	1	0	3	0	1	0	15
162			min	-1391.292	3	.363	15	.01	15	0	1	0	15	-.003	4
163		6	max	960.787	2	1.425	4	.179	1	0	3	0	1	0	15
164			min	-1390.902	3	.335	15	.01	15	0	1	0	15	-.003	4
165		7	max	961.307	2	1.306	4	.179	1	0	3	0	1	0	15
166			min	-1390.511	3	.307	15	.01	15	0	1	0	15	-.004	4
167		8	max	961.828	2	1.187	4	.179	1	0	3	0	1	0	15
168			min	-1390.121	3	.279	15	.01	15	0	1	0	15	-.004	4
169		9	max	962.349	2	1.068	4	.179	1	0	3	0	1	-.001	15
170			min	-1389.73	3	.248	12	.01	15	0	1	0	15	-.004	4
171		10	max	962.869	2	.95	4	.179	1	0	3	0	1	-.001	15
172			min	-1389.34	3	.202	12	.01	15	0	1	0	15	-.005	4
173		11	max	963.39	2	.853	2	.179	1	0	3	0	1	-.001	15
174			min	-1388.949	3	.156	12	.01	15	0	1	0	15	-.005	4
175		12	max	963.911	2	.76	2	.179	1	0	3	0	1	-.001	15
176			min	-1388.558	3	.109	12	.01	15	0	1	0	15	-.005	4
177		13	max	964.431	2	.668	2	.179	1	0	3	0	1	-.001	15
178			min	-1388.168	3	.063	12	.01	15	0	1	0	15	-.006	4
179		14	max	964.952	2	.575	2	.179	1	0	3	0	1	-.001	15
180			min	-1387.777	3	-.003	3	.01	15	0	1	0	15	-.006	4
181		15	max	965.473	2	.482	2	.179	1	0	3	0	1	-.001	15
182			min	-1387.387	3	-.073	3	.01	15	0	1	0	15	-.006	4
183		16	max	965.994	2	.39	2	.179	1	0	3	0	1	-.001	15
184			min	-1386.996	3	-.142	3	.01	15	0	1	0	15	-.006	4
185		17	max	966.514	2	.297	2	.179	1	0	3	.001	1	-.001	12
186			min	-1386.606	3	-.212	3	.01	15	0	1	0	15	-.006	4
187		18	max	967.035	2	.204	2	.179	1	0	3	.001	1	-.001	12
188			min	-1386.215	3	-.281	3	.01	15	0	1	0	15	-.006	4
189		19	max	967.556	2	.112	2	.179	1	0	3	.001	1	-.001	12
190			min	-1385.825	3	-.351	3	.01	15	0	1	0	15	-.006	4
191	M3	1	max	860.209	2	7.663	4	.181	1	0	3	0	1	.006	4
192			min	-958.858	3	1.801	15	.01	15	0	1	0	15	.001	12
193		2	max	860.039	2	6.902	4	.181	1	0	3	0	1	.004	2
194			min	-958.985	3	1.623	15	.01	15	0	1	0	15	0	3
195		3	max	859.868	2	6.141	4	.181	1	0	3	0	1	.001	2
196			min	-959.113	3	1.444	15	.01	15	0	1	0	15	-.001	3
197		4	max	859.698	2	5.38	4	.181	1	0	3	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-959.241	3	1.265	15	.01	15	0	1	0	15	-.003	3
199		5	max	859.528	2	4.619	4	.181	1	0	3	0	1	0	15
200			min	-959.369	3	1.086	15	.01	15	0	1	0	15	-.004	4
201		6	max	859.357	2	3.858	4	.181	1	0	3	0	1	-.001	15
202			min	-959.496	3	.907	15	.01	15	0	1	0	15	-.006	4
203		7	max	859.187	2	3.097	4	.181	1	0	3	0	1	-.002	15
204			min	-959.624	3	.728	15	.01	15	0	1	0	15	-.007	4
205		8	max	859.017	2	2.336	4	.181	1	0	3	0	1	-.002	15
206			min	-959.752	3	.549	15	.01	15	0	1	0	15	-.008	4
207		9	max	858.846	2	1.575	4	.181	1	0	3	0	1	-.002	15
208			min	-959.88	3	.37	15	.01	15	0	1	0	15	-.009	4
209		10	max	858.676	2	.814	4	.181	1	0	3	0	1	-.002	15
210			min	-960.007	3	.173	12	.01	15	0	1	0	15	-.01	4
211		11	max	858.506	2	.217	2	.181	1	0	3	0	1	-.002	15
212			min	-960.135	3	-.209	3	.01	15	0	1	0	15	-.01	4
213		12	max	858.335	2	-.166	15	.181	1	0	3	.001	1	-.002	15
214			min	-960.263	3	-.708	4	.01	15	0	1	0	15	-.01	4
215		13	max	858.165	2	-.345	15	.181	1	0	3	.001	1	-.002	15
216			min	-960.391	3	-1.469	4	.01	15	0	1	0	15	-.009	4
217		14	max	857.995	2	-.524	15	.181	1	0	3	.001	1	-.002	15
218			min	-960.518	3	-2.23	4	.01	15	0	1	0	15	-.009	4
219		15	max	857.824	2	-.703	15	.181	1	0	3	.001	1	-.002	15
220			min	-960.646	3	-2.991	4	.01	15	0	1	0	15	-.008	4
221		16	max	857.654	2	-.882	15	.181	1	0	3	.001	1	-.001	15
222			min	-960.774	3	-3.752	4	.01	15	0	1	0	15	-.006	4
223		17	max	857.484	2	-1.061	15	.181	1	0	3	.001	1	-.001	15
224			min	-960.902	3	-4.513	4	.01	15	0	1	0	15	-.004	4
225		18	max	857.313	2	-1.24	15	.181	1	0	3	.001	1	0	15
226			min	-961.03	3	-5.274	4	.01	15	0	1	0	15	-.002	4
227		19	max	857.143	2	-1.418	15	.181	1	0	3	.002	1	0	1
228			min	-961.157	3	-6.035	4	.01	15	0	1	0	15	0	1
229	M4	1	max	730.655	1	0	1	-.35	15	0	1	.001	1	0	1
230			min	34.34	15	0	1	-6.167	1	0	1	0	15	0	1
231		2	max	730.825	1	0	1	-.35	15	0	1	0	1	0	1
232			min	34.391	15	0	1	-6.167	1	0	1	0	15	0	1
233		3	max	730.995	1	0	1	-.35	15	0	1	0	1	0	1
234			min	34.443	15	0	1	-6.167	1	0	1	0	10	0	1
235		4	max	731.166	1	0	1	-.35	15	0	1	0	15	0	1
236			min	34.494	15	0	1	-6.167	1	0	1	0	1	0	1
237		5	max	731.336	1	0	1	-.35	15	0	1	0	15	0	1
238			min	34.545	15	0	1	-6.167	1	0	1	-.001	1	0	1
239		6	max	731.506	1	0	1	-.35	15	0	1	0	15	0	1
240			min	34.597	15	0	1	-6.167	1	0	1	-.002	1	0	1
241		7	max	731.677	1	0	1	-.35	15	0	1	0	15	0	1
242			min	34.648	15	0	1	-6.167	1	0	1	-.003	1	0	1
243		8	max	731.847	1	0	1	-.35	15	0	1	0	15	0	1
244			min	34.7	15	0	1	-6.167	1	0	1	-.003	1	0	1
245		9	max	732.017	1	0	1	-.35	15	0	1	0	15	0	1
246			min	34.751	15	0	1	-6.167	1	0	1	-.004	1	0	1
247		10	max	732.188	1	0	1	-.35	15	0	1	0	15	0	1
248			min	34.802	15	0	1	-6.167	1	0	1	-.005	1	0	1
249		11	max	732.358	1	0	1	-.35	15	0	1	0	15	0	1
250			min	34.854	15	0	1	-6.167	1	0	1	-.006	1	0	1
251		12	max	732.528	1	0	1	-.35	15	0	1	0	15	0	1
252			min	34.905	15	0	1	-6.167	1	0	1	-.006	1	0	1
253		13	max	732.699	1	0	1	-.35	15	0	1	0	15	0	1
254			min	34.957	15	0	1	-6.167	1	0	1	-.007	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	732.869	1	0	1	-.35	15	0	1	0	15	0	1
256			min	35.008	15	0	1	-6.167	1	0	1	-.008	1	0	1
257		15	max	733.039	1	0	1	-.35	15	0	1	0	15	0	1
258			min	35.059	15	0	1	-6.167	1	0	1	-.008	1	0	1
259		16	max	733.21	1	0	1	-.35	15	0	1	0	15	0	1
260			min	35.111	15	0	1	-6.167	1	0	1	-.009	1	0	1
261		17	max	733.38	1	0	1	-.35	15	0	1	0	15	0	1
262			min	35.162	15	0	1	-6.167	1	0	1	-.01	1	0	1
263		18	max	733.55	1	0	1	-.35	15	0	1	0	15	0	1
264			min	35.213	15	0	1	-6.167	1	0	1	-.011	1	0	1
265		19	max	733.721	1	0	1	-.35	15	0	1	0	15	0	1
266			min	35.265	15	0	1	-6.167	1	0	1	-.011	1	0	1
267	M6	1	max	2950.168	2	2.238	2	0	1	0	1	0	1	0	1
268			min	-4394.305	3	.268	12	0	1	0	1	0	1	0	1
269		2	max	2950.689	2	2.145	2	0	1	0	1	0	1	0	12
270			min	-4393.915	3	.221	12	0	1	0	1	0	1	0	2
271		3	max	2951.21	2	2.053	2	0	1	0	1	0	1	0	12
272			min	-4393.524	3	.175	12	0	1	0	1	0	1	-.002	2
273		4	max	2951.73	2	1.96	2	0	1	0	1	0	1	0	12
274			min	-4393.133	3	.106	3	0	1	0	1	0	1	-.002	2
275		5	max	2952.251	2	1.867	2	0	1	0	1	0	1	0	12
276			min	-4392.743	3	.037	3	0	1	0	1	0	1	-.003	2
277		6	max	2952.772	2	1.775	2	0	1	0	1	0	1	0	3
278			min	-4392.352	3	-.033	3	0	1	0	1	0	1	-.004	2
279		7	max	2953.292	2	1.682	2	0	1	0	1	0	1	0	3
280			min	-4391.962	3	-.102	3	0	1	0	1	0	1	-.004	2
281		8	max	2953.813	2	1.59	2	0	1	0	1	0	1	0	3
282			min	-4391.571	3	-.172	3	0	1	0	1	0	1	-.005	2
283		9	max	2954.334	2	1.497	2	0	1	0	1	0	1	0	3
284			min	-4391.181	3	-.241	3	0	1	0	1	0	1	-.005	2
285		10	max	2954.854	2	1.404	2	0	1	0	1	0	1	0	3
286			min	-4390.79	3	-.311	3	0	1	0	1	0	1	-.006	2
287		11	max	2955.375	2	1.312	2	0	1	0	1	0	1	0	3
288			min	-4390.4	3	-.38	3	0	1	0	1	0	1	-.006	2
289		12	max	2955.896	2	1.219	2	0	1	0	1	0	1	0	3
290			min	-4390.009	3	-.449	3	0	1	0	1	0	1	-.007	2
291		13	max	2956.417	2	1.127	2	0	1	0	1	0	1	0	3
292			min	-4389.619	3	-.519	3	0	1	0	1	0	1	-.007	2
293		14	max	2956.937	2	1.034	2	0	1	0	1	0	1	0	3
294			min	-4389.228	3	-.588	3	0	1	0	1	0	1	-.008	2
295		15	max	2957.458	2	.941	2	0	1	0	1	0	1	0	3
296			min	-4388.838	3	-.658	3	0	1	0	1	0	1	-.008	2
297		16	max	2957.979	2	.849	2	0	1	0	1	0	1	.001	3
298			min	-4388.447	3	-.727	3	0	1	0	1	0	1	-.008	2
299		17	max	2958.499	2	.756	2	0	1	0	1	0	1	.001	3
300			min	-4388.057	3	-.797	3	0	1	0	1	0	1	-.009	2
301		18	max	2959.02	2	.663	2	0	1	0	1	0	1	.002	3
302			min	-4387.666	3	-.866	3	0	1	0	1	0	1	-.009	2
303		19	max	2959.541	2	.571	2	0	1	0	1	0	1	.002	3
304			min	-4387.276	3	-.936	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2852.254	2	7.682	4	0	1	0	1	0	1	.009	2
306			min	-2907.37	3	1.805	15	0	1	0	1	0	1	-.002	3
307		2	max	2852.083	2	6.921	4	0	1	0	1	0	1	.006	2
308			min	-2907.498	3	1.626	15	0	1	0	1	0	1	-.003	3
309		3	max	2851.913	2	6.16	4	0	1	0	1	0	1	.004	2
310			min	-2907.625	3	1.447	15	0	1	0	1	0	1	-.005	3
311		4	max	2851.743	2	5.399	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2907.753	3	1.268	15	0	1	0	1	0	1	-.006	3
313		5	max	2851.572	2	4.638	4	0	1	0	1	0	1	0	2
314			min	-2907.881	3	1.089	15	0	1	0	1	0	1	-.007	3
315		6	max	2851.402	2	3.877	4	0	1	0	1	0	1	-.001	15
316			min	-2908.009	3	.91	15	0	1	0	1	0	1	-.007	3
317		7	max	2851.231	2	3.116	4	0	1	0	1	0	1	-.002	15
318			min	-2908.136	3	.731	15	0	1	0	1	0	1	-.008	3
319		8	max	2851.061	2	2.39	2	0	1	0	1	0	1	-.002	15
320			min	-2908.264	3	.465	12	0	1	0	1	0	1	-.008	4
321		9	max	2850.891	2	1.797	2	0	1	0	1	0	1	-.002	15
322			min	-2908.392	3	.169	12	0	1	0	1	0	1	-.009	4
323		10	max	2850.72	2	1.204	2	0	1	0	1	0	1	-.002	15
324			min	-2908.52	3	-.266	3	0	1	0	1	0	1	-.01	4
325		11	max	2850.55	2	.611	2	0	1	0	1	0	1	-.002	15
326			min	-2908.647	3	-.711	3	0	1	0	1	0	1	-.01	4
327		12	max	2850.38	2	.018	2	0	1	0	1	0	1	-.002	15
328			min	-2908.775	3	-1.156	3	0	1	0	1	0	1	-.01	4
329		13	max	2850.209	2	-.342	15	0	1	0	1	0	1	-.002	15
330			min	-2908.903	3	-1.6	3	0	1	0	1	0	1	-.009	4
331		14	max	2850.039	2	-.521	15	0	1	0	1	0	1	-.002	15
332			min	-2909.031	3	-2.211	4	0	1	0	1	0	1	-.009	4
333		15	max	2849.869	2	-.7	15	0	1	0	1	0	1	-.002	15
334			min	-2909.159	3	-2.972	4	0	1	0	1	0	1	-.007	4
335		16	max	2849.698	2	-.879	15	0	1	0	1	0	1	-.001	15
336			min	-2909.286	3	-3.733	4	0	1	0	1	0	1	-.006	4
337		17	max	2849.528	2	-1.057	15	0	1	0	1	0	1	-.001	15
338			min	-2909.414	3	-4.494	4	0	1	0	1	0	1	-.004	4
339		18	max	2849.358	2	-1.236	15	0	1	0	1	0	1	0	15
340			min	-2909.542	3	-5.255	4	0	1	0	1	0	1	-.002	4
341		19	max	2849.187	2	-1.415	15	0	1	0	1	0	1	0	1
342			min	-2909.67	3	-6.016	4	0	1	0	1	0	1	0	1
343	M8	1	max	1867.759	2	0	1	0	1	0	1	0	1	0	1
344			min	70.303	15	0	1	0	1	0	1	0	1	0	1
345		2	max	1867.93	2	0	1	0	1	0	1	0	1	0	1
346			min	70.354	15	0	1	0	1	0	1	0	1	0	1
347		3	max	1868.1	2	0	1	0	1	0	1	0	1	0	1
348			min	70.406	15	0	1	0	1	0	1	0	1	0	1
349		4	max	1868.27	2	0	1	0	1	0	1	0	1	0	1
350			min	70.457	15	0	1	0	1	0	1	0	1	0	1
351		5	max	1868.441	2	0	1	0	1	0	1	0	1	0	1
352			min	70.509	15	0	1	0	1	0	1	0	1	0	1
353		6	max	1868.611	2	0	1	0	1	0	1	0	1	0	1
354			min	70.56	15	0	1	0	1	0	1	0	1	0	1
355		7	max	1868.781	2	0	1	0	1	0	1	0	1	0	1
356			min	70.611	15	0	1	0	1	0	1	0	1	0	1
357		8	max	1868.952	2	0	1	0	1	0	1	0	1	0	1
358			min	70.663	15	0	1	0	1	0	1	0	1	0	1
359		9	max	1869.122	2	0	1	0	1	0	1	0	1	0	1
360			min	70.714	15	0	1	0	1	0	1	0	1	0	1
361		10	max	1869.292	2	0	1	0	1	0	1	0	1	0	1
362			min	70.766	15	0	1	0	1	0	1	0	1	0	1
363		11	max	1869.463	2	0	1	0	1	0	1	0	1	0	1
364			min	70.817	15	0	1	0	1	0	1	0	1	0	1
365		12	max	1869.633	2	0	1	0	1	0	1	0	1	0	1
366			min	70.868	15	0	1	0	1	0	1	0	1	0	1
367		13	max	1869.803	2	0	1	0	1	0	1	0	1	0	1
368			min	70.92	15	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	1869.974	2	0	1	0	1	0	1	0	1	0	1
370			min	70.971	15	0	1	0	1	0	1	0	1	0	1
371		15	max	1870.144	2	0	1	0	1	0	1	0	1	0	1
372			min	71.022	15	0	1	0	1	0	1	0	1	0	1
373		16	max	1870.315	2	0	1	0	1	0	1	0	1	0	1
374			min	71.074	15	0	1	0	1	0	1	0	1	0	1
375		17	max	1870.485	2	0	1	0	1	0	1	0	1	0	1
376			min	71.125	15	0	1	0	1	0	1	0	1	0	1
377		18	max	1870.655	2	0	1	0	1	0	1	0	1	0	1
378			min	71.177	15	0	1	0	1	0	1	0	1	0	1
379		19	max	1870.826	2	0	1	0	1	0	1	0	1	0	1
380			min	71.228	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	958.183	2	2.019	4	-.01	15	0	1	0	2	0	1
382			min	-1392.854	3	.475	15	-.179	1	0	3	0	3	0	1
383		2	max	958.704	2	1.9	4	-.01	15	0	1	0	10	0	15
384			min	-1392.464	3	.447	15	-.179	1	0	3	0	1	0	4
385		3	max	959.224	2	1.782	4	-.01	15	0	1	0	15	0	15
386			min	-1392.073	3	.419	15	-.179	1	0	3	0	1	-.001	4
387		4	max	959.745	2	1.663	4	-.01	15	0	1	0	15	0	15
388			min	-1391.683	3	.391	15	-.179	1	0	3	0	1	-.002	4
389		5	max	960.266	2	1.544	4	-.01	15	0	1	0	15	0	15
390			min	-1391.292	3	.363	15	-.179	1	0	3	0	1	-.003	4
391		6	max	960.787	2	1.425	4	-.01	15	0	1	0	15	0	15
392			min	-1390.902	3	.335	15	-.179	1	0	3	0	1	-.003	4
393		7	max	961.307	2	1.306	4	-.01	15	0	1	0	15	0	15
394			min	-1390.511	3	.307	15	-.179	1	0	3	0	1	-.004	4
395		8	max	961.828	2	1.187	4	-.01	15	0	1	0	15	0	15
396			min	-1390.121	3	.279	15	-.179	1	0	3	0	1	-.004	4
397		9	max	962.349	2	1.068	4	-.01	15	0	1	0	15	-.001	15
398			min	-1389.73	3	.248	12	-.179	1	0	3	0	1	-.004	4
399		10	max	962.869	2	.95	4	-.01	15	0	1	0	15	-.001	15
400			min	-1389.34	3	.202	12	-.179	1	0	3	0	1	-.005	4
401		11	max	963.39	2	.853	2	-.01	15	0	1	0	15	-.001	15
402			min	-1388.949	3	.156	12	-.179	1	0	3	0	1	-.005	4
403		12	max	963.911	2	.76	2	-.01	15	0	1	0	15	-.001	15
404			min	-1388.558	3	.109	12	-.179	1	0	3	0	1	-.005	4
405		13	max	964.431	2	.668	2	-.01	15	0	1	0	15	-.001	15
406			min	-1388.168	3	.063	12	-.179	1	0	3	0	1	-.006	4
407		14	max	964.952	2	.575	2	-.01	15	0	1	0	15	-.001	15
408			min	-1387.777	3	-.003	3	-.179	1	0	3	0	1	-.006	4
409		15	max	965.473	2	.482	2	-.01	15	0	1	0	15	-.001	15
410			min	-1387.387	3	-.073	3	-.179	1	0	3	0	1	-.006	4
411		16	max	965.994	2	.39	2	-.01	15	0	1	0	15	-.001	15
412			min	-1386.996	3	-.142	3	-.179	1	0	3	0	1	-.006	4
413		17	max	966.514	2	.297	2	-.01	15	0	1	0	15	-.001	12
414			min	-1386.606	3	-.212	3	-.179	1	0	3	-.001	1	-.006	4
415		18	max	967.035	2	.204	2	-.01	15	0	1	0	15	-.001	12
416			min	-1386.215	3	-.281	3	-.179	1	0	3	-.001	1	-.006	4
417		19	max	967.556	2	.112	2	-.01	15	0	1	0	15	-.001	12
418			min	-1385.825	3	-.351	3	-.179	1	0	3	-.001	1	-.006	4
419	M11	1	max	860.209	2	7.663	4	-.01	15	0	1	0	15	.006	4
420			min	-958.858	3	1.801	15	-.181	1	0	3	0	1	.001	12
421		2	max	860.039	2	6.902	4	-.01	15	0	1	0	15	.004	2
422			min	-958.985	3	1.623	15	-.181	1	0	3	0	1	0	3
423		3	max	859.868	2	6.141	4	-.01	15	0	1	0	15	.001	2
424			min	-959.113	3	1.444	15	-.181	1	0	3	0	1	-.001	3
425		4	max	859.698	2	5.38	4	-.01	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-959.241	3	1.265	15	-.181	1	0	3	0	1	-.003	3
427		5	max	859.528	2	4.619	4	-.01	15	0	1	0	15	0	15
428			min	-959.369	3	1.086	15	-.181	1	0	3	0	1	-.004	4
429		6	max	859.357	2	3.858	4	-.01	15	0	1	0	15	-.001	15
430			min	-959.496	3	.907	15	-.181	1	0	3	0	1	-.006	4
431		7	max	859.187	2	3.097	4	-.01	15	0	1	0	15	-.002	15
432			min	-959.624	3	.728	15	-.181	1	0	3	0	1	-.007	4
433		8	max	859.017	2	2.336	4	-.01	15	0	1	0	15	-.002	15
434			min	-959.752	3	.549	15	-.181	1	0	3	0	1	-.008	4
435		9	max	858.846	2	1.575	4	-.01	15	0	1	0	15	-.002	15
436			min	-959.88	3	.37	15	-.181	1	0	3	0	1	-.009	4
437		10	max	858.676	2	.814	4	-.01	15	0	1	0	15	-.002	15
438			min	-960.007	3	.173	12	-.181	1	0	3	0	1	-.01	4
439		11	max	858.506	2	.217	2	-.01	15	0	1	0	15	-.002	15
440			min	-960.135	3	-.209	3	-.181	1	0	3	0	1	-.01	4
441		12	max	858.335	2	-.166	15	-.01	15	0	1	0	15	-.002	15
442			min	-960.263	3	-.708	4	-.181	1	0	3	-.001	1	-.01	4
443		13	max	858.165	2	-.345	15	-.01	15	0	1	0	15	-.002	15
444			min	-960.391	3	-1.469	4	-.181	1	0	3	-.001	1	-.009	4
445		14	max	857.995	2	-.524	15	-.01	15	0	1	0	15	-.002	15
446			min	-960.518	3	-2.23	4	-.181	1	0	3	-.001	1	-.009	4
447		15	max	857.824	2	-.703	15	-.01	15	0	1	0	15	-.002	15
448			min	-960.646	3	-2.991	4	-.181	1	0	3	-.001	1	-.008	4
449		16	max	857.654	2	-.882	15	-.01	15	0	1	0	15	-.001	15
450			min	-960.774	3	-3.752	4	-.181	1	0	3	-.001	1	-.006	4
451		17	max	857.484	2	-1.061	15	-.01	15	0	1	0	15	-.001	15
452			min	-960.902	3	-4.513	4	-.181	1	0	3	-.001	1	-.004	4
453		18	max	857.313	2	-1.24	15	-.01	15	0	1	0	15	0	15
454			min	-961.03	3	-5.274	4	-.181	1	0	3	-.001	1	-.002	4
455		19	max	857.143	2	-1.418	15	-.01	15	0	1	0	15	0	1
456			min	-961.157	3	-6.035	4	-.181	1	0	3	-.002	1	0	1
457	M12	1	max	730.655	1	0	1	6.167	1	0	1	0	15	0	1
458			min	34.34	15	0	1	.35	15	0	1	-.001	1	0	1
459		2	max	730.825	1	0	1	6.167	1	0	1	0	15	0	1
460			min	34.391	15	0	1	.35	15	0	1	0	1	0	1
461		3	max	730.995	1	0	1	6.167	1	0	1	0	10	0	1
462			min	34.443	15	0	1	.35	15	0	1	0	1	0	1
463		4	max	731.166	1	0	1	6.167	1	0	1	0	1	0	1
464			min	34.494	15	0	1	.35	15	0	1	0	15	0	1
465		5	max	731.336	1	0	1	6.167	1	0	1	.001	1	0	1
466			min	34.545	15	0	1	.35	15	0	1	0	15	0	1
467		6	max	731.506	1	0	1	6.167	1	0	1	.002	1	0	1
468			min	34.597	15	0	1	.35	15	0	1	0	15	0	1
469		7	max	731.677	1	0	1	6.167	1	0	1	.003	1	0	1
470			min	34.648	15	0	1	.35	15	0	1	0	15	0	1
471		8	max	731.847	1	0	1	6.167	1	0	1	.003	1	0	1
472			min	34.7	15	0	1	.35	15	0	1	0	15	0	1
473		9	max	732.017	1	0	1	6.167	1	0	1	.004	1	0	1
474			min	34.751	15	0	1	.35	15	0	1	0	15	0	1
475		10	max	732.188	1	0	1	6.167	1	0	1	.005	1	0	1
476			min	34.802	15	0	1	.35	15	0	1	0	15	0	1
477		11	max	732.358	1	0	1	6.167	1	0	1	.006	1	0	1
478			min	34.854	15	0	1	.35	15	0	1	0	15	0	1
479		12	max	732.528	1	0	1	6.167	1	0	1	.006	1	0	1
480			min	34.905	15	0	1	.35	15	0	1	0	15	0	1
481		13	max	732.699	1	0	1	6.167	1	0	1	.007	1	0	1
482			min	34.957	15	0	1	.35	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	732.869	1	0	1	6.167	1	0	1	.008	1	0	1
484			min	35.008	15	0	1	.35	15	0	1	0	15	0	1
485		15	max	733.039	1	0	1	6.167	1	0	1	.008	1	0	1
486			min	35.059	15	0	1	.35	15	0	1	0	15	0	1
487		16	max	733.21	1	0	1	6.167	1	0	1	.009	1	0	1
488			min	35.111	15	0	1	.35	15	0	1	0	15	0	1
489		17	max	733.38	1	0	1	6.167	1	0	1	.01	1	0	1
490			min	35.162	15	0	1	.35	15	0	1	0	15	0	1
491		18	max	733.55	1	0	1	6.167	1	0	1	.011	1	0	1
492			min	35.213	15	0	1	.35	15	0	1	0	15	0	1
493		19	max	733.721	1	0	1	6.167	1	0	1	.011	1	0	1
494			min	35.265	15	0	1	.35	15	0	1	0	15	0	1
495	M1	1	max	126.58	1	714.029	3	-3.05	15	0	2	.127	1	0	15
496			min	7.074	15	-375.144	2	-53.239	1	0	3	.007	15	-.013	2
497		2	max	127.402	1	713.149	3	-3.05	15	0	2	.099	1	.185	2
498			min	7.322	15	-376.317	2	-53.239	1	0	3	.006	15	-.378	3
499		3	max	602.567	3	488.246	2	-3.04	15	0	3	.07	1	.374	2
500			min	-347.044	2	-555.028	3	-53.123	1	0	2	.004	15	-.739	3
501		4	max	603.184	3	487.073	2	-3.04	15	0	3	.042	1	.117	2
502			min	-346.223	2	-555.908	3	-53.123	1	0	2	.002	15	-.445	3
503		5	max	603.8	3	485.9	2	-3.04	15	0	3	.014	1	-.003	15
504			min	-345.401	2	-556.788	3	-53.123	1	0	2	0	15	-.152	3
505		6	max	604.416	3	484.726	2	-3.04	15	0	3	0	15	.142	3
506			min	-344.579	2	-557.668	3	-53.123	1	0	2	-.014	1	-.396	2
507		7	max	605.032	3	483.553	2	-3.04	15	0	3	-.002	15	.437	3
508			min	-343.758	2	-558.548	3	-53.123	1	0	2	-.042	1	-.652	2
509		8	max	605.649	3	482.38	2	-3.04	15	0	3	-.004	15	.732	3
510			min	-342.936	2	-559.428	3	-53.123	1	0	2	-.07	1	-.907	2
511		9	max	620.763	3	53.092	2	-4.766	15	0	9	.044	1	.85	3
512			min	-286.534	2	.359	15	-83.497	1	0	3	.002	15	-1.037	2
513		10	max	621.379	3	51.919	2	-4.766	15	0	9	0	10	.832	3
514			min	-285.712	2	.005	15	-83.497	1	0	3	0	1	-1.064	2
515		11	max	621.995	3	50.745	2	-4.766	15	0	9	-.003	15	.815	3
516			min	-284.89	2	-1.448	4	-83.497	1	0	3	-.044	1	-1.092	2
517		12	max	636.824	3	385.118	3	-2.972	15	0	2	.069	1	.714	3
518			min	-228.355	2	-594.194	2	-52.252	1	0	3	.004	15	-.97	2
519		13	max	637.44	3	384.238	3	-2.972	15	0	2	.041	1	.511	3
520			min	-227.533	2	-595.367	2	-52.252	1	0	3	.002	15	-.656	2
521		14	max	638.057	3	383.358	3	-2.972	15	0	2	.014	1	.309	3
522			min	-226.712	2	-596.54	2	-52.252	1	0	3	0	15	-.342	2
523		15	max	638.673	3	382.478	3	-2.972	15	0	2	0	15	.106	3
524			min	-225.89	2	-597.714	2	-52.252	1	0	3	-.014	1	-.037	1
525		16	max	639.289	3	381.598	3	-2.972	15	0	2	-.002	15	.289	2
526			min	-225.069	2	-598.887	2	-52.252	1	0	3	-.041	1	-.095	3
527		17	max	639.905	3	380.718	3	-2.972	15	0	2	-.004	15	.605	2
528			min	-224.247	2	-600.061	2	-52.252	1	0	3	-.069	1	-.296	3
529		18	max	-7.33	15	594.335	2	-3.311	15	0	3	-.006	15	.306	2
530			min	-127.802	1	-299.571	3	-58.14	1	0	2	-.098	1	-.147	3
531		19	max	-7.082	15	593.161	2	-3.311	15	0	3	-.007	15	.012	3
532			min	-126.98	1	-300.451	3	-58.14	1	0	2	-.128	1	-.007	2
533	M5	1	max	284.077	1	2365.066	3	0	1	0	1	0	1	.026	2
534			min	11.455	12	-1296.878	2	0	1	0	1	0	1	0	15
535		2	max	284.899	1	2364.186	3	0	1	0	1	0	1	.71	2
536			min	11.865	12	-1298.051	2	0	1	0	1	0	1	-1.245	3
537		3	max	1866.633	3	1348.725	2	0	1	0	1	0	1	1.364	2
538			min	-1111.612	2	-1656.072	3	0	1	0	1	0	1	-2.444	3
539		4	max	1867.249	3	1347.551	2	0	1	0	1	0	1	.652	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	-1110.791	2	-1656.952	3	0	1	0	1	0	1	-1.57	3
541		5	max	1867.866	3	1346.378	2	0	1	0	1	0	1	.014	9
542			min	-1109.969	2	-1657.832	3	0	1	0	1	0	1	-.696	3
543		6	max	1868.482	3	1345.205	2	0	1	0	1	0	1	.179	3
544			min	-1109.148	2	-1658.712	3	0	1	0	1	0	1	-.768	2
545		7	max	1869.098	3	1344.031	2	0	1	0	1	0	1	1.055	3
546			min	-1108.326	2	-1659.592	3	0	1	0	1	0	1	-1.478	2
547		8	max	1869.714	3	1342.858	2	0	1	0	1	0	1	1.931	3
548			min	-1107.504	2	-1660.472	3	0	1	0	1	0	1	-2.187	2
549		9	max	1885.902	3	179.834	2	0	1	0	1	0	1	2.218	3
550			min	-982.235	2	.35	15	0	1	0	1	0	1	-2.503	2
551		10	max	1886.518	3	178.66	2	0	1	0	1	0	1	2.151	3
552			min	-981.413	2	-.004	15	0	1	0	1	0	1	-2.598	2
553		11	max	1887.134	3	177.487	2	0	1	0	1	0	1	2.084	3
554			min	-980.591	2	-1.423	4	0	1	0	1	0	1	-2.692	2
555		12	max	1903.893	3	1114.339	3	0	1	0	1	0	1	1.829	3
556			min	-855.588	2	-1705.122	2	0	1	0	1	0	1	-2.414	2
557		13	max	1904.509	3	1113.459	3	0	1	0	1	0	1	1.242	3
558			min	-854.766	2	-1706.295	2	0	1	0	1	0	1	-1.514	2
559		14	max	1905.125	3	1112.579	3	0	1	0	1	0	1	.654	3
560			min	-853.944	2	-1707.469	2	0	1	0	1	0	1	-.613	2
561		15	max	1905.742	3	1111.699	3	0	1	0	1	0	1	.288	2
562			min	-853.123	2	-1708.642	2	0	1	0	1	0	1	0	13
563		16	max	1906.358	3	1110.819	3	0	1	0	1	0	1	1.19	2
564			min	-852.301	2	-1709.815	2	0	1	0	1	0	1	-.519	3
565		17	max	1906.974	3	1109.939	3	0	1	0	1	0	1	2.092	2
566			min	-851.48	2	-1710.989	2	0	1	0	1	0	1	-1.105	3
567		18	max	-13.005	12	2011.11	2	0	1	0	1	0	1	1.076	2
568			min	-284.099	1	-1049.28	3	0	1	0	1	0	1	-.577	3
569		19	max	-12.595	12	2009.937	2	0	1	0	1	0	1	.015	2
570			min	-283.277	1	-1050.16	3	0	1	0	1	0	1	-.023	3
571	M9	1	max	126.58	1	714.029	3	53.239	1	0	3	-.007	15	0	15
572			min	7.074	15	-375.144	2	3.05	15	0	2	-.127	1	-.013	2
573		2	max	127.402	1	713.149	3	53.239	1	0	3	-.006	15	.185	2
574			min	7.322	15	-376.317	2	3.05	15	0	2	-.099	1	-.378	3
575		3	max	602.567	3	488.246	2	53.123	1	0	2	-.004	15	.374	2
576			min	-347.044	2	-555.028	3	3.04	15	0	3	-.07	1	-.739	3
577		4	max	603.184	3	487.073	2	53.123	1	0	2	-.002	15	.117	2
578			min	-346.223	2	-555.908	3	3.04	15	0	3	-.042	1	-.445	3
579		5	max	603.8	3	485.9	2	53.123	1	0	2	0	15	-.003	15
580			min	-345.401	2	-556.788	3	3.04	15	0	3	-.014	1	-.152	3
581		6	max	604.416	3	484.726	2	53.123	1	0	2	.014	1	.142	3
582			min	-344.579	2	-557.668	3	3.04	15	0	3	0	15	-.396	2
583		7	max	605.032	3	483.553	2	53.123	1	0	2	.042	1	.437	3
584			min	-343.758	2	-558.548	3	3.04	15	0	3	.002	15	-.652	2
585		8	max	605.649	3	482.38	2	53.123	1	0	2	.07	1	.732	3
586			min	-342.936	2	-559.428	3	3.04	15	0	3	.004	15	-.907	2
587		9	max	620.763	3	53.092	2	83.497	1	0	3	-.002	15	.85	3
588			min	-286.534	2	.359	15	4.766	15	0	9	-.044	1	-1.037	2
589		10	max	621.379	3	51.919	2	83.497	1	0	3	0	1	.832	3
590			min	-285.712	2	.005	15	4.766	15	0	9	0	10	-1.064	2
591		11	max	621.995	3	50.745	2	83.497	1	0	3	.044	1	.815	3
592			min	-284.89	2	-1.448	4	4.766	15	0	9	.003	15	-1.092	2
593		12	max	636.824	3	385.118	3	52.252	1	0	3	-.004	15	.714	3
594			min	-228.355	2	-594.194	2	2.972	15	0	2	-.069	1	-.97	2
595		13	max	637.44	3	384.238	3	52.252	1	0	3	-.002	15	.511	3
596			min	-227.533	2	-595.367	2	2.972	15	0	2	-.041	1	-.656	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	638.057	3	383.358	3	52.252	1	0	3	0	15	.309	3
598			min	-226.712	2	-596.54	2	2.972	15	0	2	-.014	1	-.342	2
599		15	max	638.673	3	382.478	3	52.252	1	0	3	.014	1	.106	3
600			min	-225.89	2	-597.714	2	2.972	15	0	2	0	15	-.037	1
601		16	max	639.289	3	381.598	3	52.252	1	0	3	.041	1	.289	2
602			min	-225.069	2	-598.887	2	2.972	15	0	2	.002	15	-.095	3
603		17	max	639.905	3	380.718	3	52.252	1	0	3	.069	1	.605	2
604			min	-224.247	2	-600.061	2	2.972	15	0	2	.004	15	-.296	3
605		18	max	-7.33	15	594.335	2	58.14	1	0	2	.098	1	.306	2
606			min	-127.802	1	-299.571	3	3.311	15	0	3	.006	15	-.147	3
607		19	max	-7.082	15	593.161	2	58.14	1	0	2	.128	1	.012	3
608			min	-126.98	1	-300.451	3	3.311	15	0	3	.007	15	-.007	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	.112	2	.01	3	9.493e-3	2	NC	1	NC	1
2			min	0	15	-.03	3	-.006	2	-2.991e-3	3	NC	1	NC	1
3		2	max	0	1	.103	3	.012	3	1.041e-2	2	NC	4	NC	1
4			min	0	15	.001	15	-.003	10	-2.905e-3	3	1313.353	3	NC	1
5		3	max	0	1	.211	3	.027	1	1.132e-2	2	NC	4	NC	2
6			min	0	15	-.003	9	-.001	10	-2.819e-3	3	723.647	3	6234.536	1
7		4	max	0	1	.278	3	.04	1	1.223e-2	2	NC	4	NC	2
8			min	0	15	-.012	1	0	10	-2.733e-3	3	566.072	3	4238.165	1
9		5	max	0	1	.296	3	.046	1	1.314e-2	2	NC	4	NC	2
10			min	0	15	-.009	1	0	10	-2.647e-3	3	534.535	3	3697.443	1
11		6	max	0	1	.266	3	.043	1	1.406e-2	2	NC	4	NC	2
12			min	0	15	-.002	9	-.002	10	-2.561e-3	3	588.178	3	3947.539	1
13		7	max	0	1	.198	3	.032	1	1.497e-2	2	NC	4	NC	2
14			min	0	15	.001	15	-.005	10	-2.475e-3	3	763.04	3	5312.044	1
15		8	max	0	1	.134	2	.03	3	1.588e-2	2	NC	1	NC	1
16			min	0	15	.002	15	-.01	2	-2.389e-3	3	1237.605	3	8710.727	3
17		9	max	0	1	.182	2	.031	3	1.679e-2	2	NC	4	NC	1
18			min	0	15	.003	15	-.018	2	-2.303e-3	3	2479.793	2	8527.698	3
19		10	max	0	1	.204	2	.031	3	1.771e-2	2	NC	4	NC	1
20			min	0	1	-.006	3	-.022	2	-2.218e-3	3	1896.897	2	8515.845	3
21		11	max	0	15	.182	2	.031	3	1.679e-2	2	NC	4	NC	1
22			min	0	1	.003	15	-.018	2	-2.303e-3	3	2479.793	2	8527.698	3
23		12	max	0	15	.134	2	.03	3	1.588e-2	2	NC	1	NC	1
24			min	0	1	.002	15	-.01	2	-2.389e-3	3	1237.605	3	8710.727	3
25		13	max	0	15	.198	3	.032	1	1.497e-2	2	NC	4	NC	2
26			min	0	1	.001	15	-.005	10	-2.475e-3	3	763.04	3	5312.044	1
27		14	max	0	15	.266	3	.043	1	1.406e-2	2	NC	4	NC	2
28			min	0	1	-.002	9	-.002	10	-2.561e-3	3	588.178	3	3947.539	1
29		15	max	0	15	.296	3	.046	1	1.314e-2	2	NC	4	NC	2
30			min	0	1	-.009	1	0	10	-2.647e-3	3	534.535	3	3697.443	1
31		16	max	0	15	.278	3	.04	1	1.223e-2	2	NC	4	NC	2
32			min	0	1	-.012	1	0	10	-2.733e-3	3	566.072	3	4238.165	1
33		17	max	0	15	.211	3	.027	1	1.132e-2	2	NC	4	NC	2
34			min	0	1	-.003	9	-.001	10	-2.819e-3	3	723.647	3	6234.536	1
35		18	max	0	15	.103	3	.012	3	1.041e-2	2	NC	4	NC	1
36			min	0	1	.001	15	-.003	10	-2.905e-3	3	1313.353	3	NC	1
37		19	max	0	15	.112	2	.01	3	9.493e-3	2	NC	1	NC	1
38			min	0	1	-.03	3	-.006	2	-2.991e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.264	3	.009	3	5.237e-3	2	NC	1	NC	1
40			min	0	15	-.354	2	-.006	2	-4.449e-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	.429	3	.01	3	6.071e-3	2	NC	4	NC	1
42			min	0	15	-.502	2	-.003	2	-5.23e-3	3	1057.235	3	NC	1
43		3	max	0	1	.573	3	.021	1	6.906e-3	2	NC	5	NC	2
44			min	0	15	-.634	2	-.001	10	-6.012e-3	3	563.757	3	8164.517	1
45		4	max	0	1	.682	3	.033	1	7.74e-3	2	NC	5	NC	2
46			min	0	15	-.741	2	0	10	-6.794e-3	3	416.393	3	5136.292	1
47		5	max	0	1	.749	3	.04	1	8.574e-3	2	NC	5	NC	2
48			min	0	15	-.816	2	0	10	-7.576e-3	3	358.966	3	4291.234	1
49		6	max	0	1	.773	3	.038	1	9.409e-3	2	NC	5	NC	2
50			min	0	15	-.858	2	-.002	10	-8.358e-3	3	342.239	3	4454.655	1
51		7	max	0	1	.759	3	.029	1	1.024e-2	2	NC	5	NC	2
52			min	0	15	-.869	2	-.005	10	-9.14e-3	3	337.619	2	5871.099	1
53		8	max	0	1	.721	3	.027	3	1.108e-2	2	NC	5	NC	1
54			min	0	15	-.858	2	-.009	2	-9.922e-3	3	344.715	2	9874.153	3
55		9	max	0	1	.679	3	.027	3	1.191e-2	2	NC	5	NC	1
56			min	0	15	-.839	2	-.017	2	-1.07e-2	3	358.764	2	9615.299	3
57		10	max	0	1	.657	3	.027	3	1.275e-2	2	NC	5	NC	1
58			min	0	1	-.827	2	-.02	2	-1.149e-2	3	367.388	2	9587.275	3
59		11	max	0	15	.679	3	.027	3	1.191e-2	2	NC	5	NC	1
60			min	0	1	-.839	2	-.017	2	-1.07e-2	3	358.764	2	9615.299	3
61		12	max	0	15	.721	3	.027	3	1.108e-2	2	NC	5	NC	1
62			min	0	1	-.858	2	-.009	2	-9.922e-3	3	344.715	2	9874.153	3
63		13	max	0	15	.759	3	.029	1	1.024e-2	2	NC	5	NC	2
64			min	0	1	-.869	2	-.005	10	-9.14e-3	3	337.619	2	5871.099	1
65		14	max	0	15	.773	3	.038	1	9.409e-3	2	NC	5	NC	2
66			min	0	1	-.858	2	-.002	10	-8.358e-3	3	342.239	3	4454.655	1
67		15	max	0	15	.749	3	.04	1	8.574e-3	2	NC	5	NC	2
68			min	0	1	-.816	2	0	10	-7.576e-3	3	358.966	3	4291.234	1
69		16	max	0	15	.682	3	.033	1	7.74e-3	2	NC	5	NC	2
70			min	0	1	-.741	2	0	10	-6.794e-3	3	416.393	3	5136.292	1
71		17	max	0	15	.573	3	.021	1	6.906e-3	2	NC	5	NC	2
72			min	0	1	-.634	2	-.001	10	-6.012e-3	3	563.757	3	8164.517	1
73		18	max	0	15	.429	3	.01	3	6.071e-3	2	NC	4	NC	1
74			min	0	1	-.502	2	-.003	2	-5.23e-3	3	1057.235	3	NC	1
75		19	max	0	15	.264	3	.009	3	5.237e-3	2	NC	1	NC	1
76			min	0	1	-.354	2	-.006	2	-4.449e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.268	3	.008	3	3.958e-3	3	NC	1	NC	1
78			min	0	1	-.352	2	-.005	2	-5.512e-3	2	NC	1	NC	1
79		2	max	0	15	.39	3	.01	3	4.656e-3	3	NC	4	NC	1
80			min	0	1	-.539	2	-.003	10	-6.399e-3	2	932.548	2	NC	1
81		3	max	0	15	.5	3	.021	1	5.354e-3	3	NC	5	NC	2
82			min	0	1	-.703	2	-.001	10	-7.285e-3	2	496.195	2	8125.448	1
83		4	max	0	15	.588	3	.033	1	6.052e-3	3	NC	5	NC	2
84			min	0	1	-.829	2	0	10	-8.171e-3	2	365.169	2	5112.468	1
85		5	max	0	15	.651	3	.04	1	6.75e-3	3	NC	5	NC	2
86			min	0	1	-.908	2	0	10	-9.058e-3	2	313.143	2	4268.878	1
87		6	max	0	15	.686	3	.039	1	7.448e-3	3	NC	5	NC	2
88			min	0	1	-.94	2	-.002	10	-9.944e-3	2	296.358	2	4424.846	1
89		7	max	0	15	.697	3	.029	1	8.146e-3	3	NC	5	NC	2
90			min	0	1	-.93	2	-.004	10	-1.083e-2	2	301.441	2	5810.811	1
91		8	max	0	15	.69	3	.025	3	8.844e-3	3	NC	5	NC	1
92			min	0	1	-.892	2	-.008	2	-1.172e-2	2	322.441	2	NC	1
93		9	max	0	15	.675	3	.025	3	9.542e-3	3	NC	5	NC	1
94			min	0	1	-.848	2	-.015	2	-1.26e-2	2	351.237	2	NC	1
95		10	max	0	1	.666	3	.025	3	1.024e-2	3	NC	5	NC	1
96			min	0	1	-.825	2	-.019	2	-1.349e-2	2	367.944	2	NC	1
97		11	max	0	1	.675	3	.025	3	9.542e-3	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.848	2	-.015	2	-1.26e-2	2	351.237	2	NC	1
99		12	max	0	1	.69	3	.025	3	8.844e-3	3	NC	5	NC	1
100			min	0	15	-.892	2	-.008	2	-1.172e-2	2	322.441	2	NC	1
101		13	max	0	1	.697	3	.029	1	8.146e-3	3	NC	5	NC	2
102			min	0	15	-.93	2	-.004	10	-1.083e-2	2	301.441	2	5810.811	1
103		14	max	0	1	.686	3	.039	1	7.448e-3	3	NC	5	NC	2
104			min	0	15	-.94	2	-.002	10	-9.944e-3	2	296.358	2	4424.846	1
105		15	max	0	1	.651	3	.04	1	6.75e-3	3	NC	5	NC	2
106			min	0	15	-.908	2	0	10	-9.058e-3	2	313.143	2	4268.878	1
107		16	max	0	1	.588	3	.033	1	6.052e-3	3	NC	5	NC	2
108			min	0	15	-.829	2	0	10	-8.171e-3	2	365.169	2	5112.468	1
109		17	max	0	1	.5	3	.021	1	5.354e-3	3	NC	5	NC	2
110			min	0	15	-.703	2	-.001	10	-7.285e-3	2	496.195	2	8125.448	1
111		18	max	0	1	.39	3	.01	3	4.656e-3	3	NC	4	NC	1
112			min	0	15	-.539	2	-.003	10	-6.399e-3	2	932.548	2	NC	1
113		19	max	0	1	.268	3	.008	3	3.958e-3	3	NC	1	NC	1
114			min	0	15	-.352	2	-.005	2	-5.512e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.099	2	.007	3	7.263e-3	3	NC	1	NC	1
116			min	0	1	-.089	3	-.005	2	-7.778e-3	2	NC	1	NC	1
117		2	max	0	15	.012	1	.011	1	8.095e-3	3	NC	4	NC	1
118			min	0	1	-.049	3	-.002	10	-8.305e-3	2	1786.746	2	NC	1
119		3	max	0	15	.002	4	.027	1	8.926e-3	3	NC	4	NC	2
120			min	0	1	-.076	2	0	10	-8.832e-3	2	997.286	2	6214.387	1
121		4	max	0	15	0	13	.041	1	9.758e-3	3	NC	4	NC	2
122			min	0	1	-.119	2	.001	10	-9.359e-3	2	799.186	2	4207.765	1
123		5	max	0	15	0	13	.047	1	1.059e-2	3	NC	4	NC	2
124			min	0	1	-.122	2	.001	10	-9.887e-3	2	787.547	2	3653.608	1
125		6	max	0	15	.003	4	.044	1	1.142e-2	3	NC	4	NC	2
126			min	0	1	-.087	2	0	10	-1.041e-2	2	939.028	2	3871.961	1
127		7	max	0	15	.013	9	.033	1	1.225e-2	3	NC	3	NC	2
128			min	0	1	-.079	3	-.003	10	-1.094e-2	2	1458.16	2	5131.888	1
129		8	max	0	15	.061	1	.022	3	1.308e-2	3	NC	1	NC	2
130			min	0	1	-.125	3	-.006	10	-1.147e-2	2	4470.565	2	9872.911	1
131		9	max	0	15	.131	2	.022	3	1.392e-2	3	NC	4	NC	1
132			min	0	1	-.166	3	-.014	2	-1.2e-2	2	2280.581	3	NC	1
133		10	max	0	1	.164	2	.022	3	1.475e-2	3	NC	4	NC	1
134			min	0	1	-.183	3	-.017	2	-1.252e-2	2	1850.785	3	NC	1
135		11	max	0	1	.131	2	.022	3	1.392e-2	3	NC	4	NC	1
136			min	0	15	-.166	3	-.014	2	-1.2e-2	2	2280.581	3	NC	1
137		12	max	0	1	.061	1	.022	3	1.308e-2	3	NC	1	NC	2
138			min	0	15	-.125	3	-.006	10	-1.147e-2	2	4470.565	2	9872.911	1
139		13	max	0	1	.013	9	.033	1	1.225e-2	3	NC	3	NC	2
140			min	0	15	-.079	3	-.003	10	-1.094e-2	2	1458.16	2	5131.888	1
141		14	max	0	1	.003	4	.044	1	1.142e-2	3	NC	4	NC	2
142			min	0	15	-.087	2	0	10	-1.041e-2	2	939.028	2	3871.961	1
143		15	max	0	1	0	13	.047	1	1.059e-2	3	NC	4	NC	2
144			min	0	15	-.122	2	.001	10	-9.887e-3	2	787.547	2	3653.608	1
145		16	max	0	1	0	13	.041	1	9.758e-3	3	NC	4	NC	2
146			min	0	15	-.119	2	.001	10	-9.359e-3	2	799.186	2	4207.765	1
147		17	max	0	1	.002	4	.027	1	8.926e-3	3	NC	4	NC	2
148			min	0	15	-.076	2	0	10	-8.832e-3	2	997.286	2	6214.387	1
149		18	max	0	1	.012	1	.011	1	8.095e-3	3	NC	4	NC	1
150			min	0	15	-.049	3	-.002	10	-8.305e-3	2	1786.746	2	NC	1
151		19	max	0	1	.099	2	.007	3	7.263e-3	3	NC	1	NC	1
152			min	0	15	-.089	3	-.005	2	-7.778e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.01	2	.004	1	-6.456e-6	15	NC	1	NC	1
154			min	-.01	3	-.016	3	0	15	-1.124e-4	1	7425.377	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	2	.009	2	.004	1	-6.124e-6	15	NC	1	NC	1
156			min	-.01	3	-.015	3	0	15	-1.066e-4	1	8607.117	2	NC	1
157		3	max	.006	2	.008	2	.003	1	-5.791e-6	15	NC	1	NC	1
158			min	-.009	3	-.015	3	0	15	-1.008e-4	1	NC	1	NC	1
159		4	max	.006	2	.006	2	.003	1	-5.459e-6	15	NC	1	NC	1
160			min	-.009	3	-.014	3	0	15	-9.498e-5	1	NC	1	NC	1
161		5	max	.006	2	.005	2	.003	1	-5.126e-6	15	NC	1	NC	1
162			min	-.008	3	-.014	3	0	15	-8.919e-5	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.002	1	-4.794e-6	15	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-8.339e-5	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.002	1	-4.462e-6	15	NC	1	NC	1
166			min	-.007	3	-.013	3	0	15	-7.76e-5	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.002	1	-4.129e-6	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-7.181e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.002	1	-3.797e-6	15	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-6.602e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	.001	1	-3.464e-6	15	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-6.023e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-3.132e-6	15	NC	1	NC	1
174			min	-.005	3	-.009	3	0	15	-5.444e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	2	0	1	-2.799e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-4.865e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-2.467e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-4.286e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-2.134e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-3.707e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.802e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-3.127e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.47e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-2.548e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.137e-6	15	NC	1	NC	1
186			min	-.001	3	-.003	3	0	15	-1.969e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-8.047e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-1.39e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-4.723e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-8.11e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.837e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	1.074e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	1.235e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	7.032e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	15	2.286e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	1.299e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	15	3.338e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	1	1.895e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	15	4.389e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	1	2.49e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	10	5.44e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	1	3.086e-6	15	9256.496	4	NC	1
203		7	max	.003	3	-.003	15	0	1	6.492e-5	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	3	3.682e-6	15	8004.397	4	NC	1
205		8	max	.003	3	-.003	15	0	1	7.543e-5	1	NC	2	NC	1
206			min	-.003	2	-.013	4	0	12	4.278e-6	15	7233.839	4	NC	1
207		9	max	.004	3	-.003	15	0	1	8.594e-5	1	NC	5	NC	1
208			min	-.003	2	-.014	4	0	12	4.873e-6	15	6784.246	4	NC	1
209		10	max	.004	3	-.003	15	0	1	9.646e-5	1	NC	5	NC	1
210			min	-.004	2	-.014	4	0	15	5.469e-6	15	6578.301	4	NC	1
211		11	max	.005	3	-.003	15	0	1	1.07e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.004	2	-.014	4	0	15	6.065e-6	15	6585.934	4	NC	1
213		12	max	.005	3	-.003	15	0	1	1.175e-4	1	NC	5	NC	1
214			min	-.005	2	-.014	4	0	15	6.66e-6	15	6812.77	4	NC	1
215		13	max	.006	3	-.003	15	.001	1	1.28e-4	1	NC	2	NC	1
216			min	-.005	2	-.013	4	0	15	7.256e-6	15	7303.795	4	NC	1
217		14	max	.006	3	-.003	15	.001	1	1.385e-4	1	NC	1	NC	1
218			min	-.005	2	-.011	4	0	15	7.852e-6	15	8166.12	4	NC	1
219		15	max	.006	3	-.002	15	.002	1	1.49e-4	1	NC	1	NC	1
220			min	-.006	2	-.01	4	0	15	8.448e-6	15	9635.075	4	NC	1
221		16	max	.007	3	-.002	15	.002	1	1.595e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	9.043e-6	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.003	1	1.701e-4	1	NC	1	NC	1
224			min	-.007	2	-.006	3	0	15	9.639e-6	15	NC	1	NC	1
225		18	max	.008	3	0	15	.003	1	1.806e-4	1	NC	1	NC	1
226			min	-.007	2	-.004	3	0	15	1.023e-5	15	NC	1	NC	1
227		19	max	.008	3	0	2	.004	1	1.911e-4	1	NC	1	NC	1
228			min	-.007	2	-.003	3	0	15	1.083e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	7.523e-5	1	NC	1	NC	2
230			min	0	15	-.009	3	-.004	1	4.287e-6	15	NC	1	6209.692	1
231		2	max	.002	1	.007	2	0	15	7.523e-5	1	NC	1	NC	2
232			min	0	15	-.008	3	-.004	1	4.287e-6	15	NC	1	6728.531	1
233		3	max	.002	1	.006	2	0	15	7.523e-5	1	NC	1	NC	2
234			min	0	15	-.008	3	-.003	1	4.287e-6	15	NC	1	7347.606	1
235		4	max	.001	1	.006	2	0	15	7.523e-5	1	NC	1	NC	2
236			min	0	15	-.007	3	-.003	1	4.287e-6	15	NC	1	8092.681	1
237		5	max	.001	1	.006	2	0	15	7.523e-5	1	NC	1	NC	2
238			min	0	15	-.007	3	-.003	1	4.287e-6	15	NC	1	8998.79	1
239		6	max	.001	1	.005	2	0	15	7.523e-5	1	NC	1	NC	1
240			min	0	15	-.006	3	-.002	1	4.287e-6	15	NC	1	NC	1
241		7	max	.001	1	.005	2	0	15	7.523e-5	1	NC	1	NC	1
242			min	0	15	-.006	3	-.002	1	4.287e-6	15	NC	1	NC	1
243		8	max	.001	1	.004	2	0	15	7.523e-5	1	NC	1	NC	1
244			min	0	15	-.005	3	-.002	1	4.287e-6	15	NC	1	NC	1
245		9	max	0	1	.004	2	0	15	7.523e-5	1	NC	1	NC	1
246			min	0	15	-.005	3	-.002	1	4.287e-6	15	NC	1	NC	1
247		10	max	0	1	.004	2	0	15	7.523e-5	1	NC	1	NC	1
248			min	0	15	-.004	3	-.001	1	4.287e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	7.523e-5	1	NC	1	NC	1
250			min	0	15	-.004	3	-.001	1	4.287e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	7.523e-5	1	NC	1	NC	1
252			min	0	15	-.003	3	0	1	4.287e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	7.523e-5	1	NC	1	NC	1
254			min	0	15	-.003	3	0	1	4.287e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	7.523e-5	1	NC	1	NC	1
256			min	0	15	-.002	3	0	1	4.287e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	7.523e-5	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	4.287e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	7.523e-5	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	4.287e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	7.523e-5	1	NC	1	NC	1
262			min	0	15	0	3	0	1	4.287e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	7.523e-5	1	NC	1	NC	1
264			min	0	15	0	3	0	1	4.287e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	7.523e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	4.287e-6	15	NC	1	NC	1
267	M6	1	max	.022	2	.034	2	0	1	0	1	NC	4	NC	1
268			min	-.033	3	-.049	3	0	1	0	1	1576.774	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	.021	2	.031	2	0	1	0	1	NC	4	NC	1
270			min	-.031	3	-.046	3	0	1	0	1	1669.499	3	NC	1
271		3	max	.019	2	.028	2	0	1	0	1	NC	4	NC	1
272			min	-.029	3	-.043	3	0	1	0	1	1773.942	3	NC	1
273		4	max	.018	2	.025	2	0	1	0	1	NC	4	NC	1
274			min	-.027	3	-.041	3	0	1	0	1	1892.584	3	NC	1
275		5	max	.017	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.025	3	-.038	3	0	1	0	1	2028.621	3	NC	1
277		6	max	.016	2	.02	2	0	1	0	1	NC	4	NC	1
278			min	-.023	3	-.035	3	0	1	0	1	2186.229	3	NC	1
279		7	max	.015	2	.017	2	0	1	0	1	NC	1	NC	1
280			min	-.022	3	-.032	3	0	1	0	1	2370.98	3	NC	1
281		8	max	.013	2	.014	2	0	1	0	1	NC	1	NC	1
282			min	-.02	3	-.03	3	0	1	0	1	2590.476	3	NC	1
283		9	max	.012	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.018	3	-.027	3	0	1	0	1	2855.365	3	NC	1
285		10	max	.011	2	.01	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.024	3	0	1	0	1	3181.034	3	NC	1
287		11	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3590.581	3	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.013	3	-.019	3	0	1	0	1	4120.319	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.016	3	0	1	0	1	4830.799	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5831.054	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	7339.219	3	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	9864.387	3	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.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	-.003	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8765.692	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7835.562	3	NC	1
319		8	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.01	2	-.015	3	0	1	0	1	7286.175	3	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6852.438	4	NC	1
323		10	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.012	2	-.017	3	0	1	0	1	6640.866	4	NC	1
325		11	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.014	2	-.017	3	0	1	0	1	6645.548	4	NC	1
327		12	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.015	2	-.017	3	0	1	0	1	6871.785	4	NC	1
329		13	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7364.662	4	NC	1
331		14	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.018	2	-.015	3	0	1	0	1	8231.931	4	NC	1
333		15	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9710.558	4	NC	1
335		16	max	.021	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.021	2	-.013	3	0	1	0	1	NC	1	NC	1
337		17	max	.022	3	0	2	0	1	0	1	NC	1	NC	1
338			min	-.022	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.024	3	0	2	0	1	0	1	NC	1	NC	1
340			min	-.023	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	.002	2	0	1	0	1	NC	1	NC	1
342			min	-.025	2	-.008	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.004	2	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.004	2	.023	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.025	3	0	1	0	1	NC	1	NC	1
347		3	max	.004	2	.022	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.004	2	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.022	3	0	1	0	1	NC	1	NC	1
351		5	max	.003	2	.019	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.003	2	.018	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.019	3	0	1	0	1	NC	1	NC	1
355		7	max	.003	2	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.018	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.015	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.002	2	.014	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.015	3	0	1	0	1	NC	1	NC	1
361		10	max	.002	2	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	2	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.012	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.001	2	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.001	2	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	0	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	15	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.01	2	0	15	1.124e-4	1	NC	1	NC	1
382			min	-.01	3	-.016	3	-.004	1	6.456e-6	15	7425.377	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	2	.009	2	0	15	1.066e-4	1	NC	1	NC	1
384			min	-.01	3	-.015	3	-.004	1	6.124e-6	15	8607.117	2	NC	1
385		3	max	.006	2	.008	2	0	15	1.008e-4	1	NC	1	NC	1
386			min	-.009	3	-.015	3	-.003	1	5.791e-6	15	NC	1	NC	1
387		4	max	.006	2	.006	2	0	15	9.498e-5	1	NC	1	NC	1
388			min	-.009	3	-.014	3	-.003	1	5.459e-6	15	NC	1	NC	1
389		5	max	.006	2	.005	2	0	15	8.919e-5	1	NC	1	NC	1
390			min	-.008	3	-.014	3	-.003	1	5.126e-6	15	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	8.339e-5	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.002	1	4.794e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	7.76e-5	1	NC	1	NC	1
394			min	-.007	3	-.013	3	-.002	1	4.462e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	7.181e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.002	1	4.129e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	6.602e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.002	1	3.797e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	6.023e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	-.001	1	3.464e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	5.444e-5	1	NC	1	NC	1
402			min	-.005	3	-.009	3	-.001	1	3.132e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	2	0	15	4.865e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	0	1	2.799e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	4.286e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	0	1	2.467e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	3.707e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	2.134e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	3.127e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.802e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	2.548e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	1.47e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.969e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	1.137e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	1.39e-5	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	8.047e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	8.11e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	4.723e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-1.074e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.837e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-7.032e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	15	-1.235e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-1.299e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	15	-2.286e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	1	-1.895e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	15	-3.338e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	1	-2.49e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	15	-4.389e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	1	-3.086e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	10	-5.44e-5	1	9256.496	4	NC	1
431		7	max	.003	3	-.003	15	0	3	-3.682e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-6.492e-5	1	8004.397	4	NC	1
433		8	max	.003	3	-.003	15	0	12	-4.278e-6	15	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-7.543e-5	1	7233.839	4	NC	1
435		9	max	.004	3	-.003	15	0	12	-4.873e-6	15	NC	5	NC	1
436			min	-.003	2	-.014	4	0	1	-8.594e-5	1	6784.246	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-5.469e-6	15	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-9.646e-5	1	6578.301	4	NC	1
439		11	max	.005	3	-.003	15	0	15	-6.065e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.014	4	0	1	-1.07e-4	1	6585.934	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-6.66e-6	15	NC	5	NC	1
442			min	-.005	2	-.014	4	0	1	-1.175e-4	1	6812.77	4	NC	1
443		13	max	.006	3	-.003	15	0	15	-7.256e-6	15	NC	2	NC	1
444			min	-.005	2	-.013	4	-.001	1	-1.28e-4	1	7303.795	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-7.852e-6	15	NC	1	NC	1
446			min	-.005	2	-.011	4	-.001	1	-1.385e-4	1	8166.12	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-8.448e-6	15	NC	1	NC	1
448			min	-.006	2	-.01	4	-.002	1	-1.49e-4	1	9635.075	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-9.043e-6	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.002	1	-1.595e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-9.639e-6	15	NC	1	NC	1
452			min	-.007	2	-.006	3	-.003	1	-1.701e-4	1	NC	1	NC	1
453		18	max	.008	3	0	15	0	15	-1.023e-5	15	NC	1	NC	1
454			min	-.007	2	-.004	3	-.003	1	-1.806e-4	1	NC	1	NC	1
455		19	max	.008	3	0	2	0	15	-1.083e-5	15	NC	1	NC	1
456			min	-.007	2	-.003	3	-.004	1	-1.911e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.004	1	-4.287e-6	15	NC	1	NC	2
458			min	0	15	-.009	3	0	15	-7.523e-5	1	NC	1	6209.692	1
459		2	max	.002	1	.007	2	.004	1	-4.287e-6	15	NC	1	NC	2
460			min	0	15	-.008	3	0	15	-7.523e-5	1	NC	1	6728.531	1
461		3	max	.002	1	.006	2	.003	1	-4.287e-6	15	NC	1	NC	2
462			min	0	15	-.008	3	0	15	-7.523e-5	1	NC	1	7347.606	1
463		4	max	.001	1	.006	2	.003	1	-4.287e-6	15	NC	1	NC	2
464			min	0	15	-.007	3	0	15	-7.523e-5	1	NC	1	8092.681	1
465		5	max	.001	1	.006	2	.003	1	-4.287e-6	15	NC	1	NC	2
466			min	0	15	-.007	3	0	15	-7.523e-5	1	NC	1	8998.79	1
467		6	max	.001	1	.005	2	.002	1	-4.287e-6	15	NC	1	NC	1
468			min	0	15	-.006	3	0	15	-7.523e-5	1	NC	1	NC	1
469		7	max	.001	1	.005	2	.002	1	-4.287e-6	15	NC	1	NC	1
470			min	0	15	-.006	3	0	15	-7.523e-5	1	NC	1	NC	1
471		8	max	.001	1	.004	2	.002	1	-4.287e-6	15	NC	1	NC	1
472			min	0	15	-.005	3	0	15	-7.523e-5	1	NC	1	NC	1
473		9	max	0	1	.004	2	.002	1	-4.287e-6	15	NC	1	NC	1
474			min	0	15	-.005	3	0	15	-7.523e-5	1	NC	1	NC	1
475		10	max	0	1	.004	2	.001	1	-4.287e-6	15	NC	1	NC	1
476			min	0	15	-.004	3	0	15	-7.523e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	.001	1	-4.287e-6	15	NC	1	NC	1
478			min	0	15	-.004	3	0	15	-7.523e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-4.287e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-7.523e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-4.287e-6	15	NC	1	NC	1
482			min	0	15	-.003	3	0	15	-7.523e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-4.287e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-7.523e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-4.287e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-7.523e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-4.287e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-7.523e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-4.287e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-7.523e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-4.287e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-7.523e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-4.287e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-7.523e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.112	2	0	1	5.887e-3	2	NC	1	NC	1
496			min	-.006	2	-.03	3	0	15	-1.423e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.01	3	.052	2	0	15	2.887e-3	2	NC	4	NC	1
498			min	-.006	2	-.01	3	-.003	1	-7.043e-3	3	1913.373	2	NC	1
499		3	max	.01	3	.017	3	0	15	2.39e-5	10	NC	5	NC	1
500			min	-.006	2	-.012	2	-.004	1	-9.621e-5	3	927.688	2	NC	1
501		4	max	.01	3	.058	3	0	15	2.909e-3	2	NC	5	NC	1
502			min	-.006	2	-.083	2	-.004	1	-3.31e-3	3	590.724	2	NC	1
503		5	max	.01	3	.108	3	0	15	5.798e-3	2	NC	5	NC	1
504			min	-.006	2	-.156	2	-.003	1	-6.524e-3	3	429.522	2	NC	1
505		6	max	.01	3	.16	3	0	15	8.687e-3	2	NC	5	NC	1
506			min	-.006	2	-.227	2	-.001	1	-9.738e-3	3	340.257	2	NC	1
507		7	max	.009	3	.21	3	0	1	1.158e-2	2	NC	15	NC	1
508			min	-.006	2	-.289	2	0	3	-1.295e-2	3	287.332	2	NC	1
509		8	max	.009	3	.252	3	0	1	1.446e-2	2	NC	15	NC	1
510			min	-.006	2	-.339	2	0	15	-1.617e-2	3	255.923	2	NC	1
511		9	max	.009	3	.278	3	0	15	1.639e-2	2	NC	15	NC	1
512			min	-.006	2	-.37	2	0	1	-1.659e-2	3	239.532	2	NC	1
513		10	max	.009	3	.288	3	0	1	1.769e-2	2	NC	15	NC	1
514			min	-.006	2	-.38	2	0	15	-1.515e-2	3	234.758	2	NC	1
515		11	max	.009	3	.281	3	0	1	1.899e-2	2	NC	15	NC	1
516			min	-.006	2	-.369	2	0	15	-1.371e-2	3	240.498	2	NC	1
517		12	max	.008	3	.257	3	0	15	1.832e-2	2	NC	15	NC	1
518			min	-.005	2	-.337	2	0	1	-1.19e-2	3	258.81	2	NC	1
519		13	max	.008	3	.219	3	0	15	1.469e-2	2	NC	15	NC	1
520			min	-.005	2	-.284	2	0	1	-9.525e-3	3	294.25	2	NC	1
521		14	max	.008	3	.171	3	.001	1	1.106e-2	2	NC	5	NC	1
522			min	-.005	2	-.219	2	0	15	-7.149e-3	3	354.847	2	NC	1
523		15	max	.008	3	.117	3	.002	1	7.429e-3	2	NC	5	NC	1
524			min	-.005	2	-.147	2	0	15	-4.773e-3	3	459.164	2	NC	1
525		16	max	.007	3	.06	3	.004	1	3.8e-3	2	NC	5	NC	1
526			min	-.005	2	-.074	2	0	15	-2.397e-3	3	652.332	2	NC	1
527		17	max	.007	3	.006	3	.004	1	2.816e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-2.111e-5	3	1065.234	2	NC	1
529		18	max	.007	3	.049	2	.003	1	5.239e-3	2	NC	4	NC	1
530			min	-.005	2	-.043	3	0	15	-2.153e-3	3	2260.14	2	NC	1
531		19	max	.007	3	.099	2	0	15	1.051e-2	2	NC	1	NC	1
532			min	-.005	2	-.089	3	0	1	-4.391e-3	3	NC	1	NC	1
533	M5	1	max	.031	3	.204	2	0	1	0	1	NC	1	NC	1
534			min	-.022	2	-.006	3	0	1	0	1	NC	1	NC	1
535		2	max	.031	3	.09	2	0	1	0	1	NC	5	NC	1
536			min	-.022	2	.002	15	0	1	0	1	1024.298	2	NC	1
537		3	max	.031	3	.052	3	0	1	0	1	NC	5	NC	1
538			min	-.022	2	-.038	2	0	1	0	1	481.323	2	NC	1
539		4	max	.03	3	.138	3	0	1	0	1	NC	5	NC	1
540			min	-.022	2	-.191	2	0	1	0	1	294.136	2	NC	1
541		5	max	.029	3	.256	3	0	1	0	1	NC	15	NC	1
542			min	-.021	2	-.356	2	0	1	0	1	206.765	2	NC	1
543		6	max	.029	3	.388	3	0	1	0	1	8563.124	15	NC	1
544			min	-.021	2	-.521	2	0	1	0	1	159.674	2	NC	1
545		7	max	.028	3	.517	3	0	1	0	1	7071.386	15	NC	1
546			min	-.02	2	-.671	2	0	1	0	1	132.372	2	NC	1
547		8	max	.027	3	.624	3	0	1	0	1	6206.199	15	NC	1
548			min	-.02	2	-.791	2	0	1	0	1	116.453	2	NC	1
549		9	max	.027	3	.693	3	0	1	0	1	5763.352	15	NC	1
550			min	-.02	2	-.867	2	0	1	0	1	108.273	2	NC	1
551		10	max	.026	3	.717	3	0	1	0	1	5630.131	15	NC	1
552			min	-.019	2	-.893	2	0	1	0	1	105.896	2	NC	1
553		11	max	.026	3	.697	3	0	1	0	1	5763.868	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.019	2	-.867	2	0	1	0	1	108.753	2	NC	1
555		12	max	.025	3	.636	3	0	1	0	1	6207.381	15	NC	1
556			min	-.019	2	-.786	2	0	1	0	1	118.051	2	NC	1
557		13	max	.024	3	.539	3	0	1	0	1	7073.682	15	NC	1
558			min	-.019	2	-.658	2	0	1	0	1	136.571	2	NC	1
559		14	max	.024	3	.416	3	0	1	0	1	8567.44	15	NC	1
560			min	-.018	2	-.499	2	0	1	0	1	169.258	2	NC	1
561		15	max	.023	3	.281	3	0	1	0	1	NC	15	NC	1
562			min	-.018	2	-.328	2	0	1	0	1	227.965	2	NC	1
563		16	max	.022	3	.144	3	0	1	0	1	NC	5	NC	1
564			min	-.018	2	-.162	2	0	1	0	1	342.991	2	NC	1
565		17	max	.022	3	.017	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.02	2	0	1	0	1	604.912	2	NC	1
567		18	max	.022	3	.082	2	0	1	0	1	NC	5	NC	1
568			min	-.017	2	-.089	3	0	1	0	1	1346.341	3	NC	1
569		19	max	.022	3	.164	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.183	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.112	2	0	15	1.423e-2	3	NC	1	NC	1
572			min	-.006	2	-.03	3	0	1	-5.887e-3	2	NC	1	NC	1
573		2	max	.01	3	.052	2	.003	1	7.043e-3	3	NC	4	NC	1
574			min	-.006	2	-.01	3	0	15	-2.887e-3	2	1913.373	2	NC	1
575		3	max	.01	3	.017	3	.004	1	9.621e-5	3	NC	5	NC	1
576			min	-.006	2	-.012	2	0	15	-2.39e-5	10	927.688	2	NC	1
577		4	max	.01	3	.058	3	.004	1	3.31e-3	3	NC	5	NC	1
578			min	-.006	2	-.083	2	0	15	-2.909e-3	2	590.724	2	NC	1
579		5	max	.01	3	.108	3	.003	1	6.524e-3	3	NC	5	NC	1
580			min	-.006	2	-.156	2	0	15	-5.798e-3	2	429.522	2	NC	1
581		6	max	.01	3	.16	3	.001	1	9.738e-3	3	NC	5	NC	1
582			min	-.006	2	-.227	2	0	15	-8.687e-3	2	340.257	2	NC	1
583		7	max	.009	3	.21	3	0	3	1.295e-2	3	NC	15	NC	1
584			min	-.006	2	-.289	2	0	1	-1.158e-2	2	287.332	2	NC	1
585		8	max	.009	3	.252	3	0	15	1.617e-2	3	NC	15	NC	1
586			min	-.006	2	-.339	2	0	1	-1.446e-2	2	255.923	2	NC	1
587		9	max	.009	3	.278	3	0	1	1.659e-2	3	NC	15	NC	1
588			min	-.006	2	-.37	2	0	15	-1.639e-2	2	239.532	2	NC	1
589		10	max	.009	3	.288	3	0	15	1.515e-2	3	NC	15	NC	1
590			min	-.006	2	-.38	2	0	1	-1.769e-2	2	234.758	2	NC	1
591		11	max	.009	3	.281	3	0	15	1.371e-2	3	NC	15	NC	1
592			min	-.006	2	-.369	2	0	1	-1.899e-2	2	240.498	2	NC	1
593		12	max	.008	3	.257	3	0	1	1.19e-2	3	NC	15	NC	1
594			min	-.005	2	-.337	2	0	15	-1.832e-2	2	258.81	2	NC	1
595		13	max	.008	3	.219	3	0	1	9.525e-3	3	NC	15	NC	1
596			min	-.005	2	-.284	2	0	15	-1.469e-2	2	294.25	2	NC	1
597		14	max	.008	3	.171	3	0	15	7.149e-3	3	NC	5	NC	1
598			min	-.005	2	-.219	2	-.001	1	-1.106e-2	2	354.847	2	NC	1
599		15	max	.008	3	.117	3	0	15	4.773e-3	3	NC	5	NC	1
600			min	-.005	2	-.147	2	-.002	1	-7.429e-3	2	459.164	2	NC	1
601		16	max	.007	3	.06	3	0	15	2.397e-3	3	NC	5	NC	1
602			min	-.005	2	-.074	2	-.004	1	-3.8e-3	2	652.332	2	NC	1
603		17	max	.007	3	.006	3	0	15	2.111e-5	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.004	1	-2.816e-4	1	1065.234	2	NC	1
605		18	max	.007	3	.049	2	0	15	2.153e-3	3	NC	4	NC	1
606			min	-.005	2	-.043	3	-.003	1	-5.239e-3	2	2260.14	2	NC	1
607		19	max	.007	3	.099	2	0	1	4.391e-3	3	NC	1	NC	1
608			min	-.005	2	-.089	3	0	15	-1.051e-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

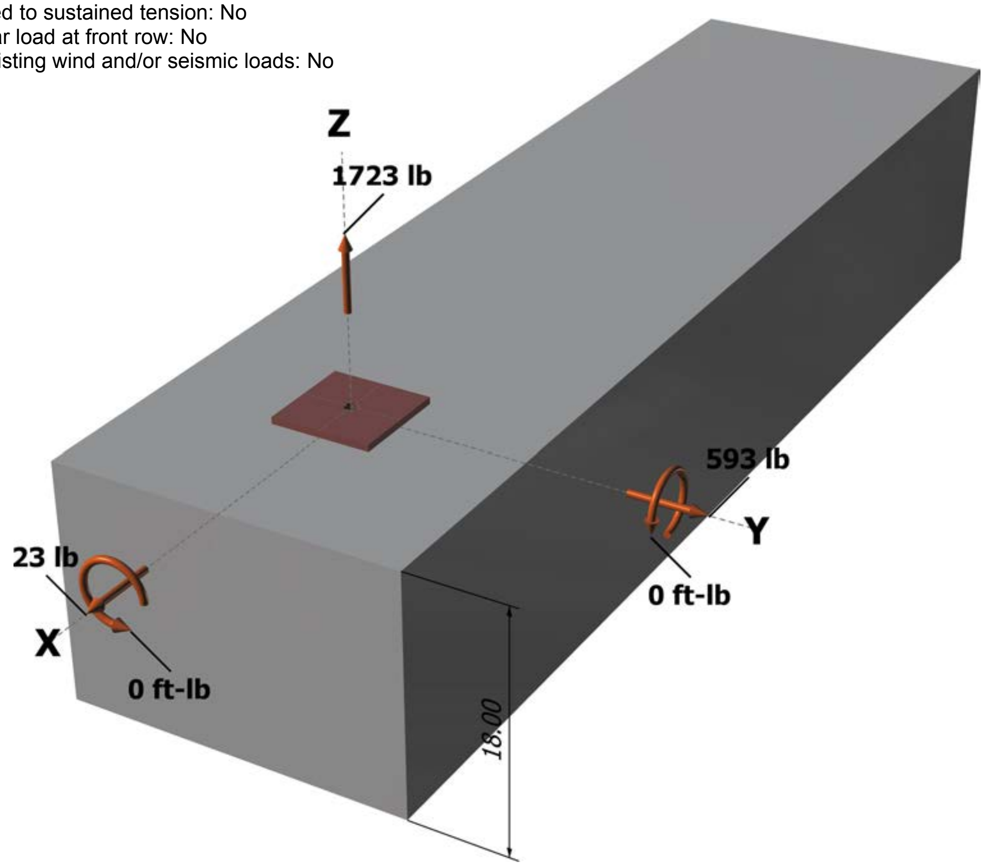
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

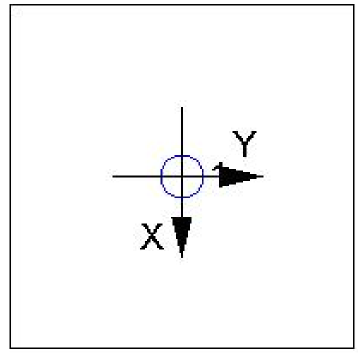
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, ϕN_n (lb)	Ratio	Status
Steel	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

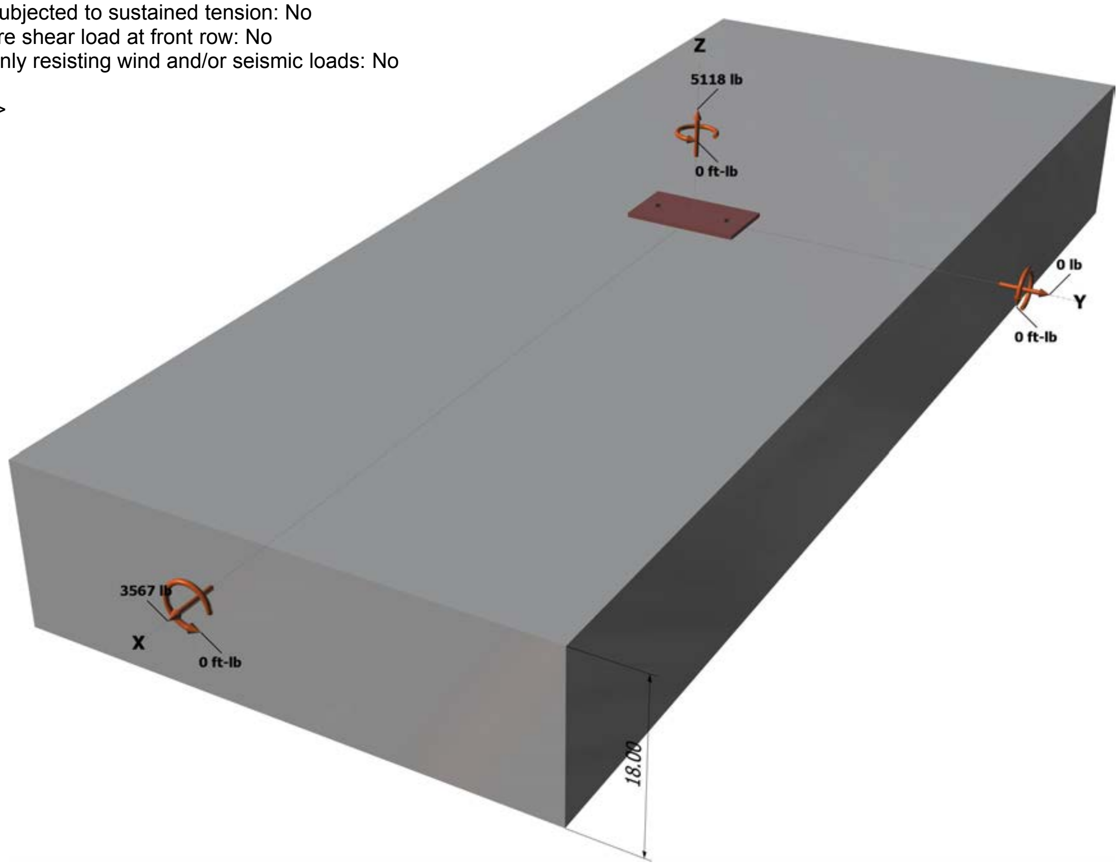
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

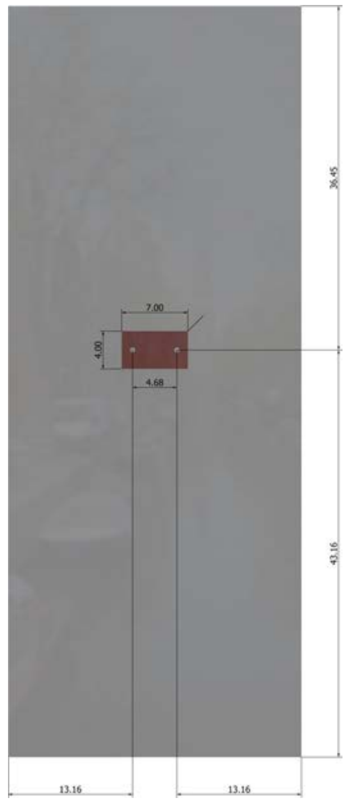
<Figure 1>



SIMPSON Strong-Tie®

Anchor Designer™
Software
Version 2.4.5673.0

<Figure 2>



Recommended Anchor

Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)

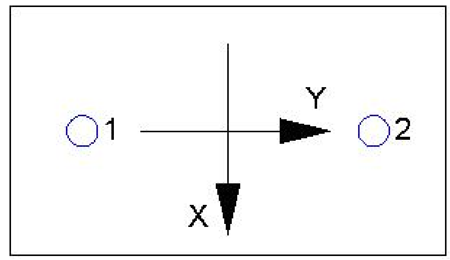
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

A_{Nc} (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)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.16	17908

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

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

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

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

Sec. D.7.3	0.63	0.57	119.8 %	1.2	Pass

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

12. Warnings

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

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

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