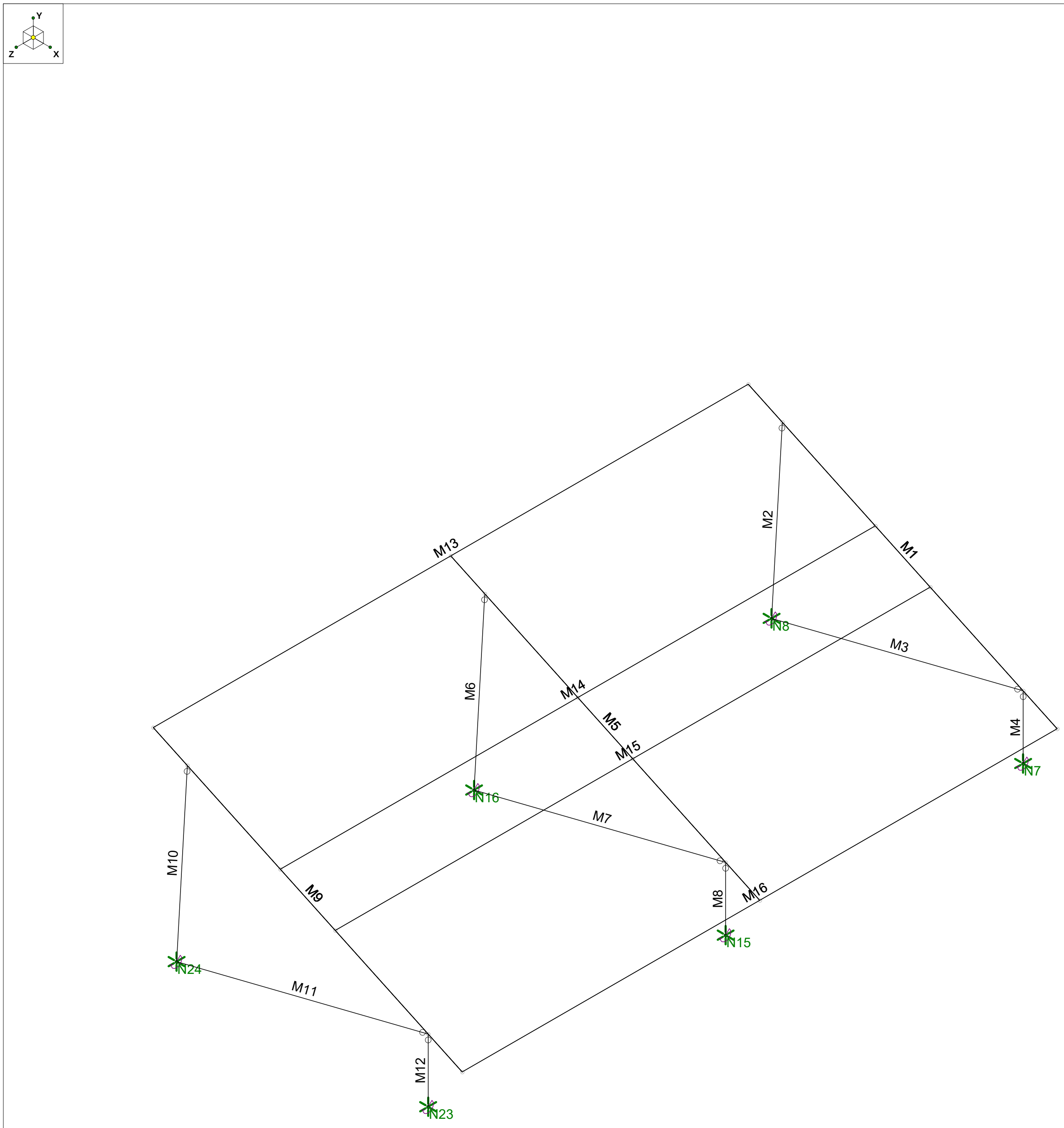


Schletter, Inc.		25° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

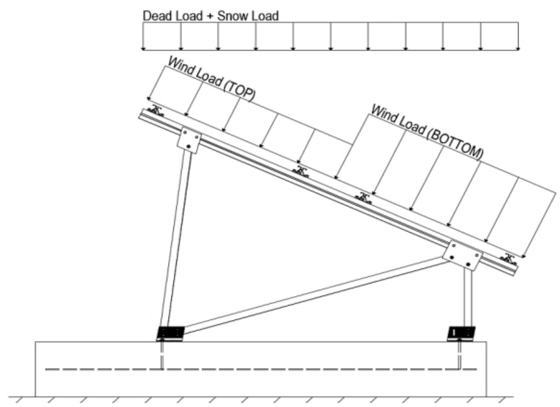
1.2 Construction

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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

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

2.3 Wind Loads

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

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 19.00 psf *Including the gust factor, G=0.85. (ASCE 7-05, 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

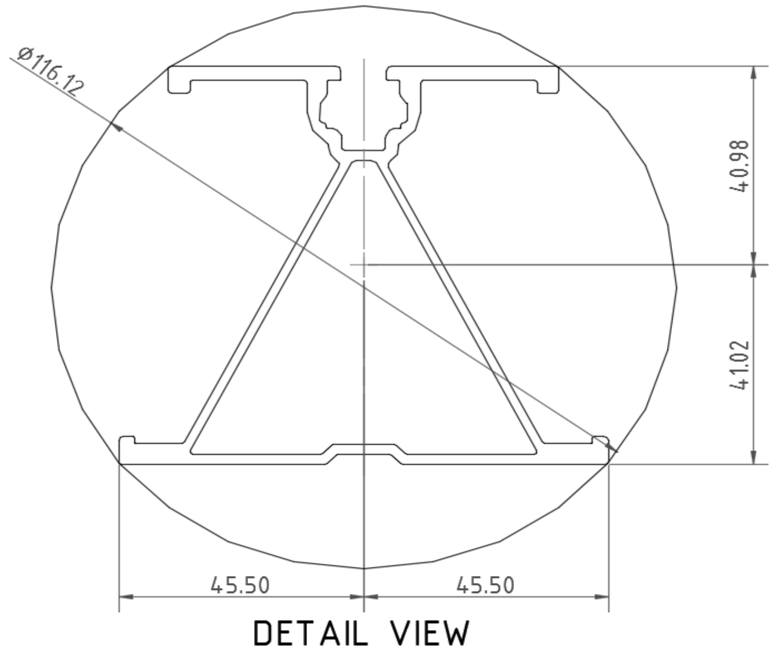
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

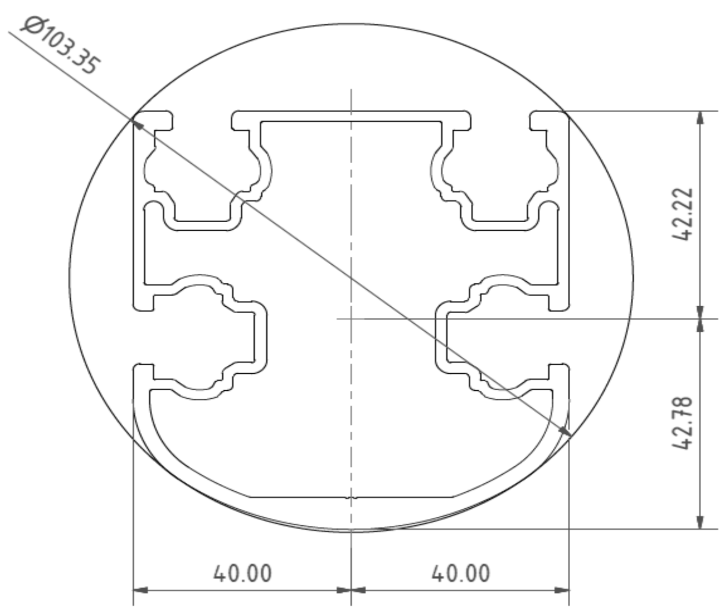
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.486	k-ft
M_z =	0.255	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	76%	



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).

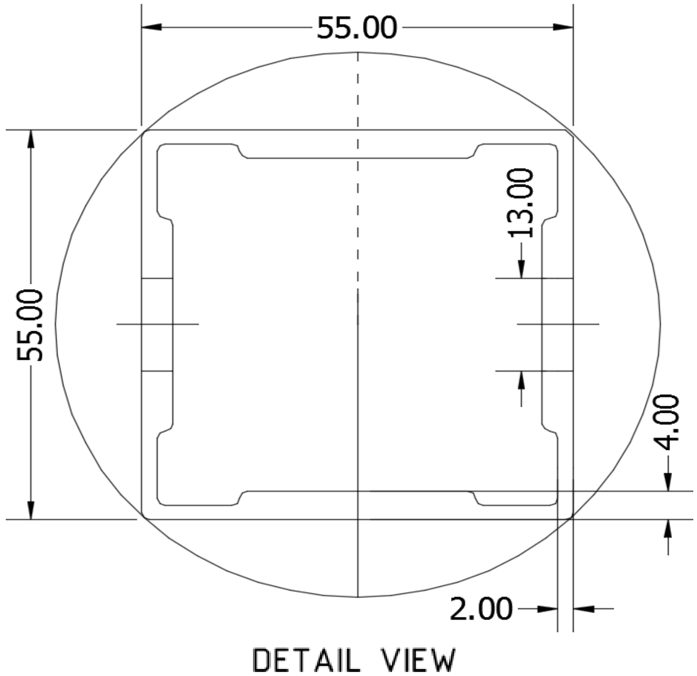
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.327	k-ft
M_z =	0.000	k-ft
P_n =	-0.885	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



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).

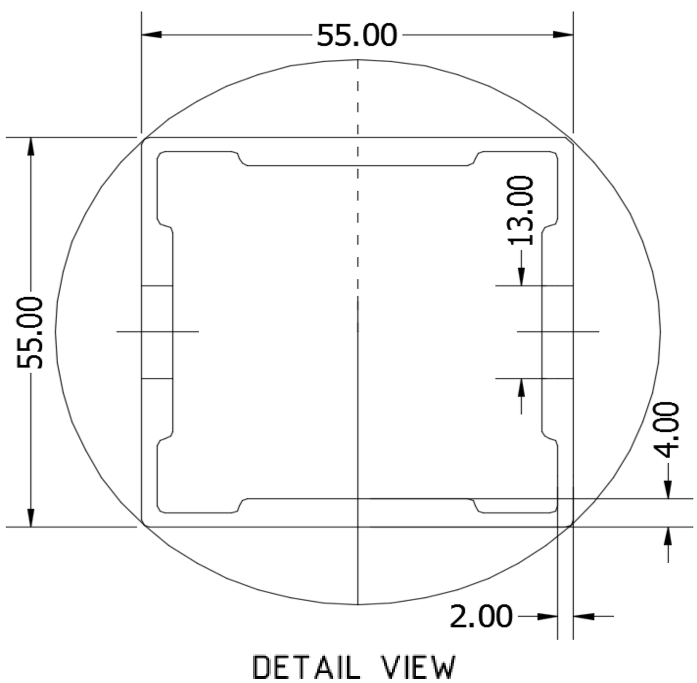
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.900	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	



4.4 Diagonal Strut Design

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

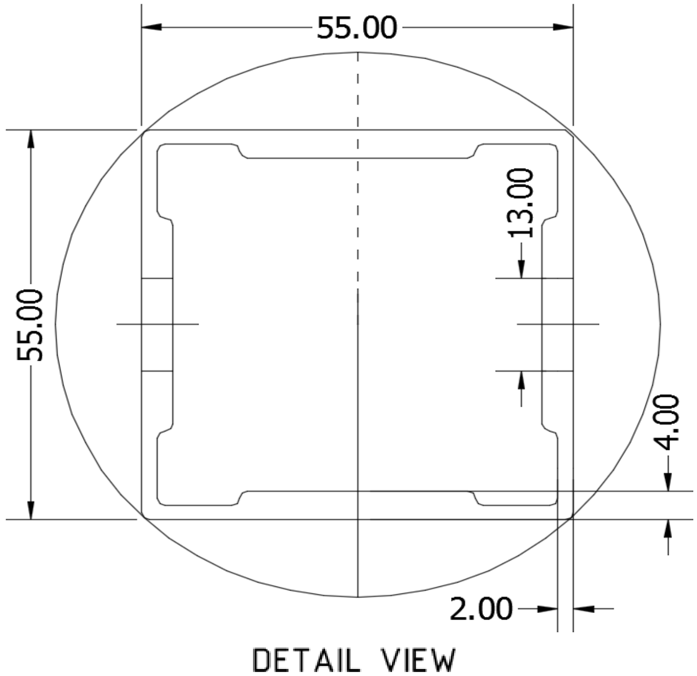
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.252	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	38%	



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 =	3.248	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.629	k
Utilization =	31%	



5. FOUNDATION DESIGN CALCULATIONS

5.1 Helical Pile Foundations

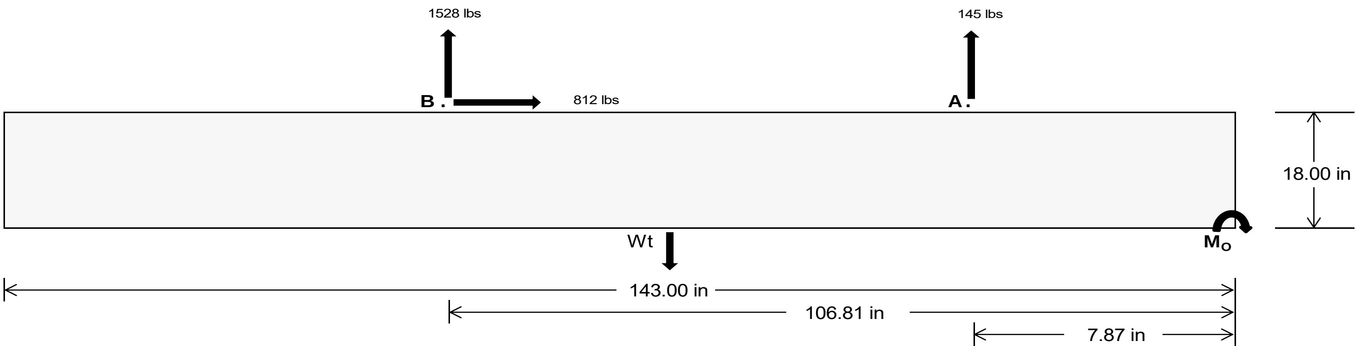
The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present,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

Maximum	Front	Rear	
Tensile Load =	612.84	6367.08	k
Compressive Load =	3769.53	4936.11	k
Lateral Load =	13.96	3377.88	k
Moment (Weak Axis) =	0.03	0.00	k

SCHLETTER

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 = 178985.8 in-lbs
Resisting Force Required = 2503.30 lbs
S.F. = 1.67
Weight Required = 4172.16 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 = 812.06 lbs
Friction = 0.4
Weight Required = 2030.14 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 = 812.06 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	1261 lbs	1261 lbs	1261 lbs	1261 lbs	1456 lbs	1456 lbs	1456 lbs	1456 lbs	1921 lbs	1921 lbs	1921 lbs	1921 lbs	-289 lbs	-289 lbs	-289 lbs	-289 lbs
F_B	1303 lbs	1303 lbs	1303 lbs	1303 lbs	2100 lbs	2100 lbs	2100 lbs	2100 lbs	2432 lbs	2432 lbs	2432 lbs	2432 lbs	-3056 lbs	-3056 lbs	-3056 lbs	-3056 lbs
F_V	151 lbs	151 lbs	151 lbs	151 lbs	1454 lbs	1454 lbs	1454 lbs	1454 lbs	1191 lbs	1191 lbs	1191 lbs	1191 lbs	-1624 lbs	-1624 lbs	-1624 lbs	-1624 lbs
P_{total}	10123 lbs	10339 lbs	10555 lbs	10771 lbs	11116 lbs	11332 lbs	11548 lbs	11764 lbs	11912 lbs	12128 lbs	12344 lbs	12560 lbs	1190 lbs	1320 lbs	1449 lbs	1579 lbs
M	3080 lbs-ft	3080 lbs-ft	3080 lbs-ft	3080 lbs-ft	3723 lbs-ft	3723 lbs-ft	3723 lbs-ft	3723 lbs-ft	4814 lbs-ft	4814 lbs-ft	4814 lbs-ft	4814 lbs-ft	5025 lbs-ft	5025 lbs-ft	5025 lbs-ft	5025 lbs-ft
e	0.30 ft	0.30 ft	0.29 ft	0.29 ft	0.33 ft	0.33 ft	0.32 ft	0.32 ft	0.40 ft	0.40 ft	0.39 ft	0.38 ft	4.22 ft	3.81 ft	3.47 ft	3.18 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}	246.6 psf	245.8 psf	245.1 psf	244.3 psf	265.9 psf	264.5 psf	263.3 psf	262.1 psf	273.0 psf	271.5 psf	270.0 psf	268.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	335.9 psf	332.6 psf	329.5 psf	326.5 psf	373.8 psf	369.4 psf	365.3 psf	361.4 psf	412.5 psf	407.1 psf	401.9 psf	397.1 psf	156.7 psf	136.3 psf	125.8 psf	119.8 psf

Maximum Bearing Pressure = 412 psf
Allowable Bearing Pressure = 1500 psf

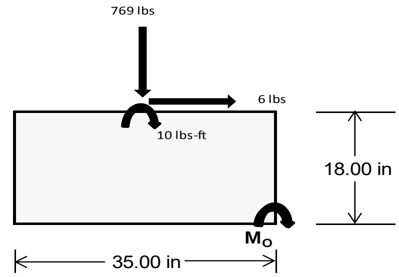
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1103.8 ft-lbs
Resisting Force Required = 756.87 lbs
S.F. = 1.67
Weight Required = 1261.44 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	240 lbs	588 lbs	240 lbs	769 lbs	2126 lbs	769 lbs	70 lbs	172 lbs	70 lbs
F_V	1 lbs	0 lbs	1 lbs	6 lbs	0 lbs	6 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9599 lbs	7560 lbs	9599 lbs	9678 lbs	7560 lbs	9678 lbs	2807 lbs	7560 lbs	2807 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	18 lbs-ft	0 lbs-ft	18 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}	275.9 psf	217.5 psf	275.9 psf	277.4 psf	217.5 psf	277.4 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.5 psf	217.5 psf	276.5 psf	279.5 psf	217.5 psf	279.5 psf	80.8 psf	217.5 psf	80.8 psf

Maximum Bearing Pressure = 280 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 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

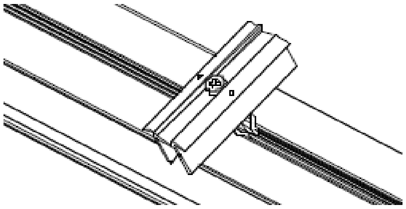
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

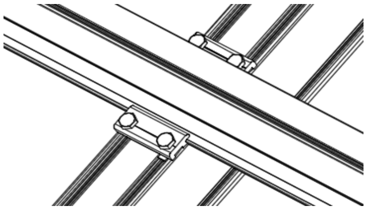
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.841	k
Allowable Uplift =	1.214	k
Utilization =	69%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.400	k
Allowable Uplift =	4.357	k
Utilization =	55%	



6.2 Strut Connections

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

Front Strut

Maximum Axial Load =	2.900	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	39%	

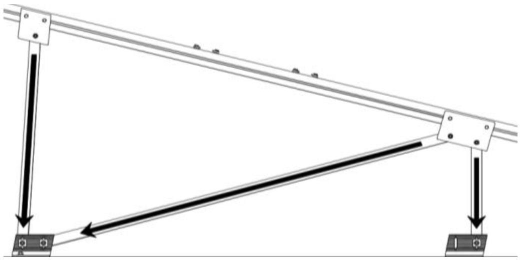
Rear Strut

Maximum Axial Load =	4.332	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	58%	

Diagonal Strut

Maximum Axial Load =	2.406	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	32%	

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.

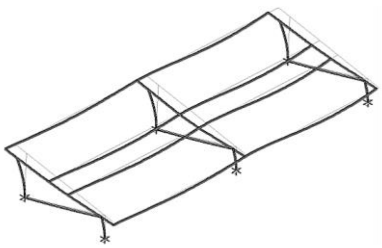
7. SEISMIC DESIGN

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} =	0.025	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 = 96 in

J = 0.432

265.581

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

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= 28.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in³

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 96

J = 0.432

168.894

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

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= 29.1

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in³

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 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

Weak Axis:

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 (strong direction)

h/t = 7.4

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

S1 =	35.2
m =	0.68
C_0 =	41.067
Cc =	43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

3.4.18 (weak direction)

h/t = 16.2

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

S1 =	36.9
m =	0.65
C_0 =	40
Cc =	40

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

φF_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 = **<u>55x55</u>**

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
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

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

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)/(λ^2)

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

$\varphi F_L = \varphi y F c y$

$\varphi F_L =$ 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	-68.563	-68.563	0	0
2	M14	y	-68.563	-68.563	0	0
3	M15	y	-105.961	-105.961	0	0
4	M16	y	-105.961	-105.961	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	155.825	155.825	0	0
2	M14	y	118.427	118.427	0	0
3	M15	y	62.33	62.33	0	0
4	M16	y	62.33	62.33	0	0

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	699.38	2	1231.069	2	.633	1	.003	1	0	1	0	1
2		min	-858.464	3	-1557.082	3	.03	15	0	15	0	1	0	1
3	N7	max	.028	9	1081.572	1	-.452	15	0	15	0	1	0	1
4		min	-.23	2	-124.25	3	-10.736	1	-.021	1	0	1	0	1
5	N15	max	0	4	2899.637	1	0	2	0	2	0	1	0	1
6		min	-2.341	2	-471.413	3	0	3	0	3	0	1	0	1
7	N16	max	2380.4	2	3797.004	2	0	3	0	3	0	1	0	1
8		min	-2598.373	3	-4897.756	3	0	11	0	2	0	1	0	1
9	N23	max	.028	9	1081.572	1	10.736	1	.021	1	0	1	0	1
10		min	-.23	2	-124.25	3	.452	15	0	15	0	1	0	1
11	N24	max	699.38	2	1231.069	2	-.03	15	0	15	0	1	0	1
12		min	-858.464	3	-1557.082	3	-.633	1	-.003	1	0	1	0	1
13	Totals:	max	3776.36	2	10899.157	2	0	2						
14		min	-4315.84	3	-8731.834	3	0	3						

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	64.129	1	431.781	1	-6.587	15	0	15	.179	1	0	1
2			min	2.635	15	-734.386	3	-162.474	1	-.015	2	.007	15	0	3
3		2	max	64.129	1	300.936	1	-5.044	15	0	15	.052	1	.557	3
4			min	2.635	15	-517.813	3	-124.195	1	-.015	2	.002	15	-.326	1
5		3	max	64.129	1	170.09	1	-3.501	15	0	15	.003	3	.921	3
6			min	2.635	15	-301.241	3	-85.916	1	-.015	2	-.042	1	-.535	1
7		4	max	64.129	1	39.244	1	-1.958	15	0	15	-.002	12	1.092	3
8			min	2.635	15	-84.668	3	-47.637	1	-.015	2	-.101	1	-.628	1
9		5	max	64.129	1	131.905	3	0	10	0	15	-.005	12	1.071	3
10			min	2.635	15	-92.811	2	-9.357	1	-.015	2	-.126	1	-.605	1
11		6	max	64.129	1	348.478	3	28.922	1	0	15	-.005	15	.858	3
12			min	2.635	15	-223.517	2	-.787	3	-.015	2	-.118	1	-.465	1
13		7	max	64.129	1	565.051	3	67.201	1	0	15	-.003	15	.452	3
14			min	2.635	15	-354.224	2	1.146	12	-.015	2	-.075	1	-.209	1
15		8	max	64.129	1	781.623	3	105.48	1	0	15	.004	2	.171	2
16			min	2.635	15	-484.93	2	2.714	12	-.015	2	-.006	3	-.147	3
17		9	max	64.129	1	998.196	3	143.759	1	0	15	.113	1	.66	2
18			min	2.635	15	-615.637	2	4.282	12	-.015	2	-.002	3	-.938	3
19		10	max	64.129	1	746.343	2	-5.851	12	.015	2	.257	1	1.265	2
20			min	2.635	15	-1214.769	3	-182.038	1	-.004	3	.004	12	-1.922	3
21		11	max	64.129	1	615.637	2	-4.282	12	.015	2	.113	1	.66	2
22			min	2.635	15	-998.196	3	-143.759	1	0	15	-.002	3	-.938	3
23		12	max	64.129	1	484.93	2	-2.714	12	.015	2	.004	2	.171	2
24			min	2.635	15	-781.623	3	-105.48	1	0	15	-.006	3	-.147	3
25		13	max	64.129	1	354.224	2	-1.146	12	.015	2	-.003	15	.452	3
26			min	2.635	15	-565.051	3	-67.201	1	0	15	-.075	1	-.209	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	64.129	1	223.517	2	.787	3	.015	2	-.005	15	.858	3
28			min	2.635	15	-348.478	3	-28.922	1	0	15	-.118	1	-.465	1
29		15	max	64.129	1	92.811	2	9.357	1	.015	2	-.005	12	1.071	3
30			min	2.635	15	-131.905	3	0	10	0	15	-.126	1	-.605	1
31		16	max	64.129	1	84.668	3	47.637	1	.015	2	-.002	12	1.092	3
32			min	2.635	15	-39.244	1	1.958	15	0	15	-.101	1	-.628	1
33		17	max	64.129	1	301.241	3	85.916	1	.015	2	.003	3	.921	3
34			min	2.635	15	-170.09	1	3.501	15	0	15	-.042	1	-.535	1
35		18	max	64.129	1	517.813	3	124.195	1	.015	2	.052	1	.557	3
36			min	2.635	15	-300.936	1	5.044	15	0	15	.002	15	-.326	1
37		19	max	64.129	1	734.386	3	162.474	1	.015	2	.179	1	0	1
38			min	2.635	15	-431.781	1	6.587	15	0	15	.007	15	0	3
39	M14	1	max	40.045	1	498.024	2	-6.867	15	.013	3	.216	1	0	1
40			min	1.644	15	-593.011	3	-169.379	1	-.015	2	.009	15	0	3
41		2	max	40.045	1	367.317	2	-5.324	15	.013	3	.082	1	.454	3
42			min	1.644	15	-429.627	3	-131.1	1	-.015	2	.003	15	-.385	2
43		3	max	40.045	1	236.611	2	-3.781	15	.013	3	.005	3	.764	3
44			min	1.644	15	-266.242	3	-92.821	1	-.015	2	-.017	1	-.653	2
45		4	max	40.045	1	105.904	2	-2.238	15	.013	3	-.001	12	.928	3
46			min	1.644	15	-102.858	3	-54.542	1	-.015	2	-.083	1	-.805	2
47		5	max	40.045	1	60.527	3	-.694	15	.013	3	-.004	12	.947	3
48			min	1.644	15	-28.8	1	-16.262	1	-.015	2	-.114	1	-.841	2
49		6	max	40.045	1	223.911	3	22.017	1	.013	3	-.005	15	.82	3
50			min	1.644	15	-159.646	1	-1.257	3	-.015	2	-.112	1	-.761	2
51		7	max	40.045	1	387.296	3	60.296	1	.013	3	-.003	15	.549	3
52			min	1.644	15	-290.492	1	.834	12	-.015	2	-.075	1	-.565	2
53		8	max	40.045	1	550.68	3	98.575	1	.013	3	.002	10	.132	3
54			min	1.644	15	-421.338	1	2.402	12	-.015	2	-.006	3	-.252	2
55		9	max	40.045	1	714.065	3	136.854	1	.013	3	.1	1	.205	1
56			min	1.644	15	-552.183	1	3.971	12	-.015	2	-.002	3	-.43	3
57		10	max	40.045	1	683.029	1	-5.539	12	.015	2	.239	1	.754	1
58			min	1.644	15	-877.449	3	-175.133	1	-.013	3	.003	12	-1.138	3
59		11	max	40.045	1	552.183	1	-3.971	12	.015	2	.1	1	.205	1
60			min	1.644	15	-714.065	3	-136.854	1	-.013	3	-.002	3	-.43	3
61		12	max	40.045	1	421.338	1	-2.402	12	.015	2	.002	10	.132	3
62			min	1.644	15	-550.68	3	-98.575	1	-.013	3	-.006	3	-.252	2
63		13	max	40.045	1	290.492	1	-.834	12	.015	2	-.003	15	.549	3
64			min	1.644	15	-387.296	3	-60.296	1	-.013	3	-.075	1	-.565	2
65		14	max	40.045	1	159.646	1	1.257	3	.015	2	-.005	15	.82	3
66			min	1.644	15	-223.911	3	-22.017	1	-.013	3	-.112	1	-.761	2
67		15	max	40.045	1	28.8	1	16.262	1	.015	2	-.004	12	.947	3
68			min	1.644	15	-60.527	3	.694	15	-.013	3	-.114	1	-.841	2
69		16	max	40.045	1	102.858	3	54.542	1	.015	2	-.001	12	.928	3
70			min	1.644	15	-105.904	2	2.238	15	-.013	3	-.083	1	-.805	2
71		17	max	40.045	1	266.242	3	92.821	1	.015	2	.005	3	.764	3
72			min	1.644	15	-236.611	2	3.781	15	-.013	3	-.017	1	-.653	2
73		18	max	40.045	1	429.627	3	131.1	1	.015	2	.082	1	.454	3
74			min	1.644	15	-367.317	2	5.324	15	-.013	3	.003	15	-.385	2
75		19	max	40.045	1	593.011	3	169.379	1	.015	2	.216	1	0	1
76			min	1.644	15	-498.024	2	6.867	15	-.013	3	.009	15	0	3
77	M15	1	max	-1.744	15	677.617	2	-6.863	15	.016	2	.216	1	0	2
78			min	-42.304	1	-324.624	3	-169.357	1	-.011	3	.009	15	0	3
79		2	max	-1.744	15	493.722	2	-5.32	15	.016	2	.082	1	.251	3
80			min	-42.304	1	-241.022	3	-131.078	1	-.011	3	.003	15	-.521	2
81		3	max	-1.744	15	309.827	2	-3.777	15	.016	2	.004	3	.428	3
82			min	-42.304	1	-157.419	3	-92.799	1	-.011	3	-.017	1	-.878	2
83		4	max	-1.744	15	125.932	2	-2.234	15	.016	2	-.001	12	.531	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	-42.304	1	-73.817	3	-54.52	1	-.011	3	-.083	1	-1.071	2
85		5	max	-1.744	15	9.785	3	-.691	15	.016	2	-.004	12	.56	3
86			min	-42.304	1	-57.962	2	-16.241	1	-.011	3	-.114	1	-1.102	2
87		6	max	-1.744	15	93.387	3	22.039	1	.016	2	-.005	15	.514	3
88			min	-42.304	1	-241.857	2	-1.035	3	-.011	3	-.112	1	-.968	2
89		7	max	-1.744	15	176.989	3	60.318	1	.016	2	-.003	15	.394	3
90			min	-42.304	1	-425.752	2	.973	12	-.011	3	-.075	1	-.672	2
91		8	max	-1.744	15	260.591	3	98.597	1	.016	2	.002	10	.199	3
92			min	-42.304	1	-609.647	2	2.542	12	-.011	3	-.006	3	-.211	2
93		9	max	-1.744	15	344.193	3	136.876	1	.016	2	.1	1	.412	2
94			min	-42.304	1	-793.541	2	4.11	12	-.011	3	-.001	3	-.07	3
95		10	max	-1.744	15	977.436	2	8.375	3	.011	3	.239	1	1.199	2
96			min	-42.304	1	-266.925	12	-175.155	1	-.016	2	.004	12	-.413	3
97		11	max	-1.744	15	793.541	2	-4.11	12	.011	3	.1	1	.412	2
98			min	-42.304	1	-344.193	3	-136.876	1	-.016	2	-.001	3	-.07	3
99		12	max	-1.744	15	609.647	2	-2.542	12	.011	3	.002	10	.199	3
100			min	-42.304	1	-260.591	3	-98.597	1	-.016	2	-.006	3	-.211	2
101		13	max	-1.744	15	425.752	2	-.973	12	.011	3	-.003	15	.394	3
102			min	-42.304	1	-176.989	3	-60.318	1	-.016	2	-.075	1	-.672	2
103		14	max	-1.744	15	241.857	2	1.035	3	.011	3	-.005	15	.514	3
104			min	-42.304	1	-93.387	3	-22.039	1	-.016	2	-.112	1	-.968	2
105		15	max	-1.744	15	57.962	2	16.241	1	.011	3	-.004	12	.56	3
106			min	-42.304	1	-9.785	3	.691	15	-.016	2	-.114	1	-1.102	2
107		16	max	-1.744	15	73.817	3	54.52	1	.011	3	-.001	12	.531	3
108			min	-42.304	1	-125.932	2	2.234	15	-.016	2	-.083	1	-1.071	2
109		17	max	-1.744	15	157.419	3	92.799	1	.011	3	.004	3	.428	3
110			min	-42.304	1	-309.827	2	3.777	15	-.016	2	-.017	1	-.878	2
111		18	max	-1.744	15	241.022	3	131.078	1	.011	3	.082	1	.251	3
112			min	-42.304	1	-493.722	2	5.32	15	-.016	2	.003	15	-.521	2
113		19	max	-1.744	15	324.624	3	169.357	1	.011	3	.216	1	0	2
114			min	-42.304	1	-677.617	2	6.863	15	-.016	2	.009	15	0	3
115	M16	1	max	-2.957	15	612.675	2	-6.602	15	.01	1	.182	1	0	2
116			min	-71.972	1	-271.686	3	-163.036	1	-.013	3	.007	15	0	3
117		2	max	-2.957	15	428.78	2	-5.059	15	.01	1	.054	1	.204	3
118			min	-71.972	1	-188.083	3	-124.757	1	-.013	3	.002	15	-.463	2
119		3	max	-2.957	15	244.885	2	-3.516	15	.01	1	.001	3	.334	3
120			min	-71.972	1	-104.481	3	-86.478	1	-.013	3	-.04	1	-.762	2
121		4	max	-2.957	15	60.99	2	-1.972	15	.01	1	-.003	12	.39	3
122			min	-71.972	1	-20.879	3	-48.198	1	-.013	3	-.1	1	-.898	2
123		5	max	-2.957	15	62.723	3	-.283	10	.01	1	-.005	12	.371	3
124			min	-71.972	1	-122.904	2	-9.919	1	-.013	3	-.126	1	-.871	2
125		6	max	-2.957	15	146.325	3	28.36	1	.01	1	-.005	15	.279	3
126			min	-71.972	1	-306.799	2	-.089	3	-.013	3	-.118	1	-.68	2
127		7	max	-2.957	15	229.927	3	66.639	1	.01	1	-.003	15	.111	3
128			min	-71.972	1	-490.694	2	1.582	12	-.013	3	-.075	1	-.325	2
129		8	max	-2.957	15	313.529	3	104.918	1	.01	1	.003	2	.193	2
130			min	-71.972	1	-674.589	2	3.15	12	-.013	3	-.004	3	-.13	3
131		9	max	-2.957	15	397.132	3	143.197	1	.01	1	.111	1	.874	2
132			min	-71.972	1	-858.484	2	4.718	12	-.013	3	0	3	-.446	3
133		10	max	-2.957	15	1042.378	2	-6.287	12	.013	3	.255	1	1.719	2
134			min	-71.972	1	-480.734	3	-181.476	1	-.01	1	.006	12	-.836	3
135		11	max	-2.957	15	858.484	2	-4.718	12	.013	3	.111	1	.874	2
136			min	-71.972	1	-397.132	3	-143.197	1	-.01	1	0	3	-.446	3
137		12	max	-2.957	15	674.589	2	-3.15	12	.013	3	.003	2	.193	2
138			min	-71.972	1	-313.529	3	-104.918	1	-.01	1	-.004	3	-.13	3
139		13	max	-2.957	15	490.694	2	-1.582	12	.013	3	-.003	15	.111	3
140			min	-71.972	1	-229.927	3	-66.639	1	-.01	1	-.075	1	-.325	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	-2.957	15	306.799	2	.089	3	.013	3	-.005	15	.279	3
142			min	-71.972	1	-146.325	3	-28.36	1	-.01	1	-.118	1	-.68	2
143		15	max	-2.957	15	122.904	2	9.919	1	.013	3	-.005	12	.371	3
144			min	-71.972	1	-62.723	3	.283	10	-.01	1	-.126	1	-.871	2
145		16	max	-2.957	15	20.879	3	48.198	1	.013	3	-.003	12	.39	3
146			min	-71.972	1	-60.99	2	1.972	15	-.01	1	-.1	1	-.898	2
147		17	max	-2.957	15	104.481	3	86.478	1	.013	3	.001	3	.334	3
148			min	-71.972	1	-244.885	2	3.516	15	-.01	1	-.04	1	-.762	2
149		18	max	-2.957	15	188.083	3	124.757	1	.013	3	.054	1	.204	3
150			min	-71.972	1	-428.78	2	5.059	15	-.01	1	.002	15	-.463	2
151		19	max	-2.957	15	271.686	3	163.036	1	.013	3	.182	1	0	2
152			min	-71.972	1	-612.675	2	6.602	15	-.01	1	.007	15	0	3
153	M2	1	max	1058.425	2	2.024	4	.51	1	0	3	0	3	0	1
154			min	-1376.842	3	.476	15	.021	15	0	1	0	1	0	1
155		2	max	1058.898	2	1.987	4	.51	1	0	3	0	1	0	15
156			min	-1376.487	3	.467	15	.021	15	0	1	0	15	0	4
157		3	max	1059.372	2	1.95	4	.51	1	0	3	0	1	0	15
158			min	-1376.131	3	.459	15	.021	15	0	1	0	15	-.001	4
159		4	max	1059.846	2	1.913	4	.51	1	0	3	0	1	0	15
160			min	-1375.776	3	.45	15	.021	15	0	1	0	15	-.002	4
161		5	max	1060.32	2	1.876	4	.51	1	0	3	0	1	0	15
162			min	-1375.421	3	.441	15	.021	15	0	1	0	15	-.002	4
163		6	max	1060.793	2	1.839	4	.51	1	0	3	0	1	0	15
164			min	-1375.066	3	.432	15	.021	15	0	1	0	15	-.003	4
165		7	max	1061.267	2	1.802	4	.51	1	0	3	0	1	0	15
166			min	-1374.71	3	.424	15	.021	15	0	1	0	15	-.004	4
167		8	max	1061.741	2	1.765	4	.51	1	0	3	.001	1	0	15
168			min	-1374.355	3	.415	15	.021	15	0	1	0	15	-.004	4
169		9	max	1062.215	2	1.728	4	.51	1	0	3	.001	1	-.001	15
170			min	-1374	3	.406	15	.021	15	0	1	0	15	-.005	4
171		10	max	1062.688	2	1.691	4	.51	1	0	3	.001	1	-.001	15
172			min	-1373.644	3	.398	15	.021	15	0	1	0	15	-.005	4
173		11	max	1063.162	2	1.654	4	.51	1	0	3	.002	1	-.001	15
174			min	-1373.289	3	.389	15	.021	15	0	1	0	15	-.006	4
175		12	max	1063.636	2	1.617	4	.51	1	0	3	.002	1	-.002	15
176			min	-1372.934	3	.38	15	.021	15	0	1	0	15	-.006	4
177		13	max	1064.11	2	1.58	4	.51	1	0	3	.002	1	-.002	15
178			min	-1372.578	3	.371	15	.021	15	0	1	0	15	-.007	4
179		14	max	1064.583	2	1.542	4	.51	1	0	3	.002	1	-.002	15
180			min	-1372.223	3	.363	15	.021	15	0	1	0	15	-.007	4
181		15	max	1065.057	2	1.505	4	.51	1	0	3	.002	1	-.002	15
182			min	-1371.868	3	.354	15	.021	15	0	1	0	15	-.008	4
183		16	max	1065.531	2	1.468	4	.51	1	0	3	.002	1	-.002	15
184			min	-1371.512	3	.345	15	.021	15	0	1	0	15	-.008	4
185		17	max	1066.004	2	1.431	4	.51	1	0	3	.003	1	-.002	15
186			min	-1371.157	3	.337	15	.021	15	0	1	0	15	-.009	4
187		18	max	1066.478	2	1.394	4	.51	1	0	3	.003	1	-.002	15
188			min	-1370.802	3	.328	15	.021	15	0	1	0	15	-.009	4
189		19	max	1066.952	2	1.357	4	.51	1	0	3	.003	1	-.002	15
190			min	-1370.447	3	.319	15	.021	15	0	1	0	15	-.01	4
191	M3	1	max	654.731	2	8.994	4	.233	1	0	5	0	1	.01	4
192			min	-798.02	3	2.114	15	.01	15	0	1	0	15	.002	15
193		2	max	654.561	2	8.122	4	.233	1	0	5	0	1	.006	2
194			min	-798.148	3	1.909	15	.01	15	0	1	0	15	.001	12
195		3	max	654.391	2	7.25	4	.233	1	0	5	0	1	.003	2
196			min	-798.276	3	1.704	15	.01	15	0	1	0	15	0	3
197		4	max	654.22	2	6.378	4	.233	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	-798.403	3	1.499	15	.01	15	0	1	0	15	-.002	3
199		5	max	654.05	2	5.506	4	.233	1	0	5	0	1	0	15
200			min	-798.531	3	1.294	15	.01	15	0	1	0	15	-.004	4
201		6	max	653.879	2	4.634	4	.233	1	0	5	0	1	-.001	15
202			min	-798.659	3	1.089	15	.01	15	0	1	0	15	-.006	4
203		7	max	653.709	2	3.762	4	.233	1	0	5	0	1	-.002	15
204			min	-798.787	3	.884	15	.01	15	0	1	0	15	-.008	4
205		8	max	653.539	2	2.889	4	.233	1	0	5	0	1	-.002	15
206			min	-798.914	3	.679	15	.01	15	0	1	0	15	-.01	4
207		9	max	653.368	2	2.017	4	.233	1	0	5	.001	1	-.003	15
208			min	-799.042	3	.474	15	.01	15	0	1	0	15	-.011	4
209		10	max	653.198	2	1.145	4	.233	1	0	5	.001	1	-.003	15
210			min	-799.17	3	.269	15	.01	15	0	1	0	15	-.012	4
211		11	max	653.028	2	.375	2	.233	1	0	5	.001	1	-.003	15
212			min	-799.298	3	-.063	3	.01	15	0	1	0	15	-.012	4
213		12	max	652.857	2	-.141	15	.233	1	0	5	.001	1	-.003	15
214			min	-799.425	3	-.599	4	.01	15	0	1	0	15	-.012	4
215		13	max	652.687	2	-.346	15	.233	1	0	5	.002	1	-.003	15
216			min	-799.553	3	-1.471	4	.01	15	0	1	0	15	-.012	4
217		14	max	652.517	2	-.551	15	.233	1	0	5	.002	1	-.003	15
218			min	-799.681	3	-2.343	4	.01	15	0	1	0	15	-.011	4
219		15	max	652.346	2	-.756	15	.233	1	0	5	.002	1	-.002	15
220			min	-799.809	3	-3.215	4	.01	15	0	1	0	15	-.009	4
221		16	max	652.176	2	-.961	15	.233	1	0	5	.002	1	-.002	15
222			min	-799.937	3	-4.087	4	.01	15	0	1	0	15	-.008	4
223		17	max	652.006	2	-1.165	15	.233	1	0	5	.002	1	-.001	15
224			min	-800.064	3	-4.959	4	.01	15	0	1	0	15	-.006	4
225		18	max	651.835	2	-1.37	15	.233	1	0	5	.002	1	0	15
226			min	-800.192	3	-5.831	4	.01	15	0	1	0	15	-.003	4
227		19	max	651.665	2	-1.575	15	.233	1	0	5	.002	1	0	1
228			min	-800.32	3	-6.703	4	.01	15	0	1	0	15	0	1
229	M4	1	max	1078.506	1	0	1	-.452	15	0	1	.001	1	0	1
230			min	-126.55	3	0	1	-11.076	1	0	1	0	15	0	1
231		2	max	1078.676	1	0	1	-.452	15	0	1	0	1	0	1
232			min	-126.422	3	0	1	-11.076	1	0	1	0	15	0	1
233		3	max	1078.847	1	0	1	-.452	15	0	1	0	15	0	1
234			min	-126.295	3	0	1	-11.076	1	0	1	-.001	1	0	1
235		4	max	1079.017	1	0	1	-.452	15	0	1	0	15	0	1
236			min	-126.167	3	0	1	-11.076	1	0	1	-.002	1	0	1
237		5	max	1079.187	1	0	1	-.452	15	0	1	0	15	0	1
238			min	-126.039	3	0	1	-11.076	1	0	1	-.004	1	0	1
239		6	max	1079.358	1	0	1	-.452	15	0	1	0	15	0	1
240			min	-125.911	3	0	1	-11.076	1	0	1	-.005	1	0	1
241		7	max	1079.528	1	0	1	-.452	15	0	1	0	15	0	1
242			min	-125.783	3	0	1	-11.076	1	0	1	-.006	1	0	1
243		8	max	1079.698	1	0	1	-.452	15	0	1	0	15	0	1
244			min	-125.656	3	0	1	-11.076	1	0	1	-.007	1	0	1
245		9	max	1079.869	1	0	1	-.452	15	0	1	0	15	0	1
246			min	-125.528	3	0	1	-11.076	1	0	1	-.009	1	0	1
247		10	max	1080.039	1	0	1	-.452	15	0	1	0	15	0	1
248			min	-125.4	3	0	1	-11.076	1	0	1	-.01	1	0	1
249		11	max	1080.209	1	0	1	-.452	15	0	1	0	15	0	1
250			min	-125.272	3	0	1	-11.076	1	0	1	-.011	1	0	1
251		12	max	1080.38	1	0	1	-.452	15	0	1	0	15	0	1
252			min	-125.145	3	0	1	-11.076	1	0	1	-.012	1	0	1
253		13	max	1080.55	1	0	1	-.452	15	0	1	0	15	0	1
254			min	-125.017	3	0	1	-11.076	1	0	1	-.014	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	1080.721	1	0	1	-.452	15	0	1	0	15	0	1
256			min	-124.889	3	0	1	-11.076	1	0	1	-.015	1	0	1
257		15	max	1080.891	1	0	1	-.452	15	0	1	0	15	0	1
258			min	-124.761	3	0	1	-11.076	1	0	1	-.016	1	0	1
259		16	max	1081.061	1	0	1	-.452	15	0	1	0	15	0	1
260			min	-124.634	3	0	1	-11.076	1	0	1	-.018	1	0	1
261		17	max	1081.232	1	0	1	-.452	15	0	1	0	15	0	1
262			min	-124.506	3	0	1	-11.076	1	0	1	-.019	1	0	1
263		18	max	1081.402	1	0	1	-.452	15	0	1	0	15	0	1
264			min	-124.378	3	0	1	-11.076	1	0	1	-.02	1	0	1
265		19	max	1081.572	1	0	1	-.452	15	0	1	0	15	0	1
266			min	-124.25	3	0	1	-11.076	1	0	1	-.021	1	0	1
267	M6	1	max	3239.62	2	2.377	2	0	1	0	1	0	1	0	1
268			min	-4332.467	3	.159	12	0	1	0	1	0	1	0	1
269		2	max	3240.094	2	2.348	2	0	1	0	1	0	1	0	12
270			min	-4332.111	3	.144	12	0	1	0	1	0	1	0	2
271		3	max	3240.567	2	2.319	2	0	1	0	1	0	1	0	12
272			min	-4331.756	3	.13	12	0	1	0	1	0	1	-.002	2
273		4	max	3241.041	2	2.29	2	0	1	0	1	0	1	0	12
274			min	-4331.401	3	.11	3	0	1	0	1	0	1	-.002	2
275		5	max	3241.515	2	2.261	2	0	1	0	1	0	1	0	12
276			min	-4331.046	3	.088	3	0	1	0	1	0	1	-.003	2
277		6	max	3241.989	2	2.233	2	0	1	0	1	0	1	0	3
278			min	-4330.69	3	.067	3	0	1	0	1	0	1	-.004	2
279		7	max	3242.462	2	2.204	2	0	1	0	1	0	1	0	3
280			min	-4330.335	3	.045	3	0	1	0	1	0	1	-.004	2
281		8	max	3242.936	2	2.175	2	0	1	0	1	0	1	0	3
282			min	-4329.98	3	.023	3	0	1	0	1	0	1	-.005	2
283		9	max	3243.41	2	2.146	2	0	1	0	1	0	1	0	3
284			min	-4329.624	3	.002	3	0	1	0	1	0	1	-.006	2
285		10	max	3243.884	2	2.117	2	0	1	0	1	0	1	0	3
286			min	-4329.269	3	-.02	3	0	1	0	1	0	1	-.006	2
287		11	max	3244.357	2	2.088	2	0	1	0	1	0	1	0	3
288			min	-4328.914	3	-.042	3	0	1	0	1	0	1	-.007	2
289		12	max	3244.831	2	2.059	2	0	1	0	1	0	1	0	3
290			min	-4328.558	3	-.063	3	0	1	0	1	0	1	-.008	2
291		13	max	3245.305	2	2.031	2	0	1	0	1	0	1	0	3
292			min	-4328.203	3	-.085	3	0	1	0	1	0	1	-.008	2
293		14	max	3245.778	2	2.002	2	0	1	0	1	0	1	0	3
294			min	-4327.848	3	-.107	3	0	1	0	1	0	1	-.009	2
295		15	max	3246.252	2	1.973	2	0	1	0	1	0	1	0	3
296			min	-4327.492	3	-.128	3	0	1	0	1	0	1	-.01	2
297		16	max	3246.726	2	1.944	2	0	1	0	1	0	1	0	3
298			min	-4327.137	3	-.15	3	0	1	0	1	0	1	-.01	2
299		17	max	3247.2	2	1.915	2	0	1	0	1	0	1	0	3
300			min	-4326.782	3	-.171	3	0	1	0	1	0	1	-.011	2
301		18	max	3247.673	2	1.886	2	0	1	0	1	0	1	0	3
302			min	-4326.427	3	-.193	3	0	1	0	1	0	1	-.012	2
303		19	max	3248.147	2	1.857	2	0	1	0	1	0	1	0	3
304			min	-4326.071	3	-.215	3	0	1	0	1	0	1	-.012	2
305	M7	1	max	2251.895	2	9.023	4	0	1	0	1	0	1	.012	2
306			min	-2403.316	3	2.118	15	0	1	0	1	0	1	0	3
307		2	max	2251.724	2	8.151	4	0	1	0	1	0	1	.009	2
308			min	-2403.444	3	1.913	15	0	1	0	1	0	1	-.002	3
309		3	max	2251.554	2	7.279	4	0	1	0	1	0	1	.006	2
310			min	-2403.572	3	1.709	15	0	1	0	1	0	1	-.004	3
311		4	max	2251.384	2	6.407	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	-2403.699	3	1.504	15	0	1	0	1	0	1	-.006	3
313		5	max	2251.213	2	5.535	4	0	1	0	1	0	1	0	2
314			min	-2403.827	3	1.299	15	0	1	0	1	0	1	-.007	3
315		6	max	2251.043	2	4.663	4	0	1	0	1	0	1	-.001	15
316			min	-2403.955	3	1.094	15	0	1	0	1	0	1	-.008	3
317		7	max	2250.873	2	3.791	4	0	1	0	1	0	1	-.002	15
318			min	-2404.083	3	.889	15	0	1	0	1	0	1	-.009	3
319		8	max	2250.702	2	2.919	4	0	1	0	1	0	1	-.002	15
320			min	-2404.21	3	.684	15	0	1	0	1	0	1	-.01	4
321		9	max	2250.532	2	2.114	2	0	1	0	1	0	1	-.003	15
322			min	-2404.338	3	.359	12	0	1	0	1	0	1	-.011	4
323		10	max	2250.362	2	1.434	2	0	1	0	1	0	1	-.003	15
324			min	-2404.466	3	-.014	3	0	1	0	1	0	1	-.012	4
325		11	max	2250.191	2	.755	2	0	1	0	1	0	1	-.003	15
326			min	-2404.594	3	-.523	3	0	1	0	1	0	1	-.012	4
327		12	max	2250.021	2	.075	2	0	1	0	1	0	1	-.003	15
328			min	-2404.722	3	-1.033	3	0	1	0	1	0	1	-.012	4
329		13	max	2249.851	2	-.341	15	0	1	0	1	0	1	-.003	15
330			min	-2404.849	3	-1.542	3	0	1	0	1	0	1	-.011	4
331		14	max	2249.68	2	-.546	15	0	1	0	1	0	1	-.002	15
332			min	-2404.977	3	-2.313	4	0	1	0	1	0	1	-.011	4
333		15	max	2249.51	2	-.751	15	0	1	0	1	0	1	-.002	15
334			min	-2405.105	3	-3.185	4	0	1	0	1	0	1	-.009	4
335		16	max	2249.339	2	-.956	15	0	1	0	1	0	1	-.002	15
336			min	-2405.233	3	-4.057	4	0	1	0	1	0	1	-.008	4
337		17	max	2249.169	2	-1.161	15	0	1	0	1	0	1	-.001	15
338			min	-2405.36	3	-4.929	4	0	1	0	1	0	1	-.005	4
339		18	max	2248.999	2	-1.366	15	0	1	0	1	0	1	0	15
340			min	-2405.488	3	-5.801	4	0	1	0	1	0	1	-.003	4
341		19	max	2248.828	2	-1.571	15	0	1	0	1	0	1	0	1
342			min	-2405.616	3	-6.673	4	0	1	0	1	0	1	0	1
343	M8	1	max	2896.571	1	0	1	0	1	0	1	0	1	0	1
344			min	-473.713	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2896.741	1	0	1	0	1	0	1	0	1	0	1
346			min	-473.585	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2896.912	1	0	1	0	1	0	1	0	1	0	1
348			min	-473.458	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2897.082	1	0	1	0	1	0	1	0	1	0	1
350			min	-473.33	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2897.252	1	0	1	0	1	0	1	0	1	0	1
352			min	-473.202	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2897.423	1	0	1	0	1	0	1	0	1	0	1
354			min	-473.074	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2897.593	1	0	1	0	1	0	1	0	1	0	1
356			min	-472.946	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2897.763	1	0	1	0	1	0	1	0	1	0	1
358			min	-472.819	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2897.934	1	0	1	0	1	0	1	0	1	0	1
360			min	-472.691	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2898.104	1	0	1	0	1	0	1	0	1	0	1
362			min	-472.563	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2898.275	1	0	1	0	1	0	1	0	1	0	1
364			min	-472.435	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2898.445	1	0	1	0	1	0	1	0	1	0	1
366			min	-472.308	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2898.615	1	0	1	0	1	0	1	0	1	0	1
368			min	-472.18	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	2898.786	1	0	1	0	1	0	1	0	1	0	1
370			min	-472.052	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2898.956	1	0	1	0	1	0	1	0	1	0	1
372			min	-471.924	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2899.126	1	0	1	0	1	0	1	0	1	0	1
374			min	-471.797	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2899.297	1	0	1	0	1	0	1	0	1	0	1
376			min	-471.669	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2899.467	1	0	1	0	1	0	1	0	1	0	1
378			min	-471.541	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2899.637	1	0	1	0	1	0	1	0	1	0	1
380			min	-471.413	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1058.425	2	2.024	4	-.021	15	0	1	0	1	0	1
382			min	-1376.842	3	.476	15	-.51	1	0	3	0	3	0	1
383		2	max	1058.898	2	1.987	4	-.021	15	0	1	0	15	0	15
384			min	-1376.487	3	.467	15	-.51	1	0	3	0	1	0	4
385		3	max	1059.372	2	1.95	4	-.021	15	0	1	0	15	0	15
386			min	-1376.131	3	.459	15	-.51	1	0	3	0	1	-.001	4
387		4	max	1059.846	2	1.913	4	-.021	15	0	1	0	15	0	15
388			min	-1375.776	3	.45	15	-.51	1	0	3	0	1	-.002	4
389		5	max	1060.32	2	1.876	4	-.021	15	0	1	0	15	0	15
390			min	-1375.421	3	.441	15	-.51	1	0	3	0	1	-.002	4
391		6	max	1060.793	2	1.839	4	-.021	15	0	1	0	15	0	15
392			min	-1375.066	3	.432	15	-.51	1	0	3	0	1	-.003	4
393		7	max	1061.267	2	1.802	4	-.021	15	0	1	0	15	0	15
394			min	-1374.71	3	.424	15	-.51	1	0	3	0	1	-.004	4
395		8	max	1061.741	2	1.765	4	-.021	15	0	1	0	15	0	15
396			min	-1374.355	3	.415	15	-.51	1	0	3	-.001	1	-.004	4
397		9	max	1062.215	2	1.728	4	-.021	15	0	1	0	15	-.001	15
398			min	-1374	3	.406	15	-.51	1	0	3	-.001	1	-.005	4
399		10	max	1062.688	2	1.691	4	-.021	15	0	1	0	15	-.001	15
400			min	-1373.644	3	.398	15	-.51	1	0	3	-.001	1	-.005	4
401		11	max	1063.162	2	1.654	4	-.021	15	0	1	0	15	-.001	15
402			min	-1373.289	3	.389	15	-.51	1	0	3	-.002	1	-.006	4
403		12	max	1063.636	2	1.617	4	-.021	15	0	1	0	15	-.002	15
404			min	-1372.934	3	.38	15	-.51	1	0	3	-.002	1	-.006	4
405		13	max	1064.11	2	1.58	4	-.021	15	0	1	0	15	-.002	15
406			min	-1372.578	3	.371	15	-.51	1	0	3	-.002	1	-.007	4
407		14	max	1064.583	2	1.542	4	-.021	15	0	1	0	15	-.002	15
408			min	-1372.223	3	.363	15	-.51	1	0	3	-.002	1	-.007	4
409		15	max	1065.057	2	1.505	4	-.021	15	0	1	0	15	-.002	15
410			min	-1371.868	3	.354	15	-.51	1	0	3	-.002	1	-.008	4
411		16	max	1065.531	2	1.468	4	-.021	15	0	1	0	15	-.002	15
412			min	-1371.512	3	.345	15	-.51	1	0	3	-.002	1	-.008	4
413		17	max	1066.004	2	1.431	4	-.021	15	0	1	0	15	-.002	15
414			min	-1371.157	3	.337	15	-.51	1	0	3	-.003	1	-.009	4
415		18	max	1066.478	2	1.394	4	-.021	15	0	1	0	15	-.002	15
416			min	-1370.802	3	.328	15	-.51	1	0	3	-.003	1	-.009	4
417		19	max	1066.952	2	1.357	4	-.021	15	0	1	0	15	-.002	15
418			min	-1370.447	3	.319	15	-.51	1	0	3	-.003	1	-.01	4
419	M11	1	max	654.731	2	8.994	4	-.01	15	0	1	0	15	.01	4
420			min	-798.02	3	2.114	15	-.233	1	0	5	0	1	.002	15
421		2	max	654.561	2	8.122	4	-.01	15	0	1	0	15	.006	2
422			min	-798.148	3	1.909	15	-.233	1	0	5	0	1	.001	12
423		3	max	654.391	2	7.25	4	-.01	15	0	1	0	15	.003	2
424			min	-798.276	3	1.704	15	-.233	1	0	5	0	1	0	3
425		4	max	654.22	2	6.378	4	-.01	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	-798.403	3	1.499	15	-.233	1	0	5	0	1	-.002	3
427		5	max	654.05	2	5.506	4	-.01	15	0	1	0	15	0	15
428			min	-798.531	3	1.294	15	-.233	1	0	5	0	1	-.004	4
429		6	max	653.879	2	4.634	4	-.01	15	0	1	0	15	-.001	15
430			min	-798.659	3	1.089	15	-.233	1	0	5	0	1	-.006	4
431		7	max	653.709	2	3.762	4	-.01	15	0	1	0	15	-.002	15
432			min	-798.787	3	.884	15	-.233	1	0	5	0	1	-.008	4
433		8	max	653.539	2	2.889	4	-.01	15	0	1	0	15	-.002	15
434			min	-798.914	3	.679	15	-.233	1	0	5	0	1	-.01	4
435		9	max	653.368	2	2.017	4	-.01	15	0	1	0	15	-.003	15
436			min	-799.042	3	.474	15	-.233	1	0	5	-.001	1	-.011	4
437		10	max	653.198	2	1.145	4	-.01	15	0	1	0	15	-.003	15
438			min	-799.17	3	.269	15	-.233	1	0	5	-.001	1	-.012	4
439		11	max	653.028	2	.375	2	-.01	15	0	1	0	15	-.003	15
440			min	-799.298	3	-.063	3	-.233	1	0	5	-.001	1	-.012	4
441		12	max	652.857	2	-.141	15	-.01	15	0	1	0	15	-.003	15
442			min	-799.425	3	-.599	4	-.233	1	0	5	-.001	1	-.012	4
443		13	max	652.687	2	-.346	15	-.01	15	0	1	0	15	-.003	15
444			min	-799.553	3	-1.471	4	-.233	1	0	5	-.002	1	-.012	4
445		14	max	652.517	2	-.551	15	-.01	15	0	1	0	15	-.003	15
446			min	-799.681	3	-2.343	4	-.233	1	0	5	-.002	1	-.011	4
447		15	max	652.346	2	-.756	15	-.01	15	0	1	0	15	-.002	15
448			min	-799.809	3	-3.215	4	-.233	1	0	5	-.002	1	-.009	4
449		16	max	652.176	2	-.961	15	-.01	15	0	1	0	15	-.002	15
450			min	-799.937	3	-4.087	4	-.233	1	0	5	-.002	1	-.008	4
451		17	max	652.006	2	-1.165	15	-.01	15	0	1	0	15	-.001	15
452			min	-800.064	3	-4.959	4	-.233	1	0	5	-.002	1	-.006	4
453		18	max	651.835	2	-1.37	15	-.01	15	0	1	0	15	0	15
454			min	-800.192	3	-5.831	4	-.233	1	0	5	-.002	1	-.003	4
455		19	max	651.665	2	-1.575	15	-.01	15	0	1	0	15	0	1
456			min	-800.32	3	-6.703	4	-.233	1	0	5	-.002	1	0	1
457	M12	1	max	1078.506	1	0	1	11.076	1	0	1	0	15	0	1
458			min	-126.55	3	0	1	.452	15	0	1	-.001	1	0	1
459		2	max	1078.676	1	0	1	11.076	1	0	1	0	15	0	1
460			min	-126.422	3	0	1	.452	15	0	1	0	1	0	1
461		3	max	1078.847	1	0	1	11.076	1	0	1	.001	1	0	1
462			min	-126.295	3	0	1	.452	15	0	1	0	15	0	1
463		4	max	1079.017	1	0	1	11.076	1	0	1	.002	1	0	1
464			min	-126.167	3	0	1	.452	15	0	1	0	15	0	1
465		5	max	1079.187	1	0	1	11.076	1	0	1	.004	1	0	1
466			min	-126.039	3	0	1	.452	15	0	1	0	15	0	1
467		6	max	1079.358	1	0	1	11.076	1	0	1	.005	1	0	1
468			min	-125.911	3	0	1	.452	15	0	1	0	15	0	1
469		7	max	1079.528	1	0	1	11.076	1	0	1	.006	1	0	1
470			min	-125.783	3	0	1	.452	15	0	1	0	15	0	1
471		8	max	1079.698	1	0	1	11.076	1	0	1	.007	1	0	1
472			min	-125.656	3	0	1	.452	15	0	1	0	15	0	1
473		9	max	1079.869	1	0	1	11.076	1	0	1	.009	1	0	1
474			min	-125.528	3	0	1	.452	15	0	1	0	15	0	1
475		10	max	1080.039	1	0	1	11.076	1	0	1	.01	1	0	1
476			min	-125.4	3	0	1	.452	15	0	1	0	15	0	1
477		11	max	1080.209	1	0	1	11.076	1	0	1	.011	1	0	1
478			min	-125.272	3	0	1	.452	15	0	1	0	15	0	1
479		12	max	1080.38	1	0	1	11.076	1	0	1	.012	1	0	1
480			min	-125.145	3	0	1	.452	15	0	1	0	15	0	1
481		13	max	1080.55	1	0	1	11.076	1	0	1	.014	1	0	1
482			min	-125.017	3	0	1	.452	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	1080.721	1	0	1	11.076	1	0	1	.015	1	0	1
484			min	-124.889	3	0	1	.452	15	0	1	0	15	0	1
485		15	max	1080.891	1	0	1	11.076	1	0	1	.016	1	0	1
486			min	-124.761	3	0	1	.452	15	0	1	0	15	0	1
487		16	max	1081.061	1	0	1	11.076	1	0	1	.018	1	0	1
488			min	-124.634	3	0	1	.452	15	0	1	0	15	0	1
489		17	max	1081.232	1	0	1	11.076	1	0	1	.019	1	0	1
490			min	-124.506	3	0	1	.452	15	0	1	0	15	0	1
491		18	max	1081.402	1	0	1	11.076	1	0	1	.02	1	0	1
492			min	-124.378	3	0	1	.452	15	0	1	0	15	0	1
493		19	max	1081.572	1	0	1	11.076	1	0	1	.021	1	0	1
494			min	-124.25	3	0	1	.452	15	0	1	0	15	0	1
495	M1	1	max	162.48	1	734.327	3	-2.635	15	0	1	.179	1	0	15
496			min	6.587	15	-429.688	1	-64.031	1	0	3	.007	15	-.015	2
497		2	max	163.192	1	733.182	3	-2.635	15	0	1	.139	1	.254	1
498			min	6.802	15	-431.215	1	-64.031	1	0	3	.006	15	-.46	3
499		3	max	519.054	3	547.363	2	-2.614	15	0	3	.1	1	.512	1
500			min	-320.919	2	-553.603	3	-63.699	1	0	2	.004	15	-.9	3
501		4	max	519.588	3	545.836	2	-2.614	15	0	3	.06	1	.187	1
502			min	-320.207	2	-554.748	3	-63.699	1	0	2	.002	15	-.557	3
503		5	max	520.122	3	544.309	2	-2.614	15	0	3	.021	1	-.005	15
504			min	-319.495	2	-555.893	3	-63.699	1	0	2	0	15	-.212	3
505		6	max	520.656	3	542.782	2	-2.614	15	0	3	0	15	.133	3
506			min	-318.783	2	-557.039	3	-63.699	1	0	2	-.019	1	-.506	2
507		7	max	521.19	3	541.255	2	-2.614	15	0	3	-.002	15	.48	3
508			min	-318.071	2	-558.184	3	-63.699	1	0	2	-.058	1	-.842	2
509		8	max	521.724	3	539.728	2	-2.614	15	0	3	-.004	15	.826	3
510			min	-317.359	2	-559.329	3	-63.699	1	0	2	-.098	1	-1.177	2
511		9	max	535.277	3	45.145	2	-4.258	15	0	9	.063	1	.965	3
512			min	-249.69	2	.466	15	-103.79	1	0	3	.003	15	-1.344	2
513		10	max	535.811	3	43.618	2	-4.258	15	0	9	0	15	.942	3
514			min	-248.978	2	.005	15	-103.79	1	0	3	-.001	1	-1.372	2
515		11	max	536.345	3	42.091	2	-4.258	15	0	9	-.003	15	.92	3
516			min	-248.266	2	-1.858	4	-103.79	1	0	3	-.065	1	-1.398	2
517		12	max	549.678	3	364.261	3	-2.514	15	0	2	.096	1	.805	3
518			min	-180.516	2	-634.465	2	-61.511	1	0	3	.004	15	-1.24	2
519		13	max	550.212	3	363.115	3	-2.514	15	0	2	.058	1	.58	3
520			min	-179.804	2	-635.992	2	-61.511	1	0	3	.002	15	-.846	2
521		14	max	550.746	3	361.97	3	-2.514	15	0	2	.02	1	.355	3
522			min	-179.092	2	-637.519	2	-61.511	1	0	3	0	15	-.45	2
523		15	max	551.28	3	360.825	3	-2.514	15	0	2	0	15	.13	3
524			min	-178.38	2	-639.046	2	-61.511	1	0	3	-.018	1	-.079	1
525		16	max	551.814	3	359.68	3	-2.514	15	0	2	-.002	15	.343	2
526			min	-177.668	2	-640.573	2	-61.511	1	0	3	-.057	1	-.093	3
527		17	max	552.348	3	358.535	3	-2.514	15	0	2	-.004	15	.741	2
528			min	-176.956	2	-642.1	2	-61.511	1	0	3	-.095	1	-.316	3
529		18	max	-6.817	15	615.017	2	-2.957	15	0	3	-.006	15	.372	2
530			min	-163.743	1	-270.654	3	-72.065	1	0	2	-.137	1	-.155	3
531		19	max	-6.602	15	613.49	2	-2.957	15	0	3	-.007	15	.013	3
532			min	-163.031	1	-271.799	3	-72.065	1	0	2	-.182	1	-.01	1
533	M5	1	max	364.065	1	2429.483	3	0	1	0	1	0	1	.029	2
534			min	11.702	12	-1488.599	2	0	1	0	1	0	1	0	15
535		2	max	364.777	1	2428.338	3	0	1	0	1	0	1	.954	2
536			min	12.058	12	-1490.126	2	0	1	0	1	0	1	-1.499	3
537		3	max	1604.711	3	1483.821	2	0	1	0	1	0	1	1.846	2
538			min	-1035.614	2	-1640.84	3	0	1	0	1	0	1	-2.961	3
539		4	max	1605.245	3	1482.294	2	0	1	0	1	0	1	.947	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1034.902	2	-1641.986	3	0	1	0	1	0	1	-1.942	3
541		5	max	1605.779	3	1480.767	2	0	1	0	1	0	1	.06	1
542			min	-1034.19	2	-1643.131	3	0	1	0	1	0	1	-.923	3
543		6	max	1606.313	3	1479.24	2	0	1	0	1	0	1	.097	3
544			min	-1033.478	2	-1644.276	3	0	1	0	1	0	1	-.912	2
545		7	max	1606.847	3	1477.713	2	0	1	0	1	0	1	1.118	3
546			min	-1032.766	2	-1645.421	3	0	1	0	1	0	1	-1.83	2
547		8	max	1607.381	3	1476.186	2	0	1	0	1	0	1	2.14	3
548			min	-1032.054	2	-1646.566	3	0	1	0	1	0	1	-2.746	2
549		9	max	1624.222	3	152.568	2	0	1	0	1	0	1	2.47	3
550			min	-886.634	2	.461	15	0	1	0	1	0	1	-3.14	2
551		10	max	1624.756	3	151.041	2	0	1	0	1	0	1	2.382	3
552			min	-885.922	2	0	15	0	1	0	1	0	1	-3.234	2
553		11	max	1625.29	3	149.514	2	0	1	0	1	0	1	2.295	3
554			min	-885.21	2	-1.717	4	0	1	0	1	0	1	-3.327	2
555		12	max	1642.572	3	1035.467	3	0	1	0	1	0	1	2.007	3
556			min	-739.953	2	-1781.569	2	0	1	0	1	0	1	-2.972	2
557		13	max	1643.106	3	1034.322	3	0	1	0	1	0	1	1.365	3
558			min	-739.241	2	-1783.096	2	0	1	0	1	0	1	-1.865	2
559		14	max	1643.64	3	1033.176	3	0	1	0	1	0	1	.724	3
560			min	-738.529	2	-1784.623	2	0	1	0	1	0	1	-.758	2
561		15	max	1644.174	3	1032.031	3	0	1	0	1	0	1	.35	2
562			min	-737.817	2	-1786.15	2	0	1	0	1	0	1	0	15
563		16	max	1644.708	3	1030.886	3	0	1	0	1	0	1	1.459	2
564			min	-737.105	2	-1787.677	2	0	1	0	1	0	1	-.557	3
565		17	max	1645.242	3	1029.741	3	0	1	0	1	0	1	2.569	2
566			min	-736.393	2	-1789.204	2	0	1	0	1	0	1	-1.197	3
567		18	max	-12.928	12	2089.526	2	0	1	0	1	0	1	1.314	2
568			min	-363.674	1	-960.733	3	0	1	0	1	0	1	-.623	3
569		19	max	-12.572	12	2087.999	2	0	1	0	1	0	1	.019	1
570			min	-362.962	1	-961.878	3	0	1	0	1	0	1	-.026	3
571	M9	1	max	162.48	1	734.327	3	64.031	1	0	3	-.007	15	0	15
572			min	6.587	15	-429.688	1	2.635	15	0	1	-.179	1	-.015	2
573		2	max	163.192	1	733.182	3	64.031	1	0	3	-.006	15	.254	1
574			min	6.802	15	-431.215	1	2.635	15	0	1	-.139	1	-.46	3
575		3	max	519.054	3	547.363	2	63.699	1	0	2	-.004	15	.512	1
576			min	-320.919	2	-553.603	3	2.614	15	0	3	-.1	1	-.9	3
577		4	max	519.588	3	545.836	2	63.699	1	0	2	-.002	15	.187	1
578			min	-320.207	2	-554.748	3	2.614	15	0	3	-.06	1	-.557	3
579		5	max	520.122	3	544.309	2	63.699	1	0	2	0	15	-.005	15
580			min	-319.495	2	-555.893	3	2.614	15	0	3	-.021	1	-.212	3
581		6	max	520.656	3	542.782	2	63.699	1	0	2	.019	1	.133	3
582			min	-318.783	2	-557.039	3	2.614	15	0	3	0	15	-.506	2
583		7	max	521.19	3	541.255	2	63.699	1	0	2	.058	1	.48	3
584			min	-318.071	2	-558.184	3	2.614	15	0	3	.002	15	-.842	2
585		8	max	521.724	3	539.728	2	63.699	1	0	2	.098	1	.826	3
586			min	-317.359	2	-559.329	3	2.614	15	0	3	.004	15	-1.177	2
587		9	max	535.277	3	45.145	2	103.79	1	0	3	-.003	15	.965	3
588			min	-249.69	2	.466	15	4.258	15	0	9	-.063	1	-1.344	2
589		10	max	535.811	3	43.618	2	103.79	1	0	3	.001	1	.942	3
590			min	-248.978	2	.005	15	4.258	15	0	9	0	15	-1.372	2
591		11	max	536.345	3	42.091	2	103.79	1	0	3	.065	1	.92	3
592			min	-248.266	2	-1.858	4	4.258	15	0	9	.003	15	-1.398	2
593		12	max	549.678	3	364.261	3	61.511	1	0	3	-.004	15	.805	3
594			min	-180.516	2	-634.465	2	2.514	15	0	2	-.096	1	-1.24	2
595		13	max	550.212	3	363.115	3	61.511	1	0	3	-.002	15	.58	3
596			min	-179.804	2	-635.992	2	2.514	15	0	2	-.058	1	-.846	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	550.746	3	361.97	3	61.511	1	0	3	0	15	.355	3
598			min	-179.092	2	-637.519	2	2.514	15	0	2	-.02	1	-.45	2
599		15	max	551.28	3	360.825	3	61.511	1	0	3	.018	1	.13	3
600			min	-178.38	2	-639.046	2	2.514	15	0	2	0	15	-.079	1
601		16	max	551.814	3	359.68	3	61.511	1	0	3	.057	1	.343	2
602			min	-177.668	2	-640.573	2	2.514	15	0	2	.002	15	-.093	3
603		17	max	552.348	3	358.535	3	61.511	1	0	3	.095	1	.741	2
604			min	-176.956	2	-642.1	2	2.514	15	0	2	.004	15	-.316	3
605		18	max	-6.817	15	615.017	2	72.065	1	0	2	.137	1	.372	2
606			min	-163.743	1	-270.654	3	2.957	15	0	3	.006	15	-.155	3
607		19	max	-6.602	15	613.49	2	72.065	1	0	2	.182	1	.013	3
608			min	-163.031	1	-271.799	3	2.957	15	0	3	.007	15	-.01	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.208	2	.01	3	1.42e-2	2	NC	1	NC	1
2			min	0	15	-.05	3	-.006	2	-3.286e-3	3	NC	1	NC	1
3		2	max	0	1	.134	3	.021	1	1.534e-2	2	NC	4	NC	2
4			min	0	15	.003	15	-.002	10	-2.938e-3	3	1042.07	3	8998.429	1
5		3	max	0	1	.285	3	.049	1	1.649e-2	2	NC	5	NC	2
6			min	0	15	.002	15	0	10	-2.589e-3	3	573.804	3	3874.929	1
7		4	max	0	1	.378	3	.073	1	1.763e-2	2	NC	5	NC	3
8			min	0	15	-.006	9	.001	10	-2.241e-3	3	448.329	3	2634.759	1
9		5	max	0	1	.405	3	.084	1	1.877e-2	2	NC	5	NC	3
10			min	0	15	-.004	9	.001	10	-1.892e-3	3	422.5	3	2290.431	1
11		6	max	0	1	.365	3	.079	1	1.991e-2	2	NC	5	NC	3
12			min	0	15	.002	15	0	10	-1.544e-3	3	463.243	3	2423.532	1
13		7	max	0	1	.272	3	.06	1	2.105e-2	2	NC	4	NC	2
14			min	0	15	.004	15	-.004	10	-1.195e-3	3	596.762	3	3191.703	1
15		8	max	0	1	.253	2	.032	1	2.219e-2	2	NC	4	NC	2
16			min	0	15	.006	15	-.008	10	-8.465e-4	3	951.924	3	5998.587	1
17		9	max	0	1	.328	2	.03	3	2.333e-2	2	NC	4	NC	1
18			min	0	15	.008	15	-.015	2	-4.98e-4	3	1594.575	2	9444.845	3
19		10	max	0	1	.361	2	.03	3	2.448e-2	2	NC	5	NC	1
20			min	0	1	-.008	3	-.021	2	-1.494e-4	3	1248.353	2	9518.056	3
21		11	max	0	15	.328	2	.03	3	2.333e-2	2	NC	4	NC	1
22			min	0	1	.008	15	-.015	2	-4.98e-4	3	1594.575	2	9444.845	3
23		12	max	0	15	.253	2	.032	1	2.219e-2	2	NC	4	NC	2
24			min	0	1	.006	15	-.008	10	-8.465e-4	3	951.924	3	5998.587	1
25		13	max	0	15	.272	3	.06	1	2.105e-2	2	NC	4	NC	2
26			min	0	1	.004	15	-.004	10	-1.195e-3	3	596.762	3	3191.703	1
27		14	max	0	15	.365	3	.079	1	1.991e-2	2	NC	5	NC	3
28			min	0	1	.002	15	0	10	-1.544e-3	3	463.243	3	2423.532	1
29		15	max	0	15	.405	3	.084	1	1.877e-2	2	NC	5	NC	3
30			min	0	1	-.004	9	.001	10	-1.892e-3	3	422.5	3	2290.431	1
31		16	max	0	15	.378	3	.073	1	1.763e-2	2	NC	5	NC	3
32			min	0	1	-.006	9	.001	10	-2.241e-3	3	448.329	3	2634.759	1
33		17	max	0	15	.285	3	.049	1	1.649e-2	2	NC	5	NC	2
34			min	0	1	.002	15	0	10	-2.589e-3	3	573.804	3	3874.929	1
35		18	max	0	15	.134	3	.021	1	1.534e-2	2	NC	4	NC	2
36			min	0	1	.003	15	-.002	10	-2.938e-3	3	1042.07	3	8998.429	1
37		19	max	0	15	.208	2	.01	3	1.42e-2	2	NC	1	NC	1
38			min	0	1	-.05	3	-.006	2	-3.286e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.4	3	.009	3	7.989e-3	2	NC	1	NC	1
40			min	0	15	-.621	2	-.005	2	-6.08e-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	.627	3	.013	1	9.192e-3	2	NC	5	NC	1
42			min	0	15	-.856	2	-.003	10	-7.118e-3	3	818.692	2	NC	1
43		3	max	0	1	.826	3	.037	1	1.039e-2	2	NC	5	NC	2
44			min	0	15	-1.067	2	0	10	-8.155e-3	3	430.944	2	5144.445	1
45		4	max	0	1	.978	3	.06	1	1.16e-2	2	NC	15	NC	3
46			min	0	15	-1.238	2	0	10	-9.193e-3	3	311.582	2	3225.691	1
47		5	max	0	1	1.072	3	.072	1	1.28e-2	2	NC	15	NC	3
48			min	0	15	-1.358	2	0	10	-1.023e-2	3	260.513	2	2679.639	1
49		6	max	0	1	1.108	3	.07	1	1.4e-2	2	NC	15	NC	3
50			min	0	15	-1.427	2	0	10	-1.127e-2	3	238.314	2	2752.878	1
51		7	max	0	1	1.093	3	.054	1	1.52e-2	2	NC	15	NC	2
52			min	0	15	-1.449	2	-.003	10	-1.231e-2	3	232.109	2	3547.307	1
53		8	max	0	1	1.045	3	.029	1	1.64e-2	2	NC	15	NC	2
54			min	0	15	-1.435	2	-.007	10	-1.335e-2	3	235.893	2	6530.275	1
55		9	max	0	1	.989	3	.027	3	1.761e-2	2	NC	15	NC	1
56			min	0	15	-1.407	2	-.014	2	-1.438e-2	3	244.447	2	NC	1
57		10	max	0	1	.96	3	.027	3	1.881e-2	2	NC	15	NC	1
58			min	0	1	-1.39	2	-.019	2	-1.542e-2	3	249.795	2	NC	1
59		11	max	0	15	.989	3	.027	3	1.761e-2	2	NC	15	NC	1
60			min	0	1	-1.407	2	-.014	2	-1.438e-2	3	244.447	2	NC	1
61		12	max	0	15	1.045	3	.029	1	1.64e-2	2	NC	15	NC	2
62			min	0	1	-1.435	2	-.007	10	-1.335e-2	3	235.893	2	6530.275	1
63		13	max	0	15	1.093	3	.054	1	1.52e-2	2	NC	15	NC	2
64			min	0	1	-1.449	2	-.003	10	-1.231e-2	3	232.109	2	3547.307	1
65		14	max	0	15	1.108	3	.07	1	1.4e-2	2	NC	15	NC	3
66			min	0	1	-1.427	2	0	10	-1.127e-2	3	238.314	2	2752.878	1
67		15	max	0	15	1.072	3	.072	1	1.28e-2	2	NC	15	NC	3
68			min	0	1	-1.358	2	0	10	-1.023e-2	3	260.513	2	2679.639	1
69		16	max	0	15	.978	3	.06	1	1.16e-2	2	NC	15	NC	3
70			min	0	1	-1.238	2	0	10	-9.193e-3	3	311.582	2	3225.691	1
71		17	max	0	15	.826	3	.037	1	1.039e-2	2	NC	5	NC	2
72			min	0	1	-1.067	2	0	10	-8.155e-3	3	430.944	2	5144.445	1
73		18	max	0	15	.627	3	.013	1	9.192e-3	2	NC	5	NC	1
74			min	0	1	-.856	2	-.003	10	-7.118e-3	3	818.692	2	NC	1
75		19	max	0	15	.4	3	.009	3	7.989e-3	2	NC	1	NC	1
76			min	0	1	-.621	2	-.005	2	-6.08e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.41	3	.008	3	5.102e-3	3	NC	1	NC	1
78			min	0	1	-.62	2	-.005	2	-8.28e-3	2	NC	1	NC	1
79		2	max	0	15	.574	3	.014	1	5.963e-3	3	NC	5	NC	1
80			min	0	1	-.898	2	-.002	10	-9.533e-3	2	690.53	2	NC	1
81		3	max	0	15	.722	3	.038	1	6.823e-3	3	NC	5	NC	2
82			min	0	1	-1.144	2	0	10	-1.079e-2	2	366.197	2	5111.702	1
83		4	max	0	15	.844	3	.06	1	7.684e-3	3	NC	15	NC	3
84			min	0	1	-1.336	2	.001	10	-1.204e-2	2	268.011	2	3208.229	1
85		5	max	0	15	.933	3	.072	1	8.545e-3	3	NC	15	NC	3
86			min	0	1	-1.462	2	.001	10	-1.329e-2	2	227.988	2	2665.168	1
87		6	max	0	15	.987	3	.07	1	9.406e-3	3	NC	15	NC	3
88			min	0	1	-1.52	2	0	10	-1.455e-2	2	213.407	2	2735.746	1
89		7	max	0	15	1.009	3	.055	1	1.027e-2	3	NC	15	NC	2
90			min	0	1	-1.517	2	-.003	10	-1.58e-2	2	213.958	2	3516.794	1
91		8	max	0	15	1.007	3	.03	1	1.113e-2	3	NC	15	NC	2
92			min	0	1	-1.474	2	-.007	10	-1.705e-2	2	224.878	2	6423.224	1
93		9	max	0	15	.993	3	.025	3	1.199e-2	3	NC	15	NC	1
94			min	0	1	-1.418	2	-.013	2	-1.831e-2	2	240.657	2	NC	1
95		10	max	0	1	.984	3	.025	3	1.285e-2	3	NC	15	NC	1
96			min	0	1	-1.389	2	-.018	2	-1.956e-2	2	249.827	2	NC	1
97		11	max	0	1	.993	3	.025	3	1.199e-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	-1.418	2	-.013	2	-1.831e-2	2	240.657	2	NC	1
99		12	max	0	1	1.007	3	.03	1	1.113e-2	3	NC	15	NC	2
100			min	0	15	-1.474	2	-.007	10	-1.705e-2	2	224.878	2	6423.224	1
101		13	max	0	1	1.009	3	.055	1	1.027e-2	3	NC	15	NC	2
102			min	0	15	-1.517	2	-.003	10	-1.58e-2	2	213.958	2	3516.794	1
103		14	max	0	1	.987	3	.07	1	9.406e-3	3	NC	15	NC	3
104			min	0	15	-1.52	2	0	10	-1.455e-2	2	213.407	2	2735.746	1
105		15	max	0	1	.933	3	.072	1	8.545e-3	3	NC	15	NC	3
106			min	0	15	-1.462	2	.001	10	-1.329e-2	2	227.988	2	2665.168	1
107		16	max	0	1	.844	3	.06	1	7.684e-3	3	NC	15	NC	3
108			min	0	15	-1.336	2	.001	10	-1.204e-2	2	268.011	2	3208.229	1
109		17	max	0	1	.722	3	.038	1	6.823e-3	3	NC	5	NC	2
110			min	0	15	-1.144	2	0	10	-1.079e-2	2	366.197	2	5111.702	1
111		18	max	0	1	.574	3	.014	1	5.963e-3	3	NC	5	NC	1
112			min	0	15	-.898	2	-.002	10	-9.533e-3	2	690.53	2	NC	1
113		19	max	0	1	.41	3	.008	3	5.102e-3	3	NC	1	NC	1
114			min	0	15	-.62	2	-.005	2	-8.28e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.187	2	.007	3	9.727e-3	3	NC	1	NC	1
116			min	0	1	-.145	3	-.004	2	-1.214e-2	2	NC	1	NC	1
117		2	max	0	15	.073	1	.021	1	1.075e-2	3	NC	4	NC	2
118			min	0	1	-.1	3	-.001	10	-1.283e-2	2	1455.461	2	9087.433	1
119		3	max	0	15	.012	9	.049	1	1.177e-2	3	NC	5	NC	2
120			min	0	1	-.068	3	.001	10	-1.352e-2	2	814.711	2	3887.292	1
121		4	max	0	15	.004	4	.073	1	1.278e-2	3	NC	5	NC	3
122			min	0	1	-.106	2	.003	10	-1.421e-2	2	656.465	2	2631.463	1
123		5	max	0	15	.005	4	.084	1	1.38e-2	3	NC	5	NC	3
124			min	0	1	-.107	2	.003	10	-1.489e-2	2	653.459	2	2277.536	1
125		6	max	0	15	.019	9	.08	1	1.482e-2	3	NC	5	NC	3
126			min	0	1	-.104	3	.002	10	-1.564e-2	1	795.27	2	2395.424	1
127		7	max	0	15	.077	1	.062	1	1.584e-2	3	NC	3	NC	2
128			min	0	1	-.157	3	-.001	10	-1.64e-2	1	1303.731	2	3119.452	1
129		8	max	0	15	.176	1	.034	1	1.686e-2	3	NC	1	NC	2
130			min	0	1	-.216	3	-.005	10	-1.716e-2	1	2695.465	3	5678.745	1
131		9	max	0	15	.263	1	.022	3	1.788e-2	3	NC	4	NC	1
132			min	0	1	-.266	3	-.011	2	-1.792e-2	1	1576.822	3	NC	1
133		10	max	0	1	.302	1	.021	3	1.89e-2	3	NC	5	NC	1
134			min	0	1	-.289	3	-.016	2	-1.868e-2	1	1333.866	3	NC	1
135		11	max	0	1	.263	1	.022	3	1.788e-2	3	NC	4	NC	1
136			min	0	15	-.266	3	-.011	2	-1.792e-2	1	1576.822	3	NC	1
137		12	max	0	1	.176	1	.034	1	1.686e-2	3	NC	1	NC	2
138			min	0	15	-.216	3	-.005	10	-1.716e-2	1	2695.465	3	5678.745	1
139		13	max	0	1	.077	1	.062	1	1.584e-2	3	NC	3	NC	2
140			min	0	15	-.157	3	-.001	10	-1.64e-2	1	1303.731	2	3119.452	1
141		14	max	0	1	.019	9	.08	1	1.482e-2	3	NC	5	NC	3
142			min	0	15	-.104	3	.002	10	-1.564e-2	1	795.27	2	2395.424	1
143		15	max	0	1	.005	4	.084	1	1.38e-2	3	NC	5	NC	3
144			min	0	15	-.107	2	.003	10	-1.489e-2	2	653.459	2	2277.536	1
145		16	max	0	1	.004	4	.073	1	1.278e-2	3	NC	5	NC	3
146			min	0	15	-.106	2	.003	10	-1.421e-2	2	656.465	2	2631.463	1
147		17	max	0	1	.012	9	.049	1	1.177e-2	3	NC	5	NC	2
148			min	0	15	-.068	3	.001	10	-1.352e-2	2	814.711	2	3887.292	1
149		18	max	0	1	.073	1	.021	1	1.075e-2	3	NC	4	NC	2
150			min	0	15	-.1	3	-.001	10	-1.283e-2	2	1455.461	2	9087.433	1
151		19	max	0	1	.187	2	.007	3	9.727e-3	3	NC	1	NC	1
152			min	0	15	-.145	3	-.004	2	-1.214e-2	2	NC	1	NC	1
153	M2	1	max	.007	2	.009	2	.008	1	-7.654e-6	15	NC	1	NC	2
154			min	-.009	3	-.014	3	0	15	-1.863e-4	1	7576.217	2	8273.038	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	.008	2	.008	1	-7.227e-6	15	NC	1	NC	2
156			min	-.009	3	-.014	3	0	15	-1.759e-4	1	8797.232	2	9020.08	1
157		3	max	.006	2	.007	2	.007	1	-6.801e-6	15	NC	1	NC	2
158			min	-.008	3	-.014	3	0	15	-1.655e-4	1	NC	1	9909.697	1
159		4	max	.006	2	.005	2	.006	1	-6.374e-6	15	NC	1	NC	1
160			min	-.008	3	-.013	3	0	15	-1.551e-4	1	NC	1	NC	1
161		5	max	.005	2	.004	2	.006	1	-5.948e-6	15	NC	1	NC	1
162			min	-.007	3	-.013	3	0	15	-1.447e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.005	1	-5.521e-6	15	NC	1	NC	1
164			min	-.007	3	-.012	3	0	15	-1.343e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.004	1	-5.095e-6	15	NC	1	NC	1
166			min	-.006	3	-.011	3	0	15	-1.239e-4	1	NC	1	NC	1
167		8	max	.004	2	.001	2	.004	1	-4.668e-6	15	NC	1	NC	1
168			min	-.006	3	-.011	3	0	15	-1.135e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-4.242e-6	15	NC	1	NC	1
170			min	-.005	3	-.01	3	0	15	-1.031e-4	1	NC	1	NC	1
171		10	max	.004	2	0	2	.003	1	-3.815e-6	15	NC	1	NC	1
172			min	-.005	3	-.009	3	0	15	-9.271e-5	1	NC	1	NC	1
173		11	max	.003	2	-.001	2	.002	1	-3.389e-6	15	NC	1	NC	1
174			min	-.004	3	-.009	3	0	15	-8.23e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	15	.002	1	-2.962e-6	15	NC	1	NC	1
176			min	-.004	3	-.008	3	0	15	-7.19e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	.001	1	-2.535e-6	15	NC	1	NC	1
178			min	-.003	3	-.007	3	0	15	-6.15e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-2.109e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-5.109e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.682e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-4.069e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-1.256e-6	15	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-3.029e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-8.292e-7	15	NC	1	NC	1
186			min	-.001	3	-.003	4	0	15	-1.989e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-4.026e-7	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-9.483e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	9.2e-7	1	NC	1	NC	1
190			min	0	1	0	1	0	1	-5.233e-7	3	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	0	3	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.456e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	2.129e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	3	8.709e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	4.404e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	3	1.798e-6	15	NC	1	NC	1
197		4	max	.001	3	-.002	15	0	1	6.678e-5	1	NC	1	NC	1
198			min	-.001	2	-.009	4	0	3	2.726e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	1	8.953e-5	1	NC	1	NC	1
200			min	-.001	2	-.012	4	0	12	3.653e-6	15	8799.847	4	NC	1
201		6	max	.002	3	-.003	15	0	1	1.123e-4	1	NC	2	NC	1
202			min	-.002	2	-.015	4	0	12	4.58e-6	15	7103.473	4	NC	1
203		7	max	.003	3	-.004	15	0	1	1.35e-4	1	NC	5	NC	1
204			min	-.002	2	-.017	4	0	12	5.508e-6	15	6083.179	4	NC	1
205		8	max	.003	3	-.004	15	0	1	1.578e-4	1	NC	5	NC	1
206			min	-.002	2	-.019	4	0	15	6.435e-6	15	5453.562	4	NC	1
207		9	max	.003	3	-.005	15	0	1	1.805e-4	1	NC	5	NC	1
208			min	-.003	2	-.02	4	0	15	7.362e-6	15	5080.384	4	NC	1
209		10	max	.004	3	-.005	15	.001	1	2.033e-4	1	NC	5	NC	1
210			min	-.003	2	-.021	4	0	15	8.29e-6	15	4898.399	4	NC	1
211		11	max	.004	3	-.005	15	.002	1	2.26e-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	9.217e-6	15	4880.717	4	NC	1
213		12	max	.005	3	-.005	15	.002	1	2.488e-4	1	NC	5	NC	1
214			min	-.004	2	-.021	4	0	15	1.014e-5	15	5028.48	4	NC	1
215		13	max	.005	3	-.005	15	.003	1	2.715e-4	1	NC	5	NC	1
216			min	-.004	2	-.019	4	0	15	1.107e-5	15	5372.612	4	NC	1
217		14	max	.006	3	-.004	15	.003	1	2.943e-4	1	NC	5	NC	1
218			min	-.005	2	-.018	4	0	15	1.2e-5	15	5989.943	4	NC	1
219		15	max	.006	3	-.003	15	.004	1	3.17e-4	1	NC	3	NC	1
220			min	-.005	2	-.015	4	0	15	1.293e-5	15	7051.106	4	NC	1
221		16	max	.007	3	-.003	15	.005	1	3.397e-4	1	NC	1	NC	1
222			min	-.005	2	-.012	4	0	15	1.385e-5	15	8969.625	4	NC	1
223		17	max	.007	3	-.002	15	.006	1	3.625e-4	1	NC	1	NC	1
224			min	-.006	2	-.008	4	0	15	1.478e-5	15	NC	1	NC	1
225		18	max	.007	3	-.001	15	.007	1	3.852e-4	1	NC	1	NC	1
226			min	-.006	2	-.005	1	0	15	1.571e-5	15	NC	1	NC	1
227		19	max	.008	3	0	15	.008	1	4.08e-4	1	NC	1	NC	1
228			min	-.006	2	-.002	1	0	15	1.664e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.006	2	0	15	1.069e-4	1	NC	1	NC	3
230			min	0	3	-.008	3	-.008	1	4.388e-6	15	NC	1	3172.032	1
231		2	max	.002	1	.006	2	0	15	1.069e-4	1	NC	1	NC	3
232			min	0	3	-.008	3	-.007	1	4.388e-6	15	NC	1	3446.276	1
233		3	max	.002	1	.005	2	0	15	1.069e-4	1	NC	1	NC	3
234			min	0	3	-.007	3	-.007	1	4.388e-6	15	NC	1	3772.854	1
235		4	max	.002	1	.005	2	0	15	1.069e-4	1	NC	1	NC	2
236			min	0	3	-.007	3	-.006	1	4.388e-6	15	NC	1	4165.329	1
237		5	max	.002	1	.005	2	0	15	1.069e-4	1	NC	1	NC	2
238			min	0	3	-.006	3	-.005	1	4.388e-6	15	NC	1	4642.132	1
239		6	max	.002	1	.004	2	0	15	1.069e-4	1	NC	1	NC	2
240			min	0	3	-.006	3	-.005	1	4.388e-6	15	NC	1	5228.826	1
241		7	max	.002	1	.004	2	0	15	1.069e-4	1	NC	1	NC	2
242			min	0	3	-.005	3	-.004	1	4.388e-6	15	NC	1	5961.698	1
243		8	max	.002	1	.004	2	0	15	1.069e-4	1	NC	1	NC	2
244			min	0	3	-.005	3	-.004	1	4.388e-6	15	NC	1	6893.662	1
245		9	max	.001	1	.003	2	0	15	1.069e-4	1	NC	1	NC	2
246			min	0	3	-.004	3	-.003	1	4.388e-6	15	NC	1	8104.375	1
247		10	max	.001	1	.003	2	0	15	1.069e-4	1	NC	1	NC	2
248			min	0	3	-.004	3	-.003	1	4.388e-6	15	NC	1	9718.344	1
249		11	max	.001	1	.003	2	0	15	1.069e-4	1	NC	1	NC	1
250			min	0	3	-.004	3	-.002	1	4.388e-6	15	NC	1	NC	1
251		12	max	.001	1	.002	2	0	15	1.069e-4	1	NC	1	NC	1
252			min	0	3	-.003	3	-.002	1	4.388e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.069e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	-.001	1	4.388e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	1.069e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	4.388e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	1.069e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	4.388e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	1.069e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	4.388e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.069e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	4.388e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.069e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	4.388e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.069e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	4.388e-6	15	NC	1	NC	1
267	M6	1	max	.022	2	.031	2	0	1	0	1	NC	3	NC	1
268			min	-.029	3	-.044	3	0	1	0	1	2205.307	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
269		2	max	.02	2	.029	2	0	1	0	1	NC	3	NC	1
270			min	-.027	3	-.041	3	0	1	0	1	2417.653	2	NC	1
271		3	max	.019	2	.026	2	0	1	0	1	NC	3	NC	1
272			min	-.026	3	-.039	3	0	1	0	1	2673.207	2	NC	1
273		4	max	.018	2	.023	2	0	1	0	1	NC	3	NC	1
274			min	-.024	3	-.037	3	0	1	0	1	2984.105	2	NC	1
275		5	max	.017	2	.021	2	0	1	0	1	NC	3	NC	1
276			min	-.022	3	-.034	3	0	1	0	1	3367.208	2	NC	1
277		6	max	.016	2	.018	2	0	1	0	1	NC	3	NC	1
278			min	-.021	3	-.032	3	0	1	0	1	3846.489	2	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	3	NC	1
280			min	-.019	3	-.029	3	0	1	0	1	4456.983	2	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.018	3	-.027	3	0	1	0	1	5251.569	2	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.016	3	-.025	3	0	1	0	1	6313.166	2	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.014	3	-.022	3	0	1	0	1	7777.989	2	NC	1
287		11	max	.01	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.013	3	-.02	3	0	1	0	1	9883.014	2	NC	1
289		12	max	.008	2	.005	2	0	1	0	1	NC	1	NC	1
290			min	-.011	3	-.017	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.015	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.012	3	0	1	0	1	NC	1	NC	1
295		15	max	.005	2	.001	2	0	1	0	1	NC	1	NC	1
296			min	-.006	3	-.01	3	0	1	0	1	NC	1	NC	1
297		16	max	.004	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.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	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	15	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	-.002	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	-.01	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.013	3	0	1	0	1	8320.741	3	NC	1
315		6	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.016	3	0	1	0	1	7006.109	3	NC	1
317		7	max	.008	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.018	3	0	1	0	1	6188.974	4	NC	1
319		8	max	.009	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.009	2	-.02	3	0	1	0	1	5541.353	4	NC	1
321		9	max	.01	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.01	2	-.021	3	0	1	0	1	5156.729	4	NC	1
323		10	max	.012	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.011	2	-.021	3	0	1	0	1	4967.633	4	NC	1
325		11	max	.013	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	-.012	2	-.021	4	0	1	0	1	4946.041	4	NC	1
327		12	max	.014	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.013	2	-.021	4	0	1	0	1	5092.612	4	NC	1
329		13	max	.016	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.015	2	-.02	4	0	1	0	1	5438.296	4	NC	1
331		14	max	.017	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.016	2	-.018	3	0	1	0	1	6060.549	4	NC	1
333		15	max	.018	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.017	2	-.016	3	0	1	0	1	7131.704	4	NC	1
335		16	max	.02	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.018	2	-.013	3	0	1	0	1	9069.638	4	NC	1
337		17	max	.021	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.02	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.022	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.021	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.024	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.022	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	1	.021	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.024	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.02	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.023	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.019	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.021	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.018	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.016	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.015	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.013	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.012	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.009	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	1	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.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	.002	1	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.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	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.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	.009	2	0	15	1.863e-4	1	NC	1	NC	2
382			min	-.009	3	-.014	3	-.008	1	7.654e-6	15	7576.217	2	8273.038	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	.008	2	0	15	1.759e-4	1	NC	1	NC	2
384			min	-.009	3	-.014	3	-.008	1	7.227e-6	15	8797.232	2	9020.08	1
385		3	max	.006	2	.007	2	0	15	1.655e-4	1	NC	1	NC	2
386			min	-.008	3	-.014	3	-.007	1	6.801e-6	15	NC	1	9909.697	1
387		4	max	.006	2	.005	2	0	15	1.551e-4	1	NC	1	NC	1
388			min	-.008	3	-.013	3	-.006	1	6.374e-6	15	NC	1	NC	1
389		5	max	.005	2	.004	2	0	15	1.447e-4	1	NC	1	NC	1
390			min	-.007	3	-.013	3	-.006	1	5.948e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.343e-4	1	NC	1	NC	1
392			min	-.007	3	-.012	3	-.005	1	5.521e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	1.239e-4	1	NC	1	NC	1
394			min	-.006	3	-.011	3	-.004	1	5.095e-6	15	NC	1	NC	1
395		8	max	.004	2	.001	2	0	15	1.135e-4	1	NC	1	NC	1
396			min	-.006	3	-.011	3	-.004	1	4.668e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.031e-4	1	NC	1	NC	1
398			min	-.005	3	-.01	3	-.003	1	4.242e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	9.271e-5	1	NC	1	NC	1
400			min	-.005	3	-.009	3	-.003	1	3.815e-6	15	NC	1	NC	1
401		11	max	.003	2	-.001	2	0	15	8.23e-5	1	NC	1	NC	1
402			min	-.004	3	-.009	3	-.002	1	3.389e-6	15	NC	1	NC	1
403		12	max	.003	2	-.001	15	0	15	7.19e-5	1	NC	1	NC	1
404			min	-.004	3	-.008	3	-.002	1	2.962e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	6.15e-5	1	NC	1	NC	1
406			min	-.003	3	-.007	3	-.001	1	2.535e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	5.109e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	2.109e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	4.069e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.682e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	3.029e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	1.256e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.989e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	4	0	1	8.292e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	9.483e-6	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	4.026e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	5.233e-7	3	NC	1	NC	1
418			min	0	1	0	1	0	1	-9.2e-7	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.456e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	0	3	NC	1	NC	1
421		2	max	0	3	0	15	0	3	-8.709e-7	15	NC	1	NC	1
422			min	0	2	-.003	4	0	1	-2.129e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	3	-1.798e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	1	-4.404e-5	1	NC	1	NC	1
425		4	max	.001	3	-.002	15	0	3	-2.726e-6	15	NC	1	NC	1
426			min	-.001	2	-.009	4	0	1	-6.678e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	12	-3.653e-6	15	NC	1	NC	1
428			min	-.001	2	-.012	4	0	1	-8.953e-5	1	8799.847	4	NC	1
429		6	max	.002	3	-.003	15	0	12	-4.58e-6	15	NC	2	NC	1
430			min	-.002	2	-.015	4	0	1	-1.123e-4	1	7103.473	4	NC	1
431		7	max	.003	3	-.004	15	0	12	-5.508e-6	15	NC	5	NC	1
432			min	-.002	2	-.017	4	0	1	-1.35e-4	1	6083.179	4	NC	1
433		8	max	.003	3	-.004	15	0	15	-6.435e-6	15	NC	5	NC	1
434			min	-.002	2	-.019	4	0	1	-1.578e-4	1	5453.562	4	NC	1
435		9	max	.003	3	-.005	15	0	15	-7.362e-6	15	NC	5	NC	1
436			min	-.003	2	-.02	4	0	1	-1.805e-4	1	5080.384	4	NC	1
437		10	max	.004	3	-.005	15	0	15	-8.29e-6	15	NC	5	NC	1
438			min	-.003	2	-.021	4	-.001	1	-2.033e-4	1	4898.399	4	NC	1
439		11	max	.004	3	-.005	15	0	15	-9.217e-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	-.002	1	-2.26e-4	1	4880.717	4	NC	1
441		12	max	.005	3	-.005	15	0	15	-1.014e-5	15	NC	5	NC	1
442			min	-.004	2	-.021	4	-.002	1	-2.488e-4	1	5028.48	4	NC	1
443		13	max	.005	3	-.005	15	0	15	-1.107e-5	15	NC	5	NC	1
444			min	-.004	2	-.019	4	-.003	1	-2.715e-4	1	5372.612	4	NC	1
445		14	max	.006	3	-.004	15	0	15	-1.2e-5	15	NC	5	NC	1
446			min	-.005	2	-.018	4	-.003	1	-2.943e-4	1	5989.943	4	NC	1
447		15	max	.006	3	-.003	15	0	15	-1.293e-5	15	NC	3	NC	1
448			min	-.005	2	-.015	4	-.004	1	-3.17e-4	1	7051.106	4	NC	1
449		16	max	.007	3	-.003	15	0	15	-1.385e-5	15	NC	1	NC	1
450			min	-.005	2	-.012	4	-.005	1	-3.397e-4	1	8969.625	4	NC	1
451		17	max	.007	3	-.002	15	0	15	-1.478e-5	15	NC	1	NC	1
452			min	-.006	2	-.008	4	-.006	1	-3.625e-4	1	NC	1	NC	1
453		18	max	.007	3	-.001	15	0	15	-1.571e-5	15	NC	1	NC	1
454			min	-.006	2	-.005	1	-.007	1	-3.852e-4	1	NC	1	NC	1
455		19	max	.008	3	0	15	0	15	-1.664e-5	15	NC	1	NC	1
456			min	-.006	2	-.002	1	-.008	1	-4.08e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.006	2	.008	1	-4.388e-6	15	NC	1	NC	3
458			min	0	3	-.008	3	0	15	-1.069e-4	1	NC	1	3172.032	1
459		2	max	.002	1	.006	2	.007	1	-4.388e-6	15	NC	1	NC	3
460			min	0	3	-.008	3	0	15	-1.069e-4	1	NC	1	3446.276	1
461		3	max	.002	1	.005	2	.007	1	-4.388e-6	15	NC	1	NC	3
462			min	0	3	-.007	3	0	15	-1.069e-4	1	NC	1	3772.854	1
463		4	max	.002	1	.005	2	.006	1	-4.388e-6	15	NC	1	NC	2
464			min	0	3	-.007	3	0	15	-1.069e-4	1	NC	1	4165.329	1
465		5	max	.002	1	.005	2	.005	1	-4.388e-6	15	NC	1	NC	2
466			min	0	3	-.006	3	0	15	-1.069e-4	1	NC	1	4642.132	1
467		6	max	.002	1	.004	2	.005	1	-4.388e-6	15	NC	1	NC	2
468			min	0	3	-.006	3	0	15	-1.069e-4	1	NC	1	5228.826	1
469		7	max	.002	1	.004	2	.004	1	-4.388e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-1.069e-4	1	NC	1	5961.698	1
471		8	max	.002	1	.004	2	.004	1	-4.388e-6	15	NC	1	NC	2
472			min	0	3	-.005	3	0	15	-1.069e-4	1	NC	1	6893.662	1
473		9	max	.001	1	.003	2	.003	1	-4.388e-6	15	NC	1	NC	2
474			min	0	3	-.004	3	0	15	-1.069e-4	1	NC	1	8104.375	1
475		10	max	.001	1	.003	2	.003	1	-4.388e-6	15	NC	1	NC	2
476			min	0	3	-.004	3	0	15	-1.069e-4	1	NC	1	9718.344	1
477		11	max	.001	1	.003	2	.002	1	-4.388e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-1.069e-4	1	NC	1	NC	1
479		12	max	.001	1	.002	2	.002	1	-4.388e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-1.069e-4	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-4.388e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-1.069e-4	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-4.388e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.069e-4	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-4.388e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-1.069e-4	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-4.388e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-1.069e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-4.388e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.069e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-4.388e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.069e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-4.388e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.069e-4	1	NC	1	NC	1
495	M1	1	max	.01	3	.208	2	0	1	8.304e-3	1	NC	1	NC	1
496			min	-.006	2	-.05	3	0	15	-1.792e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.01	3	.101	2	0	15	3.996e-3	1	NC	5	NC	1
498			min	-.006	2	-.024	3	-.006	1	-8.893e-3	3	1274.459	2	NC	1
499		3	max	.01	3	.015	3	0	15	1.939e-5	10	NC	5	NC	1
500			min	-.006	2	-.012	2	-.008	1	-1.65e-4	1	616.73	2	NC	1
501		4	max	.01	3	.076	3	0	15	4.138e-3	2	NC	15	NC	1
502			min	-.006	2	-.138	2	-.008	1	-4.111e-3	3	392.031	2	NC	1
503		5	max	.01	3	.153	3	0	15	8.29e-3	2	NC	15	NC	1
504			min	-.006	2	-.268	2	-.005	1	-8.123e-3	3	284.475	2	NC	1
505		6	max	.009	3	.235	3	0	15	1.244e-2	2	8281.113	15	NC	1
506			min	-.006	2	-.394	2	-.002	1	-1.213e-2	3	224.971	2	NC	1
507		7	max	.009	3	.314	3	0	1	1.659e-2	2	6999.01	15	NC	1
508			min	-.005	2	-.506	2	0	3	-1.615e-2	3	189.734	2	NC	1
509		8	max	.009	3	.38	3	0	1	2.075e-2	2	6239.235	15	NC	1
510			min	-.005	2	-.594	2	0	15	-2.016e-2	3	168.846	2	NC	1
511		9	max	.009	3	.422	3	0	15	2.32e-2	2	5841.191	15	NC	1
512			min	-.005	2	-.65	2	0	1	-2.061e-2	3	157.945	2	NC	1
513		10	max	.009	3	.438	3	0	1	2.453e-2	2	5719.377	15	NC	1
514			min	-.005	2	-.669	2	0	15	-1.869e-2	3	154.741	2	NC	1
515		11	max	.008	3	.428	3	0	1	2.585e-2	2	5840.868	15	NC	1
516			min	-.005	2	-.65	2	0	15	-1.677e-2	3	158.458	2	NC	1
517		12	max	.008	3	.393	3	0	15	2.469e-2	2	6238.543	15	NC	1
518			min	-.005	2	-.592	2	0	1	-1.446e-2	3	170.357	2	NC	1
519		13	max	.008	3	.335	3	0	15	1.98e-2	2	6997.788	15	NC	1
520			min	-.005	2	-.5	2	0	1	-1.157e-2	3	193.306	2	NC	1
521		14	max	.008	3	.261	3	.002	1	1.492e-2	2	8279.034	15	NC	1
522			min	-.005	2	-.384	2	0	15	-8.68e-3	3	232.45	2	NC	1
523		15	max	.008	3	.177	3	.005	1	1.003e-2	2	NC	15	NC	1
524			min	-.005	2	-.256	2	0	15	-5.789e-3	3	299.58	2	NC	1
525		16	max	.007	3	.09	3	.007	1	5.144e-3	2	NC	15	NC	1
526			min	-.005	2	-.127	2	0	15	-2.898e-3	3	423.218	2	NC	1
527		17	max	.007	3	.005	3	.008	1	5.263e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-7.12e-6	3	685.687	2	NC	1
529		18	max	.007	3	.095	2	.006	1	6.482e-3	2	NC	5	NC	1
530			min	-.005	2	-.072	3	0	15	-2.167e-3	3	1447.815	2	NC	1
531		19	max	.007	3	.187	2	0	15	1.291e-2	2	NC	1	NC	1
532			min	-.004	2	-.145	3	0	1	-4.418e-3	3	NC	1	NC	1
533	M5	1	max	.03	3	.361	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	-.008	3	0	1	0	1	NC	1	NC	1
535		2	max	.03	3	.176	2	0	1	0	1	NC	5	NC	1
536			min	-.021	2	-.003	3	0	1	0	1	736.903	2	NC	1
537		3	max	.03	3	.044	3	0	1	0	1	NC	15	NC	1
538			min	-.021	2	-.036	2	0	1	0	1	343.508	2	NC	1
539		4	max	.03	3	.166	3	0	1	0	1	8605.433	15	NC	1
540			min	-.021	2	-.294	2	0	1	0	1	207.98	2	NC	1
541		5	max	.029	3	.342	3	0	1	0	1	5978.213	15	NC	1
542			min	-.02	2	-.577	2	0	1	0	1	145.01	2	NC	1
543		6	max	.028	3	.543	3	0	1	0	1	4577.913	15	NC	1
544			min	-.02	2	-.86	2	0	1	0	1	111.293	2	NC	1
545		7	max	.028	3	.741	3	0	1	0	1	3773.671	15	NC	1
546			min	-.02	2	-1.119	2	0	1	0	1	91.857	2	NC	1
547		8	max	.027	3	.908	3	0	1	0	1	3308.113	15	NC	1
548			min	-.019	2	-1.327	2	0	1	0	1	80.576	2	NC	1
549		9	max	.026	3	1.017	3	0	1	0	1	3069.853	15	NC	1
550			min	-.019	2	-1.459	2	0	1	0	1	74.795	2	NC	1
551		10	max	.026	3	1.056	3	0	1	0	1	2998.086	15	NC	1
552			min	-.018	2	-1.504	2	0	1	0	1	73.104	2	NC	1
553		11	max	.025	3	1.03	3	0	1	0	1	3070.032	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	-.018	2	-1.459	2	0	1	0	1	75.066	2	NC	1
555		12	max	.025	3	.94	3	0	1	0	1	3308.532	15	NC	1
556			min	-.018	2	-1.322	2	0	1	0	1	81.471	2	NC	1
557		13	max	.024	3	.795	3	0	1	0	1	3774.505	15	NC	1
558			min	-.018	2	-1.103	2	0	1	0	1	94.198	2	NC	1
559		14	max	.023	3	.612	3	0	1	0	1	4579.513	15	NC	1
560			min	-.017	2	-.833	2	0	1	0	1	116.645	2	NC	1
561		15	max	.023	3	.409	3	0	1	0	1	5981.342	15	NC	1
562			min	-.017	2	-.542	2	0	1	0	1	156.892	2	NC	1
563		16	max	.022	3	.204	3	0	1	0	1	8611.962	15	NC	1
564			min	-.017	2	-.26	2	0	1	0	1	235.479	2	NC	1
565		17	max	.021	3	.014	3	0	1	0	1	NC	15	NC	1
566			min	-.016	2	-.019	2	0	1	0	1	413.162	2	NC	1
567		18	max	.021	3	.16	1	0	1	0	1	NC	5	NC	1
568			min	-.016	2	-.146	3	0	1	0	1	930.74	2	NC	1
569		19	max	.021	3	.302	1	0	1	0	1	NC	1	NC	1
570			min	-.016	2	-.289	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.208	2	0	15	1.792e-2	3	NC	1	NC	1
572			min	-.006	2	-.05	3	0	1	-8.304e-3	1	NC	1	NC	1
573		2	max	.01	3	.101	2	.006	1	8.893e-3	3	NC	5	NC	1
574			min	-.006	2	-.024	3	0	15	-3.996e-3	1	1274.459	2	NC	1
575		3	max	.01	3	.015	3	.008	1	1.65e-4	1	NC	5	NC	1
576			min	-.006	2	-.012	2	0	15	-1.939e-5	10	616.73	2	NC	1
577		4	max	.01	3	.076	3	.008	1	4.111e-3	3	NC	15	NC	1
578			min	-.006	2	-.138	2	0	15	-4.138e-3	2	392.031	2	NC	1
579		5	max	.01	3	.153	3	.005	1	8.123e-3	3	NC	15	NC	1
580			min	-.006	2	-.268	2	0	15	-8.29e-3	2	284.475	2	NC	1
581		6	max	.009	3	.235	3	.002	1	1.213e-2	3	8281.113	15	NC	1
582			min	-.006	2	-.394	2	0	15	-1.244e-2	2	224.971	2	NC	1
583		7	max	.009	3	.314	3	0	3	1.615e-2	3	6999.01	15	NC	1
584			min	-.005	2	-.506	2	0	1	-1.659e-2	2	189.734	2	NC	1
585		8	max	.009	3	.38	3	0	15	2.016e-2	3	6239.235	15	NC	1
586			min	-.005	2	-.594	2	0	1	-2.075e-2	2	168.846	2	NC	1
587		9	max	.009	3	.422	3	0	1	2.061e-2	3	5841.191	15	NC	1
588			min	-.005	2	-.65	2	0	15	-2.32e-2	2	157.945	2	NC	1
589		10	max	.009	3	.438	3	0	15	1.869e-2	3	5719.377	15	NC	1
590			min	-.005	2	-.669	2	0	1	-2.453e-2	2	154.741	2	NC	1
591		11	max	.008	3	.428	3	0	15	1.677e-2	3	5840.868	15	NC	1
592			min	-.005	2	-.65	2	0	1	-2.585e-2	2	158.458	2	NC	1
593		12	max	.008	3	.393	3	0	1	1.446e-2	3	6238.543	15	NC	1
594			min	-.005	2	-.592	2	0	15	-2.469e-2	2	170.357	2	NC	1
595		13	max	.008	3	.335	3	0	1	1.157e-2	3	6997.788	15	NC	1
596			min	-.005	2	-.5	2	0	15	-1.98e-2	2	193.306	2	NC	1
597		14	max	.008	3	.261	3	0	15	8.68e-3	3	8279.034	15	NC	1
598			min	-.005	2	-.384	2	-.002	1	-1.492e-2	2	232.45	2	NC	1
599		15	max	.008	3	.177	3	0	15	5.789e-3	3	NC	15	NC	1
600			min	-.005	2	-.256	2	-.005	1	-1.003e-2	2	299.58	2	NC	1
601		16	max	.007	3	.09	3	0	15	2.898e-3	3	NC	15	NC	1
602			min	-.005	2	-.127	2	-.007	1	-5.144e-3	2	423.218	2	NC	1
603		17	max	.007	3	.005	3	0	15	7.12e-6	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.008	1	-5.263e-4	1	685.687	2	NC	1
605		18	max	.007	3	.095	2	0	15	2.167e-3	3	NC	5	NC	1
606			min	-.005	2	-.072	3	-.006	1	-6.482e-3	2	1447.815	2	NC	1
607		19	max	.007	3	.187	2	0	1	4.418e-3	3	NC	1	NC	1
608			min	-.004	2	-.145	3	0	15	-1.291e-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

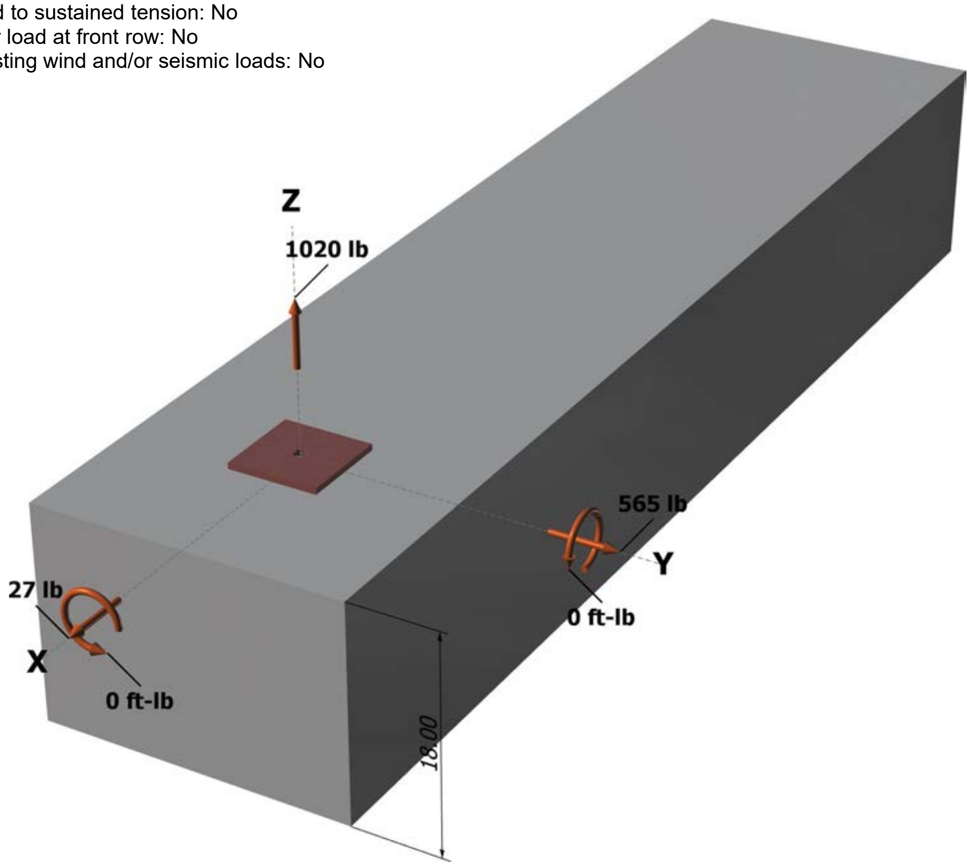
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

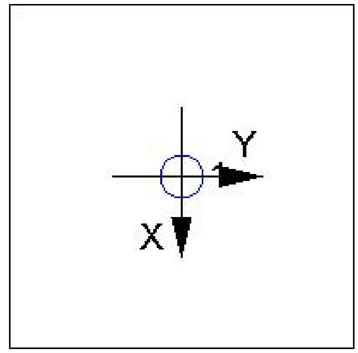
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, øN_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, øV_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

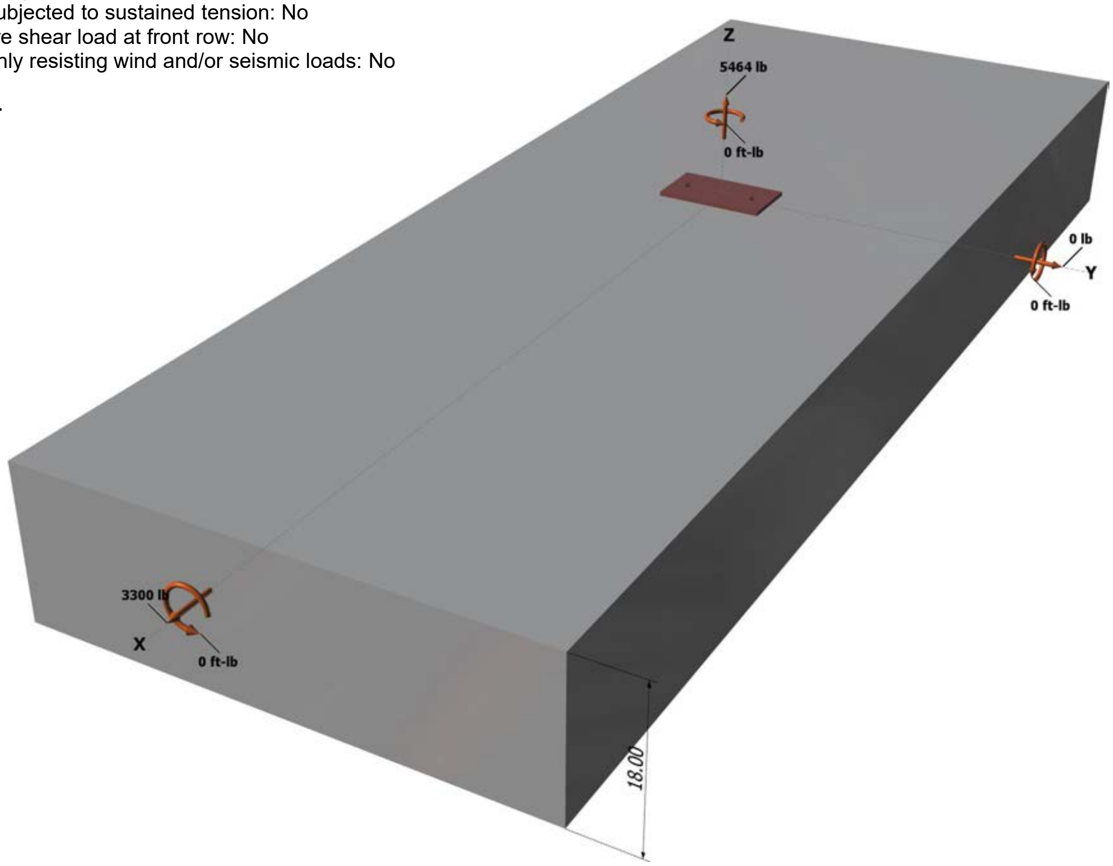
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

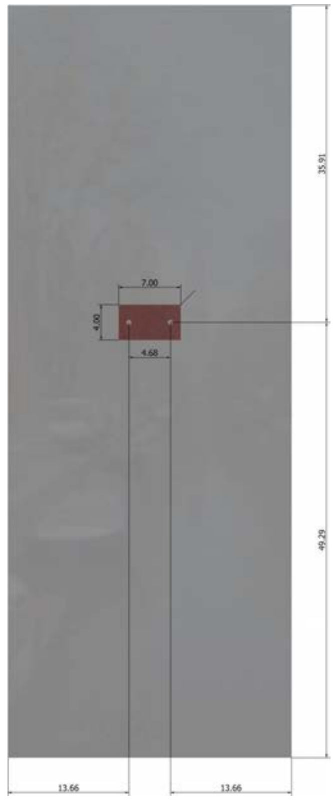
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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



<Figure 2>



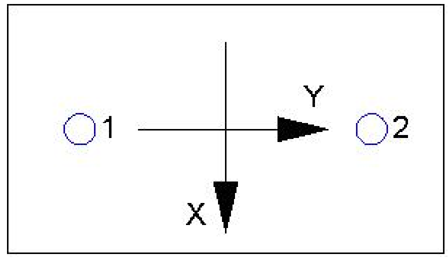
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, $øN_n$ (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, $øV_n$ (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.