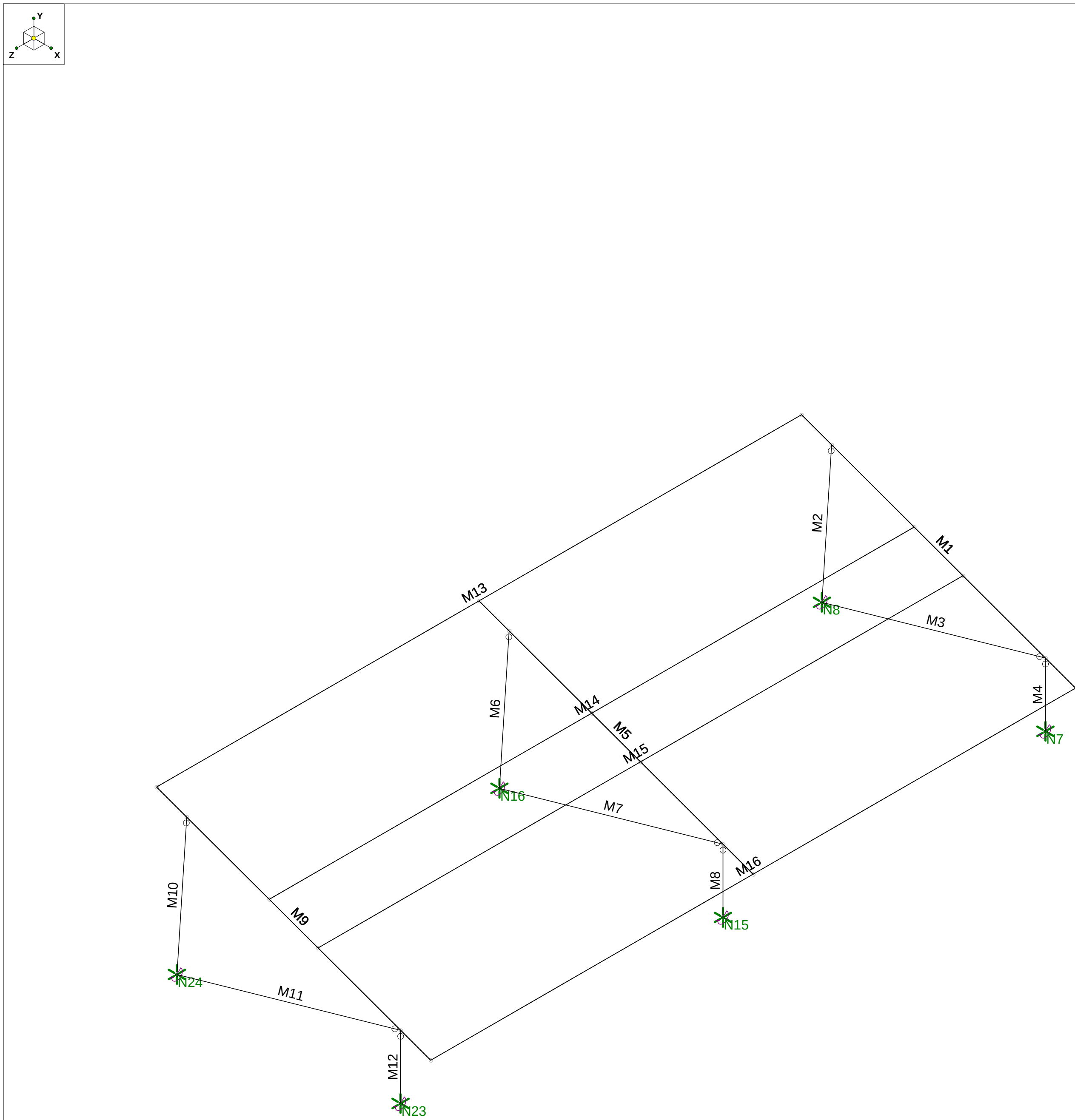


Schletter, Inc.		20ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

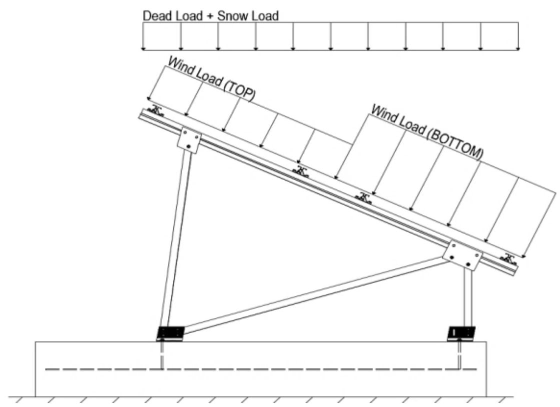
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum			Minimum	
Height =	1700	mm	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 = 20°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
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 = 20.62 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.91
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 140 mph   Exposure Category = C
Height < 15 ft   Importance Category = II

Peak Velocity Pressure, q_z = 30.77 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
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

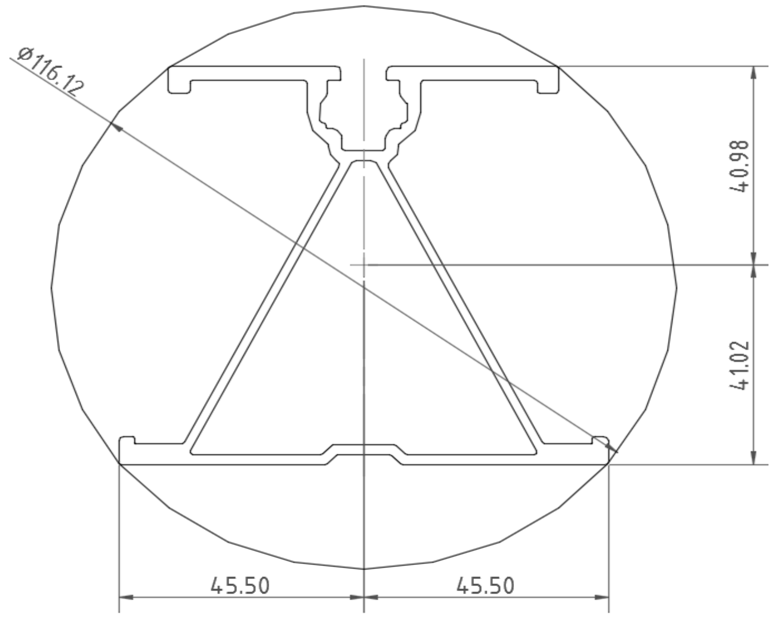
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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 =	117	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 =	1.992	k-ft
M_z =	0.288	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	97%	

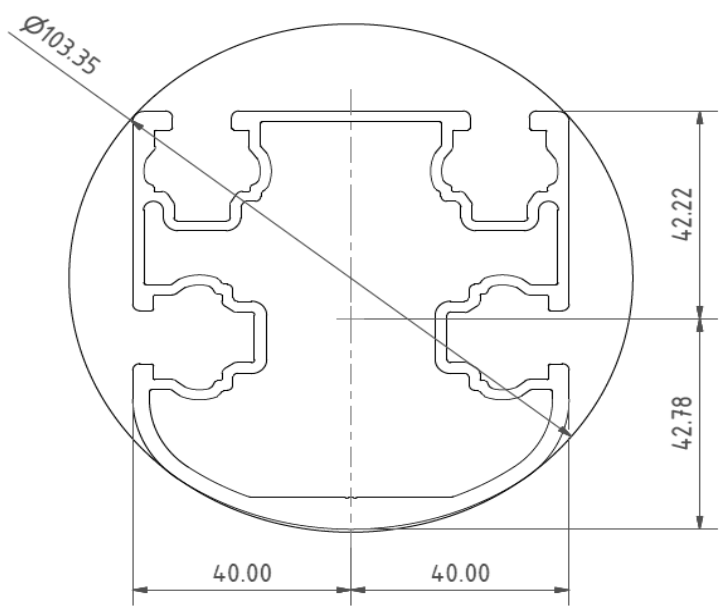


DETAIL VIEW

4.2 Girder Design

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

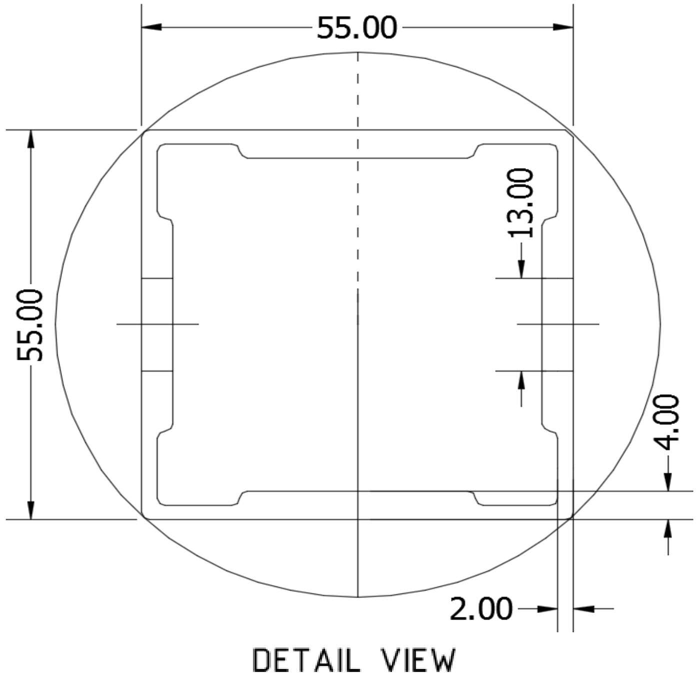
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.213	k-ft
M_z =	0.000	k-ft
P_n =	-0.652	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	94%	



4.3 Front Strut Design

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

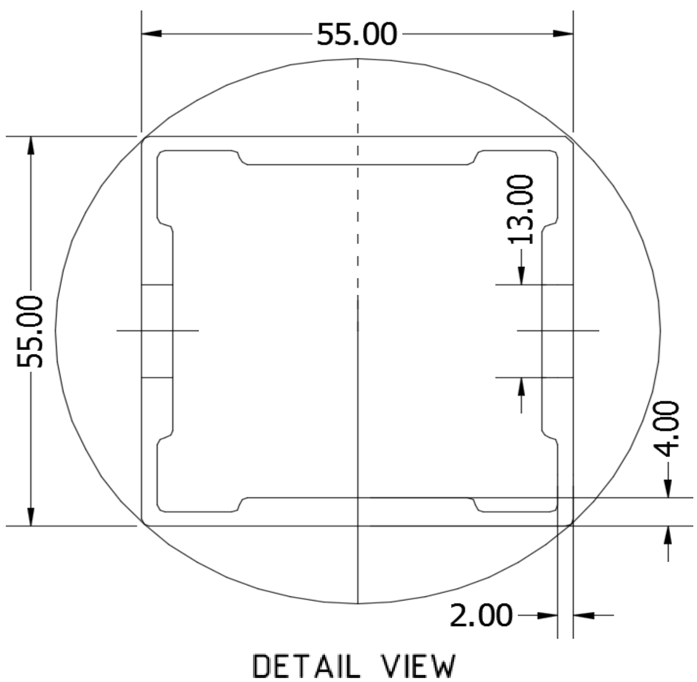
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.492	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	



4.4 Diagonal Strut Design

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

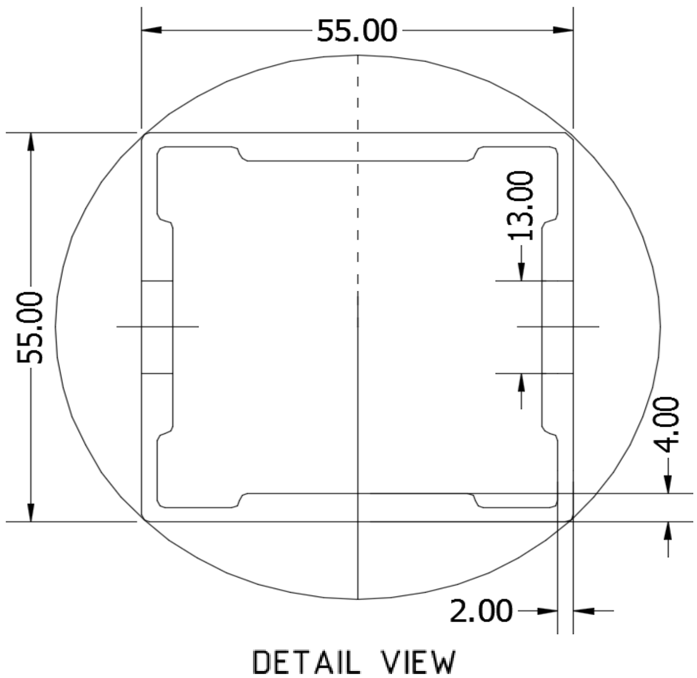
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	1.853	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	26%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	55.91	in
$\Phi F_{ty\ AXIAL}$ =	15.92	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	3.550	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	15.642	k
Utilization =	23%	



5. FOUNDATION DESIGN CALCULATIONS

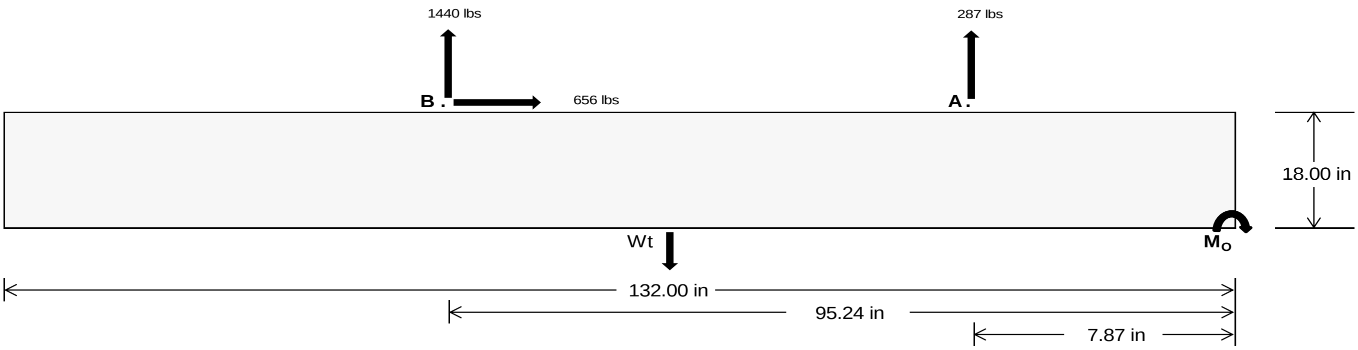
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	1262.44	6260.57	k
Compressive Load =	4540.16	5016.45	k
Lateral Load =	11.56	2844.70	k
Moment (Weak Axis) =	0.02	0.01	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O = 151219.8 in-lbs
Resisting Force Required = 2291.21 lbs
S.F. = 1.67
Weight Required = 3818.68 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force = 656.14 lbs
Friction = 0.4
Weight Required = 1640.35 lbs
Resisting Weight = 6579.38 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force = 656.14 lbs
Cohesion = 130 psf
Area = 30.25 ft^2
Resisting = 3289.69 lbs
Additional Weight Required = 0 lbs

Use a 132in long x 33in 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			
	33 in	34 in	35 in	36 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.75 ft) =	6579 lbs	6779 lbs	6978 lbs	7178 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in
F_A	1514 lbs	1514 lbs	1514 lbs	1514 lbs	1657 lbs	1657 lbs	1657 lbs	1657 lbs	2253 lbs	2253 lbs	2253 lbs	2253 lbs	-573 lbs	-573 lbs	-573 lbs	-573 lbs
F_B	1544 lbs	1544 lbs	1544 lbs	1544 lbs	1999 lbs	1999 lbs	1999 lbs	1999 lbs	2530 lbs	2530 lbs	2530 lbs	2530 lbs	-2880 lbs	-2880 lbs	-2880 lbs	-2880 lbs
F_V	171 lbs	171 lbs	171 lbs	171 lbs	1170 lbs	1170 lbs	1170 lbs	1170 lbs	993 lbs	993 lbs	993 lbs	993 lbs	-1312 lbs	-1312 lbs	-1312 lbs	-1312 lbs
P_{total}	9637 lbs	9837 lbs	10036 lbs	10236 lbs	10236 lbs	10435 lbs	10634 lbs	10834 lbs	11362 lbs	11562 lbs	11761 lbs	11961 lbs	494 lbs	614 lbs	734 lbs	853 lbs
M	3829 lbs-ft	3829 lbs-ft	3829 lbs-ft	3829 lbs-ft	4911 lbs-ft	4911 lbs-ft	4911 lbs-ft	4911 lbs-ft	6237 lbs-ft	6237 lbs-ft	6237 lbs-ft	6237 lbs-ft	2273 lbs-ft	2273 lbs-ft	2273 lbs-ft	2273 lbs-ft
e	0.40 ft	0.39 ft	0.38 ft	0.37 ft	0.48 ft	0.47 ft	0.46 ft	0.45 ft	0.55 ft	0.54 ft	0.53 ft	0.52 ft	4.60 ft	3.70 ft	3.10 ft	2.66 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}	249.5 psf	248.6 psf	247.7 psf	246.9 psf	249.8 psf	248.9 psf	248.0 psf	247.1 psf	263.2 psf	261.8 psf	260.5 psf	259.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	387.6 psf	382.6 psf	377.9 psf	373.5 psf	426.9 psf	420.8 psf	414.9 psf	409.5 psf	488.1 psf	480.1 psf	472.6 psf	465.5 psf	133.0 psf	80.4 psf	69.8 psf	66.9 psf

Maximum Bearing Pressure = 488 psf
Allowable Bearing Pressure = 1500 psf

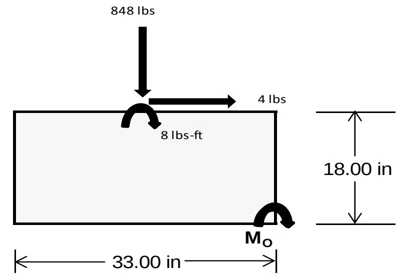
Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	1151.7 ft-lbs
Resisting Force Required =	837.63 lbs
S.F. =	1.67
Weight Required =	1396.06 lbs
Minimum Width =	33 in in
Weight Provided =	6579.38 lbs

A minimum 132in long x 33in 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	33 in			33 in			33 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	236 lbs	626 lbs	236 lbs	848 lbs	2510 lbs	848 lbs	69 lbs	183 lbs	69 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	8382 lbs	6579 lbs	8382 lbs	8602 lbs	6579 lbs	8602 lbs	2451 lbs	6579 lbs	2451 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	15 lbs-ft	0 lbs-ft	15 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft
f_{min}	276.8 psf	217.5 psf	276.8 psf	283.3 psf	217.5 psf	283.3 psf	81.0 psf	217.5 psf	81.0 psf
f_{max}	277.3 psf	217.5 psf	277.3 psf	285.4 psf	217.5 psf	285.4 psf	81.1 psf	217.5 psf	81.1 psf

Maximum Bearing Pressure = 285 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

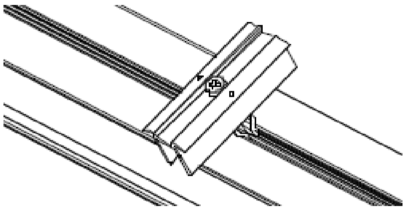
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

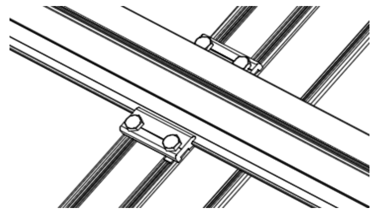
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.694 k
Allowable Uplift =	1.214 k
Utilization =	57%



Fastening of Purlins to Girders	
Maximum Uplifting Force =	2.410 k
Allowable Uplift =	4.357 k
Utilization =	55%



6.2 Strut Connections

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

Front Strut	
Maximum Axial Load =	3.492 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	47%

Rear Strut	
Maximum Axial Load =	4.298 k
M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	58%

Diagonal Strut	
Maximum Axial Load =	1.968 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	27%

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

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

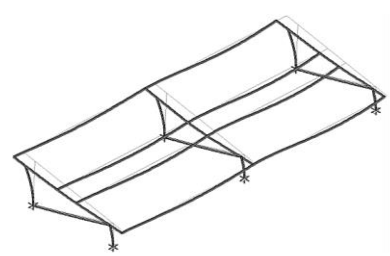
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	40.12 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$
	0.802 in
Max Drift, Δ_{MAX} =	0.039 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 = 117 in

J = 0.432

323.677

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.5 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 = 117

J = 0.432

205.839

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

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= 28.7

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

b/t = 32.195
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.9 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.94 ksi
A = 1215.13 mm^2
1.88 in^2
P_{max} = 41.32 kips

A.2 Design of Aluminum Girders - Aluminum Design Manual, 2005 Edition

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.4 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

S2 = 46.7
φF_L= φb[Bp-1.6Dp*b/t]
φF_L= 31.6 ksi

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.2

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L St$ = 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

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

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L Wk$ = 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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 = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 55.91 in
J = 0.942
87.2529

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 55.91
J = 0.942
87.2529

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.29339

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76107

φF_L= (φccFcy)/(λ²)

φF_L= 15.9235 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 15.92 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 16.39 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-54.031	-54.031	0	0
2	M14	Y	-54.031	-54.031	0	0
3	M15	Y	-54.031	-54.031	0	0
4	M16	Y	-54.031	-54.031	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-90.111	-90.111	0	0
2	M14	y	-90.111	-90.111	0	0
3	M15	y	-141.602	-141.602	0	0
4	M16	y	-141.602	-141.602	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	205.967	205.967	0	0
2	M14	y	157.908	157.908	0	0
3	M15	y	85.82	85.82	0	0
4	M16	y	85.82	85.82	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	540.798	2	1187.52	2	.816	1	.004	1	0	1	0	1
2		min	-691.266	3	-1474.164	3	.035	15	0	15	0	1	0	1
3	N7	max	.035	9	1229.654	1	-.337	15	0	15	0	1	0	1
4		min	-.16	2	-276.987	3	-8.896	1	-.019	1	0	1	0	1
5	N15	max	.025	9	3492.431	1	0	12	0	12	0	1	0	1
6		min	-1.928	2	-971.106	3	0	11	0	11	0	1	0	1
7	N16	max	2011.422	2	3858.805	2	0	11	0	14	0	1	0	1
8		min	-2188.23	3	-4815.823	3	0	1	0	1	0	1	0	1
9	N23	max	.035	9	1229.654	1	8.896	1	.019	1	0	1	0	1
10		min	-.16	2	-276.987	3	.337	15	0	15	0	1	0	1
11	N24	max	540.798	2	1187.52	2	-.035	15	0	15	0	1	0	1
12		min	-691.266	3	-1474.164	3	-.816	1	-.004	1	0	1	0	1
13	Totals:	max	3090.77	2	12053.583	1	0	12						
14		min	-3571.56	3	-9289.231	3	0	11						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	93.952	1	496.563	1	-5.729	15	0	3	.224	1	0	1
2			min	3.443	15	-734.711	3	-157.233	1	-.015	2	.008	15	0	3
3		2	max	93.952	1	347.69	1	-4.405	15	0	3	.073	1	.678	3
4			min	3.443	15	-517.036	3	-120.813	1	-.015	2	.003	15	-.457	1
5		3	max	93.952	1	198.817	1	-3.081	15	0	3	0	3	1.12	3
6			min	3.443	15	-299.36	3	-84.393	1	-.015	2	-.038	1	-.753	1
7		4	max	93.952	1	49.944	1	-1.758	15	0	3	-.003	12	1.327	3
8			min	3.443	15	-81.684	3	-47.973	1	-.015	2	-.11	1	-.888	1
9		5	max	93.952	1	135.991	3	-.434	15	0	3	-.005	12	1.297	3
10			min	3.443	15	-98.929	1	-11.553	1	-.015	2	-.142	1	-.862	1
11		6	max	93.952	1	353.667	3	24.867	1	0	3	-.005	15	1.032	3
12			min	3.443	15	-247.803	1	.271	12	-.015	2	-.135	1	-.674	1
13		7	max	93.952	1	571.343	3	61.287	1	0	3	-.003	15	.531	3
14			min	3.443	15	-396.676	1	1.595	12	-.015	2	-.088	1	-.325	1
15		8	max	93.952	1	789.019	3	97.707	1	0	3	.001	10	.186	1
16			min	3.443	15	-545.549	1	2.918	12	-.015	2	-.003	3	-.206	3
17		9	max	93.952	1	1006.694	3	134.127	1	0	3	.124	1	.857	1
18			min	3.443	15	-694.422	1	4.242	12	-.015	2	.002	12	-1.179	3
19		10	max	93.952	1	843.295	1	-5.566	12	0	3	.289	1	1.69	1
20			min	3.443	15	-1224.37	3	-170.547	1	-.015	2	.007	12	-2.387	3
21		11	max	93.952	1	694.422	1	-4.242	12	.015	2	.124	1	.857	1
22			min	3.443	15	-1006.694	3	-134.127	1	0	3	.002	12	-1.179	3
23		12	max	93.952	1	545.549	1	-2.918	12	.015	2	.001	10	.186	1
24			min	3.443	15	-789.019	3	-97.707	1	0	3	-.003	3	-.206	3
25		13	max	93.952	1	396.676	1	-1.595	12	.015	2	-.003	15	.531	3
26			min	3.443	15	-571.343	3	-61.287	1	0	3	-.088	1	-.325	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	93.952	1	247.803	1	-.271	12	.015	2	-.005	15	1.032	3
28			min	3.443	15	-353.667	3	-24.867	1	0	3	-.135	1	-.674	1
29		15	max	93.952	1	98.929	1	11.553	1	.015	2	-.005	12	1.297	3
30			min	3.443	15	-135.991	3	.434	15	0	3	-.142	1	-.862	1
31		16	max	93.952	1	81.684	3	47.973	1	.015	2	-.003	12	1.327	3
32			min	3.443	15	-49.944	1	1.758	15	0	3	-.11	1	-.888	1
33		17	max	93.952	1	299.36	3	84.393	1	.015	2	0	3	1.12	3
34			min	3.443	15	-198.817	1	3.081	15	0	3	-.038	1	-.753	1
35		18	max	93.952	1	517.036	3	120.813	1	.015	2	.073	1	.678	3
36			min	3.443	15	-347.69	1	4.405	15	0	3	.003	15	-.457	1
37		19	max	93.952	1	734.711	3	157.233	1	.015	2	.224	1	0	1
38			min	3.443	15	-496.563	1	5.729	15	0	3	.008	15	0	3
39	M14	1	max	44.373	1	528.053	1	-5.91	15	.009	3	.256	1	0	1
40			min	1.628	15	-576.619	3	-162.207	1	-.012	1	.009	15	0	3
41		2	max	44.373	1	379.18	1	-4.586	15	.009	3	.1	1	.535	3
42			min	1.628	15	-411.008	3	-125.787	1	-.012	1	.004	15	-.491	1
43		3	max	44.373	1	230.307	1	-3.262	15	.009	3	.002	3	.891	3
44			min	1.628	15	-245.396	3	-89.367	1	-.012	1	-.016	1	-.822	1
45		4	max	44.373	1	81.433	1	-1.938	15	.009	3	-.002	12	1.067	3
46			min	1.628	15	-79.784	3	-52.947	1	-.012	1	-.094	1	-.99	1
47		5	max	44.373	1	85.828	3	-.615	15	.009	3	-.004	12	1.063	3
48			min	1.628	15	-67.44	1	-16.527	1	-.012	1	-.131	1	-.998	1
49		6	max	44.373	1	251.44	3	19.893	1	.009	3	-.005	15	.881	3
50			min	1.628	15	-216.313	1	.042	3	-.012	1	-.129	1	-.844	1
51		7	max	44.373	1	417.052	3	56.313	1	.009	3	-.003	15	.519	3
52			min	1.628	15	-365.186	1	1.419	12	-.012	1	-.088	1	-.529	1
53		8	max	44.373	1	582.663	3	92.733	1	.009	3	0	10	0	15
54			min	1.628	15	-514.06	1	2.743	12	-.012	1	-.007	1	-.065	2
55		9	max	44.373	1	748.275	3	129.153	1	.009	3	.113	1	.584	1
56			min	1.628	15	-662.933	1	4.067	12	-.012	1	.002	12	-.744	3
57		10	max	44.373	1	811.806	1	-5.39	12	.009	3	.272	1	1.383	1
58			min	1.628	15	-913.887	3	-165.573	1	-.012	1	.007	12	-1.644	3
59		11	max	44.373	1	662.933	1	-4.067	12	.012	1	.113	1	.584	1
60			min	1.628	15	-748.275	3	-129.153	1	-.009	3	.002	12	-.744	3
61		12	max	44.373	1	514.06	1	-2.743	12	.012	1	0	10	0	15
62			min	1.628	15	-582.663	3	-92.733	1	-.009	3	-.007	1	-.065	2
63		13	max	44.373	1	365.186	1	-1.419	12	.012	1	-.003	15	.519	3
64			min	1.628	15	-417.052	3	-56.313	1	-.009	3	-.088	1	-.529	1
65		14	max	44.373	1	216.313	1	-.042	3	.012	1	-.005	15	.881	3
66			min	1.628	15	-251.44	3	-19.893	1	-.009	3	-.129	1	-.844	1
67		15	max	44.373	1	67.44	1	16.527	1	.012	1	-.004	12	1.063	3
68			min	1.628	15	-85.828	3	.615	15	-.009	3	-.131	1	-.998	1
69		16	max	44.373	1	79.784	3	52.947	1	.012	1	-.002	12	1.067	3
70			min	1.628	15	-81.433	1	1.938	15	-.009	3	-.094	1	-.99	1
71		17	max	44.373	1	245.396	3	89.367	1	.012	1	.002	3	.891	3
72			min	1.628	15	-230.307	1	3.262	15	-.009	3	-.016	1	-.822	1
73		18	max	44.373	1	411.008	3	125.787	1	.012	1	.1	1	.535	3
74			min	1.628	15	-379.18	1	4.586	15	-.009	3	.004	15	-.491	1
75		19	max	44.373	1	576.619	3	162.207	1	.012	1	.256	1	0	1
76			min	1.628	15	-528.053	1	5.91	15	-.009	3	.009	15	0	3
77	M15	1	max	-1.711	15	676.971	2	-5.909	15	.012	2	.256	1	0	2
78			min	-46.565	1	-313.321	3	-162.19	1	-.008	3	.009	15	0	3
79		2	max	-1.711	15	484.01	2	-4.585	15	.012	2	.1	1	.292	3
80			min	-46.565	1	-225.804	3	-125.77	1	-.008	3	.004	15	-.629	2
81		3	max	-1.711	15	291.049	2	-3.261	15	.012	2	.002	3	.489	3
82			min	-46.565	1	-138.288	3	-89.35	1	-.008	3	-.017	1	-1.049	2
83		4	max	-1.711	15	98.087	2	-1.937	15	.012	2	-.002	12	.592	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	-46.565	1	-50.771	3	-52.93	1	-.008	3	-.094	1	-1.259	2
85		5	max	-1.711	15	36.745	3	-.613	15	.012	2	-.004	12	.599	3
86			min	-46.565	1	-94.874	2	-16.51	1	-.008	3	-.131	1	-1.261	2
87		6	max	-1.711	15	124.262	3	19.91	1	.012	2	-.005	15	.512	3
88			min	-46.565	1	-287.835	2	.122	3	-.008	3	-.129	1	-1.054	2
89		7	max	-1.711	15	211.778	3	56.33	1	.012	2	-.003	15	.33	3
90			min	-46.565	1	-480.797	2	1.467	12	-.008	3	-.088	1	-.638	2
91		8	max	-1.711	15	299.295	3	92.75	1	.012	2	0	10	.053	3
92			min	-46.565	1	-673.758	2	2.791	12	-.008	3	-.007	1	-.027	1
93		9	max	-1.711	15	386.811	3	129.17	1	.012	2	.113	1	.822	2
94			min	-46.565	1	-866.719	2	4.114	12	-.008	3	.002	12	-.318	3
95		10	max	-1.711	15	1059.681	2	-5.438	12	.008	3	.272	1	1.866	2
96			min	-46.565	1	-474.328	3	-165.59	1	-.012	2	.007	12	-.785	3
97		11	max	-1.711	15	866.719	2	-4.114	12	.008	3	.113	1	.822	2
98			min	-46.565	1	-386.811	3	-129.17	1	-.012	2	.002	12	-.318	3
99		12	max	-1.711	15	673.758	2	-2.791	12	.008	3	0	10	.053	3
100			min	-46.565	1	-299.295	3	-92.75	1	-.012	2	-.007	1	-.027	1
101		13	max	-1.711	15	480.797	2	-1.467	12	.008	3	-.003	15	.33	3
102			min	-46.565	1	-211.778	3	-56.33	1	-.012	2	-.088	1	-.638	2
103		14	max	-1.711	15	287.835	2	-.122	3	.008	3	-.005	15	.512	3
104			min	-46.565	1	-124.262	3	-19.91	1	-.012	2	-.129	1	-1.054	2
105		15	max	-1.711	15	94.874	2	16.51	1	.008	3	-.004	12	.599	3
106			min	-46.565	1	-36.745	3	.613	15	-.012	2	-.131	1	-1.261	2
107		16	max	-1.711	15	50.771	3	52.93	1	.008	3	-.002	12	.592	3
108			min	-46.565	1	-98.087	2	1.937	15	-.012	2	-.094	1	-1.259	2
109		17	max	-1.711	15	138.288	3	89.35	1	.008	3	.002	3	.489	3
110			min	-46.565	1	-291.049	2	3.261	15	-.012	2	-.017	1	-1.049	2
111		18	max	-1.711	15	225.804	3	125.77	1	.008	3	.1	1	.292	3
112			min	-46.565	1	-484.01	2	4.585	15	-.012	2	.004	15	-.629	2
113		19	max	-1.711	15	313.321	3	162.19	1	.008	3	.256	1	0	2
114			min	-46.565	1	-676.971	2	5.909	15	-.012	2	.009	15	0	3
115	M16	1	max	-3.662	15	646.258	2	-5.735	15	.012	1	.225	1	0	2
116			min	-99.84	1	-290.412	3	-157.467	1	-.011	3	.008	15	0	3
117		2	max	-3.662	15	453.296	2	-4.411	15	.012	1	.074	1	.267	3
118			min	-99.84	1	-202.896	3	-121.047	1	-.011	3	.003	15	-.596	2
119		3	max	-3.662	15	260.335	2	-3.087	15	.012	1	0	3	.44	3
120			min	-99.84	1	-115.379	3	-84.627	1	-.011	3	-.037	1	-.982	2
121		4	max	-3.662	15	67.374	2	-1.763	15	.012	1	-.003	12	.517	3
122			min	-99.84	1	-27.863	3	-48.207	1	-.011	3	-.109	1	-1.16	2
123		5	max	-3.662	15	59.654	3	-.439	15	.012	1	-.005	12	.5	3
124			min	-99.84	1	-125.588	2	-11.787	1	-.011	3	-.142	1	-1.128	2
125		6	max	-3.662	15	147.17	3	24.633	1	.012	1	-.005	15	.388	3
126			min	-99.84	1	-318.549	2	.43	12	-.011	3	-.135	1	-.888	2
127		7	max	-3.662	15	234.687	3	61.053	1	.012	1	-.003	15	.181	3
128			min	-99.84	1	-511.51	2	1.754	12	-.011	3	-.088	1	-.438	2
129		8	max	-3.662	15	322.203	3	97.473	1	.012	1	0	10	.221	2
130			min	-99.84	1	-704.472	2	3.078	12	-.011	3	-.002	3	-.121	3
131		9	max	-3.662	15	409.72	3	133.893	1	.012	1	.123	1	1.088	2
132			min	-99.84	1	-897.433	2	4.401	12	-.011	3	.003	12	-.517	3
133		10	max	-3.662	15	1090.394	2	-5.725	12	.012	1	.288	1	2.165	2
134			min	-99.84	1	-497.236	3	-170.313	1	-.011	3	.008	12	-1.008	3
135		11	max	-3.662	15	897.433	2	-4.401	12	.011	3	.123	1	1.088	2
136			min	-99.84	1	-409.72	3	-133.893	1	-.012	1	.003	12	-.517	3
137		12	max	-3.662	15	704.472	2	-3.078	12	.011	3	0	10	.221	2
138			min	-99.84	1	-322.203	3	-97.473	1	-.012	1	-.002	3	-.121	3
139		13	max	-3.662	15	511.51	2	-1.754	12	.011	3	-.003	15	.181	3
140			min	-99.84	1	-234.687	3	-61.053	1	-.012	1	-.088	1	-.438	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	-3.662	15	318.549	2	-.43	12	.011	3	-.005	15	.388	3
142			min	-99.84	1	-147.17	3	-24.633	1	-.012	1	-.135	1	-.888	2
143		15	max	-3.662	15	125.588	2	11.787	1	.011	3	-.005	12	.5	3
144			min	-99.84	1	-59.654	3	.439	15	-.012	1	-.142	1	-1.128	2
145		16	max	-3.662	15	27.863	3	48.207	1	.011	3	-.003	12	.517	3
146			min	-99.84	1	-67.374	2	1.763	15	-.012	1	-.109	1	-1.16	2
147		17	max	-3.662	15	115.379	3	84.627	1	.011	3	0	3	.44	3
148			min	-99.84	1	-260.335	2	3.087	15	-.012	1	-.037	1	-.982	2
149		18	max	-3.662	15	202.896	3	121.047	1	.011	3	.074	1	.267	3
150			min	-99.84	1	-453.296	2	4.411	15	-.012	1	.003	15	-.596	2
151		19	max	-3.662	15	290.412	3	157.467	1	.011	3	.225	1	0	2
152			min	-99.84	1	-646.258	2	5.735	15	-.012	1	.008	15	0	3
153	M2	1	max	1103.244	1	2.027	4	.878	1	0	3	0	3	0	1
154			min	-1316.108	3	.477	15	.032	15	0	1	0	1	0	1
155		2	max	1103.623	1	1.993	4	.878	1	0	3	0	1	0	15
156			min	-1315.824	3	.47	15	.032	15	0	1	0	15	0	4
157		3	max	1104.002	1	1.96	4	.878	1	0	3	0	1	0	15
158			min	-1315.54	3	.462	15	.032	15	0	1	0	15	-.001	4
159		4	max	1104.381	1	1.926	4	.878	1	0	3	0	1	0	15
160			min	-1315.255	3	.454	15	.032	15	0	1	0	15	-.002	4
161		5	max	1104.761	1	1.893	4	.878	1	0	3	0	1	0	15
162			min	-1314.971	3	.446	15	.032	15	0	1	0	15	-.002	4
163		6	max	1105.14	1	1.86	4	.878	1	0	3	.001	1	0	15
164			min	-1314.686	3	.438	15	.032	15	0	1	0	15	-.002	4
165		7	max	1105.519	1	1.826	4	.878	1	0	3	.001	1	0	15
166			min	-1314.402	3	.43	15	.032	15	0	1	0	15	-.003	4
167		8	max	1105.898	1	1.793	4	.878	1	0	3	.002	1	0	15
168			min	-1314.117	3	.422	15	.032	15	0	1	0	15	-.003	4
169		9	max	1106.278	1	1.759	4	.878	1	0	3	.002	1	0	15
170			min	-1313.833	3	.415	15	.032	15	0	1	0	15	-.004	4
171		10	max	1106.657	1	1.726	4	.878	1	0	3	.002	1	-.001	15
172			min	-1313.548	3	.407	15	.032	15	0	1	0	15	-.004	4
173		11	max	1107.036	1	1.693	4	.878	1	0	3	.002	1	-.001	15
174			min	-1313.264	3	.399	15	.032	15	0	1	0	15	-.005	4
175		12	max	1107.416	1	1.659	4	.878	1	0	3	.002	1	-.001	15
176			min	-1312.98	3	.391	15	.032	15	0	1	0	15	-.005	4
177		13	max	1107.795	1	1.626	4	.878	1	0	3	.003	1	-.001	15
178			min	-1312.695	3	.383	15	.032	15	0	1	0	15	-.006	4
179		14	max	1108.174	1	1.593	4	.878	1	0	3	.003	1	-.001	15
180			min	-1312.411	3	.375	15	.032	15	0	1	0	15	-.006	4
181		15	max	1108.553	1	1.559	4	.878	1	0	3	.003	1	-.002	15
182			min	-1312.126	3	.368	15	.032	15	0	1	0	15	-.006	4
183		16	max	1108.933	1	1.526	4	.878	1	0	3	.003	1	-.002	15
184			min	-1311.842	3	.36	15	.032	15	0	1	0	15	-.007	4
185		17	max	1109.312	1	1.492	4	.878	1	0	3	.004	1	-.002	15
186			min	-1311.557	3	.352	15	.032	15	0	1	0	15	-.007	4
187		18	max	1109.691	1	1.459	4	.878	1	0	3	.004	1	-.002	15
188			min	-1311.273	3	.341	12	.032	15	0	1	0	15	-.008	4
189		19	max	1110.07	1	1.426	4	.878	1	0	3	.004	1	-.002	15
190			min	-1310.988	3	.328	12	.032	15	0	1	0	15	-.008	4
191	M3	1	max	487.881	2	7.982	4	.077	1	0	3	0	1	.008	4
192			min	-624.291	3	1.877	15	.003	15	0	1	0	15	.002	15
193		2	max	487.71	2	7.212	4	.077	1	0	3	0	1	.005	2
194			min	-624.419	3	1.696	15	.003	15	0	1	0	15	0	12
195		3	max	487.54	2	6.442	4	.077	1	0	3	0	1	.003	2
196			min	-624.547	3	1.515	15	.003	15	0	1	0	15	0	3
197		4	max	487.37	2	5.672	4	.077	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-624.675	3	1.334	15	.003	15	0	1	0	15	-.002	3
199		5	max	487.199	2	4.902	4	.077	1	0	3	0	1	0	15
200			min	-624.802	3	1.153	15	.003	15	0	1	0	15	-.003	3
201		6	max	487.029	2	4.132	4	.077	1	0	3	0	1	-.001	15
202			min	-624.93	3	.972	15	.003	15	0	1	0	15	-.005	4
203		7	max	486.859	2	3.362	4	.077	1	0	3	0	1	-.001	15
204			min	-625.058	3	.791	15	.003	15	0	1	0	15	-.006	4
205		8	max	486.688	2	2.592	4	.077	1	0	3	0	1	-.002	15
206			min	-625.186	3	.61	15	.003	15	0	1	0	15	-.008	4
207		9	max	486.518	2	1.822	4	.077	1	0	3	0	1	-.002	15
208			min	-625.313	3	.429	15	.003	15	0	1	0	15	-.009	4
209		10	max	486.348	2	1.052	4	.077	1	0	3	0	1	-.002	15
210			min	-625.441	3	.248	15	.003	15	0	1	0	15	-.009	4
211		11	max	486.177	2	.389	2	.077	1	0	3	0	1	-.002	15
212			min	-625.569	3	-.066	3	.003	15	0	1	0	15	-.009	4
213		12	max	486.007	2	-.114	15	.077	1	0	3	0	1	-.002	15
214			min	-625.697	3	-.516	3	.003	15	0	1	0	15	-.009	4
215		13	max	485.837	2	-.295	15	.077	1	0	3	0	1	-.002	15
216			min	-625.825	3	-1.258	4	.003	15	0	1	0	15	-.009	4
217		14	max	485.666	2	-.476	15	.077	1	0	3	0	1	-.002	15
218			min	-625.952	3	-2.028	4	.003	15	0	1	0	15	-.008	4
219		15	max	485.496	2	-.657	15	.077	1	0	3	0	1	-.002	15
220			min	-626.08	3	-2.798	4	.003	15	0	1	0	15	-.007	4
221		16	max	485.326	2	-.838	15	.077	1	0	3	0	1	-.001	15
222			min	-626.208	3	-3.568	4	.003	15	0	1	0	15	-.006	4
223		17	max	485.155	2	-1.019	15	.077	1	0	3	0	1	-.001	15
224			min	-626.336	3	-4.338	4	.003	15	0	1	0	15	-.004	4
225		18	max	484.985	2	-1.2	15	.077	1	0	3	0	1	0	15
226			min	-626.463	3	-5.108	4	.003	15	0	1	0	15	-.002	4
227		19	max	484.814	2	-1.381	15	.077	1	0	3	0	1	0	1
228			min	-626.591	3	-5.878	4	.003	15	0	1	0	15	0	1
229	M4	1	max	1226.587	1	0	1	-.337	15	0	1	0	1	0	1
230			min	-279.286	3	0	1	-9.239	1	0	1	0	15	0	1
231		2	max	1226.758	1	0	1	-.337	15	0	1	0	12	0	1
232			min	-279.158	3	0	1	-9.239	1	0	1	0	1	0	1
233		3	max	1226.928	1	0	1	-.337	15	0	1	0	15	0	1
234			min	-279.031	3	0	1	-9.239	1	0	1	-.002	1	0	1
235		4	max	1227.098	1	0	1	-.337	15	0	1	0	15	0	1
236			min	-278.903	3	0	1	-9.239	1	0	1	-.003	1	0	1
237		5	max	1227.269	1	0	1	-.337	15	0	1	0	15	0	1
238			min	-278.775	3	0	1	-9.239	1	0	1	-.004	1	0	1
239		6	max	1227.439	1	0	1	-.337	15	0	1	0	15	0	1
240			min	-278.647	3	0	1	-9.239	1	0	1	-.005	1	0	1
241		7	max	1227.609	1	0	1	-.337	15	0	1	0	15	0	1
242			min	-278.52	3	0	1	-9.239	1	0	1	-.006	1	0	1
243		8	max	1227.78	1	0	1	-.337	15	0	1	0	15	0	1
244			min	-278.392	3	0	1	-9.239	1	0	1	-.007	1	0	1
245		9	max	1227.95	1	0	1	-.337	15	0	1	0	15	0	1
246			min	-278.264	3	0	1	-9.239	1	0	1	-.008	1	0	1
247		10	max	1228.12	1	0	1	-.337	15	0	1	0	15	0	1
248			min	-278.136	3	0	1	-9.239	1	0	1	-.009	1	0	1
249		11	max	1228.291	1	0	1	-.337	15	0	1	0	15	0	1
250			min	-278.009	3	0	1	-9.239	1	0	1	-.01	1	0	1
251		12	max	1228.461	1	0	1	-.337	15	0	1	0	15	0	1
252			min	-277.881	3	0	1	-9.239	1	0	1	-.011	1	0	1
253		13	max	1228.631	1	0	1	-.337	15	0	1	0	15	0	1
254			min	-277.753	3	0	1	-9.239	1	0	1	-.012	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	1228.802	1	0	1	-.337	15	0	1	0	15	0	1
256			min	-277.625	3	0	1	-9.239	1	0	1	-.013	1	0	1
257		15	max	1228.972	1	0	1	-.337	15	0	1	0	15	0	1
258			min	-277.498	3	0	1	-9.239	1	0	1	-.014	1	0	1
259		16	max	1229.143	1	0	1	-.337	15	0	1	0	15	0	1
260			min	-277.37	3	0	1	-9.239	1	0	1	-.015	1	0	1
261		17	max	1229.313	1	0	1	-.337	15	0	1	0	15	0	1
262			min	-277.242	3	0	1	-9.239	1	0	1	-.016	1	0	1
263		18	max	1229.483	1	0	1	-.337	15	0	1	0	15	0	1
264			min	-277.114	3	0	1	-9.239	1	0	1	-.018	1	0	1
265		19	max	1229.654	1	0	1	-.337	15	0	1	0	15	0	1
266			min	-276.987	3	0	1	-9.239	1	0	1	-.019	1	0	1
267	M6	1	max	3542.869	1	2.583	2	0	1	0	1	0	1	0	1
268			min	-4298.226	3	-.034	3	0	1	0	1	0	1	0	1
269		2	max	3543.249	1	2.556	2	0	1	0	1	0	1	0	3
270			min	-4297.941	3	-.054	3	0	1	0	1	0	1	0	2
271		3	max	3543.628	1	2.53	2	0	1	0	1	0	1	0	3
272			min	-4297.657	3	-.073	3	0	1	0	1	0	1	-.001	2
273		4	max	3544.007	1	2.504	2	0	1	0	1	0	1	0	3
274			min	-4297.372	3	-.093	3	0	1	0	1	0	1	-.002	2
275		5	max	3544.387	1	2.478	2	0	1	0	1	0	1	0	3
276			min	-4297.088	3	-.112	3	0	1	0	1	0	1	-.003	2
277		6	max	3544.766	1	2.452	2	0	1	0	1	0	1	0	3
278			min	-4296.804	3	-.132	3	0	1	0	1	0	1	-.003	2
279		7	max	3545.145	1	2.426	2	0	1	0	1	0	1	0	3
280			min	-4296.519	3	-.151	3	0	1	0	1	0	1	-.004	2
281		8	max	3545.524	1	2.4	2	0	1	0	1	0	1	0	3
282			min	-4296.235	3	-.171	3	0	1	0	1	0	1	-.004	2
283		9	max	3545.904	1	2.374	2	0	1	0	1	0	1	0	3
284			min	-4295.95	3	-.19	3	0	1	0	1	0	1	-.005	2
285		10	max	3546.283	1	2.348	2	0	1	0	1	0	1	0	3
286			min	-4295.666	3	-.21	3	0	1	0	1	0	1	-.006	2
287		11	max	3546.662	1	2.322	2	0	1	0	1	0	1	0	3
288			min	-4295.381	3	-.229	3	0	1	0	1	0	1	-.006	2
289		12	max	3547.041	1	2.296	2	0	1	0	1	0	1	0	3
290			min	-4295.097	3	-.249	3	0	1	0	1	0	1	-.007	2
291		13	max	3547.421	1	2.27	2	0	1	0	1	0	1	0	3
292			min	-4294.812	3	-.268	3	0	1	0	1	0	1	-.007	2
293		14	max	3547.8	1	2.244	2	0	1	0	1	0	1	0	3
294			min	-4294.528	3	-.288	3	0	1	0	1	0	1	-.008	2
295		15	max	3548.179	1	2.218	2	0	1	0	1	0	1	0	3
296			min	-4294.244	3	-.307	3	0	1	0	1	0	1	-.009	2
297		16	max	3548.558	1	2.192	2	0	1	0	1	0	1	0	3
298			min	-4293.959	3	-.327	3	0	1	0	1	0	1	-.009	2
299		17	max	3548.938	1	2.166	2	0	1	0	1	0	1	0	3
300			min	-4293.675	3	-.346	3	0	1	0	1	0	1	-.01	2
301		18	max	3549.317	1	2.14	2	0	1	0	1	0	1	0	3
302			min	-4293.39	3	-.366	3	0	1	0	1	0	1	-.01	2
303		19	max	3549.696	1	2.114	2	0	1	0	1	0	1	0	3
304			min	-4293.106	3	-.385	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	1853.23	2	8.019	4	0	1	0	1	0	1	.011	2
306			min	-1965.413	3	1.882	15	0	1	0	1	0	1	0	3
307		2	max	1853.059	2	7.249	4	0	1	0	1	0	1	.008	2
308			min	-1965.54	3	1.701	15	0	1	0	1	0	1	-.003	3
309		3	max	1852.889	2	6.479	4	0	1	0	1	0	1	.006	2
310			min	-1965.668	3	1.52	15	0	1	0	1	0	1	-.004	3
311		4	max	1852.718	2	5.709	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-1965.796	3	1.339	15	0	1	0	1	0	1	-.005	3
313		5	max	1852.548	2	4.939	4	0	1	0	1	0	1	.001	2
314			min	-1965.924	3	1.158	15	0	1	0	1	0	1	-.006	3
315		6	max	1852.378	2	4.169	4	0	1	0	1	0	1	0	2
316			min	-1966.051	3	.977	15	0	1	0	1	0	1	-.007	3
317		7	max	1852.207	2	3.399	4	0	1	0	1	0	1	-.001	15
318			min	-1966.179	3	.796	15	0	1	0	1	0	1	-.007	3
319		8	max	1852.037	2	2.631	2	0	1	0	1	0	1	-.002	15
320			min	-1966.307	3	.565	12	0	1	0	1	0	1	-.008	3
321		9	max	1851.867	2	2.031	2	0	1	0	1	0	1	-.002	15
322			min	-1966.435	3	.265	12	0	1	0	1	0	1	-.008	4
323		10	max	1851.696	2	1.431	2	0	1	0	1	0	1	-.002	15
324			min	-1966.563	3	-.128	3	0	1	0	1	0	1	-.009	4
325		11	max	1851.526	2	.831	2	0	1	0	1	0	1	-.002	15
326			min	-1966.69	3	-.578	3	0	1	0	1	0	1	-.009	4
327		12	max	1851.356	2	.231	2	0	1	0	1	0	1	-.002	15
328			min	-1966.818	3	-1.028	3	0	1	0	1	0	1	-.009	4
329		13	max	1851.185	2	-.29	15	0	1	0	1	0	1	-.002	15
330			min	-1966.946	3	-1.478	3	0	1	0	1	0	1	-.009	4
331		14	max	1851.015	2	-.471	15	0	1	0	1	0	1	-.002	15
332			min	-1967.074	3	-1.991	4	0	1	0	1	0	1	-.008	4
333		15	max	1850.845	2	-.652	15	0	1	0	1	0	1	-.002	15
334			min	-1967.201	3	-2.761	4	0	1	0	1	0	1	-.007	4
335		16	max	1850.674	2	-.833	15	0	1	0	1	0	1	-.001	15
336			min	-1967.329	3	-3.531	4	0	1	0	1	0	1	-.006	4
337		17	max	1850.504	2	-1.014	15	0	1	0	1	0	1	-.001	15
338			min	-1967.457	3	-4.301	4	0	1	0	1	0	1	-.004	4
339		18	max	1850.334	2	-1.195	15	0	1	0	1	0	1	0	15
340			min	-1967.585	3	-5.071	4	0	1	0	1	0	1	-.002	4
341		19	max	1850.163	2	-1.376	15	0	1	0	1	0	1	0	1
342			min	-1967.712	3	-5.841	4	0	1	0	1	0	1	0	1
343	M8	1	max	3489.365	1	0	1	0	1	0	1	0	1	0	1
344			min	-973.406	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3489.535	1	0	1	0	1	0	1	0	1	0	1
346			min	-973.278	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3489.706	1	0	1	0	1	0	1	0	1	0	1
348			min	-973.15	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3489.876	1	0	1	0	1	0	1	0	1	0	1
350			min	-973.023	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3490.047	1	0	1	0	1	0	1	0	1	0	1
352			min	-972.895	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3490.217	1	0	1	0	1	0	1	0	1	0	1
354			min	-972.767	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3490.387	1	0	1	0	1	0	1	0	1	0	1
356			min	-972.639	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3490.558	1	0	1	0	1	0	1	0	1	0	1
358			min	-972.512	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3490.728	1	0	1	0	1	0	1	0	1	0	1
360			min	-972.384	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3490.898	1	0	1	0	1	0	1	0	1	0	1
362			min	-972.256	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3491.069	1	0	1	0	1	0	1	0	1	0	1
364			min	-972.128	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3491.239	1	0	1	0	1	0	1	0	1	0	1
366			min	-972.001	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3491.409	1	0	1	0	1	0	1	0	1	0	1
368			min	-971.873	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3491.58	1	0	1	0	1	0	1	0	1	0	1
370			min	-971.745	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3491.75	1	0	1	0	1	0	1	0	1	0	1
372			min	-971.617	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3491.92	1	0	1	0	1	0	1	0	1	0	1
374			min	-971.49	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3492.091	1	0	1	0	1	0	1	0	1	0	1
376			min	-971.362	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3492.261	1	0	1	0	1	0	1	0	1	0	1
378			min	-971.234	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3492.431	1	0	1	0	1	0	1	0	1	0	1
380			min	-971.106	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1103.244	1	2.027	4	-.032	15	0	1	0	1	0	1
382			min	-1316.108	3	.477	15	-.878	1	0	3	0	3	0	1
383		2	max	1103.623	1	1.993	4	-.032	15	0	1	0	15	0	15
384			min	-1315.824	3	.47	15	-.878	1	0	3	0	1	0	4
385		3	max	1104.002	1	1.96	4	-.032	15	0	1	0	15	0	15
386			min	-1315.54	3	.462	15	-.878	1	0	3	0	1	-.001	4
387		4	max	1104.381	1	1.926	4	-.032	15	0	1	0	15	0	15
388			min	-1315.255	3	.454	15	-.878	1	0	3	0	1	-.002	4
389		5	max	1104.761	1	1.893	4	-.032	15	0	1	0	15	0	15
390			min	-1314.971	3	.446	15	-.878	1	0	3	0	1	-.002	4
391		6	max	1105.14	1	1.86	4	-.032	15	0	1	0	15	0	15
392			min	-1314.686	3	.438	15	-.878	1	0	3	-.001	1	-.002	4
393		7	max	1105.519	1	1.826	4	-.032	15	0	1	0	15	0	15
394			min	-1314.402	3	.43	15	-.878	1	0	3	-.001	1	-.003	4
395		8	max	1105.898	1	1.793	4	-.032	15	0	1	0	15	0	15
396			min	-1314.117	3	.422	15	-.878	1	0	3	-.002	1	-.003	4
397		9	max	1106.278	1	1.759	4	-.032	15	0	1	0	15	0	15
398			min	-1313.833	3	.415	15	-.878	1	0	3	-.002	1	-.004	4
399		10	max	1106.657	1	1.726	4	-.032	15	0	1	0	15	-.001	15
400			min	-1313.548	3	.407	15	-.878	1	0	3	-.002	1	-.004	4
401		11	max	1107.036	1	1.693	4	-.032	15	0	1	0	15	-.001	15
402			min	-1313.264	3	.399	15	-.878	1	0	3	-.002	1	-.005	4
403		12	max	1107.416	1	1.659	4	-.032	15	0	1	0	15	-.001	15
404			min	-1312.98	3	.391	15	-.878	1	0	3	-.002	1	-.005	4
405		13	max	1107.795	1	1.626	4	-.032	15	0	1	0	15	-.001	15
406			min	-1312.695	3	.383	15	-.878	1	0	3	-.003	1	-.006	4
407		14	max	1108.174	1	1.593	4	-.032	15	0	1	0	15	-.001	15
408			min	-1312.411	3	.375	15	-.878	1	0	3	-.003	1	-.006	4
409		15	max	1108.553	1	1.559	4	-.032	15	0	1	0	15	-.002	15
410			min	-1312.126	3	.368	15	-.878	1	0	3	-.003	1	-.006	4
411		16	max	1108.933	1	1.526	4	-.032	15	0	1	0	15	-.002	15
412			min	-1311.842	3	.36	15	-.878	1	0	3	-.003	1	-.007	4
413		17	max	1109.312	1	1.492	4	-.032	15	0	1	0	15	-.002	15
414			min	-1311.557	3	.352	15	-.878	1	0	3	-.004	1	-.007	4
415		18	max	1109.691	1	1.459	4	-.032	15	0	1	0	15	-.002	15
416			min	-1311.273	3	.341	12	-.878	1	0	3	-.004	1	-.008	4
417		19	max	1110.07	1	1.426	4	-.032	15	0	1	0	15	-.002	15
418			min	-1310.988	3	.328	12	-.878	1	0	3	-.004	1	-.008	4
419	M11	1	max	487.881	2	7.982	4	-.003	15	0	1	0	15	.008	4
420			min	-624.291	3	1.877	15	-.077	1	0	3	0	1	.002	15
421		2	max	487.71	2	7.212	4	-.003	15	0	1	0	15	.005	2
422			min	-624.419	3	1.696	15	-.077	1	0	3	0	1	0	12
423		3	max	487.54	2	6.442	4	-.003	15	0	1	0	15	.003	2
424			min	-624.547	3	1.515	15	-.077	1	0	3	0	1	0	3
425		4	max	487.37	2	5.672	4	-.003	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-624.675	3	1.334	15	-.077	1	0	3	0	1	-.002	3
427		5	max	487.199	2	4.902	4	-.003	15	0	1	0	15	0	15
428			min	-624.802	3	1.153	15	-.077	1	0	3	0	1	-.003	3
429		6	max	487.029	2	4.132	4	-.003	15	0	1	0	15	-.001	15
430			min	-624.93	3	.972	15	-.077	1	0	3	0	1	-.005	4
431		7	max	486.859	2	3.362	4	-.003	15	0	1	0	15	-.001	15
432			min	-625.058	3	.791	15	-.077	1	0	3	0	1	-.006	4
433		8	max	486.688	2	2.592	4	-.003	15	0	1	0	15	-.002	15
434			min	-625.186	3	.61	15	-.077	1	0	3	0	1	-.008	4
435		9	max	486.518	2	1.822	4	-.003	15	0	1	0	15	-.002	15
436			min	-625.313	3	.429	15	-.077	1	0	3	0	1	-.009	4
437		10	max	486.348	2	1.052	4	-.003	15	0	1	0	15	-.002	15
438			min	-625.441	3	.248	15	-.077	1	0	3	0	1	-.009	4
439		11	max	486.177	2	.389	2	-.003	15	0	1	0	15	-.002	15
440			min	-625.569	3	-.066	3	-.077	1	0	3	0	1	-.009	4
441		12	max	486.007	2	-.114	15	-.003	15	0	1	0	15	-.002	15
442			min	-625.697	3	-.516	3	-.077	1	0	3	0	1	-.009	4
443		13	max	485.837	2	-.295	15	-.003	15	0	1	0	15	-.002	15
444			min	-625.825	3	-1.258	4	-.077	1	0	3	0	1	-.009	4
445		14	max	485.666	2	-.476	15	-.003	15	0	1	0	15	-.002	15
446			min	-625.952	3	-2.028	4	-.077	1	0	3	0	1	-.008	4
447		15	max	485.496	2	-.657	15	-.003	15	0	1	0	15	-.002	15
448			min	-626.08	3	-2.798	4	-.077	1	0	3	0	1	-.007	4
449		16	max	485.326	2	-.838	15	-.003	15	0	1	0	15	-.001	15
450			min	-626.208	3	-3.568	4	-.077	1	0	3	0	1	-.006	4
451		17	max	485.155	2	-1.019	15	-.003	15	0	1	0	15	-.001	15
452			min	-626.336	3	-4.338	4	-.077	1	0	3	0	1	-.004	4
453		18	max	484.985	2	-1.2	15	-.003	15	0	1	0	15	0	15
454			min	-626.463	3	-5.108	4	-.077	1	0	3	0	1	-.002	4
455		19	max	484.814	2	-1.381	15	-.003	15	0	1	0	15	0	1
456			min	-626.591	3	-5.878	4	-.077	1	0	3	0	1	0	1
457	M12	1	max	1226.587	1	0	1	9.239	1	0	1	0	15	0	1
458			min	-279.286	3	0	1	.337	15	0	1	0	1	0	1
459		2	max	1226.758	1	0	1	9.239	1	0	1	0	1	0	1
460			min	-279.158	3	0	1	.337	15	0	1	0	12	0	1
461		3	max	1226.928	1	0	1	9.239	1	0	1	.002	1	0	1
462			min	-279.031	3	0	1	.337	15	0	1	0	15	0	1
463		4	max	1227.098	1	0	1	9.239	1	0	1	.003	1	0	1
464			min	-278.903	3	0	1	.337	15	0	1	0	15	0	1
465		5	max	1227.269	1	0	1	9.239	1	0	1	.004	1	0	1
466			min	-278.775	3	0	1	.337	15	0	1	0	15	0	1
467		6	max	1227.439	1	0	1	9.239	1	0	1	.005	1	0	1
468			min	-278.647	3	0	1	.337	15	0	1	0	15	0	1
469		7	max	1227.609	1	0	1	9.239	1	0	1	.006	1	0	1
470			min	-278.52	3	0	1	.337	15	0	1	0	15	0	1
471		8	max	1227.78	1	0	1	9.239	1	0	1	.007	1	0	1
472			min	-278.392	3	0	1	.337	15	0	1	0	15	0	1
473		9	max	1227.95	1	0	1	9.239	1	0	1	.008	1	0	1
474			min	-278.264	3	0	1	.337	15	0	1	0	15	0	1
475		10	max	1228.12	1	0	1	9.239	1	0	1	.009	1	0	1
476			min	-278.136	3	0	1	.337	15	0	1	0	15	0	1
477		11	max	1228.291	1	0	1	9.239	1	0	1	.01	1	0	1
478			min	-278.009	3	0	1	.337	15	0	1	0	15	0	1
479		12	max	1228.461	1	0	1	9.239	1	0	1	.011	1	0	1
480			min	-277.881	3	0	1	.337	15	0	1	0	15	0	1
481		13	max	1228.631	1	0	1	9.239	1	0	1	.012	1	0	1
482			min	-277.753	3	0	1	.337	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	1228.802	1	0	1	9.239	1	0	1	.013	1	0	1
484			min	-277.625	3	0	1	.337	15	0	1	0	15	0	1
485		15	max	1228.972	1	0	1	9.239	1	0	1	.014	1	0	1
486			min	-277.498	3	0	1	.337	15	0	1	0	15	0	1
487		16	max	1229.143	1	0	1	9.239	1	0	1	.015	1	0	1
488			min	-277.37	3	0	1	.337	15	0	1	0	15	0	1
489		17	max	1229.313	1	0	1	9.239	1	0	1	.016	1	0	1
490			min	-277.242	3	0	1	.337	15	0	1	0	15	0	1
491		18	max	1229.483	1	0	1	9.239	1	0	1	.018	1	0	1
492			min	-277.114	3	0	1	.337	15	0	1	0	15	0	1
493		19	max	1229.654	1	0	1	9.239	1	0	1	.019	1	0	1
494			min	-276.987	3	0	1	.337	15	0	1	0	15	0	1
495	M1	1	max	157.238	1	734.688	3	-3.443	15	0	1	.224	1	0	3
496			min	5.729	15	-495.185	1	-93.85	1	0	3	.008	15	-.015	2
497		2	max	157.728	1	733.678	3	-3.443	15	0	1	.174	1	.248	1
498			min	5.877	15	-496.531	1	-93.85	1	0	3	.006	15	-.387	3
499		3	max	375.351	3	559.69	1	-3.411	15	0	3	.125	1	.497	1
500			min	-224.803	2	-534.189	3	-93.187	1	0	1	.005	15	-.759	3
501		4	max	375.718	3	558.344	1	-3.411	15	0	3	.076	1	.203	1
502			min	-224.313	2	-535.198	3	-93.187	1	0	1	.003	15	-.476	3
503		5	max	376.086	3	556.998	1	-3.411	15	0	3	.026	1	-.004	15
504			min	-223.823	2	-536.208	3	-93.187	1	0	1	0	15	-.194	3
505		6	max	376.453	3	555.652	1	-3.411	15	0	3	0	15	.089	3
506			min	-223.333	2	-537.217	3	-93.187	1	0	1	-.023	1	-.398	2
507		7	max	376.821	3	554.306	1	-3.411	15	0	3	-.003	15	.373	3
508			min	-222.844	2	-538.227	3	-93.187	1	0	1	-.072	1	-.681	2
509		8	max	377.188	3	552.96	1	-3.411	15	0	3	-.004	15	.657	3
510			min	-222.354	2	-539.237	3	-93.187	1	0	1	-.121	1	-.97	1
511		9	max	387.44	3	47.376	2	-5.039	15	0	9	.072	1	.768	3
512			min	-158.346	2	.409	15	-137.592	1	0	3	.003	15	-1.106	1
513		10	max	387.808	3	46.03	2	-5.039	15	0	9	0	15	.748	3
514			min	-157.856	2	.003	15	-137.592	1	0	3	0	1	-1.128	2
515		11	max	388.175	3	44.684	2	-5.039	15	0	9	-.003	15	.728	3
516			min	-157.366	2	-1.658	4	-137.592	1	0	3	-.073	1	-1.152	2
517		12	max	398.349	3	351.745	3	-3.328	15	0	2	.12	1	.635	3
518			min	-94.032	10	-632.757	2	-91.067	1	0	3	.004	15	-1.021	2
519		13	max	398.717	3	350.736	3	-3.328	15	0	2	.072	1	.449	3
520			min	-93.624	10	-634.103	2	-91.067	1	0	3	.003	15	-.687	2
521		14	max	399.084	3	349.726	3	-3.328	15	0	2	.024	1	.265	3
522			min	-93.216	10	-635.449	2	-91.067	1	0	3	0	15	-.362	1
523		15	max	399.452	3	348.716	3	-3.328	15	0	2	0	15	.08	3
524			min	-92.807	10	-636.795	2	-91.067	1	0	3	-.025	1	-.042	1
525		16	max	399.819	3	347.707	3	-3.328	15	0	2	-.003	15	.32	2
526			min	-92.399	10	-638.141	2	-91.067	1	0	3	-.073	1	-.103	3
527		17	max	400.186	3	346.697	3	-3.328	15	0	2	-.004	15	.658	2
528			min	-91.991	10	-639.487	2	-91.067	1	0	3	-.121	1	-.287	3
529		18	max	-5.883	15	648.093	2	-3.663	15	0	3	-.006	15	.331	2
530			min	-157.953	1	-289.457	3	-99.939	1	0	2	-.172	1	-.142	3
531		19	max	-5.735	15	646.747	2	-3.663	15	0	3	-.008	15	.011	3
532			min	-157.463	1	-290.467	3	-99.939	1	0	2	-.225	1	-.012	1
533	M5	1	max	341.084	1	2448.665	3	0	1	0	1	0	1	.029	2
534			min	11.132	12	-1678.64	1	0	1	0	1	0	1	0	3
535		2	max	341.574	1	2447.655	3	0	1	0	1	0	1	.914	1
536			min	11.377	12	-1679.986	1	0	1	0	1	0	1	-1.293	3
537		3	max	1205.232	3	1697.806	1	0	1	0	1	0	1	1.76	1
538			min	-788.495	2	-1706.104	3	0	1	0	1	0	1	-2.534	3
539		4	max	1205.6	3	1696.46	1	0	1	0	1	0	1	.864	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-788.005	2	-1707.113	3	0	1	0	1	0	1	-1.634	3
541		5	max	1205.967	3	1695.114	1	0	1	0	1	0	1	.012	9
542			min	-787.515	2	-1708.123	3	0	1	0	1	0	1	-.733	3
543		6	max	1206.335	3	1693.768	1	0	1	0	1	0	1	.169	3
544			min	-787.025	2	-1709.133	3	0	1	0	1	0	1	-.956	2
545		7	max	1206.702	3	1692.422	1	0	1	0	1	0	1	1.071	3
546			min	-786.535	2	-1710.142	3	0	1	0	1	0	1	-1.818	1
547		8	max	1207.069	3	1691.076	1	0	1	0	1	0	1	1.974	3
548			min	-786.045	2	-1711.152	3	0	1	0	1	0	1	-2.711	1
549		9	max	1223.406	3	158.339	2	0	1	0	1	0	1	2.272	3
550			min	-653.42	2	.407	15	0	1	0	1	0	1	-3.07	1
551		10	max	1223.774	3	156.993	2	0	1	0	1	0	1	2.2	3
552			min	-652.93	2	0	15	0	1	0	1	0	1	-3.131	2
553		11	max	1224.141	3	155.647	2	0	1	0	1	0	1	2.129	3
554			min	-652.44	2	-1.534	4	0	1	0	1	0	1	-3.213	2
555		12	max	1240.635	3	1107.251	3	0	1	0	1	0	1	1.869	3
556			min	-519.863	2	-1950.084	2	0	1	0	1	0	1	-2.876	2
557		13	max	1241.003	3	1106.242	3	0	1	0	1	0	1	1.285	3
558			min	-519.373	2	-1951.43	2	0	1	0	1	0	1	-1.847	2
559		14	max	1241.37	3	1105.232	3	0	1	0	1	0	1	.701	3
560			min	-518.883	2	-1952.776	2	0	1	0	1	0	1	-.853	1
561		15	max	1241.738	3	1104.223	3	0	1	0	1	0	1	.214	2
562			min	-518.393	2	-1954.122	2	0	1	0	1	0	1	-.004	13
563		16	max	1242.105	3	1103.213	3	0	1	0	1	0	1	1.246	2
564			min	-517.903	2	-1955.468	2	0	1	0	1	0	1	-.464	3
565		17	max	1242.472	3	1102.204	3	0	1	0	1	0	1	2.278	2
566			min	-517.413	2	-1956.814	2	0	1	0	1	0	1	-1.046	3
567		18	max	-11.695	12	2184.863	2	0	1	0	1	0	1	1.174	2
568			min	-341.124	1	-993.769	3	0	1	0	1	0	1	-.547	3
569		19	max	-11.45	12	2183.517	2	0	1	0	1	0	1	.024	1
570			min	-340.634	1	-994.778	3	0	1	0	1	0	1	-.022	3
571	M9	1	max	157.238	1	734.688	3	93.85	1	0	3	-.008	15	0	3
572			min	5.729	15	-495.185	1	3.443	15	0	1	-.224	1	-.015	2
573		2	max	157.728	1	733.678	3	93.85	1	0	3	-.006	15	.248	1
574			min	5.877	15	-496.531	1	3.443	15	0	1	-.174	1	-.387	3
575		3	max	375.351	3	559.69	1	93.187	1	0	1	-.005	15	.497	1
576			min	-224.803	2	-534.189	3	3.411	15	0	3	-.125	1	-.759	3
577		4	max	375.718	3	558.344	1	93.187	1	0	1	-.003	15	.203	1
578			min	-224.313	2	-535.198	3	3.411	15	0	3	-.076	1	-.476	3
579		5	max	376.086	3	556.998	1	93.187	1	0	1	0	15	-.004	15
580			min	-223.823	2	-536.208	3	3.411	15	0	3	-.026	1	-.194	3
581		6	max	376.453	3	555.652	1	93.187	1	0	1	.023	1	.089	3
582			min	-223.333	2	-537.217	3	3.411	15	0	3	0	15	-.398	2
583		7	max	376.821	3	554.306	1	93.187	1	0	1	.072	1	.373	3
584			min	-222.844	2	-538.227	3	3.411	15	0	3	.003	15	-.681	2
585		8	max	377.188	3	552.96	1	93.187	1	0	1	.121	1	.657	3
586			min	-222.354	2	-539.237	3	3.411	15	0	3	.004	15	-.97	1
587		9	max	387.44	3	47.376	2	137.592	1	0	3	-.003	15	.768	3
588			min	-158.346	2	.409	15	5.039	15	0	9	-.072	1	-1.106	1
589		10	max	387.808	3	46.03	2	137.592	1	0	3	0	1	.748	3
590			min	-157.856	2	.003	15	5.039	15	0	9	0	15	-1.128	2
591		11	max	388.175	3	44.684	2	137.592	1	0	3	.073	1	.728	3
592			min	-157.366	2	-1.658	4	5.039	15	0	9	.003	15	-1.152	2
593		12	max	398.349	3	351.745	3	91.067	1	0	3	-.004	15	.635	3
594			min	-94.032	10	-632.757	2	3.328	15	0	2	-.12	1	-1.021	2
595		13	max	398.717	3	350.736	3	91.067	1	0	3	-.003	15	.449	3
596			min	-93.624	10	-634.103	2	3.328	15	0	2	-.072	1	-.687	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	399.084	3	349.726	3	91.067	1	0	3	0	15	.265	3
598			min	-93.216	10	-635.449	2	3.328	15	0	2	-.024	1	-.362	1
599		15	max	399.452	3	348.716	3	91.067	1	0	3	.025	1	.08	3
600			min	-92.807	10	-636.795	2	3.328	15	0	2	0	15	-.042	1
601		16	max	399.819	3	347.707	3	91.067	1	0	3	.073	1	.32	2
602			min	-92.399	10	-638.141	2	3.328	15	0	2	.003	15	-.103	3
603		17	max	400.186	3	346.697	3	91.067	1	0	3	.121	1	.658	2
604			min	-91.991	10	-639.487	2	3.328	15	0	2	.004	15	-.287	3
605		18	max	-5.883	15	648.093	2	99.939	1	0	2	.172	1	.331	2
606			min	-157.953	1	-289.457	3	3.663	15	0	3	.006	15	-.142	3
607		19	max	-5.735	15	646.747	2	99.939	1	0	2	.225	1	.011	3
608			min	-157.463	1	-290.467	3	3.663	15	0	3	.008	15	-.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.117	2	.007	3	9.479e-3	2	NC	1	NC	1
2			min	0	15	-.021	3	-.003	2	-1.734e-3	3	NC	1	NC	1
3		2	max	0	1	.301	3	.034	1	1.087e-2	2	NC	5	NC	2
4			min	0	15	-.083	1	0	10	-1.779e-3	3	727.495	3	7123.284	1
5		3	max	0	1	.561	3	.081	1	1.227e-2	2	NC	5	NC	3
6			min	0	15	-.237	1	.003	15	-1.824e-3	3	402.069	3	2924.459	1
7		4	max	0	1	.719	3	.122	1	1.366e-2	2	NC	5	NC	3
8			min	0	15	-.323	1	.005	15	-1.869e-3	3	316.29	3	1938.787	1
9		5	max	0	1	.755	3	.143	1	1.506e-2	2	NC	5	NC	3
10			min	0	15	-.327	1	.005	15	-1.914e-3	3	301.568	3	1654.054	1
11		6	max	0	1	.672	3	.138	1	1.646e-2	2	NC	5	NC	3
12			min	0	15	-.252	1	.005	15	-1.959e-3	3	337.623	3	1716.665	1
13		7	max	0	1	.495	3	.108	1	1.785e-2	2	NC	5	NC	3
14			min	0	15	-.116	1	.004	10	-2.004e-3	3	453.543	3	2195.861	1
15		8	max	0	1	.27	3	.062	1	1.925e-2	2	NC	4	NC	2
16			min	0	15	.001	15	-.001	10	-2.049e-3	3	803.632	3	3838.375	1
17		9	max	0	1	.212	2	.022	3	2.064e-2	2	NC	4	NC	1
18			min	0	15	.005	15	-.006	10	-2.094e-3	3	2458.139	2	NC	1
19		10	max	0	1	.273	2	.021	3	2.204e-2	2	NC	3	NC	1
20			min	0	1	-.026	3	-.014	2	-2.14e-3	3	1499.868	2	NC	1
21		11	max	0	15	.212	2	.022	3	2.064e-2	2	NC	4	NC	1
22			min	0	1	.005	15	-.006	10	-2.094e-3	3	2458.139	2	NC	1
23		12	max	0	15	.27	3	.062	1	1.925e-2	2	NC	4	NC	2
24			min	0	1	.001	15	-.001	10	-2.049e-3	3	803.632	3	3838.375	1
25		13	max	0	15	.495	3	.108	1	1.785e-2	2	NC	5	NC	3
26			min	0	1	-.116	1	.004	10	-2.004e-3	3	453.543	3	2195.861	1
27		14	max	0	15	.672	3	.138	1	1.646e-2	2	NC	5	NC	3
28			min	0	1	-.252	1	.005	15	-1.959e-3	3	337.623	3	1716.665	1
29		15	max	0	15	.755	3	.143	1	1.506e-2	2	NC	5	NC	3
30			min	0	1	-.327	1	.005	15	-1.914e-3	3	301.568	3	1654.054	1
31		16	max	0	15	.719	3	.122	1	1.366e-2	2	NC	5	NC	3
32			min	0	1	-.323	1	.005	15	-1.869e-3	3	316.29	3	1938.787	1
33		17	max	0	15	.561	3	.081	1	1.227e-2	2	NC	5	NC	3
34			min	0	1	-.237	1	.003	15	-1.824e-3	3	402.069	3	2924.459	1
35		18	max	0	15	.301	3	.034	1	1.087e-2	2	NC	5	NC	2
36			min	0	1	-.083	1	0	10	-1.779e-3	3	727.495	3	7123.284	1
37		19	max	0	15	.117	2	.007	3	9.479e-3	2	NC	1	NC	1
38			min	0	1	-.021	3	-.003	2	-1.734e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.228	3	.006	3	5.596e-3	2	NC	1	NC	1
40			min	0	15	-.367	2	-.003	2	-4.09e-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	.544	3	.024	1	6.7e-3	2	NC	5	NC	1
42			min	0	15	-.688	1	0	10	-4.971e-3	3	721.992	1	NC	1
43		3	max	0	1	.813	3	.065	1	7.803e-3	2	NC	5	NC	3
44			min	0	15	-.968	1	.002	15	-5.852e-3	3	387.615	1	3666.148	1
45		4	max	0	1	.999	3	.104	1	8.906e-3	2	NC	15	NC	3
46			min	0	15	-1.172	1	.004	15	-6.733e-3	3	289.597	1	2273.105	1
47		5	max	0	1	1.088	3	.127	1	1.001e-2	2	NC	15	NC	3
48			min	0	15	-1.285	1	.005	15	-7.613e-3	3	253.972	1	1869.532	1
49		6	max	0	1	1.079	3	.125	1	1.111e-2	2	NC	15	NC	3
50			min	0	15	-1.307	1	.005	15	-8.494e-3	3	248.142	1	1895.481	1
51		7	max	0	1	.989	3	.1	1	1.222e-2	2	NC	15	NC	3
52			min	0	15	-1.251	1	.004	10	-9.375e-3	3	263.728	1	2384.264	1
53		8	max	0	1	.853	3	.058	1	1.332e-2	2	NC	15	NC	2
54			min	0	15	-1.148	1	-.001	10	-1.026e-2	3	298.659	1	4107.753	1
55		9	max	0	1	.719	3	.02	3	1.442e-2	2	NC	15	NC	1
56			min	0	15	-1.04	2	-.006	10	-1.114e-2	3	346.134	1	NC	1
57		10	max	0	1	.657	3	.019	3	1.553e-2	2	NC	5	NC	1
58			min	0	1	-.994	2	-.013	2	-1.202e-2	3	373.65	2	NC	1
59		11	max	0	15	.719	3	.02	3	1.442e-2	2	NC	15	NC	1
60			min	0	1	-1.04	2	-.006	10	-1.114e-2	3	346.134	1	NC	1
61		12	max	0	15	.853	3	.058	1	1.332e-2	2	NC	15	NC	2
62			min	0	1	-1.148	1	-.001	10	-1.026e-2	3	298.659	1	4107.753	1
63		13	max	0	15	.989	3	.1	1	1.222e-2	2	NC	15	NC	3
64			min	0	1	-1.251	1	.004	10	-9.375e-3	3	263.728	1	2384.264	1
65		14	max	0	15	1.079	3	.125	1	1.111e-2	2	NC	15	NC	3
66			min	0	1	-1.307	1	.005	15	-8.494e-3	3	248.142	1	1895.481	1
67		15	max	0	15	1.088	3	.127	1	1.001e-2	2	NC	15	NC	3
68			min	0	1	-1.285	1	.005	15	-7.613e-3	3	253.972	1	1869.532	1
69		16	max	0	15	.999	3	.104	1	8.906e-3	2	NC	15	NC	3
70			min	0	1	-1.172	1	.004	15	-6.733e-3	3	289.597	1	2273.105	1
71		17	max	0	15	.813	3	.065	1	7.803e-3	2	NC	5	NC	3
72			min	0	1	-.968	1	.002	15	-5.852e-3	3	387.615	1	3666.148	1
73		18	max	0	15	.544	3	.024	1	6.7e-3	2	NC	5	NC	1
74			min	0	1	-.688	1	0	10	-4.971e-3	3	721.992	1	NC	1
75		19	max	0	15	.228	3	.006	3	5.596e-3	2	NC	1	NC	1
76			min	0	1	-.367	2	-.003	2	-4.09e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.233	3	.006	3	3.465e-3	3	NC	1	NC	1
78			min	0	1	-.367	2	-.003	2	-5.793e-3	2	NC	1	NC	1
79		2	max	0	15	.435	3	.024	1	4.214e-3	3	NC	5	NC	1
80			min	0	1	-.757	2	0	10	-6.938e-3	2	600.468	2	NC	1
81		3	max	0	15	.611	3	.065	1	4.964e-3	3	NC	5	NC	3
82			min	0	1	-1.089	2	.002	15	-8.083e-3	2	323.899	2	3655.066	1
83		4	max	0	15	.742	3	.105	1	5.713e-3	3	NC	15	NC	3
84			min	0	1	-1.326	2	.004	15	-9.227e-3	2	243.964	2	2267.496	1
85		5	max	0	15	.819	3	.127	1	6.462e-3	3	NC	15	NC	3
86			min	0	1	-1.447	2	.005	15	-1.037e-2	2	216.628	2	1865.111	1
87		6	max	0	15	.841	3	.125	1	7.211e-3	3	NC	15	NC	3
88			min	0	1	-1.452	2	.005	15	-1.152e-2	2	215.59	2	1890.531	1
89		7	max	0	15	.815	3	.1	1	7.961e-3	3	NC	15	NC	3
90			min	0	1	-1.361	2	.004	15	-1.266e-2	2	235.398	2	2376.088	1
91		8	max	0	15	.76	3	.059	1	8.71e-3	3	NC	15	NC	2
92			min	0	1	-1.212	2	0	10	-1.381e-2	2	276.93	2	4083.117	1
93		9	max	0	15	.7	3	.018	3	9.459e-3	3	NC	15	NC	1
94			min	0	1	-1.063	2	-.005	10	-1.495e-2	2	336.022	2	NC	1
95		10	max	0	1	.671	3	.018	3	1.021e-2	3	NC	5	NC	1
96			min	0	1	-.993	2	-.012	2	-1.61e-2	2	373.809	2	NC	1
97		11	max	0	1	.7	3	.018	3	9.459e-3	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.063	2	-.005	10	-1.495e-2	2	336.022	2	NC	1
99		12	max	0	1	.76	3	.059	1	8.71e-3	3	NC	15	NC	2
100			min	0	15	-1.212	2	0	10	-1.381e-2	2	276.93	2	4083.117	1
101		13	max	0	1	.815	3	.1	1	7.961e-3	3	NC	15	NC	3
102			min	0	15	-1.361	2	.004	15	-1.266e-2	2	235.398	2	2376.088	1
103		14	max	0	1	.841	3	.125	1	7.211e-3	3	NC	15	NC	3
104			min	0	15	-1.452	2	.005	15	-1.152e-2	2	215.59	2	1890.531	1
105		15	max	0	1	.819	3	.127	1	6.462e-3	3	NC	15	NC	3
106			min	0	15	-1.447	2	.005	15	-1.037e-2	2	216.628	2	1865.111	1
107		16	max	0	1	.742	3	.105	1	5.713e-3	3	NC	15	NC	3
108			min	0	15	-1.326	2	.004	15	-9.227e-3	2	243.964	2	2267.496	1
109		17	max	0	1	.611	3	.065	1	4.964e-3	3	NC	5	NC	3
110			min	0	15	-1.089	2	.002	15	-8.083e-3	2	323.899	2	3655.066	1
111		18	max	0	1	.435	3	.024	1	4.214e-3	3	NC	5	NC	1
112			min	0	15	-.757	2	0	10	-6.938e-3	2	600.468	2	NC	1
113		19	max	0	1	.233	3	.006	3	3.465e-3	3	NC	1	NC	1
114			min	0	15	-.367	2	-.003	2	-5.793e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.108	1	.005	3	6.144e-3	3	NC	1	NC	1
116			min	0	1	-.077	3	-.003	2	-8.332e-3	1	NC	1	NC	1
117		2	max	0	15	.032	3	.034	1	7.209e-3	3	NC	5	NC	2
118			min	0	1	-.161	2	.001	10	-9.47e-3	1	884.272	2	7164.379	1
119		3	max	0	15	.117	3	.081	1	8.274e-3	3	NC	5	NC	3
120			min	0	1	-.372	2	.003	15	-1.061e-2	1	492.213	2	2930.959	1
121		4	max	0	15	.161	3	.122	1	9.339e-3	3	NC	5	NC	3
122			min	0	1	-.493	2	.005	15	-1.175e-2	1	392.395	2	1939.018	1
123		5	max	0	15	.158	3	.143	1	1.04e-2	3	NC	5	NC	3
124			min	0	1	-.508	2	.005	15	-1.289e-2	1	383.044	2	1651.095	1
125		6	max	0	15	.11	3	.138	1	1.147e-2	3	NC	5	NC	3
126			min	0	1	-.419	2	.005	15	-1.402e-2	1	448.264	2	1709.405	1
127		7	max	0	15	.026	3	.109	1	1.253e-2	3	NC	5	NC	3
128			min	0	1	-.249	2	.004	15	-1.516e-2	1	664.591	2	2177.177	1
129		8	max	0	15	.015	9	.063	1	1.36e-2	3	NC	3	NC	2
130			min	0	1	-.074	3	0	10	-1.63e-2	1	1636.163	2	3763.493	1
131		9	max	0	15	.17	1	.018	1	1.466e-2	3	NC	4	NC	1
132			min	0	1	-.162	3	-.005	10	-1.744e-2	1	2758.356	3	NC	1
133		10	max	0	1	.247	1	.015	3	1.573e-2	3	NC	5	NC	1
134			min	0	1	-.201	3	-.011	2	-1.858e-2	1	1683.444	1	NC	1
135		11	max	0	1	.17	1	.018	1	1.466e-2	3	NC	4	NC	1
136			min	0	15	-.162	3	-.005	10	-1.744e-2	1	2758.356	3	NC	1
137		12	max	0	1	.015	9	.063	1	1.36e-2	3	NC	3	NC	2
138			min	0	15	-.074	3	0	10	-1.63e-2	1	1636.163	2	3763.493	1
139		13	max	0	1	.026	3	.109	1	1.253e-2	3	NC	5	NC	3
140			min	0	15	-.249	2	.004	15	-1.516e-2	1	664.591	2	2177.177	1
141		14	max	0	1	.11	3	.138	1	1.147e-2	3	NC	5	NC	3
142			min	0	15	-.419	2	.005	15	-1.402e-2	1	448.264	2	1709.405	1
143		15	max	0	1	.158	3	.143	1	1.04e-2	3	NC	5	NC	3
144			min	0	15	-.508	2	.005	15	-1.289e-2	1	383.044	2	1651.095	1
145		16	max	0	1	.161	3	.122	1	9.339e-3	3	NC	5	NC	3
146			min	0	15	-.493	2	.005	15	-1.175e-2	1	392.395	2	1939.018	1
147		17	max	0	1	.117	3	.081	1	8.274e-3	3	NC	5	NC	3
148			min	0	15	-.372	2	.003	15	-1.061e-2	1	492.213	2	2930.959	1
149		18	max	0	1	.032	3	.034	1	7.209e-3	3	NC	5	NC	2
150			min	0	15	-.161	2	.001	10	-9.47e-3	1	884.272	2	7164.379	1
151		19	max	0	1	.108	1	.005	3	6.144e-3	3	NC	1	NC	1
152			min	0	15	-.077	3	-.003	2	-8.332e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.005	2	.007	1	-7.029e-6	15	NC	1	NC	2
154			min	-.007	3	-.009	3	0	15	-1.921e-4	1	NC	1	7634.923	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.004	2	.007	1	-6.558e-6	15	NC	1	NC	2
156			min	-.007	3	-.009	3	0	15	-1.792e-4	1	NC	1	8328.267	1
157		3	max	.005	1	.004	2	.006	1	-6.088e-6	15	NC	1	NC	2
158			min	-.006	3	-.008	3	0	15	-1.664e-4	1	NC	1	9154.81	1
159		4	max	.005	1	.003	2	.005	1	-5.617e-6	15	NC	1	NC	1
160			min	-.006	3	-.008	3	0	15	-1.535e-4	1	NC	1	NC	1
161		5	max	.005	1	.002	2	.005	1	-5.147e-6	15	NC	1	NC	1
162			min	-.005	3	-.008	3	0	15	-1.406e-4	1	NC	1	NC	1
163		6	max	.004	1	.002	2	.004	1	-4.676e-6	15	NC	1	NC	1
164			min	-.005	3	-.007	3	0	15	-1.278e-4	1	NC	1	NC	1
165		7	max	.004	1	.001	2	.004	1	-4.206e-6	15	NC	1	NC	1
166			min	-.005	3	-.007	3	0	15	-1.149e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.003	1	-3.735e-6	15	NC	1	NC	1
168			min	-.004	3	-.006	3	0	15	-1.02e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.003	1	-3.265e-6	15	NC	1	NC	1
170			min	-.004	3	-.006	3	0	15	-8.913e-5	1	NC	1	NC	1
171		10	max	.003	1	0	2	.002	1	-2.794e-6	15	NC	1	NC	1
172			min	-.003	3	-.006	3	0	15	-7.625e-5	1	NC	1	NC	1
173		11	max	.003	1	0	2	.002	1	-2.323e-6	15	NC	1	NC	1
174			min	-.003	3	-.005	3	0	15	-6.338e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.001	1	-1.853e-6	15	NC	1	NC	1
176			min	-.003	3	-.005	3	0	15	-5.05e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	.001	1	-1.382e-6	15	NC	1	NC	1
178			min	-.002	3	-.004	3	0	15	-3.763e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	0	1	-9.119e-7	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-2.475e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-4.413e-7	15	NC	1	NC	1
182			min	-.002	3	-.003	3	0	15	-1.188e-5	1	NC	1	NC	1
183		16	max	0	1	0	15	0	1	9.986e-7	1	NC	1	NC	1
184			min	-.001	3	-.002	3	0	15	-4.712e-7	3	NC	1	NC	1
185		17	max	0	1	0	15	0	1	1.387e-5	1	NC	1	NC	1
186			min	0	3	-.002	3	0	15	3.665e-7	12	NC	1	NC	1
187		18	max	0	1	0	15	0	1	2.675e-5	1	NC	1	NC	1
188			min	0	3	0	4	0	15	9.703e-7	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.962e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.441e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-4.554e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.251e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	9.532e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	3.488e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	3.158e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	1.153e-6	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	5.362e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.957e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	7.567e-5	1	NC	1	NC	1
200			min	0	2	-.007	4	0	15	2.761e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	.001	1	9.772e-5	1	NC	1	NC	1
202			min	-.001	2	-.009	4	0	15	3.565e-6	15	NC	1	NC	1
203		7	max	.002	3	-.002	15	.001	1	1.198e-4	1	NC	1	NC	1
204			min	-.001	2	-.01	4	0	15	4.37e-6	15	8927.257	4	NC	1
205		8	max	.002	3	-.003	15	.002	1	1.418e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	5.174e-6	15	7987.34	4	NC	1
207		9	max	.002	3	-.003	15	.002	1	1.639e-4	1	NC	1	NC	1
208			min	-.002	2	-.013	4	0	15	5.978e-6	15	7428.512	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	1.859e-4	1	NC	2	NC	1
210			min	-.002	2	-.013	4	0	15	6.782e-6	15	7152.552	4	NC	1
211		11	max	.003	3	-.003	15	.003	1	2.079e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.002	2	-.013	4	0	15	7.586e-6	15	7118.493	4	NC	1
213		12	max	.003	3	-.003	15	.003	1	2.3e-4	1	NC	2	NC	1
214			min	-.003	2	-.013	4	0	15	8.391e-6	15	7326.874	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	2.52e-4	1	NC	1	NC	1
216			min	-.003	2	-.012	4	0	15	9.195e-6	15	7821.922	4	NC	1
217		14	max	.004	3	-.003	15	.004	1	2.741e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	9.999e-6	15	8714.789	4	NC	1
219		15	max	.004	3	-.002	15	.005	1	2.961e-4	1	NC	1	NC	1
220			min	-.003	2	-.009	4	0	15	1.08e-5	15	NC	1	NC	1
221		16	max	.005	3	-.002	15	.005	1	3.182e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	1.161e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.006	1	3.402e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	1.241e-5	15	NC	1	NC	1
225		18	max	.005	3	0	15	.006	1	3.623e-4	1	NC	1	NC	1
226			min	-.004	2	-.005	1	0	15	1.322e-5	15	NC	1	NC	1
227		19	max	.005	3	0	15	.007	1	3.843e-4	1	NC	1	NC	1
228			min	-.004	2	-.003	1	0	15	1.402e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.004	2	0	15	2.057e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.007	1	7.61e-7	15	NC	1	3581.78	1
231		2	max	.003	1	.003	2	0	15	2.057e-5	1	NC	1	NC	2
232			min	0	3	-.005	3	-.006	1	7.61e-7	15	NC	1	3898.197	1
233		3	max	.003	1	.003	2	0	15	2.057e-5	1	NC	1	NC	2
234			min	0	3	-.005	3	-.006	1	7.61e-7	15	NC	1	4274.596	1
235		4	max	.002	1	.003	2	0	15	2.057e-5	1	NC	1	NC	2
236			min	0	3	-.005	3	-.005	1	7.61e-7	15	NC	1	4726.595	1
237		5	max	.002	1	.003	2	0	15	2.057e-5	1	NC	1	NC	2
238			min	0	3	-.004	3	-.005	1	7.61e-7	15	NC	1	5275.411	1
239		6	max	.002	1	.003	2	0	15	2.057e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.004	1	7.61e-7	15	NC	1	5950.474	1
241		7	max	.002	1	.002	2	0	15	2.057e-5	1	NC	1	NC	2
242			min	0	3	-.004	3	-.004	1	7.61e-7	15	NC	1	6793.555	1
243		8	max	.002	1	.002	2	0	15	2.057e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.003	1	7.61e-7	15	NC	1	7865.585	1
245		9	max	.002	1	.002	2	0	15	2.057e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.003	1	7.61e-7	15	NC	1	9258.293	1
247		10	max	.001	1	.002	2	0	15	2.057e-5	1	NC	1	NC	1
248			min	0	3	-.003	3	-.002	1	7.61e-7	15	NC	1	NC	1
249		11	max	.001	1	.002	2	0	15	2.057e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.002	1	7.61e-7	15	NC	1	NC	1
251		12	max	.001	1	.001	2	0	15	2.057e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.001	1	7.61e-7	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	2.057e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	7.61e-7	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	2.057e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	7.61e-7	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	2.057e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	7.61e-7	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	2.057e-5	1	NC	1	NC	1
260			min	0	3	0	3	0	1	7.61e-7	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	2.057e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	7.61e-7	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	2.057e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	7.61e-7	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	2.057e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	7.61e-7	15	NC	1	NC	1
267	M6	1	max	.019	1	.02	2	0	1	0	1	NC	4	NC	1
268			min	-.023	3	-.029	3	0	1	0	1	1938.909	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	.018	1	.018	2	0	1	0	1	NC	4	NC	1
270			min	-.022	3	-.027	3	0	1	0	1	2055.116	3	NC	1
271		3	max	.017	1	.016	2	0	1	0	1	NC	4	NC	1
272			min	-.02	3	-.025	3	0	1	0	1	2186.123	3	NC	1
273		4	max	.016	1	.015	2	0	1	0	1	NC	4	NC	1
274			min	-.019	3	-.024	3	0	1	0	1	2334.923	3	NC	1
275		5	max	.015	1	.013	2	0	1	0	1	NC	4	NC	1
276			min	-.018	3	-.022	3	0	1	0	1	2505.367	3	NC	1
277		6	max	.014	1	.012	2	0	1	0	1	NC	1	NC	1
278			min	-.017	3	-.02	3	0	1	0	1	2702.487	3	NC	1
279		7	max	.013	1	.01	2	0	1	0	1	NC	1	NC	1
280			min	-.015	3	-.019	3	0	1	0	1	2932.997	3	NC	1
281		8	max	.012	1	.009	2	0	1	0	1	NC	1	NC	1
282			min	-.014	3	-.017	3	0	1	0	1	3206.052	3	NC	1
283		9	max	.01	1	.007	2	0	1	0	1	NC	1	NC	1
284			min	-.013	3	-.016	3	0	1	0	1	3534.472	3	NC	1
285		10	max	.009	1	.006	2	0	1	0	1	NC	1	NC	1
286			min	-.011	3	-.014	3	0	1	0	1	3936.774	3	NC	1
287		11	max	.008	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.01	3	-.012	3	0	1	0	1	4440.74	3	NC	1
289		12	max	.007	1	.004	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.011	3	0	1	0	1	5090.028	3	NC	1
291		13	max	.006	1	.003	2	0	1	0	1	NC	1	NC	1
292			min	-.008	3	-.009	3	0	1	0	1	5957.405	3	NC	1
293		14	max	.005	1	.002	2	0	1	0	1	NC	1	NC	1
294			min	-.006	3	-.008	3	0	1	0	1	7173.86	3	NC	1
295		15	max	.004	1	.001	2	0	1	0	1	NC	1	NC	1
296			min	-.005	3	-.006	3	0	1	0	1	9001.378	3	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	0	3	0	2	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.004	2	-.01	3	0	1	0	1	9255.602	3	NC	1
317		7	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.005	2	-.012	3	0	1	0	1	8241.821	3	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.006	2	-.013	3	0	1	0	1	7638.012	3	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.007	2	-.014	3	0	1	0	1	7320.141	3	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.008	2	-.014	3	0	1	0	1	7232.024	3	NC	1
325		11	max	.01	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	-.009	2	-.014	3	0	1	0	1	7257.607	4	NC	1
327		12	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.01	2	-.013	3	0	1	0	1	7463.143	4	NC	1
329		13	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.011	2	-.012	3	0	1	0	1	7961.226	4	NC	1
331		14	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.012	2	-.011	3	0	1	0	1	8864.298	4	NC	1
333		15	max	.013	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.013	2	-.01	1	0	1	0	1	NC	1	NC	1
335		16	max	.014	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.013	2	-.009	1	0	1	0	1	NC	1	NC	1
337		17	max	.015	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.014	2	-.008	1	0	1	0	1	NC	1	NC	1
339		18	max	.016	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.015	2	-.007	1	0	1	0	1	NC	1	NC	1
341		19	max	.017	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.016	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.015	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.017	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	1	.014	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.016	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.013	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.015	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.012	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.014	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.013	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.012	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
356			min	-.002	3	-.011	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.011	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.01	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.009	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	-.001	3	-.008	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.005	2	0	15	1.921e-4	1	NC	1	NC	2
382			min	-.007	3	-.009	3	-.007	1	7.029e-6	15	NC	1	7634.923	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.004	2	0	15	1.792e-4	1	NC	1	NC	2
384			min	-.007	3	-.009	3	-.007	1	6.558e-6	15	NC	1	8328.267	1
385		3	max	.005	1	.004	2	0	15	1.664e-4	1	NC	1	NC	2
386			min	-.006	3	-.008	3	-.006	1	6.088e-6	15	NC	1	9154.81	1
387		4	max	.005	1	.003	2	0	15	1.535e-4	1	NC	1	NC	1
388			min	-.006	3	-.008	3	-.005	1	5.617e-6	15	NC	1	NC	1
389		5	max	.005	1	.002	2	0	15	1.406e-4	1	NC	1	NC	1
390			min	-.005	3	-.008	3	-.005	1	5.147e-6	15	NC	1	NC	1
391		6	max	.004	1	.002	2	0	15	1.278e-4	1	NC	1	NC	1
392			min	-.005	3	-.007	3	-.004	1	4.676e-6	15	NC	1	NC	1
393		7	max	.004	1	.001	2	0	15	1.149e-4	1	NC	1	NC	1
394			min	-.005	3	-.007	3	-.004	1	4.206e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.02e-4	1	NC	1	NC	1
396			min	-.004	3	-.006	3	-.003	1	3.735e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	8.913e-5	1	NC	1	NC	1
398			min	-.004	3	-.006	3	-.003	1	3.265e-6	15	NC	1	NC	1
399		10	max	.003	1	0	2	0	15	7.625e-5	1	NC	1	NC	1
400			min	-.003	3	-.006	3	-.002	1	2.794e-6	15	NC	1	NC	1
401		11	max	.003	1	0	2	0	15	6.338e-5	1	NC	1	NC	1
402			min	-.003	3	-.005	3	-.002	1	2.323e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	5.05e-5	1	NC	1	NC	1
404			min	-.003	3	-.005	3	-.001	1	1.853e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	3.763e-5	1	NC	1	NC	1
406			min	-.002	3	-.004	3	-.001	1	1.382e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	2.475e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	0	1	9.119e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	1.188e-5	1	NC	1	NC	1
410			min	-.002	3	-.003	3	0	1	4.413e-7	15	NC	1	NC	1
411		16	max	0	1	0	15	0	15	4.712e-7	3	NC	1	NC	1
412			min	-.001	3	-.002	3	0	1	-9.986e-7	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-3.665e-7	12	NC	1	NC	1
414			min	0	3	-.002	3	0	1	-1.387e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-9.703e-7	15	NC	1	NC	1
416			min	0	3	0	4	0	1	-2.675e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.441e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-3.962e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.251e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	4.554e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-3.488e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-9.532e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.153e-6	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-3.158e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-1.957e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-5.362e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-2.761e-6	15	NC	1	NC	1
428			min	0	2	-.007	4	0	1	-7.567e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-3.565e-6	15	NC	1	NC	1
430			min	-.001	2	-.009	4	-.001	1	-9.772e-5	1	NC	1	NC	1
431		7	max	.002	3	-.002	15	0	15	-4.37e-6	15	NC	1	NC	1
432			min	-.001	2	-.01	4	-.001	1	-1.198e-4	1	8927.257	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-5.174e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	-.002	1	-1.418e-4	1	7987.34	4	NC	1
435		9	max	.002	3	-.003	15	0	15	-5.978e-6	15	NC	1	NC	1
436			min	-.002	2	-.013	4	-.002	1	-1.639e-4	1	7428.512	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-6.782e-6	15	NC	2	NC	1
438			min	-.002	2	-.013	4	-.002	1	-1.859e-4	1	7152.552	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-7.586e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.002	2	-.013	4	-.003	1	-2.079e-4	1	7118.493	4	NC	1
441		12	max	.003	3	-.003	15	0	15	-8.391e-6	15	NC	2	NC	1
442			min	-.003	2	-.013	4	-.003	1	-2.3e-4	1	7326.874	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-9.195e-6	15	NC	1	NC	1
444			min	-.003	2	-.012	4	-.004	1	-2.52e-4	1	7821.922	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-9.999e-6	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.004	1	-2.741e-4	1	8714.789	4	NC	1
447		15	max	.004	3	-.002	15	0	15	-1.08e-5	15	NC	1	NC	1
448			min	-.003	2	-.009	4	-.005	1	-2.961e-4	1	NC	1	NC	1
449		16	max	.005	3	-.002	15	0	15	-1.161e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.005	1	-3.182e-4	1	NC	1	NC	1
451		17	max	.005	3	-.001	15	0	15	-1.241e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.006	1	-3.402e-4	1	NC	1	NC	1
453		18	max	.005	3	0	15	0	15	-1.322e-5	15	NC	1	NC	1
454			min	-.004	2	-.005	1	-.006	1	-3.623e-4	1	NC	1	NC	1
455		19	max	.005	3	0	15	0	15	-1.402e-5	15	NC	1	NC	1
456			min	-.004	2	-.003	1	-.007	1	-3.843e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.004	2	.007	1	-7.61e-7	15	NC	1	NC	3
458			min	0	3	-.005	3	0	15	-2.057e-5	1	NC	1	3581.78	1
459		2	max	.003	1	.003	2	.006	1	-7.61e-7	15	NC	1	NC	2
460			min	0	3	-.005	3	0	15	-2.057e-5	1	NC	1	3898.197	1
461		3	max	.003	1	.003	2	.006	1	-7.61e-7	15	NC	1	NC	2
462			min	0	3	-.005	3	0	15	-2.057e-5	1	NC	1	4274.596	1
463		4	max	.002	1	.003	2	.005	1	-7.61e-7	15	NC	1	NC	2
464			min	0	3	-.005	3	0	15	-2.057e-5	1	NC	1	4726.595	1
465		5	max	.002	1	.003	2	.005	1	-7.61e-7	15	NC	1	NC	2
466			min	0	3	-.004	3	0	15	-2.057e-5	1	NC	1	5275.411	1
467		6	max	.002	1	.003	2	.004	1	-7.61e-7	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-2.057e-5	1	NC	1	5950.474	1
469		7	max	.002	1	.002	2	.004	1	-7.61e-7	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-2.057e-5	1	NC	1	6793.555	1
471		8	max	.002	1	.002	2	.003	1	-7.61e-7	15	NC	1	NC	2
472			min	0	3	-.003	3	0	15	-2.057e-5	1	NC	1	7865.585	1
473		9	max	.002	1	.002	2	.003	1	-7.61e-7	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-2.057e-5	1	NC	1	9258.293	1
475		10	max	.001	1	.002	2	.002	1	-7.61e-7	15	NC	1	NC	1
476			min	0	3	-.003	3	0	15	-2.057e-5	1	NC	1	NC	1
477		11	max	.001	1	.002	2	.002	1	-7.61e-7	15	NC	1	NC	1
478			min	0	3	-.002	3	0	15	-2.057e-5	1	NC	1	NC	1
479		12	max	.001	1	.001	2	.001	1	-7.61e-7	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-2.057e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	.001	1	-7.61e-7	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-2.057e-5	1	NC	1	NC	1
483		14	max	0	1	.001	2	0	1	-7.61e-7	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-2.057e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-7.61e-7	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-2.057e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-7.61e-7	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-2.057e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-7.61e-7	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-2.057e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-7.61e-7	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-2.057e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-7.61e-7	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-2.057e-5	1	NC	1	NC	1
495	M1	1	max	.007	3	.117	2	0	1	1.57e-2	1	NC	1	NC	1
496			min	-.003	2	-.021	3	0	15	-2.567e-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	.007	3	.056	2	0	15	7.636e-3	1	NC	4	NC	1
498			min	-.003	2	-.01	3	-.005	1	-1.27e-2	3	1914.865	2	NC	1
499		3	max	.007	3	.01	3	0	15	2.989e-5	10	NC	5	NC	1
500			min	-.003	2	-.008	2	-.007	1	-1.331e-4	1	922.203	2	NC	1
501		4	max	.007	3	.043	3	0	15	4.632e-3	1	NC	5	NC	1
502			min	-.003	2	-.081	2	-.007	1	-4.746e-3	3	581.54	2	NC	1
503		5	max	.006	3	.086	3	0	15	9.398e-3	1	NC	15	NC	1
504			min	-.003	2	-.158	2	-.005	1	-9.368e-3	3	419.333	2	NC	1
505		6	max	.006	3	.133	3	0	15	1.416e-2	1	NC	15	NC	1
506			min	-.003	2	-.232	2	-.002	1	-1.399e-2	3	330.039	2	NC	1
507		7	max	.006	3	.179	3	0	1	1.893e-2	1	NC	15	NC	1
508			min	-.003	2	-.299	2	0	12	-1.861e-2	3	277.363	2	NC	1
509		8	max	.006	3	.216	3	0	1	2.369e-2	1	8986.294	15	NC	1
510			min	-.003	2	-.351	2	0	15	-2.323e-2	3	246.219	2	NC	1
511		9	max	.006	3	.241	3	0	15	2.621e-2	1	8399.704	15	NC	1
512			min	-.003	2	-.385	2	0	1	-2.337e-2	3	230.013	2	NC	1
513		10	max	.006	3	.25	3	0	1	2.753e-2	2	8220.998	15	NC	1
514			min	-.003	2	-.396	2	0	15	-2.052e-2	3	225.252	2	NC	1
515		11	max	.006	3	.244	3	0	1	2.959e-2	2	8399.471	15	NC	1
516			min	-.003	2	-.385	2	0	15	-1.767e-2	3	230.75	2	NC	1
517		12	max	.006	3	.223	3	0	15	2.857e-2	2	8985.802	15	NC	1
518			min	-.003	2	-.35	2	0	1	-1.478e-2	3	248.465	2	NC	1
519		13	max	.005	3	.19	3	0	15	2.291e-2	2	NC	15	NC	1
520			min	-.003	2	-.295	2	0	1	-1.183e-2	3	282.832	2	NC	1
521		14	max	.005	3	.147	3	.002	1	1.726e-2	2	NC	15	NC	1
522			min	-.003	2	-.227	2	0	15	-8.885e-3	3	340.496	1	NC	1
523		15	max	.005	3	.1	3	.004	1	1.16e-2	2	NC	15	NC	1
524			min	-.003	2	-.151	2	0	15	-5.937e-3	3	439.233	1	NC	1
525		16	max	.005	3	.051	3	.006	1	5.938e-3	2	NC	5	NC	1
526			min	-.003	2	-.075	2	0	15	-2.989e-3	3	621.448	1	NC	1
527		17	max	.005	3	.004	3	.007	1	5.077e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	-4.038e-5	3	1009.601	1	NC	1
529		18	max	.005	3	.055	1	.005	1	1.054e-2	2	NC	4	NC	1
530			min	-.003	2	-.038	3	0	15	-4.315e-3	3	2133.378	1	NC	1
531		19	max	.005	3	.108	1	0	15	2.118e-2	2	NC	1	NC	1
532			min	-.003	2	-.077	3	0	1	-8.757e-3	3	NC	1	NC	1
533	M5	1	max	.021	3	.273	2	0	1	0	1	NC	1	NC	1
534			min	-.014	2	-.026	3	0	1	0	1	NC	1	NC	1
535		2	max	.021	3	.132	2	0	1	0	1	NC	5	NC	1
536			min	-.014	2	-.01	3	0	1	0	1	820.811	2	NC	1
537		3	max	.021	3	.031	3	0	1	0	1	NC	5	NC	1
538			min	-.014	2	-.027	2	0	1	0	1	386.693	2	NC	1
539		4	max	.021	3	.12	3	0	1	0	1	9895.607	15	NC	1
540			min	-.014	2	-.215	2	0	1	0	1	237.1	2	NC	1
541		5	max	.02	3	.242	3	0	1	0	1	6923.428	15	NC	1
542			min	-.014	2	-.419	2	0	1	0	1	167.116	2	NC	1
543		6	max	.02	3	.378	3	0	1	0	1	5329.617	15	NC	1
544			min	-.013	2	-.62	2	0	1	0	1	129.308	2	NC	1
545		7	max	.019	3	.511	3	0	1	0	1	4409.345	15	NC	1
546			min	-.013	2	-.803	2	0	1	0	1	107.349	2	NC	1
547		8	max	.019	3	.623	3	0	1	0	1	3874.322	15	NC	1
548			min	-.013	2	-.949	2	0	1	0	1	94.528	2	NC	1
549		9	max	.019	3	.694	3	0	1	0	1	3599.974	15	NC	1
550			min	-.013	2	-1.042	2	0	1	0	1	87.934	2	NC	1
551		10	max	.018	3	.72	3	0	1	0	1	3517.319	15	NC	1
552			min	-.012	2	-1.073	2	0	1	0	1	86.001	2	NC	1
553		11	max	.018	3	.703	3	0	1	0	1	3600.06	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	-.012	2	-1.042	2	0	1	0	1	88.225	2	NC	1
555		12	max	.017	3	.642	3	0	1	0	1	3874.525	15	NC	1
556			min	-.012	2	-.946	2	0	1	0	1	95.48	2	NC	1
557		13	max	.017	3	.544	3	0	1	0	1	4409.762	15	NC	1
558			min	-.012	2	-.793	2	0	1	0	1	109.436	1	NC	1
559		14	max	.017	3	.42	3	0	1	0	1	5330.433	15	NC	1
560			min	-.012	2	-.603	2	0	1	0	1	133.668	1	NC	1
561		15	max	.016	3	.282	3	0	1	0	1	6925.042	15	NC	1
562			min	-.011	2	-.397	1	0	1	0	1	176.204	1	NC	1
563		16	max	.016	3	.142	3	0	1	0	1	9898.987	15	NC	1
564			min	-.011	2	-.194	1	0	1	0	1	256.94	1	NC	1
565		17	max	.015	3	.011	3	0	1	0	1	NC	5	NC	1
566			min	-.011	2	-.016	2	0	1	0	1	434.054	1	NC	1
567		18	max	.015	3	.127	1	0	1	0	1	NC	5	NC	1
568			min	-.011	2	-.101	3	0	1	0	1	946.423	1	NC	1
569		19	max	.015	3	.247	1	0	1	0	1	NC	1	NC	1
570			min	-.011	2	-.201	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.007	3	.117	2	0	15	2.567e-2	3	NC	1	NC	1
572			min	-.003	2	-.021	3	0	1	-1.57e-2	1	NC	1	NC	1
573		2	max	.007	3	.056	2	.005	1	1.27e-2	3	NC	4	NC	1
574			min	-.003	2	-.01	3	0	15	-7.636e-3	1	1914.865	2	NC	1
575		3	max	.007	3	.01	3	.007	1	1.331e-4	1	NC	5	NC	1
576			min	-.003	2	-.008	2	0	15	-2.989e-5	10	922.203	2	NC	1
577		4	max	.007	3	.043	3	.007	1	4.746e-3	3	NC	5	NC	1
578			min	-.003	2	-.081	2	0	15	-4.632e-3	1	581.54	2	NC	1
579		5	max	.006	3	.086	3	.005	1	9.368e-3	3	NC	15	NC	1
580			min	-.003	2	-.158	2	0	15	-9.398e-3	1	419.333	2	NC	1
581		6	max	.006	3	.133	3	.002	1	1.399e-2	3	NC	15	NC	1
582			min	-.003	2	-.232	2	0	15	-1.416e-2	1	330.039	2	NC	1
583		7	max	.006	3	.179	3	0	12	1.861e-2	3	NC	15	NC	1
584			min	-.003	2	-.299	2	0	1	-1.893e-2	1	277.363	2	NC	1
585		8	max	.006	3	.216	3	0	15	2.323e-2	3	8986.294	15	NC	1
586			min	-.003	2	-.351	2	0	1	-2.369e-2	1	246.219	2	NC	1
587		9	max	.006	3	.241	3	0	1	2.337e-2	3	8399.704	15	NC	1
588			min	-.003	2	-.385	2	0	15	-2.621e-2	1	230.013	2	NC	1
589		10	max	.006	3	.25	3	0	15	2.052e-2	3	8220.998	15	NC	1
590			min	-.003	2	-.396	2	0	1	-2.753e-2	2	225.252	2	NC	1
591		11	max	.006	3	.244	3	0	15	1.767e-2	3	8399.471	15	NC	1
592			min	-.003	2	-.385	2	0	1	-2.959e-2	2	230.75	2	NC	1
593		12	max	.006	3	.223	3	0	1	1.478e-2	3	8985.802	15	NC	1
594			min	-.003	2	-.35	2	0	15	-2.857e-2	2	248.465	2	NC	1
595		13	max	.005	3	.19	3	0	1	1.183e-2	3	NC	15	NC	1
596			min	-.003	2	-.295	2	0	15	-2.291e-2	2	282.832	2	NC	1
597		14	max	.005	3	.147	3	0	15	8.885e-3	3	NC	15	NC	1
598			min	-.003	2	-.227	2	-.002	1	-1.726e-2	2	340.496	1	NC	1
599		15	max	.005	3	.1	3	0	15	5.937e-3	3	NC	15	NC	1
600			min	-.003	2	-.151	2	-.004	1	-1.16e-2	2	439.233	1	NC	1
601		16	max	.005	3	.051	3	0	15	2.989e-3	3	NC	5	NC	1
602			min	-.003	2	-.075	2	-.006	1	-5.938e-3	2	621.448	1	NC	1
603		17	max	.005	3	.004	3	0	15	4.038e-5	3	NC	5	NC	1
604			min	-.003	2	-.005	2	-.007	1	-5.077e-4	1	1009.601	1	NC	1
605		18	max	.005	3	.055	1	0	15	4.315e-3	3	NC	4	NC	1
606			min	-.003	2	-.038	3	-.005	1	-1.054e-2	2	2133.378	1	NC	1
607		19	max	.005	3	.108	1	0	1	8.757e-3	3	NC	1	NC	1
608			min	-.003	2	-.077	3	0	15	-2.118e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-42 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

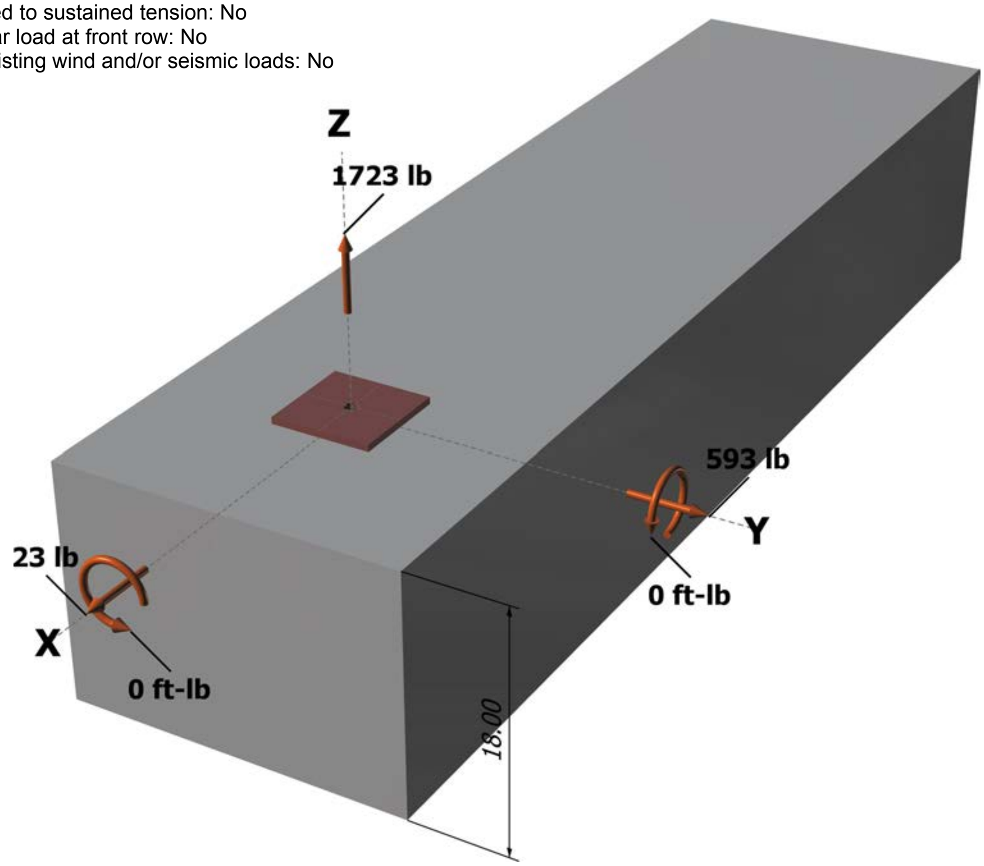
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

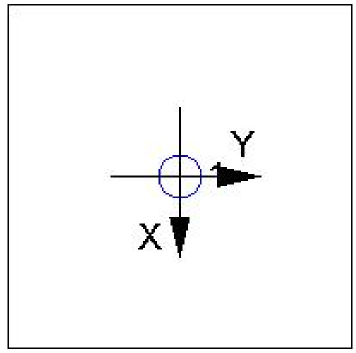
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 31-33 Inch Width		
Address:			
Phone:			
E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

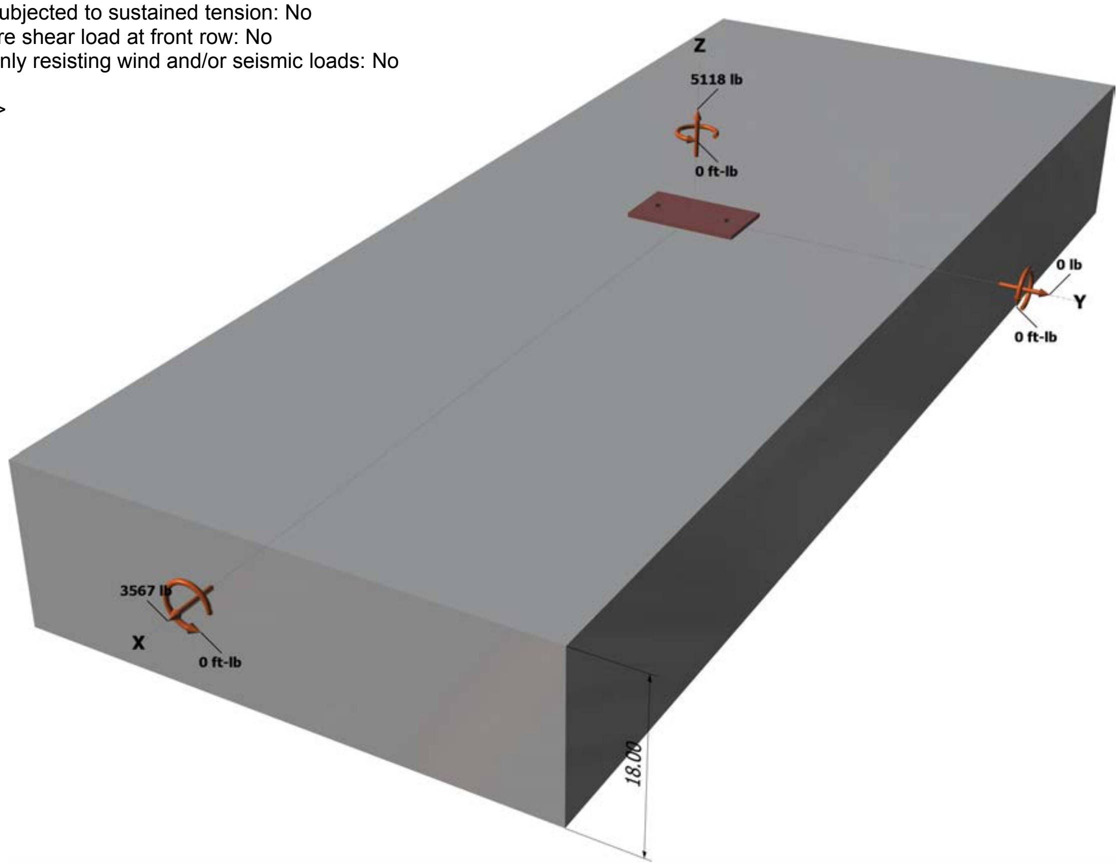
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

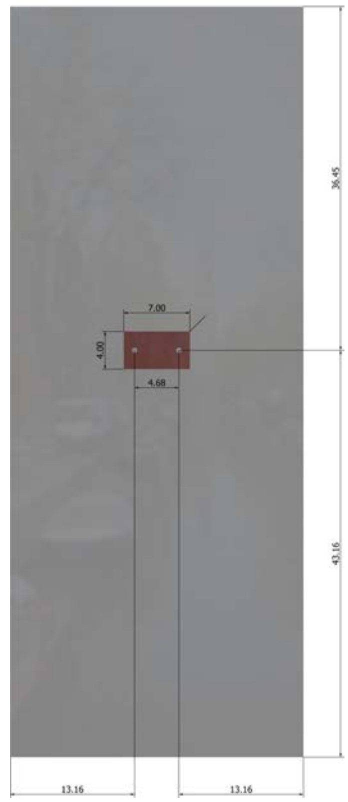
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



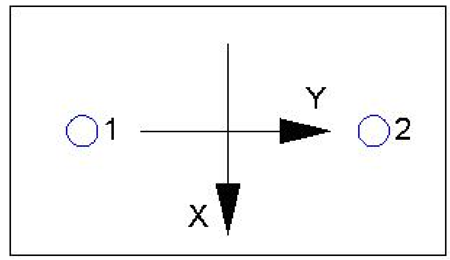
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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, $øN_n$ (lb)	Ratio	Status
Steel	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

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

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

Sec. D.7.3	0.63	0.57	119.8 %	1.2	Pass

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

12. Warnings

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

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

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