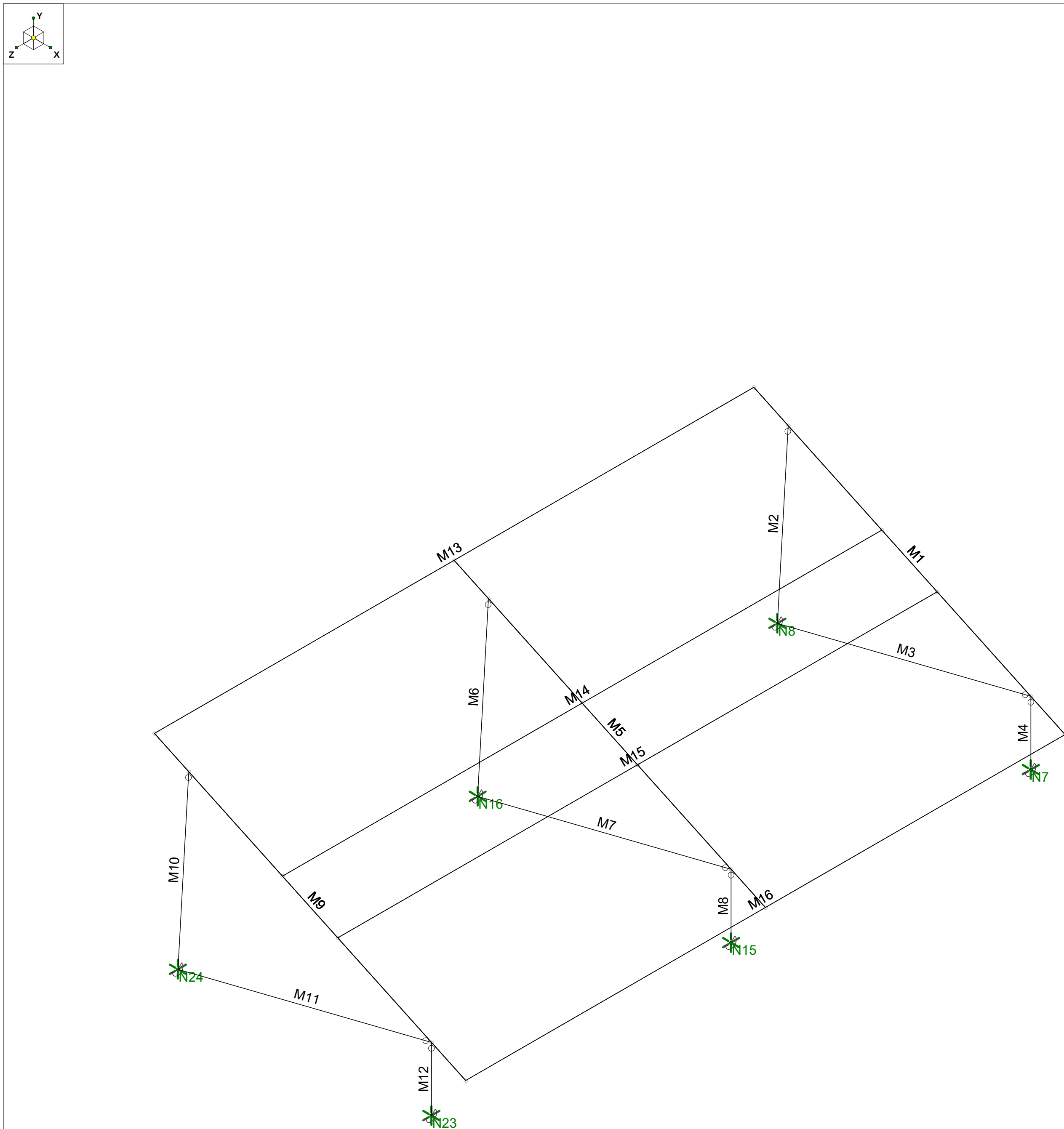


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

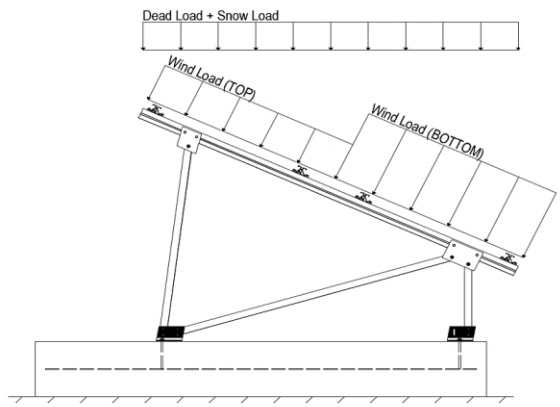
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	2000 mm	Height =	1900 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

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



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} =	3.00 psf	*Self-weight of the PV modules.*
g_{MIN} =	1.75 psf	

2.2 Snow Loads

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

2.3 Wind Loads

Design Wind Speed, V =	120 mph	Exposure Category = C
Height <	15 ft	Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

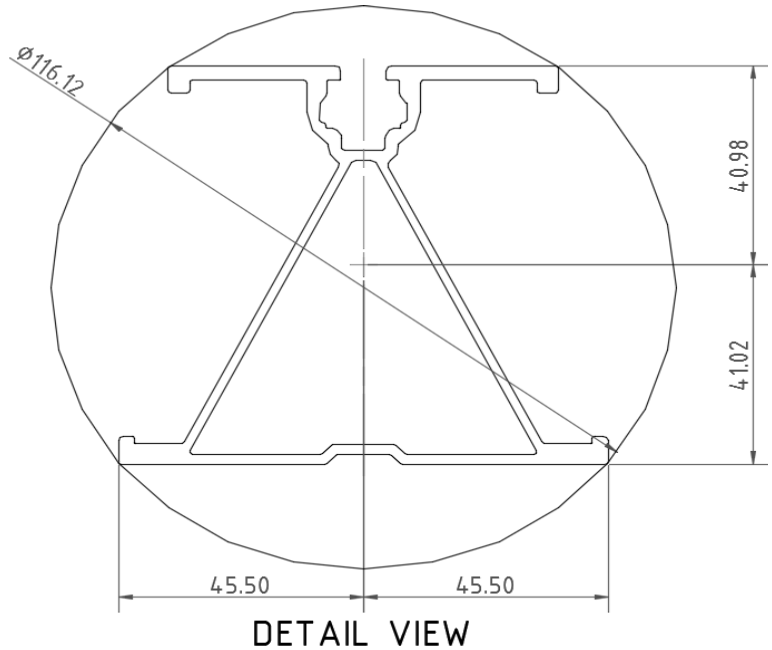
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

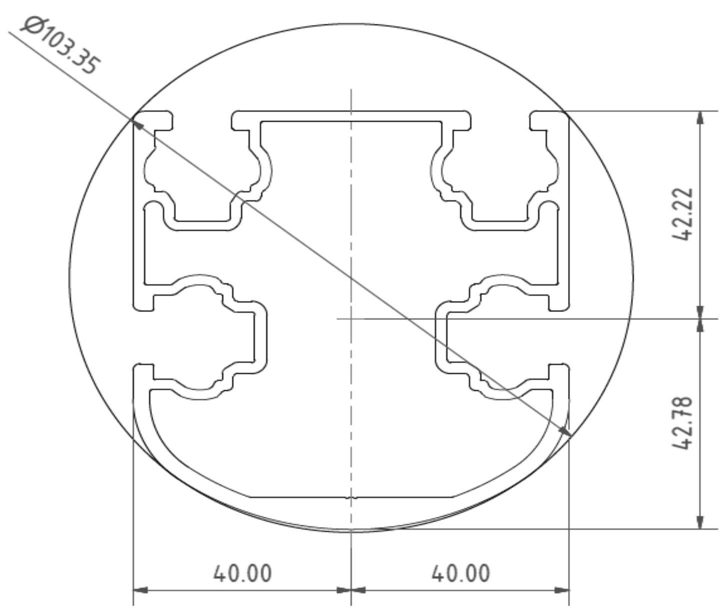
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	87	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.863	k-ft
M_z =	0.000	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	67%	



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).

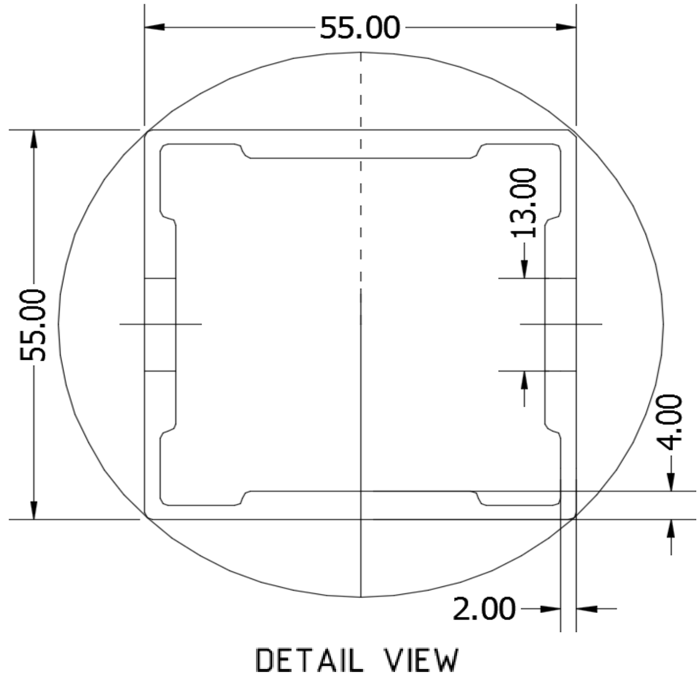
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.378	k-ft
M_z =	0.000	k-ft
P_n =	-0.942	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	100%	



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).

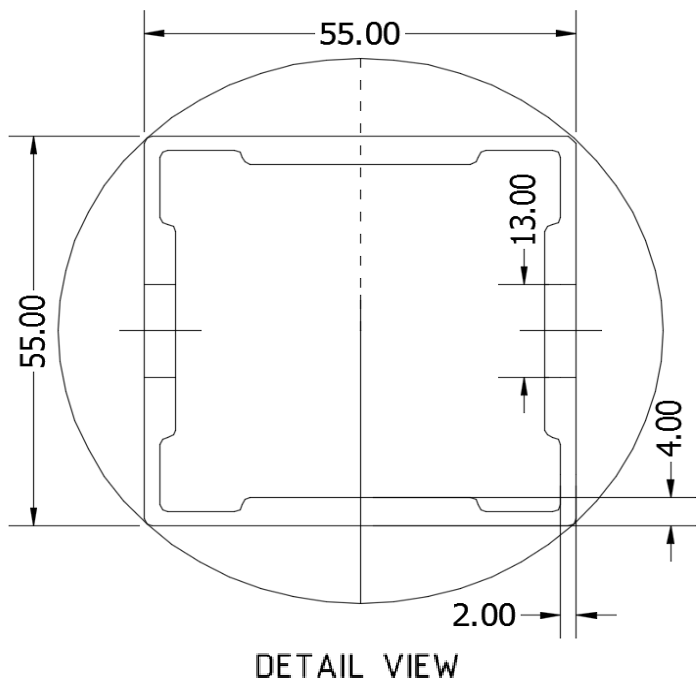
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.819	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	



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).

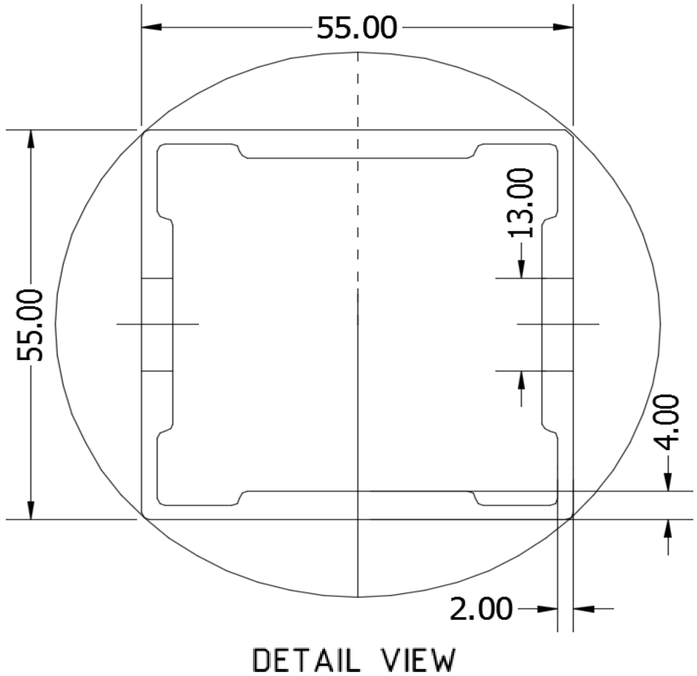
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.394	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	41%	



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 =	69.80	in
$\Phi F_{ty\ AXIAL}$ =	10.82	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 =	-0.012	k-ft
M_z =	0.000	k-ft
P_n =	3.340	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.629	k
Utilization =	32%	



5. FOUNDATION DESIGN CALCULATIONS

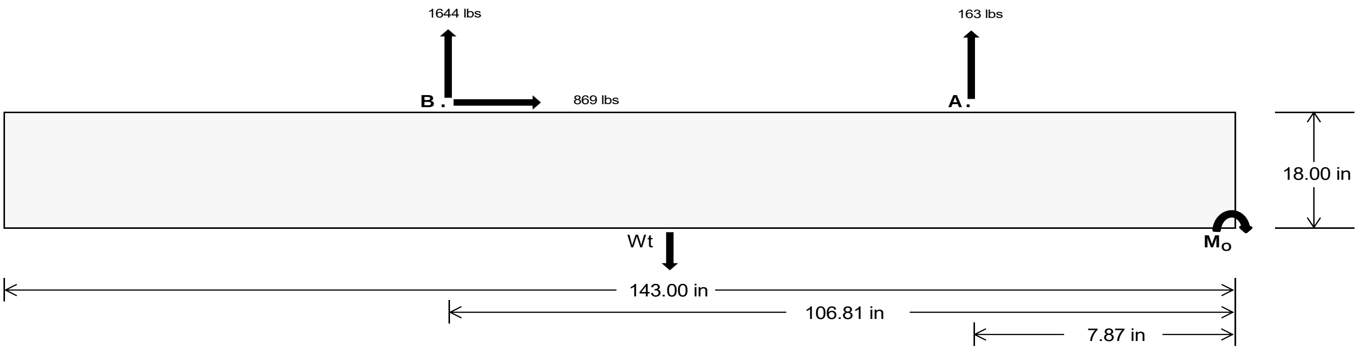
5.1 Helical Pile Foundations

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 =	686.61	6847.58	k
Compressive Load =	3665.22	5100.07	k
Lateral Load =	11.19	3614.08	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O =	192538.8 in-lbs
Resisting Force Required =	2692.85 lbs
S.F. =	1.67
Weight Required =	4488.08 lbs
Minimum Width =	35 in in
Weight Provided =	7559.64 lbs

A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	869.00 lbs
Friction =	0.4
Weight Required =	2172.50 lbs
Resisting Weight =	7559.64 lbs
Additional Weight Required =	0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	869.00 lbs
Cohesion =	130 psf
Area =	34.76 ft^2
Resisting =	3779.82 lbs
Additional Weight Required =	0 lbs

Use a 143in long x 35in 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			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1142 lbs	1142 lbs	1142 lbs	1142 lbs	1526 lbs	1526 lbs	1526 lbs	1526 lbs	1894 lbs	1894 lbs	1894 lbs	1894 lbs	-325 lbs	-325 lbs	-325 lbs	-325 lbs
F_B	1172 lbs	1172 lbs	1172 lbs	1172 lbs	2207 lbs	2207 lbs	2207 lbs	2207 lbs	2425 lbs	2425 lbs	2425 lbs	2425 lbs	-3288 lbs	-3288 lbs	-3288 lbs	-3288 lbs
F_V	128 lbs	128 lbs	128 lbs	128 lbs	1548 lbs	1548 lbs	1548 lbs	1548 lbs	1247 lbs	1247 lbs	1247 lbs	1247 lbs	-1738 lbs	-1738 lbs	-1738 lbs	-1738 lbs
P_{total}	9874 lbs	10090 lbs	10306 lbs	10522 lbs	11292 lbs	11508 lbs	11724 lbs	11940 lbs	11879 lbs	12095 lbs	12311 lbs	12527 lbs	922 lbs	1052 lbs	1182 lbs	1311 lbs
M	2800 lbs-ft	2800 lbs-ft	2800 lbs-ft	2800 lbs-ft	3917 lbs-ft	3917 lbs-ft	3917 lbs-ft	3917 lbs-ft	4774 lbs-ft	4774 lbs-ft	4774 lbs-ft	4774 lbs-ft	5346 lbs-ft	5346 lbs-ft	5346 lbs-ft	5346 lbs-ft
e	0.28 ft	0.28 ft	0.27 ft	0.27 ft	0.35 ft	0.34 ft	0.33 ft	0.33 ft	0.40 ft	0.39 ft	0.39 ft	0.38 ft	5.80 ft	5.08 ft	4.52 ft	4.08 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	243.5 psf	242.8 psf	242.1 psf	241.5 psf	268.1 psf	266.7 psf	265.4 psf	264.2 psf	272.6 psf	271.1 psf	269.6 psf	268.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	324.6 psf	321.7 psf	318.8 psf	316.2 psf	381.6 psf	377.1 psf	372.8 psf	368.7 psf	410.9 psf	405.5 psf	400.5 psf	395.6 psf	1297.4 psf	266.7 psf	178.2 psf	146.7 psf

Maximum Bearing Pressure =	1297 psf
Allowable Bearing Pressure =	1500 psf

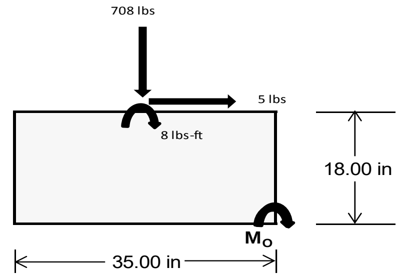
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1017.5 ft-lbs
Resisting Force Required = 697.74 lbs
S.F. = 1.67
Weight Required = 1162.91 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

A minimum 143in long x 35in 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	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	224 lbs	535 lbs	224 lbs	708 lbs	1921 lbs	708 lbs	66 lbs	157 lbs	66 lbs
F_V	1 lbs	0 lbs	1 lbs	5 lbs	0 lbs	5 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9583 lbs	7560 lbs	9583 lbs	9617 lbs	7560 lbs	9617 lbs	2802 lbs	7560 lbs	2802 lbs
M	4 lbs-ft	0 lbs-ft	4 lbs-ft	15 lbs-ft	0 lbs-ft	15 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	275.5 psf	217.5 psf	275.5 psf	275.8 psf	217.5 psf	275.8 psf	80.6 psf	217.5 psf	80.6 psf
f_{max}	275.9 psf	217.5 psf	275.9 psf	277.6 psf	217.5 psf	277.6 psf	80.7 psf	217.5 psf	80.7 psf

Maximum Bearing Pressure = 278 psf
Allowable Bearing Pressure = 1500 psf

Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 143in long x 35in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

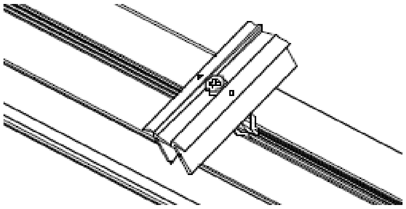
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

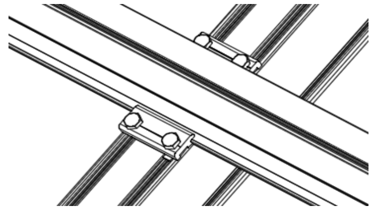
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	1.004	k
Allowable Uplift =	1.214	k
Utilization =	83%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	2.604	k
Allowable Uplift =	4.357	k
Utilization =	60%	



6.2 Strut Connections

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

Front Strut		
Maximum Axial Load =	2.819	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	38%	

Rear Strut		
Maximum Axial Load =	4.662	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	63%	

Diagonal Strut		
Maximum Axial Load =	2.572	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	35%	

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

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

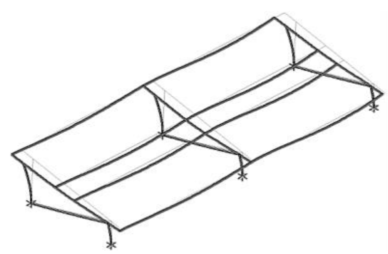
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	56.48	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.130	in
Max Drift, Δ_{MAX} =	0.018	in
N/A		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 87 in

J = 0.432

240.683

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.3 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

$M_{max}St$ = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 87

J = 0.432

153.06

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 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

<u>Compression</u>

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 = **<u>BF0</u>**

<u>Strong Axis:</u>

3.4.14

L_b = 104.56 in
J = 1.08
179.85

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

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= 29.0 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

<u>Weak Axis:</u>

3.4.14

L_b = 104.56
J = 1.08
190.335

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 28.9

3.4.16

b/t = 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	**3.4.16.1**	
Rb/t =	18.1	N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L =	φb[Bt-Dt*√(Rb/t)]		
φF_L =	31.1 ksi		

3.4.18		**3.4.18**	
h/t =	7.4	h/t =	16.2
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	35.2	S1 =	36.9
m =	0.68	m =	0.65
C_0 =	41.067	C_0 =	40
Cc =	43.717	Cc =	40
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	73.8	S2 =	77.3
φF_L =	1.3φyFcy	φF_L =	1.3φyFcy
φF_L =	43.2 ksi	φF_L =	43.2 ksi
φF_LSt=	29.0 ksi	φF_LWk=	33.3 ksi
Ix =	984962 mm^4	Iy =	923544 mm^4
	2.366 in^4		2.219 in^4
y =	43.717 mm	x =	40 mm
Sx =	1.375 in^3	Sy =	1.409 in^3
M_{max}St =	3.323 k-ft	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 = 98.03 in

J = 0.942

152.985

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

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

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 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= 6.11 ksi
A = 663.99 mm^2
1.03 in^2
P_{max} = 6.29 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 69.80 in
J = 0.942
108.93

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

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= 30.0 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 = 69.8
J = 0.942
108.93

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

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= 30.0

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 = 1.61471

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80606

φF_L= (φccFcy)/(λ²)

φF_L= 10.8205 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

$\varphi F_L =$ 10.82 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 11.14 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	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	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	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	-55.176	-55.176	0	0
2	M14	Y	-55.176	-55.176	0	0
3	M15	Y	-55.176	-55.176	0	0
4	M16	Y	-55.176	-55.176	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	-81.596	-81.596	0	0
2	M14	y	-81.596	-81.596	0	0
3	M15	y	-126.102	-126.102	0	0
4	M16	y	-126.102	-126.102	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	185.444	185.444	0	0
2	M14	y	140.938	140.938	0	0
3	M15	y	74.178	74.178	0	0
4	M16	y	74.178	74.178	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...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8												
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6												
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6										
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3										
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3										
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25										
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25										

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	776.127	2	1301.282	2	.513	1	.002	1	0	1	0	1
2		min	-936.985	3	-1705.776	3	.025	15	0	15	0	1	0	1
3	N7	max	.023	9	1040.561	1	-.365	15	0	15	0	1	0	1
4		min	-.266	2	-144.489	3	-8.609	1	-.017	1	0	1	0	1
5	N15	max	.004	9	2819.399	2	0	1	0	1	0	1	0	1
6		min	-2.559	2	-528.162	3	0	3	0	3	0	1	0	1
7	N16	max	2523.688	2	3923.134	2	0	3	0	3	0	1	0	1
8		min	-2780.064	3	-5267.371	3	0	11	0	2	0	1	0	1
9	N23	max	.023	9	1040.561	1	8.609	1	.017	1	0	1	0	1
10		min	-.266	2	-144.489	3	.365	15	0	15	0	1	0	1
11	N24	max	776.127	2	1301.282	2	-.025	15	0	15	0	1	0	1
12		min	-936.985	3	-1705.776	3	-.513	1	-.002	1	0	1	0	1
13	Totals:	max	4072.851	2	11287.757	2	0	1						
14		min	-4654.684	3	-9496.062	3	0	12						

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	51.174	1	443.832	2	-5.944	15	0	15	.143	1	0	2
2			min	2.126	15	-798.008	3	-146.173	1	-.014	2	.006	15	0	3
3		2	max	51.174	1	308.581	2	-4.546	15	0	15	.039	1	.548	3
4			min	2.126	15	-563.563	3	-111.483	1	-.014	2	0	10	-.303	2
5		3	max	51.174	1	173.33	2	-3.148	15	0	15	.004	3	.908	3
6			min	2.126	15	-329.119	3	-76.792	1	-.014	2	-.037	1	-.497	2
7		4	max	51.174	1	38.079	2	-1.749	15	0	15	-.001	12	1.079	3
8			min	2.126	15	-94.674	3	-42.102	1	-.014	2	-.085	1	-.582	2
9		5	max	51.174	1	139.771	3	.63	10	0	15	-.004	12	1.06	3
10			min	2.126	15	-97.172	2	-7.411	1	-.014	2	-.105	1	-.559	2
11		6	max	51.174	1	374.216	3	27.279	1	0	15	-.004	15	.853	3
12			min	2.126	15	-232.423	2	-1.908	3	-.014	2	-.097	1	-.426	2
13		7	max	51.174	1	608.66	3	61.97	1	0	15	-.003	15	.458	3
14			min	2.126	15	-367.674	2	.224	3	-.014	2	-.061	1	-.184	2
15		8	max	51.174	1	843.105	3	96.66	1	0	15	.006	2	.167	2
16			min	2.126	15	-502.924	2	1.713	12	-.014	2	-.008	3	-.127	3
17		9	max	51.174	1	1077.55	3	131.351	1	0	15	.095	1	.626	2
18			min	2.126	15	-638.175	2	3.134	12	-.014	2	-.005	3	-.901	3
19		10	max	51.174	1	1311.994	3	166.041	1	.007	3	.215	1	1.195	2
20			min	2.126	15	-773.426	2	4.555	12	-.014	2	0	3	-1.863	3
21		11	max	51.174	1	638.175	2	-3.134	12	.014	2	.095	1	.626	2
22			min	2.126	15	-1077.55	3	-131.351	1	0	15	-.005	3	-.901	3
23		12	max	51.174	1	502.924	2	-1.713	12	.014	2	.006	2	.167	2
24			min	2.126	15	-843.105	3	-96.66	1	0	15	-.008	3	-.127	3
25		13	max	51.174	1	367.674	2	-.224	3	.014	2	-.003	15	.458	3
26			min	2.126	15	-608.66	3	-61.97	1	0	15	-.061	1	-.184	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	51.174	1	232.423	2	1.908	3	.014	2	-.004	15	.853	3
28			min	2.126	15	-374.216	3	-27.279	1	0	15	-.097	1	-.426	2
29		15	max	51.174	1	97.172	2	7.411	1	.014	2	-.004	12	1.06	3
30			min	2.126	15	-139.771	3	-.63	10	0	15	-.105	1	-.559	2
31		16	max	51.174	1	94.674	3	42.102	1	.014	2	-.001	12	1.079	3
32			min	2.126	15	-38.079	2	1.749	15	0	15	-.085	1	-.582	2
33		17	max	51.174	1	329.119	3	76.792	1	.014	2	.004	3	.908	3
34			min	2.126	15	-173.33	2	3.148	15	0	15	-.037	1	-.497	2
35		18	max	51.174	1	563.563	3	111.483	1	.014	2	.039	1	.548	3
36			min	2.126	15	-308.581	2	4.546	15	0	15	0	10	-.303	2
37		19	max	51.174	1	798.008	3	146.173	1	.014	2	.143	1	0	2
38			min	2.126	15	-443.832	2	5.944	15	0	15	.006	15	0	3
39	M14	1	max	34.089	1	529.298	2	-6.216	15	.015	3	.175	1	0	1
40			min	1.41	15	-653.472	3	-152.849	1	-.016	2	.007	15	0	3
41		2	max	34.089	1	394.047	2	-4.818	15	.015	3	.066	1	.455	3
42			min	1.41	15	-476.391	3	-118.158	1	-.016	2	.003	15	-.372	2
43		3	max	34.089	1	258.796	2	-3.42	15	.015	3	.006	3	.768	3
44			min	1.41	15	-299.31	3	-83.468	1	-.016	2	-.016	1	-.635	2
45		4	max	34.089	1	123.545	2	-2.021	15	.015	3	0	3	.937	3
46			min	1.41	15	-122.228	3	-48.777	1	-.016	2	-.069	1	-.789	2
47		5	max	34.089	1	54.853	3	-.025	10	.015	3	-.003	12	.964	3
48			min	1.41	15	-15.532	1	-14.087	1	-.016	2	-.094	1	-.834	2
49		6	max	34.089	1	231.935	3	20.603	1	.015	3	-.004	15	.849	3
50			min	1.41	15	-146.957	2	-2.421	3	-.016	2	-.092	1	-.77	2
51		7	max	34.089	1	409.016	3	55.294	1	.015	3	-.003	15	.591	3
52			min	1.41	15	-282.208	2	-.289	3	-.016	2	-.061	1	-.597	2
53		8	max	34.089	1	586.098	3	89.984	1	.015	3	.003	2	.19	3
54			min	1.41	15	-417.458	2	1.375	12	-.016	2	-.008	3	-.315	2
55		9	max	34.089	1	763.179	3	124.675	1	.015	3	.084	1	.1	1
56			min	1.41	15	-552.709	2	2.796	12	-.016	2	-.005	3	-.354	3
57		10	max	34.089	1	940.26	3	159.365	1	.015	3	.198	1	.575	2
58			min	1.41	15	-687.96	2	4.217	12	-.016	2	-.001	3	-1.04	3
59		11	max	34.089	1	552.709	2	-2.796	12	.016	2	.084	1	.1	1
60			min	1.41	15	-763.179	3	-124.675	1	-.015	3	-.005	3	-.354	3
61		12	max	34.089	1	417.458	2	-1.375	12	.016	2	.003	2	.19	3
62			min	1.41	15	-586.098	3	-89.984	1	-.015	3	-.008	3	-.315	2
63		13	max	34.089	1	282.208	2	.289	3	.016	2	-.003	15	.591	3
64			min	1.41	15	-409.016	3	-55.294	1	-.015	3	-.061	1	-.597	2
65		14	max	34.089	1	146.957	2	2.421	3	.016	2	-.004	15	.849	3
66			min	1.41	15	-231.935	3	-20.603	1	-.015	3	-.092	1	-.77	2
67		15	max	34.089	1	15.532	1	14.087	1	.016	2	-.003	12	.964	3
68			min	1.41	15	-54.853	3	.025	10	-.015	3	-.094	1	-.834	2
69		16	max	34.089	1	122.228	3	48.777	1	.016	2	0	3	.937	3
70			min	1.41	15	-123.545	2	2.021	15	-.015	3	-.069	1	-.789	2
71		17	max	34.089	1	299.31	3	83.468	1	.016	2	.006	3	.768	3
72			min	1.41	15	-258.796	2	3.42	15	-.015	3	-.016	1	-.635	2
73		18	max	34.089	1	476.391	3	118.158	1	.016	2	.066	1	.455	3
74			min	1.41	15	-394.047	2	4.818	15	-.015	3	.003	15	-.372	2
75		19	max	34.089	1	653.472	3	152.849	1	.016	2	.175	1	0	1
76			min	1.41	15	-529.298	2	6.216	15	-.015	3	.007	15	0	3
77	M15	1	max	-1.489	15	723.049	2	-6.213	15	.017	2	.175	1	0	2
78			min	-35.74	1	-364.251	3	-152.859	1	-.012	3	.007	15	0	3
79		2	max	-1.489	15	530.435	2	-4.815	15	.017	2	.065	1	.257	3
80			min	-35.74	1	-273.216	3	-118.168	1	-.012	3	.003	15	-.505	2
81		3	max	-1.489	15	337.821	2	-3.416	15	.017	2	.006	3	.44	3
82			min	-35.74	1	-182.181	3	-83.478	1	-.012	3	-.016	1	-.855	2
83		4	max	-1.489	15	145.207	2	-2.018	15	.017	2	0	3	.55	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	-35.74	1	-91.146	3	-48.787	1	-.012	3	-.069	1	-1.049	2
85		5	max	-1.489	15	.786	12	-.122	10	.017	2	-.003	12	.587	3
86			min	-35.74	1	-47.408	2	-14.097	1	-.012	3	-.094	1	-1.089	2
87		6	max	-1.489	15	90.925	3	20.594	1	.017	2	-.004	15	.55	3
88			min	-35.74	1	-240.022	2	-2.108	3	-.012	3	-.092	1	-.973	2
89		7	max	-1.489	15	181.96	3	55.284	1	.017	2	-.003	15	.441	3
90			min	-35.74	1	-432.636	2	.024	3	-.012	3	-.061	1	-.702	2
91		8	max	-1.489	15	272.995	3	89.975	1	.017	2	.003	2	.257	3
92			min	-35.74	1	-625.25	2	1.571	12	-.012	3	-.007	3	-.276	2
93		9	max	-1.489	15	364.03	3	124.665	1	.017	2	.084	1	.306	2
94			min	-35.74	1	-817.864	2	2.992	12	-.012	3	-.005	3	-.005	12
95		10	max	-1.489	15	455.066	3	159.356	1	.017	2	.198	1	1.042	2
96			min	-35.74	1	-1010.478	2	4.414	12	-.012	3	0	3	-.329	3
97		11	max	-1.489	15	817.864	2	-2.992	12	.012	3	.084	1	.306	2
98			min	-35.74	1	-364.03	3	-124.665	1	-.017	2	-.005	3	-.005	12
99		12	max	-1.489	15	625.25	2	-1.571	12	.012	3	.003	2	.257	3
100			min	-35.74	1	-272.995	3	-89.975	1	-.017	2	-.007	3	-.276	2
101		13	max	-1.489	15	432.636	2	-.024	3	.012	3	-.003	15	.441	3
102			min	-35.74	1	-181.96	3	-55.284	1	-.017	2	-.061	1	-.702	2
103		14	max	-1.489	15	240.022	2	2.108	3	.012	3	-.004	15	.55	3
104			min	-35.74	1	-90.925	3	-20.594	1	-.017	2	-.092	1	-.973	2
105		15	max	-1.489	15	47.408	2	14.097	1	.012	3	-.003	12	.587	3
106			min	-35.74	1	-.786	12	.122	10	-.017	2	-.094	1	-1.089	2
107		16	max	-1.489	15	91.146	3	48.787	1	.012	3	0	3	.55	3
108			min	-35.74	1	-145.207	2	2.018	15	-.017	2	-.069	1	-1.049	2
109		17	max	-1.489	15	182.181	3	83.478	1	.012	3	.006	3	.44	3
110			min	-35.74	1	-337.821	2	3.416	15	-.017	2	-.016	1	-.855	2
111		18	max	-1.489	15	273.216	3	118.168	1	.012	3	.065	1	.257	3
112			min	-35.74	1	-530.435	2	4.815	15	-.017	2	.003	15	-.505	2
113		19	max	-1.489	15	364.251	3	152.859	1	.012	3	.175	1	0	2
114			min	-35.74	1	-723.049	2	6.213	15	-.017	2	.007	15	0	3
115	M16	1	max	-2.387	15	641.959	2	-5.959	15	.008	1	.145	1	0	2
116			min	-57.618	1	-294.269	3	-146.803	1	-.013	3	.006	15	0	3
117		2	max	-2.387	15	449.345	2	-4.561	15	.008	1	.041	1	.2	3
118			min	-57.618	1	-203.234	3	-112.112	1	-.013	3	.002	10	-.44	2
119		3	max	-2.387	15	256.731	2	-3.162	15	.008	1	.002	3	.327	3
120			min	-57.618	1	-112.199	3	-77.422	1	-.013	3	-.035	1	-.724	2
121		4	max	-2.387	15	64.116	2	-1.764	15	.008	1	-.002	12	.381	3
122			min	-57.618	1	-21.164	3	-42.731	1	-.013	3	-.084	1	-.853	2
123		5	max	-2.387	15	69.872	3	.253	10	.008	1	-.004	12	.362	3
124			min	-57.618	1	-128.498	2	-8.041	1	-.013	3	-.104	1	-.827	2
125		6	max	-2.387	15	160.907	3	26.649	1	.008	1	-.004	15	.269	3
126			min	-57.618	1	-321.112	2	-.923	3	-.013	3	-.097	1	-.646	2
127		7	max	-2.387	15	251.942	3	61.34	1	.008	1	-.003	15	.102	3
128			min	-57.618	1	-513.726	2	.907	12	-.013	3	-.061	1	-.31	2
129		8	max	-2.387	15	342.977	3	96.03	1	.008	1	.004	2	.182	2
130			min	-57.618	1	-706.34	2	2.328	12	-.013	3	-.006	3	-.137	3
131		9	max	-2.387	15	434.012	3	130.721	1	.008	1	.093	1	.828	2
132			min	-57.618	1	-898.954	2	3.75	12	-.013	3	-.002	3	-.45	3
133		10	max	-2.387	15	525.048	3	165.411	1	.008	1	.213	1	1.63	2
134			min	-57.618	1	-1091.568	2	5.171	12	-.013	3	.003	12	-.837	3
135		11	max	-2.387	15	898.954	2	-3.75	12	.013	3	.093	1	.828	2
136			min	-57.618	1	-434.012	3	-130.721	1	-.008	1	-.002	3	-.45	3
137		12	max	-2.387	15	706.34	2	-2.328	12	.013	3	.004	2	.182	2
138			min	-57.618	1	-342.977	3	-96.03	1	-.008	1	-.006	3	-.137	3
139		13	max	-2.387	15	513.726	2	-.907	12	.013	3	-.003	15	.102	3
140			min	-57.618	1	-251.942	3	-61.34	1	-.008	1	-.061	1	-.31	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	-2.387	15	321.112	2	.923	3	.013	3	-.004	15	.269	3
142			min	-57.618	1	-160.907	3	-26.649	1	-.008	1	-.097	1	-.646	2
143		15	max	-2.387	15	128.498	2	8.041	1	.013	3	-.004	12	.362	3
144			min	-57.618	1	-69.872	3	-.253	10	-.008	1	-.104	1	-.827	2
145		16	max	-2.387	15	21.164	3	42.731	1	.013	3	-.002	12	.381	3
146			min	-57.618	1	-64.116	2	1.764	15	-.008	1	-.084	1	-.853	2
147		17	max	-2.387	15	112.199	3	77.422	1	.013	3	.002	3	.327	3
148			min	-57.618	1	-256.731	2	3.162	15	-.008	1	-.035	1	-.724	2
149		18	max	-2.387	15	203.234	3	112.112	1	.013	3	.041	1	.2	3
150			min	-57.618	1	-449.345	2	4.561	15	-.008	1	.002	10	-.44	2
151		19	max	-2.387	15	294.269	3	146.803	1	.013	3	.145	1	0	2
152			min	-57.618	1	-641.959	2	5.959	15	-.008	1	.006	15	0	3
153	M2	1	max	1110.267	2	2.025	4	.406	1	0	3	0	3	0	1
154			min	-1508.103	3	.476	15	.017	15	0	1	0	2	0	1
155		2	max	1110.741	2	1.988	4	.406	1	0	3	0	1	0	15
156			min	-1507.748	3	.467	15	.017	15	0	1	0	15	0	4
157		3	max	1111.215	2	1.951	4	.406	1	0	3	0	1	0	15
158			min	-1507.393	3	.459	15	.017	15	0	1	0	15	-.001	4
159		4	max	1111.689	2	1.914	4	.406	1	0	3	0	1	0	15
160			min	-1507.037	3	.45	15	.017	15	0	1	0	15	-.002	4
161		5	max	1112.162	2	1.877	4	.406	1	0	3	0	1	0	15
162			min	-1506.682	3	.441	15	.017	15	0	1	0	15	-.002	4
163		6	max	1112.636	2	1.84	4	.406	1	0	3	0	1	0	15
164			min	-1506.327	3	.433	15	.017	15	0	1	0	15	-.003	4
165		7	max	1113.11	2	1.803	4	.406	1	0	3	0	1	0	15
166			min	-1505.971	3	.424	15	.017	15	0	1	0	15	-.004	4
167		8	max	1113.583	2	1.766	4	.406	1	0	3	0	1	0	15
168			min	-1505.616	3	.415	15	.017	15	0	1	0	15	-.004	4
169		9	max	1114.057	2	1.729	4	.406	1	0	3	.001	1	-.001	15
170			min	-1505.261	3	.406	15	.017	15	0	1	0	15	-.005	4
171		10	max	1114.531	2	1.691	4	.406	1	0	3	.001	1	-.001	15
172			min	-1504.906	3	.398	15	.017	15	0	1	0	15	-.005	4
173		11	max	1115.005	2	1.654	4	.406	1	0	3	.001	1	-.001	15
174			min	-1504.55	3	.389	15	.017	15	0	1	0	15	-.006	4
175		12	max	1115.478	2	1.617	4	.406	1	0	3	.001	1	-.002	15
176			min	-1504.195	3	.38	15	.017	15	0	1	0	15	-.006	4
177		13	max	1115.952	2	1.58	4	.406	1	0	3	.002	1	-.002	15
178			min	-1503.84	3	.372	15	.017	15	0	1	0	15	-.007	4
179		14	max	1116.426	2	1.543	4	.406	1	0	3	.002	1	-.002	15
180			min	-1503.484	3	.363	15	.017	15	0	1	0	15	-.007	4
181		15	max	1116.9	2	1.506	4	.406	1	0	3	.002	1	-.002	15
182			min	-1503.129	3	.354	15	.017	15	0	1	0	15	-.008	4
183		16	max	1117.373	2	1.469	4	.406	1	0	3	.002	1	-.002	15
184			min	-1502.774	3	.345	15	.017	15	0	1	0	15	-.008	4
185		17	max	1117.847	2	1.432	4	.406	1	0	3	.002	1	-.002	15
186			min	-1502.418	3	.333	12	.017	15	0	1	0	15	-.009	4
187		18	max	1118.321	2	1.395	4	.406	1	0	3	.002	1	-.002	15
188			min	-1502.063	3	.318	12	.017	15	0	1	0	15	-.009	4
189		19	max	1118.795	2	1.358	4	.406	1	0	3	.002	1	-.002	15
190			min	-1501.708	3	.304	12	.017	15	0	1	0	15	-.01	4
191	M3	1	max	730.606	2	8.994	4	.19	1	0	5	0	1	.01	4
192			min	-870.657	3	2.114	15	.008	15	0	1	0	15	.002	15
193		2	max	730.436	2	8.122	4	.19	1	0	5	0	1	.006	2
194			min	-870.785	3	1.909	15	.008	15	0	1	0	15	0	12
195		3	max	730.266	2	7.25	4	.19	1	0	5	0	1	.003	2
196			min	-870.912	3	1.704	15	.008	15	0	1	0	15	0	3
197		4	max	730.095	2	6.378	4	.19	1	0	5	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	-871.04	3	1.499	15	.008	15	0	1	0	15	-.002	3
199		5	max	729.925	2	5.506	4	.19	1	0	5	0	1	0	15
200			min	-871.168	3	1.294	15	.008	15	0	1	0	15	-.004	4
201		6	max	729.755	2	4.634	4	.19	1	0	5	0	1	-.001	15
202			min	-871.296	3	1.089	15	.008	15	0	1	0	15	-.006	4
203		7	max	729.584	2	3.762	4	.19	1	0	5	0	1	-.002	15
204			min	-871.423	3	.884	15	.008	15	0	1	0	15	-.008	4
205		8	max	729.414	2	2.89	4	.19	1	0	5	0	1	-.002	15
206			min	-871.551	3	.679	15	.008	15	0	1	0	15	-.01	4
207		9	max	729.244	2	2.018	4	.19	1	0	5	0	1	-.003	15
208			min	-871.679	3	.474	15	.008	15	0	1	0	15	-.011	4
209		10	max	729.073	2	1.146	4	.19	1	0	5	0	1	-.003	15
210			min	-871.807	3	.269	15	.008	15	0	1	0	15	-.012	4
211		11	max	728.903	2	.392	2	.19	1	0	5	.001	1	-.003	15
212			min	-871.934	3	-.084	3	.008	15	0	1	0	15	-.012	4
213		12	max	728.733	2	-.141	15	.19	1	0	5	.001	1	-.003	15
214			min	-872.062	3	-.598	4	.008	15	0	1	0	15	-.012	4
215		13	max	728.562	2	-.345	15	.19	1	0	5	.001	1	-.003	15
216			min	-872.19	3	-1.47	4	.008	15	0	1	0	15	-.012	4
217		14	max	728.392	2	-.55	15	.19	1	0	5	.001	1	-.003	15
218			min	-872.318	3	-2.342	4	.008	15	0	1	0	15	-.011	4
219		15	max	728.222	2	-.755	15	.19	1	0	5	.001	1	-.002	15
220			min	-872.446	3	-3.214	4	.008	15	0	1	0	15	-.009	4
221		16	max	728.051	2	-.96	15	.19	1	0	5	.001	1	-.002	15
222			min	-872.573	3	-4.086	4	.008	15	0	1	0	15	-.008	4
223		17	max	727.881	2	-1.165	15	.19	1	0	5	.002	1	-.001	15
224			min	-872.701	3	-4.958	4	.008	15	0	1	0	15	-.006	4
225		18	max	727.711	2	-1.37	15	.19	1	0	5	.002	1	0	15
226			min	-872.829	3	-5.83	4	.008	15	0	1	0	15	-.003	4
227		19	max	727.54	2	-1.575	15	.19	1	0	5	.002	1	0	1
228			min	-872.957	3	-6.702	4	.008	15	0	1	0	15	0	1
229	M4	1	max	1037.494	1	0	1	-.365	15	0	1	.001	1	0	1
230			min	-146.789	3	0	1	-8.87	1	0	1	0	15	0	1
231		2	max	1037.665	1	0	1	-.365	15	0	1	0	1	0	1
232			min	-146.661	3	0	1	-8.87	1	0	1	0	15	0	1
233		3	max	1037.835	1	0	1	-.365	15	0	1	0	15	0	1
234			min	-146.533	3	0	1	-8.87	1	0	1	0	1	0	1
235		4	max	1038.005	1	0	1	-.365	15	0	1	0	15	0	1
236			min	-146.405	3	0	1	-8.87	1	0	1	-.002	1	0	1
237		5	max	1038.176	1	0	1	-.365	15	0	1	0	15	0	1
238			min	-146.278	3	0	1	-8.87	1	0	1	-.003	1	0	1
239		6	max	1038.346	1	0	1	-.365	15	0	1	0	15	0	1
240			min	-146.15	3	0	1	-8.87	1	0	1	-.004	1	0	1
241		7	max	1038.516	1	0	1	-.365	15	0	1	0	15	0	1
242			min	-146.022	3	0	1	-8.87	1	0	1	-.005	1	0	1
243		8	max	1038.687	1	0	1	-.365	15	0	1	0	15	0	1
244			min	-145.894	3	0	1	-8.87	1	0	1	-.006	1	0	1
245		9	max	1038.857	1	0	1	-.365	15	0	1	0	15	0	1
246			min	-145.766	3	0	1	-8.87	1	0	1	-.007	1	0	1
247		10	max	1039.028	1	0	1	-.365	15	0	1	0	15	0	1
248			min	-145.639	3	0	1	-8.87	1	0	1	-.008	1	0	1
249		11	max	1039.198	1	0	1	-.365	15	0	1	0	15	0	1
250			min	-145.511	3	0	1	-8.87	1	0	1	-.009	1	0	1
251		12	max	1039.368	1	0	1	-.365	15	0	1	0	15	0	1
252			min	-145.383	3	0	1	-8.87	1	0	1	-.01	1	0	1
253		13	max	1039.539	1	0	1	-.365	15	0	1	0	15	0	1
254			min	-145.255	3	0	1	-8.87	1	0	1	-.011	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1039.709	1	0	1	-.365	15	0	1	0	15	0	1
256			min	-145.128	3	0	1	-8.87	1	0	1	-.012	1	0	1
257		15	max	1039.879	1	0	1	-.365	15	0	1	0	15	0	1
258			min	-145	3	0	1	-8.87	1	0	1	-.013	1	0	1
259		16	max	1040.05	1	0	1	-.365	15	0	1	0	15	0	1
260			min	-144.872	3	0	1	-8.87	1	0	1	-.014	1	0	1
261		17	max	1040.22	1	0	1	-.365	15	0	1	0	15	0	1
262			min	-144.744	3	0	1	-8.87	1	0	1	-.015	1	0	1
263		18	max	1040.39	1	0	1	-.365	15	0	1	0	15	0	1
264			min	-144.617	3	0	1	-8.87	1	0	1	-.016	1	0	1
265		19	max	1040.561	1	0	1	-.365	15	0	1	0	15	0	1
266			min	-144.489	3	0	1	-8.87	1	0	1	-.017	1	0	1
267	M6	1	max	3331.336	2	2.42	2	0	1	0	1	0	1	0	1
268			min	-4662.288	3	.103	3	0	1	0	1	0	1	0	1
269		2	max	3331.81	2	2.391	2	0	1	0	1	0	1	0	3
270			min	-4661.933	3	.082	3	0	1	0	1	0	1	0	2
271		3	max	3332.283	2	2.362	2	0	1	0	1	0	1	0	3
272			min	-4661.577	3	.06	3	0	1	0	1	0	1	-.002	2
273		4	max	3332.757	2	2.334	2	0	1	0	1	0	1	0	3
274			min	-4661.222	3	.038	3	0	1	0	1	0	1	-.002	2
275		5	max	3333.231	2	2.305	2	0	1	0	1	0	1	0	3
276			min	-4660.867	3	.017	3	0	1	0	1	0	1	-.003	2
277		6	max	3333.705	2	2.276	2	0	1	0	1	0	1	0	3
278			min	-4660.512	3	-.005	3	0	1	0	1	0	1	-.004	2
279		7	max	3334.178	2	2.247	2	0	1	0	1	0	1	0	3
280			min	-4660.156	3	-.027	3	0	1	0	1	0	1	-.004	2
281		8	max	3334.652	2	2.218	2	0	1	0	1	0	1	0	3
282			min	-4659.801	3	-.048	3	0	1	0	1	0	1	-.005	2
283		9	max	3335.126	2	2.189	2	0	1	0	1	0	1	0	3
284			min	-4659.446	3	-.07	3	0	1	0	1	0	1	-.006	2
285		10	max	3335.6	2	2.16	2	0	1	0	1	0	1	0	3
286			min	-4659.09	3	-.092	3	0	1	0	1	0	1	-.007	2
287		11	max	3336.073	2	2.132	2	0	1	0	1	0	1	0	3
288			min	-4658.735	3	-.113	3	0	1	0	1	0	1	-.007	2
289		12	max	3336.547	2	2.103	2	0	1	0	1	0	1	0	3
290			min	-4658.38	3	-.135	3	0	1	0	1	0	1	-.008	2
291		13	max	3337.021	2	2.074	2	0	1	0	1	0	1	0	3
292			min	-4658.024	3	-.157	3	0	1	0	1	0	1	-.009	2
293		14	max	3337.494	2	2.045	2	0	1	0	1	0	1	0	3
294			min	-4657.669	3	-.178	3	0	1	0	1	0	1	-.009	2
295		15	max	3337.968	2	2.016	2	0	1	0	1	0	1	0	3
296			min	-4657.314	3	-.2	3	0	1	0	1	0	1	-.01	2
297		16	max	3338.442	2	1.987	2	0	1	0	1	0	1	0	3
298			min	-4656.959	3	-.222	3	0	1	0	1	0	1	-.011	2
299		17	max	3338.916	2	1.958	2	0	1	0	1	0	1	0	3
300			min	-4656.603	3	-.243	3	0	1	0	1	0	1	-.011	2
301		18	max	3339.389	2	1.929	2	0	1	0	1	0	1	0	3
302			min	-4656.248	3	-.265	3	0	1	0	1	0	1	-.012	2
303		19	max	3339.863	2	1.901	2	0	1	0	1	0	1	0	3
304			min	-4655.893	3	-.287	3	0	1	0	1	0	1	-.012	2
305	M7	1	max	2393.964	2	9.02	4	0	1	0	1	0	1	.012	2
306			min	-2569.456	3	2.118	15	0	1	0	1	0	1	0	3
307		2	max	2393.794	2	8.148	4	0	1	0	1	0	1	.009	2
308			min	-2569.584	3	1.913	15	0	1	0	1	0	1	-.003	3
309		3	max	2393.624	2	7.276	4	0	1	0	1	0	1	.006	2
310			min	-2569.711	3	1.708	15	0	1	0	1	0	1	-.004	3
311		4	max	2393.453	2	6.404	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	-2569.839	3	1.503	15	0	1	0	1	0	1	-.006	3
313		5	max	2393.283	2	5.532	4	0	1	0	1	0	1	0	2
314			min	-2569.967	3	1.298	15	0	1	0	1	0	1	-.007	3
315		6	max	2393.113	2	4.66	4	0	1	0	1	0	1	-.001	2
316			min	-2570.095	3	1.093	15	0	1	0	1	0	1	-.008	3
317		7	max	2392.942	2	3.788	4	0	1	0	1	0	1	-.002	15
318			min	-2570.222	3	.888	15	0	1	0	1	0	1	-.009	3
319		8	max	2392.772	2	2.916	4	0	1	0	1	0	1	-.002	15
320			min	-2570.35	3	.668	12	0	1	0	1	0	1	-.01	4
321		9	max	2392.602	2	2.143	2	0	1	0	1	0	1	-.003	15
322			min	-2570.478	3	.329	12	0	1	0	1	0	1	-.011	4
323		10	max	2392.431	2	1.464	2	0	1	0	1	0	1	-.003	15
324			min	-2570.606	3	-.062	3	0	1	0	1	0	1	-.012	4
325		11	max	2392.261	2	.784	2	0	1	0	1	0	1	-.003	15
326			min	-2570.733	3	-.572	3	0	1	0	1	0	1	-.012	4
327		12	max	2392.091	2	.105	2	0	1	0	1	0	1	-.003	15
328			min	-2570.861	3	-1.081	3	0	1	0	1	0	1	-.012	4
329		13	max	2391.92	2	-.342	15	0	1	0	1	0	1	-.003	15
330			min	-2570.989	3	-1.591	3	0	1	0	1	0	1	-.012	4
331		14	max	2391.75	2	-.547	15	0	1	0	1	0	1	-.003	15
332			min	-2571.117	3	-2.316	4	0	1	0	1	0	1	-.011	4
333		15	max	2391.58	2	-.752	15	0	1	0	1	0	1	-.002	15
334			min	-2571.244	3	-3.188	4	0	1	0	1	0	1	-.009	4
335		16	max	2391.409	2	-.957	15	0	1	0	1	0	1	-.002	15
336			min	-2571.372	3	-4.06	4	0	1	0	1	0	1	-.008	4
337		17	max	2391.239	2	-1.162	15	0	1	0	1	0	1	-.001	15
338			min	-2571.5	3	-4.933	4	0	1	0	1	0	1	-.005	4
339		18	max	2391.069	2	-1.367	15	0	1	0	1	0	1	0	15
340			min	-2571.628	3	-5.805	4	0	1	0	1	0	1	-.003	4
341		19	max	2390.898	2	-1.572	15	0	1	0	1	0	1	0	1
342			min	-2571.755	3	-6.677	4	0	1	0	1	0	1	0	1
343	M8	1	max	2816.332	2	0	1	0	1	0	1	0	1	0	1
344			min	-530.462	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2816.503	2	0	1	0	1	0	1	0	1	0	1
346			min	-530.334	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2816.673	2	0	1	0	1	0	1	0	1	0	1
348			min	-530.206	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2816.844	2	0	1	0	1	0	1	0	1	0	1
350			min	-530.079	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2817.014	2	0	1	0	1	0	1	0	1	0	1
352			min	-529.951	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2817.184	2	0	1	0	1	0	1	0	1	0	1
354			min	-529.823	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2817.355	2	0	1	0	1	0	1	0	1	0	1
356			min	-529.695	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2817.525	2	0	1	0	1	0	1	0	1	0	1
358			min	-529.568	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2817.695	2	0	1	0	1	0	1	0	1	0	1
360			min	-529.44	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2817.866	2	0	1	0	1	0	1	0	1	0	1
362			min	-529.312	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2818.036	2	0	1	0	1	0	1	0	1	0	1
364			min	-529.184	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2818.206	2	0	1	0	1	0	1	0	1	0	1
366			min	-529.057	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2818.377	2	0	1	0	1	0	1	0	1	0	1
368			min	-528.929	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	2818.547	2	0	1	0	1	0	1	0	1	0	1
370			min	-528.801	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2818.717	2	0	1	0	1	0	1	0	1	0	1
372			min	-528.673	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2818.888	2	0	1	0	1	0	1	0	1	0	1
374			min	-528.546	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2819.058	2	0	1	0	1	0	1	0	1	0	1
376			min	-528.418	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2819.228	2	0	1	0	1	0	1	0	1	0	1
378			min	-528.29	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2819.399	2	0	1	0	1	0	1	0	1	0	1
380			min	-528.162	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1110.267	2	2.025	4	-.017	15	0	1	0	2	0	1
382			min	-1508.103	3	.476	15	-.406	1	0	3	0	3	0	1
383		2	max	1110.741	2	1.988	4	-.017	15	0	1	0	15	0	15
384			min	-1507.748	3	.467	15	-.406	1	0	3	0	1	0	4
385		3	max	1111.215	2	1.951	4	-.017	15	0	1	0	15	0	15
386			min	-1507.393	3	.459	15	-.406	1	0	3	0	1	-.001	4
387		4	max	1111.689	2	1.914	4	-.017	15	0	1	0	15	0	15
388			min	-1507.037	3	.45	15	-.406	1	0	3	0	1	-.002	4
389		5	max	1112.162	2	1.877	4	-.017	15	0	1	0	15	0	15
390			min	-1506.682	3	.441	15	-.406	1	0	3	0	1	-.002	4
391		6	max	1112.636	2	1.84	4	-.017	15	0	1	0	15	0	15
392			min	-1506.327	3	.433	15	-.406	1	0	3	0	1	-.003	4
393		7	max	1113.11	2	1.803	4	-.017	15	0	1	0	15	0	15
394			min	-1505.971	3	.424	15	-.406	1	0	3	0	1	-.004	4
395		8	max	1113.583	2	1.766	4	-.017	15	0	1	0	15	0	15
396			min	-1505.616	3	.415	15	-.406	1	0	3	0	1	-.004	4
397		9	max	1114.057	2	1.729	4	-.017	15	0	1	0	15	-.001	15
398			min	-1505.261	3	.406	15	-.406	1	0	3	-.001	1	-.005	4
399		10	max	1114.531	2	1.691	4	-.017	15	0	1	0	15	-.001	15
400			min	-1504.906	3	.398	15	-.406	1	0	3	-.001	1	-.005	4
401		11	max	1115.005	2	1.654	4	-.017	15	0	1	0	15	-.001	15
402			min	-1504.55	3	.389	15	-.406	1	0	3	-.001	1	-.006	4
403		12	max	1115.478	2	1.617	4	-.017	15	0	1	0	15	-.002	15
404			min	-1504.195	3	.38	15	-.406	1	0	3	-.001	1	-.006	4
405		13	max	1115.952	2	1.58	4	-.017	15	0	1	0	15	-.002	15
406			min	-1503.84	3	.372	15	-.406	1	0	3	-.002	1	-.007	4
407		14	max	1116.426	2	1.543	4	-.017	15	0	1	0	15	-.002	15
408			min	-1503.484	3	.363	15	-.406	1	0	3	-.002	1	-.007	4
409		15	max	1116.9	2	1.506	4	-.017	15	0	1	0	15	-.002	15
410			min	-1503.129	3	.354	15	-.406	1	0	3	-.002	1	-.008	4
411		16	max	1117.373	2	1.469	4	-.017	15	0	1	0	15	-.002	15
412			min	-1502.774	3	.345	15	-.406	1	0	3	-.002	1	-.008	4
413		17	max	1117.847	2	1.432	4	-.017	15	0	1	0	15	-.002	15
414			min	-1502.418	3	.333	12	-.406	1	0	3	-.002	1	-.009	4
415		18	max	1118.321	2	1.395	4	-.017	15	0	1	0	15	-.002	15
416			min	-1502.063	3	.318	12	-.406	1	0	3	-.002	1	-.009	4
417		19	max	1118.795	2	1.358	4	-.017	15	0	1	0	15	-.002	15
418			min	-1501.708	3	.304	12	-.406	1	0	3	-.002	1	-.01	4
419	M11	1	max	730.606	2	8.994	4	-.008	15	0	1	0	15	.01	4
420			min	-870.657	3	2.114	15	-.19	1	0	5	0	1	.002	15
421		2	max	730.436	2	8.122	4	-.008	15	0	1	0	15	.006	2
422			min	-870.785	3	1.909	15	-.19	1	0	5	0	1	0	12
423		3	max	730.266	2	7.25	4	-.008	15	0	1	0	15	.003	2
424			min	-870.912	3	1.704	15	-.19	1	0	5	0	1	0	3
425		4	max	730.095	2	6.378	4	-.008	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	-871.04	3	1.499	15	-.19	1	0	5	0	1	-.002	3
427		5	max	729.925	2	5.506	4	-.008	15	0	1	0	15	0	15
428			min	-871.168	3	1.294	15	-.19	1	0	5	0	1	-.004	4
429		6	max	729.755	2	4.634	4	-.008	15	0	1	0	15	-.001	15
430			min	-871.296	3	1.089	15	-.19	1	0	5	0	1	-.006	4
431		7	max	729.584	2	3.762	4	-.008	15	0	1	0	15	-.002	15
432			min	-871.423	3	.884	15	-.19	1	0	5	0	1	-.008	4
433		8	max	729.414	2	2.89	4	-.008	15	0	1	0	15	-.002	15
434			min	-871.551	3	.679	15	-.19	1	0	5	0	1	-.01	4
435		9	max	729.244	2	2.018	4	-.008	15	0	1	0	15	-.003	15
436			min	-871.679	3	.474	15	-.19	1	0	5	0	1	-.011	4
437		10	max	729.073	2	1.146	4	-.008	15	0	1	0	15	-.003	15
438			min	-871.807	3	.269	15	-.19	1	0	5	0	1	-.012	4
439		11	max	728.903	2	.392	2	-.008	15	0	1	0	15	-.003	15
440			min	-871.934	3	-.084	3	-.19	1	0	5	-.001	1	-.012	4
441		12	max	728.733	2	-.141	15	-.008	15	0	1	0	15	-.003	15
442			min	-872.062	3	-.598	4	-.19	1	0	5	-.001	1	-.012	4
443		13	max	728.562	2	-.345	15	-.008	15	0	1	0	15	-.003	15
444			min	-872.19	3	-1.47	4	-.19	1	0	5	-.001	1	-.012	4
445		14	max	728.392	2	-.55	15	-.008	15	0	1	0	15	-.003	15
446			min	-872.318	3	-2.342	4	-.19	1	0	5	-.001	1	-.011	4
447		15	max	728.222	2	-.755	15	-.008	15	0	1	0	15	-.002	15
448			min	-872.446	3	-3.214	4	-.19	1	0	5	-.001	1	-.009	4
449		16	max	728.051	2	-.96	15	-.008	15	0	1	0	15	-.002	15
450			min	-872.573	3	-4.086	4	-.19	1	0	5	-.001	1	-.008	4
451		17	max	727.881	2	-1.165	15	-.008	15	0	1	0	15	-.001	15
452			min	-872.701	3	-4.958	4	-.19	1	0	5	-.002	1	-.006	4
453		18	max	727.711	2	-1.37	15	-.008	15	0	1	0	15	0	15
454			min	-872.829	3	-5.83	4	-.19	1	0	5	-.002	1	-.003	4
455		19	max	727.54	2	-1.575	15	-.008	15	0	1	0	15	0	1
456			min	-872.957	3	-6.702	4	-.19	1	0	5	-.002	1	0	1
457	M12	1	max	1037.494	1	0	1	8.87	1	0	1	0	15	0	1
458			min	-146.789	3	0	1	.365	15	0	1	-.001	1	0	1
459		2	max	1037.665	1	0	1	8.87	1	0	1	0	15	0	1
460			min	-146.661	3	0	1	.365	15	0	1	0	1	0	1
461		3	max	1037.835	1	0	1	8.87	1	0	1	0	1	0	1
462			min	-146.533	3	0	1	.365	15	0	1	0	15	0	1
463		4	max	1038.005	1	0	1	8.87	1	0	1	.002	1	0	1
464			min	-146.405	3	0	1	.365	15	0	1	0	15	0	1
465		5	max	1038.176	1	0	1	8.87	1	0	1	.003	1	0	1
466			min	-146.278	3	0	1	.365	15	0	1	0	15	0	1
467		6	max	1038.346	1	0	1	8.87	1	0	1	.004	1	0	1
468			min	-146.15	3	0	1	.365	15	0	1	0	15	0	1
469		7	max	1038.516	1	0	1	8.87	1	0	1	.005	1	0	1
470			min	-146.022	3	0	1	.365	15	0	1	0	15	0	1
471		8	max	1038.687	1	0	1	8.87	1	0	1	.006	1	0	1
472			min	-145.894	3	0	1	.365	15	0	1	0	15	0	1
473		9	max	1038.857	1	0	1	8.87	1	0	1	.007	1	0	1
474			min	-145.766	3	0	1	.365	15	0	1	0	15	0	1
475		10	max	1039.028	1	0	1	8.87	1	0	1	.008	1	0	1
476			min	-145.639	3	0	1	.365	15	0	1	0	15	0	1
477		11	max	1039.198	1	0	1	8.87	1	0	1	.009	1	0	1
478			min	-145.511	3	0	1	.365	15	0	1	0	15	0	1
479		12	max	1039.368	1	0	1	8.87	1	0	1	.01	1	0	1
480			min	-145.383	3	0	1	.365	15	0	1	0	15	0	1
481		13	max	1039.539	1	0	1	8.87	1	0	1	.011	1	0	1
482			min	-145.255	3	0	1	.365	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	1039.709	1	0	1	8.87	1	0	1	.012	1	0	1
484			min	-145.128	3	0	1	.365	15	0	1	0	15	0	1
485		15	max	1039.879	1	0	1	8.87	1	0	1	.013	1	0	1
486			min	-145	3	0	1	.365	15	0	1	0	15	0	1
487		16	max	1040.05	1	0	1	8.87	1	0	1	.014	1	0	1
488			min	-144.872	3	0	1	.365	15	0	1	0	15	0	1
489		17	max	1040.22	1	0	1	8.87	1	0	1	.015	1	0	1
490			min	-144.744	3	0	1	.365	15	0	1	0	15	0	1
491		18	max	1040.39	1	0	1	8.87	1	0	1	.016	1	0	1
492			min	-144.617	3	0	1	.365	15	0	1	0	15	0	1
493		19	max	1040.561	1	0	1	8.87	1	0	1	.017	1	0	1
494			min	-144.489	3	0	1	.365	15	0	1	0	15	0	1
495	M1	1	max	146.178	1	797.934	3	-2.125	15	0	2	.143	1	0	15
496			min	5.944	15	-442.933	2	-51.104	1	0	3	.006	15	-.014	2
497		2	max	146.89	1	796.789	3	-2.125	15	0	2	.111	1	.262	2
498			min	6.159	15	-444.46	2	-51.104	1	0	3	.005	15	-.502	3
499		3	max	567.127	3	580.994	2	-2.109	15	0	3	.079	1	.527	2
500			min	-347.102	2	-613.332	3	-50.829	1	0	2	.003	15	-.981	3
501		4	max	567.661	3	579.467	2	-2.109	15	0	3	.048	1	.172	1
502			min	-346.39	2	-614.477	3	-50.829	1	0	2	.002	15	-.6	3
503		5	max	568.195	3	577.94	2	-2.109	15	0	3	.016	1	-.005	15
504			min	-345.678	2	-615.622	3	-50.829	1	0	2	0	15	-.218	3
505		6	max	568.729	3	576.413	2	-2.109	15	0	3	0	15	.164	3
506			min	-344.966	2	-616.767	3	-50.829	1	0	2	-.015	1	-.551	2
507		7	max	569.263	3	574.886	2	-2.109	15	0	3	-.002	15	.547	3
508			min	-344.254	2	-617.912	3	-50.829	1	0	2	-.047	1	-.908	2
509		8	max	569.797	3	573.359	2	-2.109	15	0	3	-.003	15	.931	3
510			min	-343.542	2	-619.058	3	-50.829	1	0	2	-.079	1	-1.264	2
511		9	max	583.411	3	48.284	2	-3.519	15	0	9	.052	1	1.086	3
512			min	-283.19	2	.465	15	-84.957	1	0	3	.002	15	-1.441	2
513		10	max	583.945	3	46.757	2	-3.519	15	0	9	0	10	1.062	3
514			min	-282.478	2	.005	15	-84.957	1	0	3	0	1	-1.471	2
515		11	max	584.479	3	45.23	2	-3.519	15	0	9	-.002	15	1.038	3
516			min	-281.766	2	-1.869	4	-84.957	1	0	3	-.054	1	-1.499	2
517		12	max	597.782	3	407.117	3	-2.03	15	0	2	.077	1	.911	3
518			min	-221.28	2	-675.867	2	-49.23	1	0	3	.003	15	-1.331	2
519		13	max	598.316	3	405.972	3	-2.03	15	0	2	.047	1	.659	3
520			min	-220.568	2	-677.394	2	-49.23	1	0	3	.002	15	-.911	2
521		14	max	598.85	3	404.826	3	-2.03	15	0	2	.016	1	.407	3
522			min	-219.856	2	-678.921	2	-49.23	1	0	3	0	15	-.49	2
523		15	max	599.384	3	403.681	3	-2.03	15	0	2	0	15	.156	3
524			min	-219.144	2	-680.448	2	-49.23	1	0	3	-.014	1	-.088	1
525		16	max	599.918	3	402.536	3	-2.03	15	0	2	-.002	15	.355	2
526			min	-218.432	2	-681.975	2	-49.23	1	0	3	-.045	1	-.094	3
527		17	max	600.452	3	401.391	3	-2.03	15	0	2	-.003	15	.778	2
528			min	-217.72	2	-683.502	2	-49.23	1	0	3	-.076	1	-.343	3
529		18	max	-6.174	15	644.288	2	-2.387	15	0	3	-.005	15	.393	2
530			min	-147.511	1	-293.253	3	-57.685	1	0	2	-.109	1	-.169	3
531		19	max	-5.959	15	642.761	2	-2.387	15	0	3	-.006	15	.013	3
532			min	-146.799	1	-294.398	3	-57.685	1	0	2	-.145	1	-.008	1
533	M5	1	max	332.072	1	2623.957	3	0	1	0	1	0	1	.027	2
534			min	9.112	12	-1543.134	2	0	1	0	1	0	1	0	15
535		2	max	332.784	1	2622.812	3	0	1	0	1	0	1	.985	2
536			min	9.468	12	-1544.661	2	0	1	0	1	0	1	-1.614	3
537		3	max	1721.202	3	1513.128	2	0	1	0	1	0	1	1.911	2
538			min	-1081.106	2	-1758.21	3	0	1	0	1	0	1	-3.193	3
539		4	max	1721.736	3	1511.601	2	0	1	0	1	0	1	.972	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1080.394	2	-1759.355	3	0	1	0	1	0	1	-2.102	3
541		5	max	1722.27	3	1510.074	2	0	1	0	1	0	1	.079	1
542			min	-1079.682	2	-1760.5	3	0	1	0	1	0	1	-1.009	3
543		6	max	1722.804	3	1508.547	2	0	1	0	1	0	1	.084	3
544			min	-1078.97	2	-1761.645	3	0	1	0	1	0	1	-.902	2
545		7	max	1723.338	3	1507.02	2	0	1	0	1	0	1	1.177	3
546			min	-1078.258	2	-1762.79	3	0	1	0	1	0	1	-1.838	2
547		8	max	1723.872	3	1505.493	2	0	1	0	1	0	1	2.272	3
548			min	-1077.546	2	-1763.936	3	0	1	0	1	0	1	-2.773	2
549		9	max	1736.622	3	164.451	2	0	1	0	1	0	1	2.623	3
550			min	-943.614	2	.46	15	0	1	0	1	0	1	-3.175	2
551		10	max	1737.156	3	162.924	2	0	1	0	1	0	1	2.527	3
552			min	-942.902	2	-.001	15	0	1	0	1	0	1	-3.277	2
553		11	max	1737.69	3	161.397	2	0	1	0	1	0	1	2.432	3
554			min	-942.19	2	-1.772	4	0	1	0	1	0	1	-3.378	2
555		12	max	1751.062	3	1108.013	3	0	1	0	1	0	1	2.124	3
556			min	-808.526	2	-1833.253	2	0	1	0	1	0	1	-3.016	2
557		13	max	1751.596	3	1106.868	3	0	1	0	1	0	1	1.437	3
558			min	-807.814	2	-1834.78	2	0	1	0	1	0	1	-1.878	2
559		14	max	1752.13	3	1105.723	3	0	1	0	1	0	1	.75	3
560			min	-807.102	2	-1836.307	2	0	1	0	1	0	1	-.738	2
561		15	max	1752.664	3	1104.578	3	0	1	0	1	0	1	.402	2
562			min	-806.39	2	-1837.834	2	0	1	0	1	0	1	0	15
563		16	max	1753.198	3	1103.433	3	0	1	0	1	0	1	1.543	2
564			min	-805.678	2	-1839.361	2	0	1	0	1	0	1	-.621	3
565		17	max	1753.732	3	1102.287	3	0	1	0	1	0	1	2.685	2
566			min	-804.966	2	-1840.888	2	0	1	0	1	0	1	-1.305	3
567		18	max	-10.697	12	2187.541	2	0	1	0	1	0	1	1.371	2
568			min	-331.543	1	-1049.303	3	0	1	0	1	0	1	-.678	3
569		19	max	-10.341	12	2186.014	2	0	1	0	1	0	1	.015	1
570			min	-330.831	1	-1050.448	3	0	1	0	1	0	1	-.026	3
571	M9	1	max	146.178	1	797.934	3	51.104	1	0	3	-.006	15	0	15
572			min	5.944	15	-442.933	2	2.125	15	0	2	-.143	1	-.014	2
573		2	max	146.89	1	796.789	3	51.104	1	0	3	-.005	15	.262	2
574			min	6.159	15	-444.46	2	2.125	15	0	2	-.111	1	-.502	3
575		3	max	567.127	3	580.994	2	50.829	1	0	2	-.003	15	.527	2
576			min	-347.102	2	-613.332	3	2.109	15	0	3	-.079	1	-.981	3
577		4	max	567.661	3	579.467	2	50.829	1	0	2	-.002	15	.172	1
578			min	-346.39	2	-614.477	3	2.109	15	0	3	-.048	1	-.6	3
579		5	max	568.195	3	577.94	2	50.829	1	0	2	0	15	-.005	15
580			min	-345.678	2	-615.622	3	2.109	15	0	3	-.016	1	-.218	3
581		6	max	568.729	3	576.413	2	50.829	1	0	2	.015	1	.164	3
582			min	-344.966	2	-616.767	3	2.109	15	0	3	0	15	-.551	2
583		7	max	569.263	3	574.886	2	50.829	1	0	2	.047	1	.547	3
584			min	-344.254	2	-617.912	3	2.109	15	0	3	.002	15	-.908	2
585		8	max	569.797	3	573.359	2	50.829	1	0	2	.079	1	.931	3
586			min	-343.542	2	-619.058	3	2.109	15	0	3	.003	15	-1.264	2
587		9	max	583.411	3	48.284	2	84.957	1	0	3	-.002	15	1.086	3
588			min	-283.19	2	.465	15	3.519	15	0	9	-.052	1	-1.441	2
589		10	max	583.945	3	46.757	2	84.957	1	0	3	0	1	1.062	3
590			min	-282.478	2	.005	15	3.519	15	0	9	0	10	-1.471	2
591		11	max	584.479	3	45.23	2	84.957	1	0	3	.054	1	1.038	3
592			min	-281.766	2	-1.869	4	3.519	15	0	9	.002	15	-1.499	2
593		12	max	597.782	3	407.117	3	49.23	1	0	3	-.003	15	.911	3
594			min	-221.28	2	-675.867	2	2.03	15	0	2	-.077	1	-1.331	2
595		13	max	598.316	3	405.972	3	49.23	1	0	3	-.002	15	.659	3
596			min	-220.568	2	-677.394	2	2.03	15	0	2	-.047	1	-.911	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	598.85	3	404.826	3	49.23	1	0	3	0	15	.407	3
598			min	-219.856	2	-678.921	2	2.03	15	0	2	-.016	1	-.49	2
599		15	max	599.384	3	403.681	3	49.23	1	0	3	.014	1	.156	3
600			min	-219.144	2	-680.448	2	2.03	15	0	2	0	15	-.088	1
601		16	max	599.918	3	402.536	3	49.23	1	0	3	.045	1	.355	2
602			min	-218.432	2	-681.975	2	2.03	15	0	2	.002	15	-.094	3
603		17	max	600.452	3	401.391	3	49.23	1	0	3	.076	1	.778	2
604			min	-217.72	2	-683.502	2	2.03	15	0	2	.003	15	-.343	3
605		18	max	-6.174	15	644.288	2	57.685	1	0	2	.109	1	.393	2
606			min	-147.511	1	-293.253	3	2.387	15	0	3	.005	15	-.169	3
607		19	max	-5.959	15	642.761	2	57.685	1	0	2	.145	1	.013	3
608			min	-146.799	1	-294.398	3	2.387	15	0	3	.006	15	-.008	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	.226	2	.011	3	1.548e-2	2	NC	1	NC	1
2			min	0	15	-.062	3	-.007	2	-4.129e-3	3	NC	1	NC	1
3		2	max	0	1	.165	2	.014	1	1.645e-2	2	NC	4	NC	1
4			min	0	15	.004	15	-.004	10	-3.616e-3	3	1134.18	3	NC	1
5		3	max	0	1	.217	3	.033	1	1.741e-2	2	NC	5	NC	2
6			min	0	15	.003	15	-.002	10	-3.103e-3	3	622.763	3	5154.845	1
7		4	max	0	1	.297	3	.048	1	1.838e-2	2	NC	5	NC	2
8			min	0	15	.002	15	-.002	10	-2.59e-3	3	484.086	3	3538.189	1
9		5	max	0	1	.322	3	.055	1	1.934e-2	2	NC	5	NC	2
10			min	0	15	.002	15	-.002	10	-2.078e-3	3	452.246	3	3103.773	1
11		6	max	0	1	.294	3	.051	1	2.031e-2	2	NC	4	NC	2
12			min	0	15	.003	15	-.004	10	-1.565e-3	3	488.416	3	3324.386	1
13		7	max	0	1	.222	3	.038	1	2.127e-2	2	NC	4	NC	2
14			min	0	15	.004	15	-.007	10	-1.052e-3	3	611.337	3	4479.369	1
15		8	max	0	1	.272	2	.032	3	2.224e-2	2	NC	4	NC	2
16			min	0	15	.006	15	-.01	10	-5.395e-4	3	914.646	3	8464.838	3
17		9	max	0	1	.331	2	.032	3	2.32e-2	2	NC	4	NC	1
18			min	0	15	.007	15	-.019	2	-2.674e-5	3	1665.734	2	8208.181	3
19		10	max	0	1	.357	2	.032	3	2.417e-2	2	NC	4	NC	1
20			min	0	1	.001	3	-.023	2	4.86e-4	3	1333.91	2	8159.952	3
21		11	max	0	15	.331	2	.032	3	2.32e-2	2	NC	4	NC	1
22			min	0	1	.007	15	-.019	2	-2.674e-5	3	1665.734	2	8208.181	3
23		12	max	0	15	.272	2	.032	3	2.224e-2	2	NC	4	NC	2
24			min	0	1	.006	15	-.01	10	-5.395e-4	3	914.646	3	8464.838	3
25		13	max	0	15	.222	3	.038	1	2.127e-2	2	NC	4	NC	2
26			min	0	1	.004	15	-.007	10	-1.052e-3	3	611.337	3	4479.369	1
27		14	max	0	15	.294	3	.051	1	2.031e-2	2	NC	4	NC	2
28			min	0	1	.003	15	-.004	10	-1.565e-3	3	488.416	3	3324.386	1
29		15	max	0	15	.322	3	.055	1	1.934e-2	2	NC	5	NC	2
30			min	0	1	.002	15	-.002	10	-2.078e-3	3	452.246	3	3103.773	1
31		16	max	0	15	.297	3	.048	1	1.838e-2	2	NC	5	NC	2
32			min	0	1	.002	15	-.002	10	-2.59e-3	3	484.086	3	3538.189	1
33		17	max	0	15	.217	3	.033	1	1.741e-2	2	NC	5	NC	2
34			min	0	1	.003	15	-.002	10	-3.103e-3	3	622.763	3	5154.845	1
35		18	max	0	15	.165	2	.014	1	1.645e-2	2	NC	4	NC	1
36			min	0	1	.004	15	-.004	10	-3.616e-3	3	1134.18	3	NC	1
37		19	max	0	15	.226	2	.011	3	1.548e-2	2	NC	1	NC	1
38			min	0	1	-.062	3	-.007	2	-4.129e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.454	3	.01	3	8.564e-3	2	NC	1	NC	1
40			min	0	15	-.669	2	-.006	2	-6.84e-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	.655	3	.011	3	9.729e-3	2	NC	5	NC	1
42			min	0	15	-.873	2	-.003	10	-7.897e-3	3	853.067	2	NC	1
43		3	max	0	1	.833	3	.024	1	1.089e-2	2	NC	5	NC	2
44			min	0	15	-1.058	2	-.002	10	-8.955e-3	3	447.006	2	6943.082	1
45		4	max	0	1	.972	3	.039	1	1.206e-2	2	NC	5	NC	2
46			min	0	15	-1.211	2	-.002	10	-1.001e-2	3	320.844	2	4380.731	1
47		5	max	0	1	1.063	3	.047	1	1.322e-2	2	NC	15	NC	2
48			min	0	15	-1.324	2	-.002	10	-1.107e-2	3	265.557	2	3664.373	1
49		6	max	0	1	1.106	3	.045	1	1.439e-2	2	NC	15	NC	2
50			min	0	15	-1.394	2	-.004	10	-1.213e-2	3	239.781	2	3804.48	1
51		7	max	0	1	1.105	3	.034	1	1.555e-2	2	NC	15	NC	2
52			min	0	15	-1.426	2	-.006	10	-1.318e-2	3	229.881	2	5007.927	1
53		8	max	0	1	1.074	3	.028	3	1.672e-2	2	NC	15	NC	2
54			min	0	15	-1.427	2	-.009	10	-1.424e-2	3	229.587	2	9652.669	3
55		9	max	0	1	1.035	3	.028	3	1.788e-2	2	NC	15	NC	1
56			min	0	15	-1.412	2	-.017	2	-1.53e-2	3	234.16	2	9294.203	3
57		10	max	0	1	1.014	3	.029	3	1.905e-2	2	NC	15	NC	1
58			min	0	1	-1.401	2	-.02	2	-1.636e-2	3	237.499	2	9218.866	3
59		11	max	0	15	1.035	3	.028	3	1.788e-2	2	NC	15	NC	1
60			min	0	1	-1.412	2	-.017	2	-1.53e-2	3	234.16	2	9294.203	3
61		12	max	0	15	1.074	3	.028	3	1.672e-2	2	NC	15	NC	2
62			min	0	1	-1.427	2	-.009	10	-1.424e-2	3	229.587	2	9652.669	3
63		13	max	0	15	1.105	3	.034	1	1.555e-2	2	NC	15	NC	2
64			min	0	1	-1.426	2	-.006	10	-1.318e-2	3	229.881	2	5007.927	1
65		14	max	0	15	1.106	3	.045	1	1.439e-2	2	NC	15	NC	2
66			min	0	1	-1.394	2	-.004	10	-1.213e-2	3	239.781	2	3804.48	1
67		15	max	0	15	1.063	3	.047	1	1.322e-2	2	NC	15	NC	2
68			min	0	1	-1.324	2	-.002	10	-1.107e-2	3	265.557	2	3664.373	1
69		16	max	0	15	.972	3	.039	1	1.206e-2	2	NC	5	NC	2
70			min	0	1	-1.211	2	-.002	10	-1.001e-2	3	320.844	2	4380.731	1
71		17	max	0	15	.833	3	.024	1	1.089e-2	2	NC	5	NC	2
72			min	0	1	-1.058	2	-.002	10	-8.955e-3	3	447.006	2	6943.082	1
73		18	max	0	15	.655	3	.011	3	9.729e-3	2	NC	5	NC	1
74			min	0	1	-.873	2	-.003	10	-7.897e-3	3	853.067	2	NC	1
75		19	max	0	15	.454	3	.01	3	8.564e-3	2	NC	1	NC	1
76			min	0	1	-.669	2	-.006	2	-6.84e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.465	3	.009	3	5.76e-3	3	NC	1	NC	1
78			min	0	1	-.667	2	-.006	2	-8.883e-3	2	NC	1	NC	1
79		2	max	0	15	.616	3	.01	3	6.635e-3	3	NC	5	NC	1
80			min	0	1	-.906	2	-.003	10	-1.01e-2	2	728.068	2	NC	1
81		3	max	0	15	.753	3	.025	1	7.51e-3	3	NC	5	NC	2
82			min	0	1	-1.12	2	-.002	10	-1.132e-2	2	384.407	2	6892.595	1
83		4	max	0	15	.869	3	.039	1	8.385e-3	3	NC	5	NC	2
84			min	0	1	-1.29	2	-.002	10	-1.253e-2	2	279.312	2	4352.003	1
85		5	max	0	15	.956	3	.047	1	9.26e-3	3	NC	15	NC	2
86			min	0	1	-1.407	2	-.002	10	-1.375e-2	2	235.162	2	3639.01	1
87		6	max	0	15	1.014	3	.046	1	1.013e-2	3	NC	15	NC	2
88			min	0	1	-1.469	2	-.003	10	-1.496e-2	2	217.097	2	3772.39	1
89		7	max	0	15	1.043	3	.035	1	1.101e-2	3	NC	15	NC	2
90			min	0	1	-1.481	2	-.006	10	-1.618e-2	2	213.857	2	4945.913	1
91		8	max	0	15	1.05	3	.026	3	1.188e-2	3	NC	15	NC	2
92			min	0	1	-1.458	2	-.009	10	-1.74e-2	2	220.171	2	9589.251	1
93		9	max	0	15	1.044	3	.026	3	1.276e-2	3	NC	15	NC	1
94			min	0	1	-1.421	2	-.016	2	-1.861e-2	2	230.944	2	NC	1
95		10	max	0	1	1.039	3	.026	3	1.363e-2	3	NC	15	NC	1
96			min	0	1	-1.4	2	-.019	2	-1.983e-2	2	237.393	2	9982.767	3
97		11	max	0	1	1.044	3	.026	3	1.276e-2	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	-1.421	2	-.016	2	-1.861e-2	2	230.944	2	NC	1
99		12	max	0	1	1.05	3	.026	3	1.188e-2	3	NC	15	NC	2
100			min	0	15	-1.458	2	-.009	10	-1.74e-2	2	220.171	2	9589.251	1
101		13	max	0	1	1.043	3	.035	1	1.101e-2	3	NC	15	NC	2
102			min	0	15	-1.481	2	-.006	10	-1.618e-2	2	213.857	2	4945.913	1
103		14	max	0	1	1.014	3	.046	1	1.013e-2	3	NC	15	NC	2
104			min	0	15	-1.469	2	-.003	10	-1.496e-2	2	217.097	2	3772.39	1
105		15	max	0	1	.956	3	.047	1	9.26e-3	3	NC	15	NC	2
106			min	0	15	-1.407	2	-.002	10	-1.375e-2	2	235.162	2	3639.01	1
107		16	max	0	1	.869	3	.039	1	8.385e-3	3	NC	5	NC	2
108			min	0	15	-1.29	2	-.002	10	-1.253e-2	2	279.312	2	4352.003	1
109		17	max	0	1	.753	3	.025	1	7.51e-3	3	NC	5	NC	2
110			min	0	15	-1.12	2	-.002	10	-1.132e-2	2	384.407	2	6892.595	1
111		18	max	0	1	.616	3	.01	3	6.635e-3	3	NC	5	NC	1
112			min	0	15	-.906	2	-.003	10	-1.01e-2	2	728.068	2	NC	1
113		19	max	0	1	.465	3	.009	3	5.76e-3	3	NC	1	NC	1
114			min	0	15	-.667	2	-.006	2	-8.883e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.203	2	.008	3	1.118e-2	3	NC	1	NC	1
116			min	0	1	-.166	3	-.005	2	-1.323e-2	2	NC	1	NC	1
117		2	max	0	15	.106	1	.014	1	1.211e-2	3	NC	4	NC	1
118			min	0	1	-.133	3	-.002	10	-1.372e-2	2	1686.847	2	NC	1
119		3	max	0	15	.044	1	.033	1	1.303e-2	3	NC	5	NC	2
120			min	0	1	-.109	3	0	10	-1.42e-2	2	943.942	2	5154.183	1
121		4	max	0	15	.021	9	.049	1	1.396e-2	3	NC	5	NC	2
122			min	0	1	-.102	3	0	10	-1.469e-2	2	760.149	2	3519.075	1
123		5	max	0	15	.023	9	.056	1	1.489e-2	3	NC	5	NC	3
124			min	0	1	-.115	3	0	10	-1.517e-2	2	755.853	2	3069.084	1
125		6	max	0	15	.049	1	.053	1	1.582e-2	3	NC	4	NC	2
126			min	0	1	-.146	3	-.002	10	-1.565e-2	2	917.858	2	3258.92	1
127		7	max	0	15	.11	1	.04	1	1.675e-2	3	NC	4	NC	2
128			min	0	1	-.19	3	-.004	10	-1.614e-2	2	1495.71	2	4316.25	1
129		8	max	0	15	.183	1	.023	3	1.768e-2	3	NC	1	NC	2
130			min	0	1	-.239	3	-.007	10	-1.662e-2	2	2390.105	3	8237.082	1
131		9	max	0	15	.254	2	.023	3	1.861e-2	3	NC	4	NC	1
132			min	0	1	-.281	3	-.014	2	-1.711e-2	2	1518.265	3	NC	1
133		10	max	0	1	.289	2	.023	3	1.954e-2	3	NC	4	NC	1
134			min	0	1	-.299	3	-.017	2	-1.759e-2	2	1309.189	3	NC	1
135		11	max	0	1	.254	2	.023	3	1.861e-2	3	NC	4	NC	1
136			min	0	15	-.281	3	-.014	2	-1.711e-2	2	1518.265	3	NC	1
137		12	max	0	1	.183	1	.023	3	1.768e-2	3	NC	1	NC	2
138			min	0	15	-.239	3	-.007	10	-1.662e-2	2	2390.105	3	8237.082	1
139		13	max	0	1	.11	1	.04	1	1.675e-2	3	NC	4	NC	2
140			min	0	15	-.19	3	-.004	10	-1.614e-2	2	1495.71	2	4316.25	1
141		14	max	0	1	.049	1	.053	1	1.582e-2	3	NC	4	NC	2
142			min	0	15	-.146	3	-.002	10	-1.565e-2	2	917.858	2	3258.92	1
143		15	max	0	1	.023	9	.056	1	1.489e-2	3	NC	5	NC	3
144			min	0	15	-.115	3	0	10	-1.517e-2	2	755.853	2	3069.084	1
145		16	max	0	1	.021	9	.049	1	1.396e-2	3	NC	5	NC	2
146			min	0	15	-.102	3	0	10	-1.469e-2	2	760.149	2	3519.075	1
147		17	max	0	1	.044	1	.033	1	1.303e-2	3	NC	5	NC	2
148			min	0	15	-.109	3	0	10	-1.42e-2	2	943.942	2	5154.183	1
149		18	max	0	1	.106	1	.014	1	1.211e-2	3	NC	4	NC	1
150			min	0	15	-.133	3	-.002	10	-1.372e-2	2	1686.847	2	NC	1
151		19	max	0	1	.203	2	.008	3	1.118e-2	3	NC	1	NC	1
152			min	0	15	-.166	3	-.005	2	-1.323e-2	2	NC	1	NC	1
153	M2	1	max	.007	2	.01	2	.007	1	-6.052e-6	15	NC	1	NC	1
154			min	-.01	3	-.016	3	0	15	-1.455e-4	1	6802.241	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	2	.009	2	.006	1	-5.717e-6	15	NC	1	NC	1
156			min	-.009	3	-.015	3	0	15	-1.374e-4	1	7830.75	2	NC	1
157		3	max	.007	2	.008	2	.006	1	-5.382e-6	15	NC	1	NC	1
158			min	-.009	3	-.015	3	0	15	-1.294e-4	1	9206.942	2	NC	1
159		4	max	.006	2	.006	2	.005	1	-5.048e-6	15	NC	1	NC	1
160			min	-.008	3	-.014	3	0	15	-1.213e-4	1	NC	1	NC	1
161		5	max	.006	2	.005	2	.004	1	-4.713e-6	15	NC	1	NC	1
162			min	-.008	3	-.013	3	0	15	-1.132e-4	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.004	1	-4.378e-6	15	NC	1	NC	1
164			min	-.007	3	-.013	3	0	15	-1.052e-4	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.003	1	-4.043e-6	15	NC	1	NC	1
166			min	-.007	3	-.012	3	0	15	-9.71e-5	1	NC	1	NC	1
167		8	max	.005	2	.002	2	.003	1	-3.708e-6	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-8.903e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-3.374e-6	15	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-8.096e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	.002	1	-3.039e-6	15	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-7.29e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.002	1	-2.704e-6	15	NC	1	NC	1
174			min	-.004	3	-.009	3	0	15	-6.483e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	2	.001	1	-2.369e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-5.676e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-2.035e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-4.869e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-1.7e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-4.063e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.365e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-3.256e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.03e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-2.449e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-6.954e-7	15	NC	1	NC	1
186			min	-.001	3	-.003	3	0	15	-1.642e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-3.606e-7	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-8.355e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.08e-7	2	NC	1	NC	1
190			min	0	1	0	1	0	1	-8.17e-7	3	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	5.517e-8	3	NC	1	NC	1
192			min	0	1	0	1	0	1	-9.09e-7	1	NC	1	NC	1
193		2	max	0	3	0	15	0	2	1.722e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	3	7.105e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	3.534e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	3	1.455e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	1	5.346e-5	1	NC	1	NC	1
198			min	-.001	2	-.009	4	0	3	2.2e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	1	7.159e-5	1	NC	1	NC	1
200			min	-.002	2	-.012	4	0	3	2.945e-6	15	8803.121	4	NC	1
201		6	max	.002	3	-.003	15	0	1	8.971e-5	1	NC	2	NC	1
202			min	-.002	2	-.015	4	0	12	3.69e-6	15	7105.872	4	NC	1
203		7	max	.003	3	-.004	15	0	1	1.078e-4	1	NC	5	NC	1
204			min	-.002	2	-.017	4	0	12	4.435e-6	15	6085.065	4	NC	1
205		8	max	.003	3	-.004	15	0	1	1.26e-4	1	NC	5	NC	1
206			min	-.003	2	-.019	4	0	15	5.179e-6	15	5455.129	4	NC	1
207		9	max	.004	3	-.005	15	0	1	1.441e-4	1	NC	5	NC	1
208			min	-.003	2	-.02	4	0	15	5.924e-6	15	5081.748	4	NC	1
209		10	max	.004	3	-.005	15	0	1	1.622e-4	1	NC	5	NC	1
210			min	-.004	2	-.021	4	0	15	6.669e-6	15	4899.637	4	NC	1
211		11	max	.005	3	-.005	15	.001	1	1.803e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.004	2	-.021	4	0	15	7.414e-6	15	4881.886	4	NC	1
213		12	max	.005	3	-.005	15	.002	1	1.985e-4	1	NC	5	NC	1
214			min	-.004	2	-.021	4	0	15	8.159e-6	15	5029.628	4	NC	1
215		13	max	.006	3	-.005	15	.002	1	2.166e-4	1	NC	5	NC	1
216			min	-.005	2	-.019	4	0	15	8.904e-6	15	5373.789	4	NC	1
217		14	max	.006	3	-.004	15	.003	1	2.347e-4	1	NC	5	NC	1
218			min	-.005	2	-.017	4	0	15	9.648e-6	15	5991.209	4	NC	1
219		15	max	.007	3	-.003	15	.003	1	2.528e-4	1	NC	3	NC	1
220			min	-.006	2	-.015	4	0	15	1.039e-5	15	7052.551	4	NC	1
221		16	max	.007	3	-.003	15	.004	1	2.71e-4	1	NC	1	NC	1
222			min	-.006	2	-.012	4	0	15	1.114e-5	15	8971.418	4	NC	1
223		17	max	.008	3	-.002	15	.004	1	2.891e-4	1	NC	1	NC	1
224			min	-.006	2	-.008	4	0	15	1.188e-5	15	NC	1	NC	1
225		18	max	.008	3	-.001	15	.005	1	3.072e-4	1	NC	1	NC	1
226			min	-.007	2	-.005	1	0	15	1.263e-5	15	NC	1	NC	1
227		19	max	.009	3	0	10	.006	1	3.253e-4	1	NC	1	NC	1
228			min	-.007	2	-.002	1	0	15	1.337e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	8.768e-5	1	NC	1	NC	2
230			min	0	3	-.009	3	-.006	1	3.632e-6	15	NC	1	3968.271	1
231		2	max	.002	1	.006	2	0	15	8.768e-5	1	NC	1	NC	2
232			min	0	3	-.008	3	-.006	1	3.632e-6	15	NC	1	4311.112	1
233		3	max	.002	1	.006	2	0	15	8.768e-5	1	NC	1	NC	2
234			min	0	3	-.008	3	-.005	1	3.632e-6	15	NC	1	4719.393	1
235		4	max	.002	1	.006	2	0	15	8.768e-5	1	NC	1	NC	2
236			min	0	3	-.007	3	-.005	1	3.632e-6	15	NC	1	5210.069	1
237		5	max	.002	1	.005	2	0	15	8.768e-5	1	NC	1	NC	2
238			min	0	3	-.007	3	-.004	1	3.632e-6	15	NC	1	5806.186	1
239		6	max	.002	1	.005	2	0	15	8.768e-5	1	NC	1	NC	2
240			min	0	3	-.006	3	-.004	1	3.632e-6	15	NC	1	6539.703	1
241		7	max	.002	1	.005	2	0	15	8.768e-5	1	NC	1	NC	2
242			min	0	3	-.006	3	-.003	1	3.632e-6	15	NC	1	7455.984	1
243		8	max	.002	1	.004	2	0	15	8.768e-5	1	NC	1	NC	2
244			min	0	3	-.005	3	-.003	1	3.632e-6	15	NC	1	8621.188	1
245		9	max	.001	1	.004	2	0	15	8.768e-5	1	NC	1	NC	1
246			min	0	3	-.005	3	-.002	1	3.632e-6	15	NC	1	NC	1
247		10	max	.001	1	.003	2	0	15	8.768e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.002	1	3.632e-6	15	NC	1	NC	1
249		11	max	.001	1	.003	2	0	15	8.768e-5	1	NC	1	NC	1
250			min	0	3	-.004	3	-.002	1	3.632e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	8.768e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	3.632e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	8.768e-5	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	3.632e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	8.768e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	3.632e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	8.768e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	3.632e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	8.768e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	3.632e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	8.768e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	3.632e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	8.768e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	3.632e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.768e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	3.632e-6	15	NC	1	NC	1
267	M6	1	max	.022	2	.033	2	0	1	0	1	NC	4	NC	1
268			min	-.031	3	-.047	3	0	1	0	1	1472.508	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.021	2	.03	2	0	1	0	1	NC	4	NC	1
270			min	-.029	3	-.044	3	0	1	0	1	1559.04	3	NC	1
271		3	max	.02	2	.027	2	0	1	0	1	NC	4	NC	1
272			min	-.028	3	-.042	3	0	1	0	1	1656.406	3	NC	1
273		4	max	.018	2	.025	2	0	1	0	1	NC	4	NC	1
274			min	-.026	3	-.039	3	0	1	0	1	1766.805	3	NC	1
275		5	max	.017	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.024	3	-.037	3	0	1	0	1	1893.063	3	NC	1
277		6	max	.016	2	.019	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.034	3	0	1	0	1	2038.873	3	NC	1
279		7	max	.015	2	.017	2	0	1	0	1	NC	4	NC	1
280			min	-.021	3	-.031	3	0	1	0	1	2209.164	3	NC	1
281		8	max	.014	2	.014	2	0	1	0	1	NC	1	NC	1
282			min	-.019	3	-.029	3	0	1	0	1	2410.653	3	NC	1
283		9	max	.012	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.026	3	0	1	0	1	2652.746	3	NC	1
285		10	max	.011	2	.01	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.023	3	0	1	0	1	2949.031	3	NC	1
287		11	max	.01	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3319.888	3	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.018	3	0	1	0	1	3797.344	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.016	3	0	1	0	1	4434.782	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5328.289	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	6670.043	3	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	8908.464	3	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.014	3	0	1	0	1	8063.982	3	NC	1
315		6	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.016	3	0	1	0	1	6801.084	3	NC	1
317		7	max	.008	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.019	3	0	1	0	1	6042.488	3	NC	1
319		8	max	.01	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.009	2	-.02	3	0	1	0	1	5530.898	4	NC	1
321		9	max	.011	3	-.005	15	0	1	0	1	NC	2	NC	1
322			min	-.01	2	-.021	3	0	1	0	1	5147.646	4	NC	1
323		10	max	.013	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.012	2	-.022	3	0	1	0	1	4959.402	4	NC	1
325		11	max	.014	3	-.005	15	0	1	0	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.013	2	-.022	3	0	1	0	1	4938.28	4	NC	1
327		12	max	.015	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.014	2	-.021	3	0	1	0	1	5084.996	4	NC	1
329		13	max	.017	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.016	2	-.02	3	0	1	0	1	5430.5	4	NC	1
331		14	max	.018	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.017	2	-.018	3	0	1	0	1	6052.172	4	NC	1
333		15	max	.02	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.018	2	-.016	3	0	1	0	1	7122.145	4	NC	1
335		16	max	.021	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.02	2	-.014	3	0	1	0	1	9057.779	4	NC	1
337		17	max	.022	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.021	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.024	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.023	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	2	.023	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	2	.021	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.024	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	2	.02	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	2	.019	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.021	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	2	.018	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	2	.016	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	2	.015	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	2	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	2	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	2	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.01	2	0	15	1.455e-4	1	NC	1	NC	1
382			min	-.01	3	-.016	3	-.007	1	6.052e-6	15	6802.241	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	2	.009	2	0	15	1.374e-4	1	NC	1	NC	1
384			min	-.009	3	-.015	3	-.006	1	5.717e-6	15	7830.75	2	NC	1
385		3	max	.007	2	.008	2	0	15	1.294e-4	1	NC	1	NC	1
386			min	-.009	3	-.015	3	-.006	1	5.382e-6	15	9206.942	2	NC	1
387		4	max	.006	2	.006	2	0	15	1.213e-4	1	NC	1	NC	1
388			min	-.008	3	-.014	3	-.005	1	5.048e-6	15	NC	1	NC	1
389		5	max	.006	2	.005	2	0	15	1.132e-4	1	NC	1	NC	1
390			min	-.008	3	-.013	3	-.004	1	4.713e-6	15	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	1.052e-4	1	NC	1	NC	1
392			min	-.007	3	-.013	3	-.004	1	4.378e-6	15	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	9.71e-5	1	NC	1	NC	1
394			min	-.007	3	-.012	3	-.003	1	4.043e-6	15	NC	1	NC	1
395		8	max	.005	2	.002	2	0	15	8.903e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.003	1	3.708e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	8.096e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.003	1	3.374e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	7.29e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	-.002	1	3.039e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	6.483e-5	1	NC	1	NC	1
402			min	-.004	3	-.009	3	-.002	1	2.704e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	2	0	15	5.676e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	-.001	1	2.369e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	4.869e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	0	1	2.035e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	4.063e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	1.7e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	3.256e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.365e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	2.449e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	1.03e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.642e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	6.954e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	8.355e-6	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	3.606e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	8.17e-7	3	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.08e-7	2	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	9.09e-7	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-5.517e-8	3	NC	1	NC	1
421		2	max	0	3	0	15	0	3	-7.105e-7	15	NC	1	NC	1
422			min	0	2	-.003	4	0	2	-1.722e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	3	-1.455e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	1	-3.534e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	3	-2.2e-6	15	NC	1	NC	1
426			min	-.001	2	-.009	4	0	1	-5.346e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	3	-2.945e-6	15	NC	1	NC	1
428			min	-.002	2	-.012	4	0	1	-7.159e-5	1	8803.121	4	NC	1
429		6	max	.002	3	-.003	15	0	12	-3.69e-6	15	NC	2	NC	1
430			min	-.002	2	-.015	4	0	1	-8.971e-5	1	7105.872	4	NC	1
431		7	max	.003	3	-.004	15	0	12	-4.435e-6	15	NC	5	NC	1
432			min	-.002	2	-.017	4	0	1	-1.078e-4	1	6085.065	4	NC	1
433		8	max	.003	3	-.004	15	0	15	-5.179e-6	15	NC	5	NC	1
434			min	-.003	2	-.019	4	0	1	-1.26e-4	1	5455.129	4	NC	1
435		9	max	.004	3	-.005	15	0	15	-5.924e-6	15	NC	5	NC	1
436			min	-.003	2	-.02	4	0	1	-1.441e-4	1	5081.748	4	NC	1
437		10	max	.004	3	-.005	15	0	15	-6.669e-6	15	NC	5	NC	1
438			min	-.004	2	-.021	4	0	1	-1.622e-4	1	4899.637	4	NC	1
439		11	max	.005	3	-.005	15	0	15	-7.414e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.021	4	-.001	1	-1.803e-4	1	4881.886	4	NC	1
441		12	max	.005	3	-.005	15	0	15	-8.159e-6	15	NC	5	NC	1
442			min	-.004	2	-.021	4	-.002	1	-1.985e-4	1	5029.628	4	NC	1
443		13	max	.006	3	-.005	15	0	15	-8.904e-6	15	NC	5	NC	1
444			min	-.005	2	-.019	4	-.002	1	-2.166e-4	1	5373.789	4	NC	1
445		14	max	.006	3	-.004	15	0	15	-9.648e-6	15	NC	5	NC	1
446			min	-.005	2	-.017	4	-.003	1	-2.347e-4	1	5991.209	4	NC	1
447		15	max	.007	3	-.003	15	0	15	-1.039e-5	15	NC	3	NC	1
448			min	-.006	2	-.015	4	-.003	1	-2.528e-4	1	7052.551	4	NC	1
449		16	max	.007	3	-.003	15	0	15	-1.114e-5	15	NC	1	NC	1
450			min	-.006	2	-.012	4	-.004	1	-2.71e-4	1	8971.418	4	NC	1
451		17	max	.008	3	-.002	15	0	15	-1.188e-5	15	NC	1	NC	1
452			min	-.006	2	-.008	4	-.004	1	-2.891e-4	1	NC	1	NC	1
453		18	max	.008	3	-.001	15	0	15	-1.263e-5	15	NC	1	NC	1
454			min	-.007	2	-.005	1	-.005	1	-3.072e-4	1	NC	1	NC	1
455		19	max	.009	3	0	10	0	15	-1.337e-5	15	NC	1	NC	1
456			min	-.007	2	-.002	1	-.006	1	-3.253e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.006	1	-3.632e-6	15	NC	1	NC	2
458			min	0	3	-.009	3	0	15	-8.768e-5	1	NC	1	3968.271	1
459		2	max	.002	1	.006	2	.006	1	-3.632e-6	15	NC	1	NC	2
460			min	0	3	-.008	3	0	15	-8.768e-5	1	NC	1	4311.112	1
461		3	max	.002	1	.006	2	.005	1	-3.632e-6	15	NC	1	NC	2
462			min	0	3	-.008	3	0	15	-8.768e-5	1	NC	1	4719.393	1
463		4	max	.002	1	.006	2	.005	1	-3.632e-6	15	NC	1	NC	2
464			min	0	3	-.007	3	0	15	-8.768e-5	1	NC	1	5210.069	1
465		5	max	.002	1	.005	2	.004	1	-3.632e-6	15	NC	1	NC	2
466			min	0	3	-.007	3	0	15	-8.768e-5	1	NC	1	5806.186	1
467		6	max	.002	1	.005	2	.004	1	-3.632e-6	15	NC	1	NC	2
468			min	0	3	-.006	3	0	15	-8.768e-5	1	NC	1	6539.703	1
469		7	max	.002	1	.005	2	.003	1	-3.632e-6	15	NC	1	NC	2
470			min	0	3	-.006	3	0	15	-8.768e-5	1	NC	1	7455.984	1
471		8	max	.002	1	.004	2	.003	1	-3.632e-6	15	NC	1	NC	2
472			min	0	3	-.005	3	0	15	-8.768e-5	1	NC	1	8621.188	1
473		9	max	.001	1	.004	2	.002	1	-3.632e-6	15	NC	1	NC	1
474			min	0	3	-.005	3	0	15	-8.768e-5	1	NC	1	NC	1
475		10	max	.001	1	.003	2	.002	1	-3.632e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-8.768e-5	1	NC	1	NC	1
477		11	max	.001	1	.003	2	.002	1	-3.632e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-8.768e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	.001	1	-3.632e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-8.768e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-3.632e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-8.768e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-3.632e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-8.768e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-3.632e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-8.768e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-3.632e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-8.768e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-3.632e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-8.768e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-3.632e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-8.768e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.632e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-8.768e-5	1	NC	1	NC	1
495	M1	1	max	.011	3	.226	2	0	1	6.618e-3	2	NC	1	NC	1
496			min	-.007	2	-.062	3	0	15	-1.645e-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	.011	3	.11	2	0	15	3.246e-3	2	NC	5	NC	1
498			min	-.007	2	-.03	3	-.005	1	-8.168e-3	3	1169.349	2	NC	1
499		3	max	.011	3	.016	3	0	15	2.533e-5	10	NC	5	NC	1
500			min	-.007	2	-.013	2	-.007	1	-1.23e-4	1	566.734	2	NC	1
501		4	max	.011	3	.087	3	0	15	3.979e-3	2	NC	15	NC	1
502			min	-.007	2	-.149	2	-.006	1	-4.013e-3	3	361.088	2	NC	1
503		5	max	.011	3	.175	3	0	15	7.954e-3	2	NC	15	NC	1
504			min	-.006	2	-.29	2	-.004	1	-7.928e-3	3	262.556	2	NC	1
505		6	max	.01	3	.268	3	0	15	1.193e-2	2	8644.953	15	NC	1
506			min	-.006	2	-.425	2	-.002	1	-1.184e-2	3	207.969	2	NC	1
507		7	max	.01	3	.357	3	0	1	1.59e-2	2	7316.779	15	NC	1
508			min	-.006	2	-.545	2	0	3	-1.576e-2	3	175.606	2	NC	1
509		8	max	.01	3	.431	3	0	1	1.988e-2	2	6528.968	15	NC	1
510			min	-.006	2	-.64	2	0	15	-1.967e-2	3	156.406	2	NC	1
511		9	max	.01	3	.479	3	0	15	2.218e-2	2	6115.817	15	NC	1
512			min	-.006	2	-.7	2	0	1	-2.023e-2	3	146.379	2	NC	1
513		10	max	.009	3	.497	3	0	1	2.335e-2	2	5989.249	15	NC	1
514			min	-.006	2	-.72	2	0	15	-1.854e-2	3	143.436	2	NC	1
515		11	max	.009	3	.485	3	0	1	2.453e-2	2	6115.416	15	NC	1
516			min	-.006	2	-.699	2	0	15	-1.685e-2	3	146.871	2	NC	1
517		12	max	.009	3	.445	3	0	15	2.338e-2	2	6528.1	15	NC	1
518			min	-.006	2	-.637	2	0	1	-1.467e-2	3	157.839	2	NC	1
519		13	max	.009	3	.38	3	0	10	1.875e-2	2	7315.236	15	NC	1
520			min	-.006	2	-.538	2	0	1	-1.173e-2	3	178.968	2	NC	1
521		14	max	.008	3	.296	3	.002	1	1.411e-2	2	8642.321	15	NC	1
522			min	-.005	2	-.414	2	0	15	-8.803e-3	3	214.967	2	NC	1
523		15	max	.008	3	.201	3	.004	1	9.48e-3	2	NC	15	NC	1
524			min	-.005	2	-.276	2	0	15	-5.872e-3	3	276.613	2	NC	1
525		16	max	.008	3	.102	3	.006	1	4.847e-3	2	NC	15	NC	1
526			min	-.005	2	-.137	2	0	15	-2.94e-3	3	389.951	2	NC	1
527		17	max	.008	3	.006	3	.006	1	4.288e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-9.039e-6	3	630.189	2	NC	1
529		18	max	.008	3	.103	2	.005	1	5.589e-3	2	NC	5	NC	1
530			min	-.005	2	-.083	3	0	15	-1.801e-3	3	1328.317	2	NC	1
531		19	max	.008	3	.203	2	0	15	1.114e-2	2	NC	1	NC	1
532			min	-.005	2	-.166	3	0	1	-3.678e-3	3	NC	1	NC	1
533	M5	1	max	.032	3	.357	2	0	1	0	1	NC	1	NC	1
534			min	-.023	2	.001	3	0	1	0	1	NC	1	NC	1
535		2	max	.032	3	.173	2	0	1	0	1	NC	5	NC	1
536			min	-.023	2	.002	3	0	1	0	1	747.256	2	NC	1
537		3	max	.032	3	.048	3	0	1	0	1	NC	5	NC	1
538			min	-.023	2	-.037	2	0	1	0	1	347.207	2	NC	1
539		4	max	.032	3	.174	3	0	1	0	1	9748.525	15	NC	1
540			min	-.022	2	-.295	2	0	1	0	1	209.327	2	NC	1
541		5	max	.031	3	.359	3	0	1	0	1	6757.643	15	NC	1
542			min	-.022	2	-.58	2	0	1	0	1	145.458	2	NC	1
543		6	max	.03	3	.571	3	0	1	0	1	5166.958	15	NC	1
544			min	-.021	2	-.866	2	0	1	0	1	111.363	2	NC	1
545		7	max	.03	3	.781	3	0	1	0	1	4254.905	15	NC	1
546			min	-.021	2	-1.127	2	0	1	0	1	91.756	2	NC	1
547		8	max	.029	3	.959	3	0	1	0	1	3727.58	15	NC	1
548			min	-.021	2	-1.337	2	0	1	0	1	80.395	2	NC	1
549		9	max	.028	3	1.074	3	0	1	0	1	3457.941	15	NC	1
550			min	-.02	2	-1.471	2	0	1	0	1	74.579	2	NC	1
551		10	max	.028	3	1.116	3	0	1	0	1	3376.768	15	NC	1
552			min	-.02	2	-1.517	2	0	1	0	1	72.88	2	NC	1
553		11	max	.027	3	1.088	3	0	1	0	1	3458.197	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	-.02	2	-1.472	2	0	1	0	1	74.861	2	NC	1
555		12	max	.026	3	.992	3	0	1	0	1	3728.176	15	NC	1
556			min	-.019	2	-1.333	2	0	1	0	1	81.336	2	NC	1
557		13	max	.026	3	.838	3	0	1	0	1	4256.076	15	NC	1
558			min	-.019	2	-1.111	2	0	1	0	1	94.241	2	NC	1
559		14	max	.025	3	.645	3	0	1	0	1	5169.183	15	NC	1
560			min	-.019	2	-.837	2	0	1	0	1	117.09	2	NC	1
561		15	max	.024	3	.43	3	0	1	0	1	6761.968	15	NC	1
562			min	-.018	2	-.543	2	0	1	0	1	158.287	2	NC	1
563		16	max	.023	3	.214	3	0	1	0	1	9757.518	15	NC	1
564			min	-.018	2	-.26	2	0	1	0	1	239.373	2	NC	1
565		17	max	.023	3	.015	3	0	1	0	1	NC	5	NC	1
566			min	-.018	2	-.019	2	0	1	0	1	424.503	2	NC	1
567		18	max	.023	3	.154	2	0	1	0	1	NC	5	NC	1
568			min	-.018	2	-.151	3	0	1	0	1	965.062	2	NC	1
569		19	max	.023	3	.289	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.299	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.011	3	.226	2	0	15	1.645e-2	3	NC	1	NC	1
572			min	-.007	2	-.062	3	0	1	-6.618e-3	2	NC	1	NC	1
573		2	max	.011	3	.11	2	.005	1	8.168e-3	3	NC	5	NC	1
574			min	-.007	2	-.03	3	0	15	-3.246e-3	2	1169.349	2	NC	1
575		3	max	.011	3	.016	3	.007	1	1.23e-4	1	NC	5	NC	1
576			min	-.007	2	-.013	2	0	15	-2.533e-5	10	566.734	2	NC	1
577		4	max	.011	3	.087	3	.006	1	4.013e-3	3	NC	15	NC	1
578			min	-.007	2	-.149	2	0	15	-3.979e-3	2	361.088	2	NC	1
579		5	max	.011	3	.175	3	.004	1	7.928e-3	3	NC	15	NC	1
580			min	-.006	2	-.29	2	0	15	-7.954e-3	2	262.556	2	NC	1
581		6	max	.01	3	.268	3	.002	1	1.184e-2	3	8644.953	15	NC	1
582			min	-.006	2	-.425	2	0	15	-1.193e-2	2	207.969	2	NC	1
583		7	max	.01	3	.357	3	0	3	1.576e-2	3	7316.779	15	NC	1
584			min	-.006	2	-.545	2	0	1	-1.59e-2	2	175.606	2	NC	1
585		8	max	.01	3	.431	3	0	15	1.967e-2	3	6528.968	15	NC	1
586			min	-.006	2	-.64	2	0	1	-1.988e-2	2	156.406	2	NC	1
587		9	max	.01	3	.479	3	0	1	2.023e-2	3	6115.817	15	NC	1
588			min	-.006	2	-.7	2	0	15	-2.218e-2	2	146.379	2	NC	1
589		10	max	.009	3	.497	3	0	15	1.854e-2	3	5989.249	15	NC	1
590			min	-.006	2	-.72	2	0	1	-2.335e-2	2	143.436	2	NC	1
591		11	max	.009	3	.485	3	0	15	1.685e-2	3	6115.416	15	NC	1
592			min	-.006	2	-.699	2	0	1	-2.453e-2	2	146.871	2	NC	1
593		12	max	.009	3	.445	3	0	1	1.467e-2	3	6528.1	15	NC	1
594			min	-.006	2	-.637	2	0	15	-2.338e-2	2	157.839	2	NC	1
595		13	max	.009	3	.38	3	0	1	1.173e-2	3	7315.236	15	NC	1
596			min	-.006	2	-.538	2	0	10	-1.875e-2	2	178.968	2	NC	1
597		14	max	.008	3	.296	3	0	15	8.803e-3	3	8642.321	15	NC	1
598			min	-.005	2	-.414	2	-.002	1	-1.411e-2	2	214.967	2	NC	1
599		15	max	.008	3	.201	3	0	15	5.872e-3	3	NC	15	NC	1
600			min	-.005	2	-.276	2	-.004	1	-9.48e-3	2	276.613	2	NC	1
601		16	max	.008	3	.102	3	0	15	2.94e-3	3	NC	15	NC	1
602			min	-.005	2	-.137	2	-.006	1	-4.847e-3	2	389.951	2	NC	1
603		17	max	.008	3	.006	3	0	15	9.039e-6	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.006	1	-4.288e-4	1	630.189	2	NC	1
605		18	max	.008	3	.103	2	0	15	1.801e-3	3	NC	5	NC	1
606			min	-.005	2	-.083	3	-.005	1	-5.589e-3	2	1328.317	2	NC	1
607		19	max	.008	3	.203	2	0	1	3.678e-3	3	NC	1	NC	1
608			min	-.005	2	-.166	3	0	15	-1.114e-2	2	NC	1	NC	1

Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 14-40 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

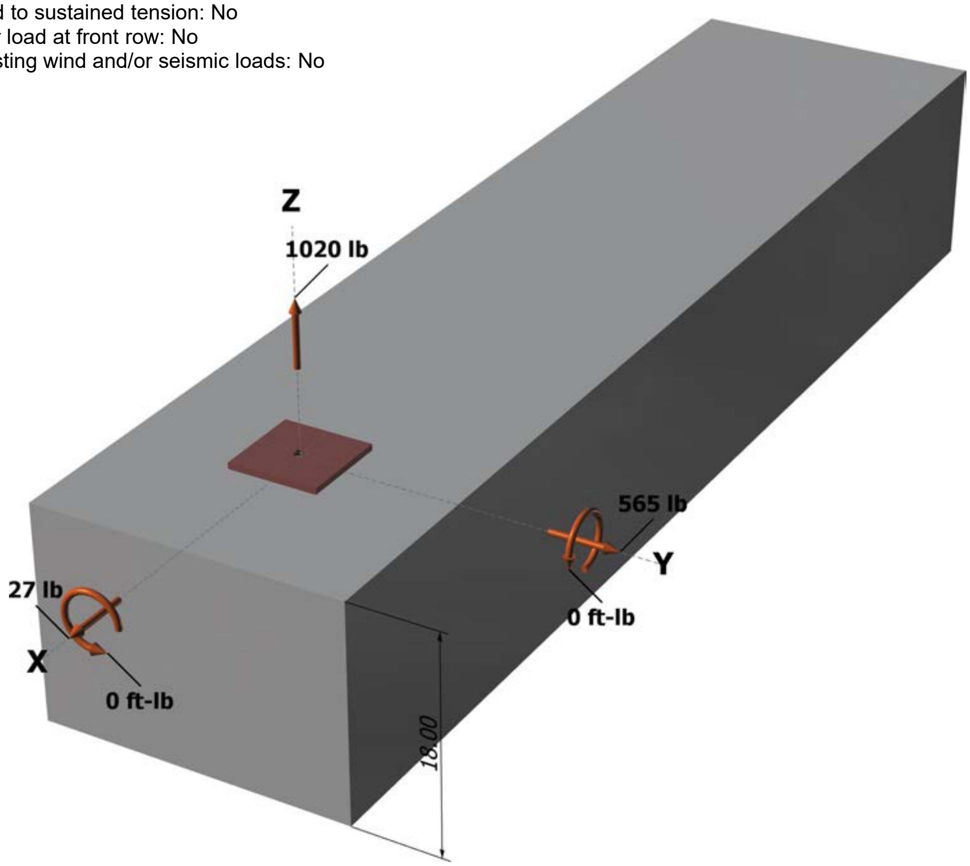
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

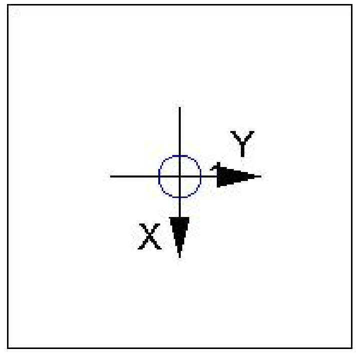
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1020
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	1020	6071	0.17	Pass
Concrete breakout	1020	5710	0.18	Pass
Adhesive	**1020**	**5365**	**0.19**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**566**	**3156**	**0.18**	**Pass (Governs)**
T Concrete breakout y+	565	3934	0.14	Pass
T Concrete breakout x+	27	3018	0.01	Pass
|| Concrete breakout y+	27	8508	0.00	Pass
|| Concrete breakout x+	565	6875	0.08	Pass
Concrete breakout, combined	-	-	0.14	Pass
Pryout	566	12298	0.05	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.19	0.00	19.0 %	1.0	Pass

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

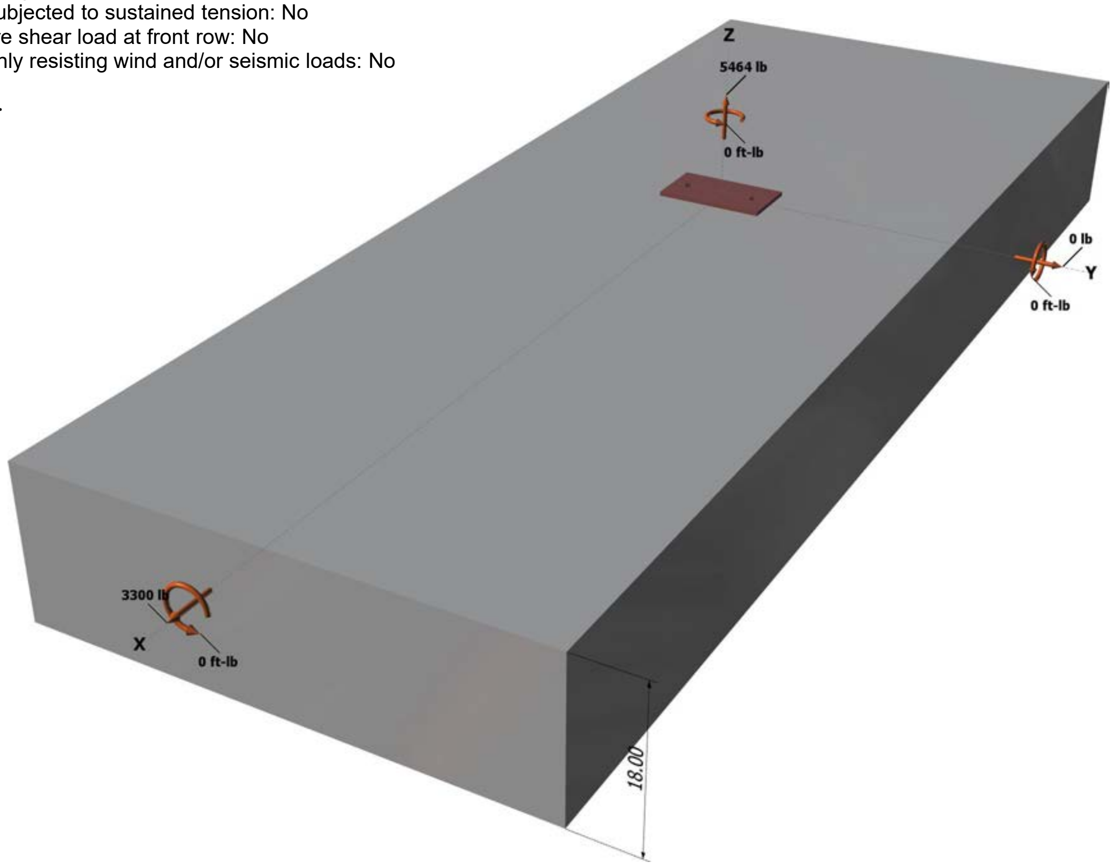
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

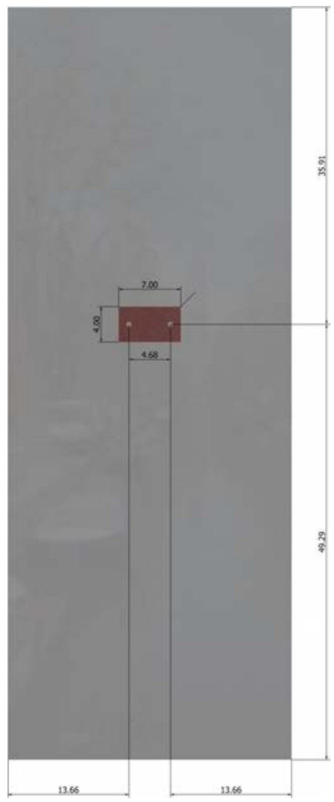
Base Plate
Length x Width x Thickness (inch): 4.00 x 7.00 x 0.28

<Figure 1>



SIMPSON Strong-Tie	Anchor Designer™ Software Version 2.4.6025.0			
	Company:	Schletter, Inc.	Date:	8/1/2016
	Engineer:	HCV	Page:	2/5
	Project:	Standard PVMax - Worst Case, 32-40 Inch Width		
	Address:			
	Phone:			
	E-mail:			

<Figure 2>



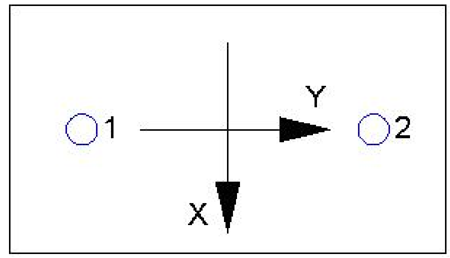
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
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)
576.00	648.00	1.000	0.928	1.000	1.000	15593	0.70	9001

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	13.66	18939

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1650**	**3156**	**0.52**	**Pass (Governs)**
T Concrete breakout x+	3300	9001	0.37	Pass

|| Concrete breakout y-	1650	23292	0.07	Pass
Pryout	3300	20601	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	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.