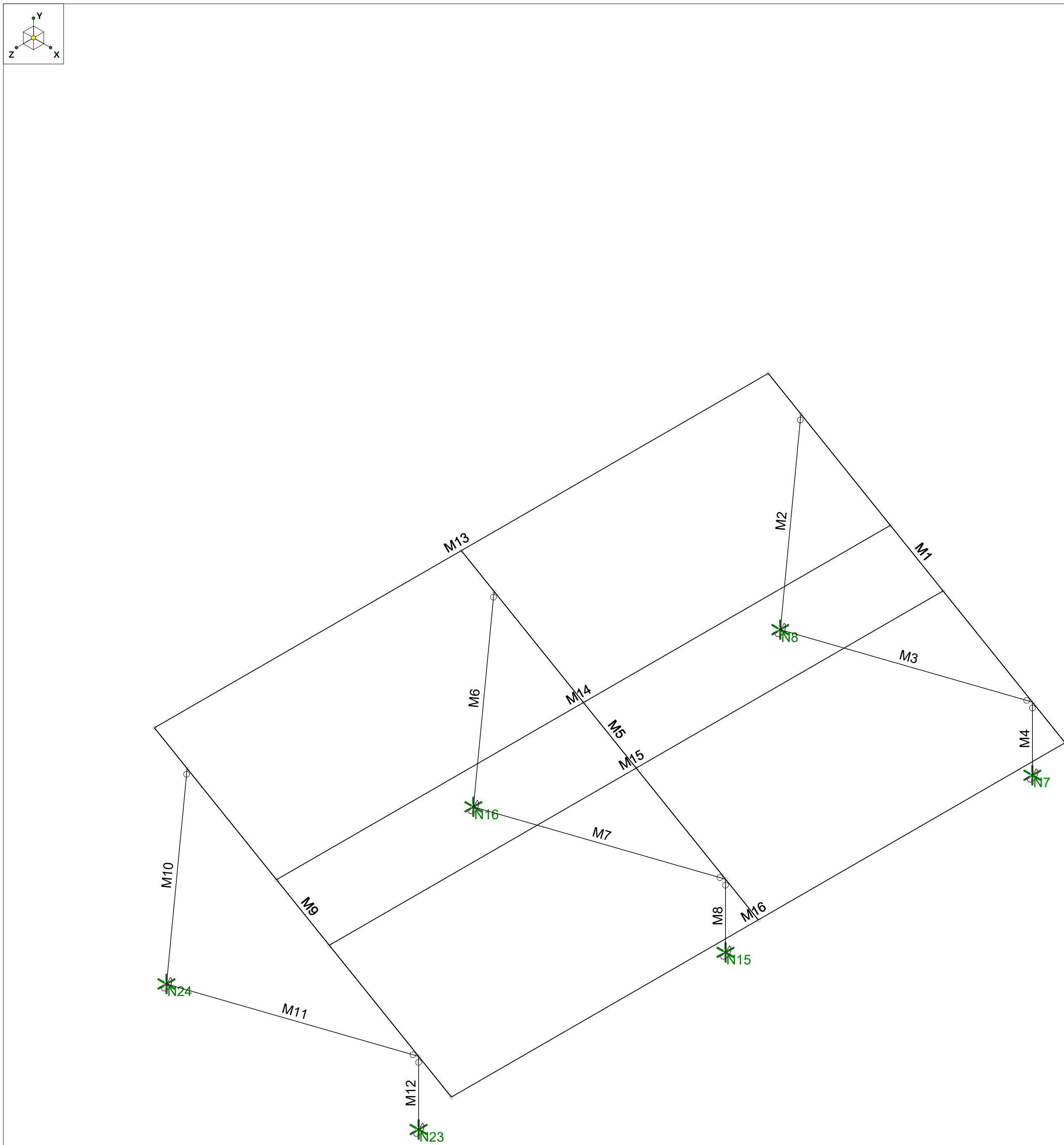


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

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.

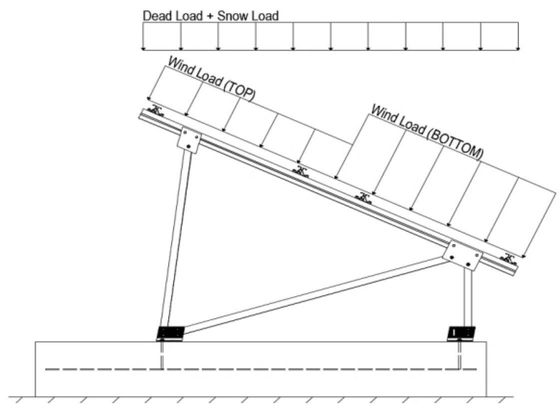
1.2 Construction

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 =	30°
Maximum Height Above Grade =	3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	16.49	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.73		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

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

$Cf+_{TOP}$ =	1.150	*(Pressure)*	
$Cf+_{BOTTOM}$ =	1.850		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.600		
$Cf-_{TOP, INNER PURLIN}$ =	-2.000	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.100		

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.

<u>Strength Design, LRFD</u>

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)

<u>Allowable Stress Design, ASD</u>

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

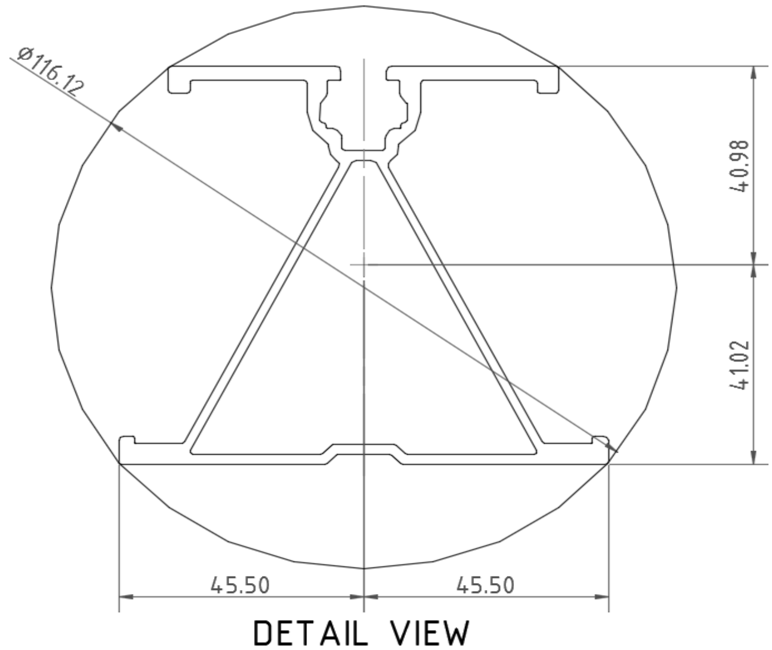
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

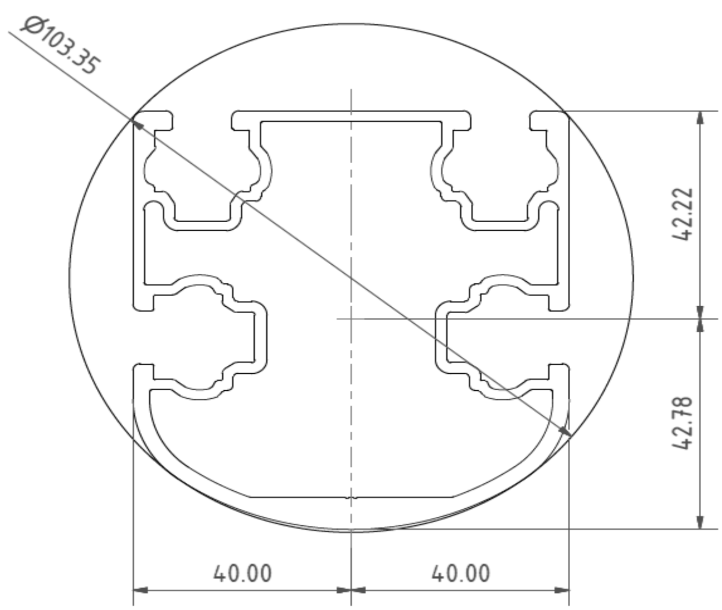
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	93	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.684	k-ft
M_z =	0.110	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	70%	



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).

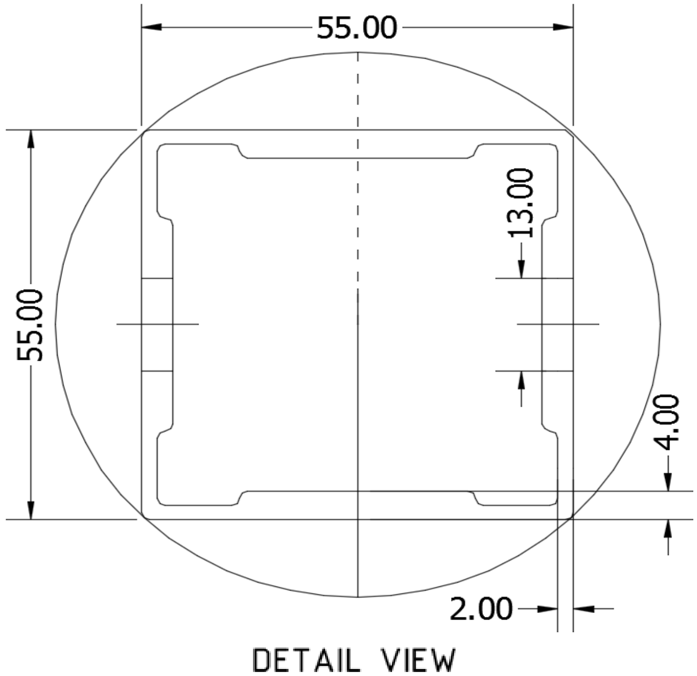
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.285	k-ft
M_z =	0.000	k-ft
P_n =	-0.991	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



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).

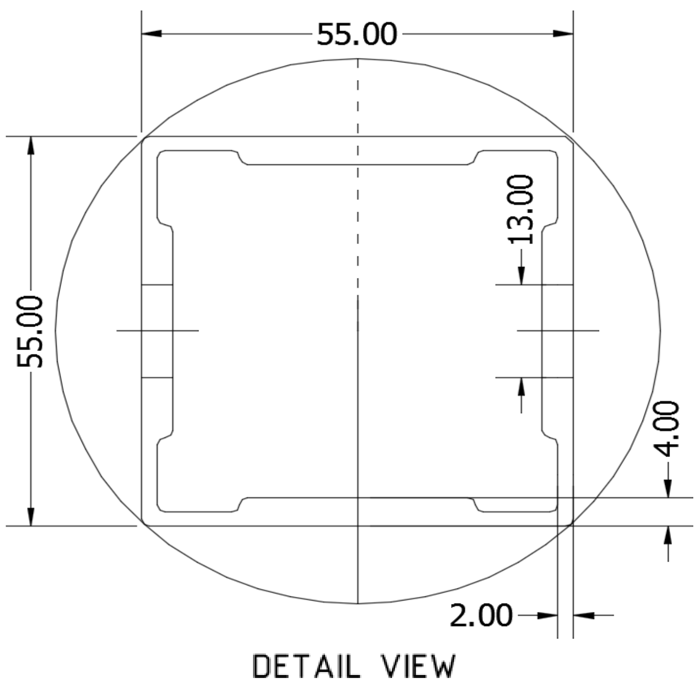
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.508	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	9%	



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).

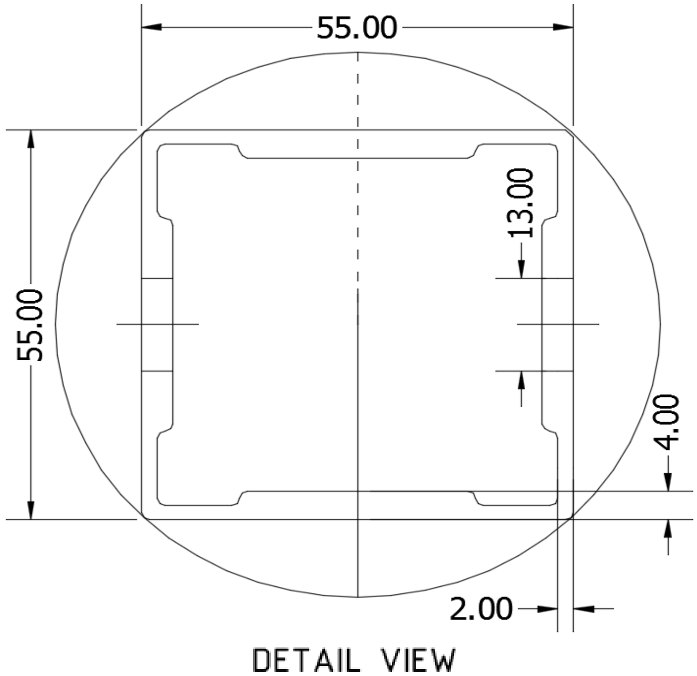
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.639	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	45%	



4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.35	in
$\Phi F_{ty\ AXIAL}$ =	8.88	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.216	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	38%	



5. FOUNDATION DESIGN CALCULATIONS

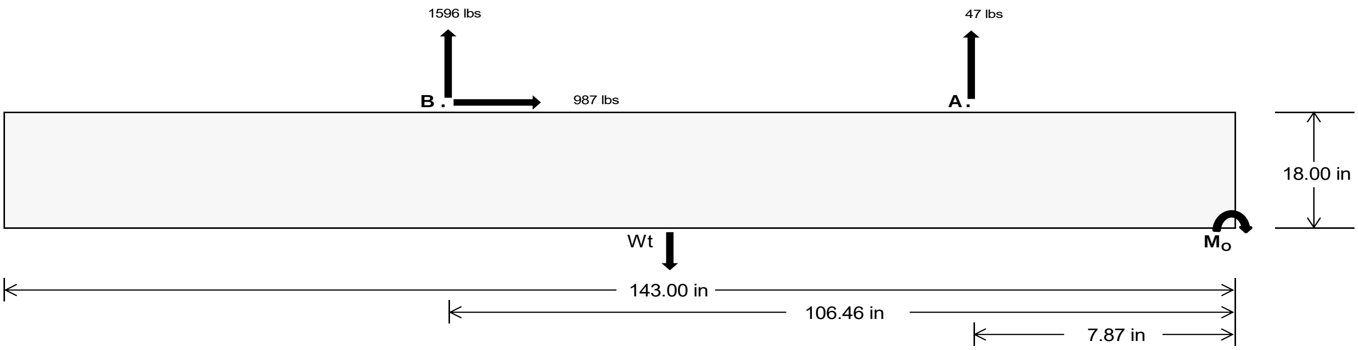
5.1 Helical Pile Foundations

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 =	206.57	6649.22	k
Compressive Load =	3260.13	5004.81	k
Lateral Load =	14.01	4105.58	k
Moment (Weak Axis) =	0.03	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check	
M_O =	188083.4 in-lbs
Resisting Force Required =	2630.54 lbs
S.F. =	1.67
Weight Required =	4384.23 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 =	987.09 lbs
Friction =	0.4
Weight Required =	2467.73 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 =	987.09 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	1087 lbs	1087 lbs	1087 lbs	1087 lbs	1309 lbs	1309 lbs	1309 lbs	1309 lbs	1682 lbs	1682 lbs	1682 lbs	1682 lbs	-94 lbs	-94 lbs	-94 lbs	-94 lbs
F_B	1066 lbs	1066 lbs	1066 lbs	1066 lbs	2198 lbs	2198 lbs	2198 lbs	2198 lbs	2336 lbs	2336 lbs	2336 lbs	2336 lbs	-3193 lbs	-3193 lbs	-3193 lbs	-3193 lbs
F_V	142 lbs	142 lbs	142 lbs	142 lbs	1777 lbs	1777 lbs	1777 lbs	1777 lbs	1426 lbs	1426 lbs	1426 lbs	1426 lbs	-1974 lbs	-1974 lbs	-1974 lbs	-1974 lbs
P_{total}	9713 lbs	9929 lbs	10145 lbs	10361 lbs	11067 lbs	11283 lbs	11499 lbs	11715 lbs	11577 lbs	11793 lbs	12009 lbs	12225 lbs	1249 lbs	1379 lbs	1508 lbs	1638 lbs
M	2872 lbs-ft	2872 lbs-ft	2872 lbs-ft	2872 lbs-ft	3203 lbs-ft	3203 lbs-ft	3203 lbs-ft	3203 lbs-ft	4250 lbs-ft	4250 lbs-ft	4250 lbs-ft	4250 lbs-ft	5842 lbs-ft	5842 lbs-ft	5842 lbs-ft	5842 lbs-ft
e	0.30 ft	0.29 ft	0.28 ft	0.28 ft	0.29 ft	0.28 ft	0.28 ft	0.27 ft	0.37 ft	0.36 ft	0.35 ft	0.35 ft	4.68 ft	4.24 ft	3.87 ft	3.57 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}	237.8 psf	237.3 psf	236.7 psf	236.2 psf	272.0 psf	270.5 psf	269.1 psf	267.7 psf	271.5 psf	270.0 psf	268.6 psf	267.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	321.1 psf	318.2 psf	315.5 psf	312.9 psf	364.8 psf	360.7 psf	356.9 psf	353.2 psf	394.7 psf	389.7 psf	385.1 psf	380.7 psf	222.8 psf	178.0 psf	156.4 psf	144.2 psf

Maximum Bearing Pressure =	395 psf
Allowable Bearing Pressure =	1500 psf

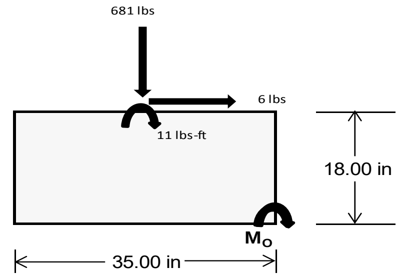
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 972.9 ft-lbs
Resisting Force Required = 667.17 lbs
S.F. = 1.67
Weight Required = 1111.94 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	239 lbs	566 lbs	239 lbs	681 lbs	1811 lbs	681 lbs	70 lbs	165 lbs	70 lbs
F_V	2 lbs	0 lbs	2 lbs	6 lbs	0 lbs	6 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9597 lbs	7560 lbs	9597 lbs	9590 lbs	7560 lbs	9590 lbs	2806 lbs	7560 lbs	2806 lbs
M	6 lbs-ft	0 lbs-ft	6 lbs-ft	20 lbs-ft	0 lbs-ft	20 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}	275.8 psf	217.5 psf	275.8 psf	274.7 psf	217.5 psf	274.7 psf	80.7 psf	217.5 psf	80.7 psf
f_{max}	276.5 psf	217.5 psf	276.5 psf	277.1 psf	217.5 psf	277.1 psf	80.8 psf	217.5 psf	80.8 psf

Maximum Bearing Pressure = 277 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 34in 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.

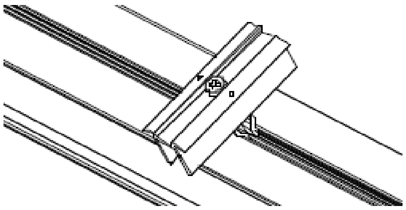
6. DESIGN OF JOINTS AND CONNECTIONS

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.

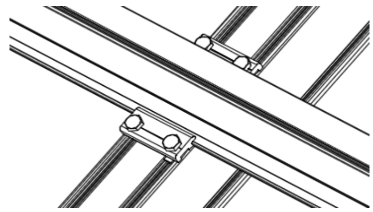
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.875	k
Allowable Uplift =	1.214	k
Utilization =	72%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.425	k
Allowable Uplift =	4.357	k
Utilization =	56%	



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 =	2.508	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	34%	

Rear Strut

Maximum Axial Load =	4.475	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	60%	

Diagonal Strut

Maximum Axial Load =	2.775	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	37%	

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.

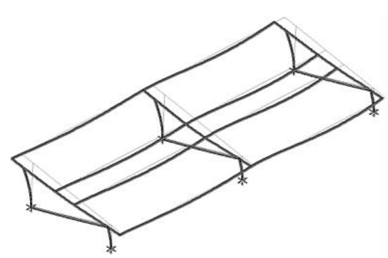
7. SEISMIC DESIGN

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} =	60.93	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.219	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 = 93 in

J = 0.432

257.282

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

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= 28.1 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in³

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

Weak Axis:

3.4.14

L_b = 93

J = 0.432

163.616

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.2

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 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

Rb/t = 18.1

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

M_{max}St = 3.323 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

ly = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **<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 in³

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 in³

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 = 78.35 in
J = 0.942
122.273

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.35
J = 0.942
122.273

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in³

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 in³

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.8125

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83375

φF_L= (φccFcy)/(λ²)

φF_L= 8.88278 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.88 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.14 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	-46.866	-46.866	0	0
2	M14	Y	-46.866	-46.866	0	0
3	M15	Y	-46.866	-46.866	0	0
4	M16	Y	-46.866	-46.866	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	-71.679	-71.679	0	0
2	M14	y	-71.679	-71.679	0	0
3	M15	y	-115.31	-115.31	0	0
4	M16	y	-115.31	-115.31	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	162.058	162.058	0	0
2	M14	y	124.66	124.66	0	0
3	M15	y	68.563	68.563	0	0
4	M16	y	68.563	68.563	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	874.272	2	1258.29	2	.544	1	.002	1	0	1	0	1
2		min	-1048.667	3	-1639.294	3	.029	15	0	15	0	1	0	1
3	N7	max	.026	9	969.934	1	-.521	15	0	15	0	1	0	1
4		min	-.254	2	-18.791	3	-10.777	1	-.021	1	0	1	0	1
5	N15	max	.014	9	2507.794	1	0	12	0	11	0	1	0	1
6		min	-2.462	2	-158.899	3	0	2	0	3	0	1	0	1
7	N16	max	2891.752	2	3849.857	2	0	2	0	2	0	1	0	1
8		min	-3158.137	3	-5114.786	3	0	3	0	3	0	1	0	1
9	N23	max	.026	9	969.934	1	10.777	1	.021	1	0	1	0	1
10		min	-.254	2	-18.791	3	.521	15	0	15	0	1	0	1
11	N24	max	874.272	2	1258.29	2	-.029	15	0	15	0	1	0	1
12		min	-1048.667	3	-1639.294	3	-.544	1	-.002	1	0	1	0	1
13	Totals:	max	4637.327	2	10495.775	2	0	11						
14		min	-5255.666	3	-8589.854	3	0	2						

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	61.262	1	415.259	2	-7.543	15	0	15	.171	1	0	2
2			min	2.909	15	-741.574	3	-161.537	1	-.014	2	.008	15	0	3
3		2	max	61.262	1	288.871	2	-5.774	15	0	15	.049	1	.544	3
4			min	2.909	15	-522.964	3	-123.389	1	-.014	2	.002	15	-.303	2
5		3	max	61.262	1	162.484	2	-4.006	15	0	15	.003	3	.901	3
6			min	2.909	15	-304.355	3	-85.24	1	-.014	2	-.041	1	-.497	2
7		4	max	61.262	1	36.097	2	-2.237	15	0	15	-.003	12	1.069	3
8			min	2.909	15	-85.745	3	-47.092	1	-.014	2	-.098	1	-.583	2
9		5	max	61.262	1	132.865	3	.15	10	0	15	-.005	12	1.048	3
10			min	2.909	15	-90.29	2	-8.944	1	-.014	2	-.122	1	-.56	2
11		6	max	61.262	1	351.475	3	29.204	1	0	15	-.005	15	.84	3
12			min	2.909	15	-216.678	2	-1.104	3	-.014	2	-.114	1	-.427	2
13		7	max	61.262	1	570.085	3	67.352	1	0	15	-.003	15	.443	3
14			min	2.909	15	-343.065	2	1.187	12	-.014	2	-.072	1	-.186	2
15		8	max	61.262	1	788.695	3	105.5	1	0	15	.005	2	.163	2
16			min	2.909	15	-469.452	2	2.984	12	-.014	2	-.007	3	-.142	3
17		9	max	61.262	1	1007.304	3	143.648	1	0	15	.11	1	.622	2
18			min	2.909	15	-595.839	2	4.782	12	-.014	2	-.003	3	-.915	3
19		10	max	61.262	1	722.226	2	-6.58	12	.014	2	.25	1	1.19	2
20			min	2.909	15	-1225.914	3	-181.797	1	-.004	3	.004	12	-1.877	3
21		11	max	61.262	1	595.839	2	-4.782	12	.014	2	.11	1	.622	2
22			min	2.909	15	-1007.304	3	-143.648	1	0	15	-.003	3	-.915	3
23		12	max	61.262	1	469.452	2	-2.984	12	.014	2	.005	2	.163	2
24			min	2.909	15	-788.695	3	-105.5	1	0	15	-.007	3	-.142	3
25		13	max	61.262	1	343.065	2	-1.187	12	.014	2	-.003	15	.443	3
26			min	2.909	15	-570.085	3	-67.352	1	0	15	-.072	1	-.186	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	61.262	1	216.678	2	1.104	3	.014	2	-.005	15	.84	3
28			min	2.909	15	-351.475	3	-29.204	1	0	15	-.114	1	-.427	2
29		15	max	61.262	1	90.29	2	8.944	1	.014	2	-.005	12	1.048	3
30			min	2.909	15	-132.865	3	-.15	10	0	15	-.122	1	-.56	2
31		16	max	61.262	1	85.745	3	47.092	1	.014	2	-.003	12	1.069	3
32			min	2.909	15	-36.097	2	2.237	15	0	15	-.098	1	-.583	2
33		17	max	61.262	1	304.355	3	85.24	1	.014	2	.003	3	.901	3
34			min	2.909	15	-162.484	2	4.006	15	0	15	-.041	1	-.497	2
35		18	max	61.262	1	522.964	3	123.389	1	.014	2	.049	1	.544	3
36			min	2.909	15	-288.871	2	5.774	15	0	15	.002	15	-.303	2
37		19	max	61.262	1	741.574	3	161.537	1	.014	2	.171	1	0	2
38			min	2.909	15	-415.259	2	7.543	15	0	15	.008	15	0	3
39	M14	1	max	39.025	1	487.109	2	-7.871	15	.014	3	.207	1	0	1
40			min	1.849	15	-611.591	3	-168.565	1	-.015	2	.01	15	0	3
41		2	max	39.025	1	360.722	2	-6.103	15	.014	3	.079	1	.455	3
42			min	1.849	15	-444.507	3	-130.417	1	-.015	2	.004	15	-.365	2
43		3	max	39.025	1	234.335	2	-4.334	15	.014	3	.006	3	.766	3
44			min	1.849	15	-277.424	3	-92.269	1	-.015	2	-.017	1	-.621	2
45		4	max	39.025	1	107.947	2	-2.566	15	.014	3	-.001	12	.932	3
46			min	1.849	15	-110.34	3	-54.12	1	-.015	2	-.08	1	-.769	2
47		5	max	39.025	1	56.744	3	-.679	10	.014	3	-.004	12	.956	3
48			min	1.849	15	-20.665	1	-15.972	1	-.015	2	-.11	1	-.807	2
49		6	max	39.025	1	223.828	3	22.176	1	.014	3	-.005	15	.835	3
50			min	1.849	15	-144.827	2	-1.664	3	-.015	2	-.108	1	-.737	2
51		7	max	39.025	1	390.911	3	60.324	1	.014	3	-.003	15	.57	3
52			min	1.849	15	-271.214	2	.816	12	-.015	2	-.072	1	-.558	2
53		8	max	39.025	1	557.995	3	98.472	1	.014	3	.003	2	.162	3
54			min	1.849	15	-397.602	2	2.614	12	-.015	2	-.007	3	-.27	2
55		9	max	39.025	1	725.079	3	136.62	1	.014	3	.097	1	.142	1
56			min	1.849	15	-523.989	2	4.411	12	-.015	2	-.003	3	-.391	3
57		10	max	39.025	1	650.376	2	-6.209	12	.015	2	.231	1	.633	2
58			min	1.849	15	-892.162	3	-174.768	1	-.014	3	.003	12	-1.087	3
59		11	max	39.025	1	523.989	2	-4.411	12	.015	2	.097	1	.142	1
60			min	1.849	15	-725.079	3	-136.62	1	-.014	3	-.003	3	-.391	3
61		12	max	39.025	1	397.602	2	-2.614	12	.015	2	.003	2	.162	3
62			min	1.849	15	-557.995	3	-98.472	1	-.014	3	-.007	3	-.27	2
63		13	max	39.025	1	271.214	2	-.816	12	.015	2	-.003	15	.57	3
64			min	1.849	15	-390.911	3	-60.324	1	-.014	3	-.072	1	-.558	2
65		14	max	39.025	1	144.827	2	1.664	3	.015	2	-.005	15	.835	3
66			min	1.849	15	-223.828	3	-22.176	1	-.014	3	-.108	1	-.737	2
67		15	max	39.025	1	20.665	1	15.972	1	.015	2	-.004	12	.956	3
68			min	1.849	15	-56.744	3	.679	10	-.014	3	-.11	1	-.807	2
69		16	max	39.025	1	110.34	3	54.12	1	.015	2	-.001	12	.932	3
70			min	1.849	15	-107.947	2	2.566	15	-.014	3	-.08	1	-.769	2
71		17	max	39.025	1	277.424	3	92.269	1	.015	2	.006	3	.766	3
72			min	1.849	15	-234.335	2	4.334	15	-.014	3	-.017	1	-.621	2
73		18	max	39.025	1	444.507	3	130.417	1	.015	2	.079	1	.455	3
74			min	1.849	15	-360.722	2	6.103	15	-.014	3	.004	15	-.365	2
75		19	max	39.025	1	611.591	3	168.565	1	.015	2	.207	1	0	1
76			min	1.849	15	-487.109	2	7.871	15	-.014	3	.01	15	0	3
77	M15	1	max	-1.959	15	690.092	2	-7.867	15	.016	2	.207	1	0	2
78			min	-41.131	1	-351.569	3	-168.549	1	-.012	3	.01	15	0	3
79		2	max	-1.959	15	503.591	2	-6.099	15	.016	2	.078	1	.264	3
80			min	-41.131	1	-261.775	3	-130.401	1	-.012	3	.004	15	-.514	2
81		3	max	-1.959	15	317.09	2	-4.33	15	.016	2	.005	3	.451	3
82			min	-41.131	1	-171.98	3	-92.253	1	-.012	3	-.017	1	-.867	2
83		4	max	-1.959	15	130.589	2	-2.561	15	.016	2	-.001	12	.56	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	-41.131	1	-82.186	3	-54.104	1	-.012	3	-.08	1	-1.06	2
85		5	max	-1.959	15	7.609	3	-.761	10	.016	2	-.005	12	.592	3
86			min	-41.131	1	-55.912	2	-15.956	1	-.012	3	-.111	1	-1.092	2
87		6	max	-1.959	15	97.403	3	22.192	1	.016	2	-.005	15	.547	3
88			min	-41.131	1	-242.413	2	-1.385	3	-.012	3	-.108	1	-.964	2
89		7	max	-1.959	15	187.198	3	60.34	1	.016	2	-.003	15	.425	3
90			min	-41.131	1	-428.914	2	.991	12	-.012	3	-.072	1	-.675	2
91		8	max	-1.959	15	276.992	3	98.488	1	.016	2	.002	2	.225	3
92			min	-41.131	1	-615.415	2	2.788	12	-.012	3	-.007	3	-.225	2
93		9	max	-1.959	15	366.787	3	136.636	1	.016	2	.097	1	.385	2
94			min	-41.131	1	-801.916	2	4.586	12	-.012	3	-.002	3	-.052	3
95		10	max	-1.959	15	988.417	2	-6.383	12	.012	3	.231	1	1.156	2
96			min	-41.131	1	-456.581	3	-174.784	1	-.016	2	.004	12	-.407	3
97		11	max	-1.959	15	801.916	2	-4.586	12	.012	3	.097	1	.385	2
98			min	-41.131	1	-366.787	3	-136.636	1	-.016	2	-.002	3	-.052	3
99		12	max	-1.959	15	615.415	2	-2.788	12	.012	3	.002	2	.225	3
100			min	-41.131	1	-276.992	3	-98.488	1	-.016	2	-.007	3	-.225	2
101		13	max	-1.959	15	428.914	2	-.991	12	.012	3	-.003	15	.425	3
102			min	-41.131	1	-187.198	3	-60.34	1	-.016	2	-.072	1	-.675	2
103		14	max	-1.959	15	242.413	2	1.385	3	.012	3	-.005	15	.547	3
104			min	-41.131	1	-97.403	3	-22.192	1	-.016	2	-.108	1	-.964	2
105		15	max	-1.959	15	55.912	2	15.956	1	.012	3	-.005	12	.592	3
106			min	-41.131	1	-7.609	3	.761	10	-.016	2	-.111	1	-1.092	2
107		16	max	-1.959	15	82.186	3	54.104	1	.012	3	-.001	12	.56	3
108			min	-41.131	1	-130.589	2	2.561	15	-.016	2	-.08	1	-1.06	2
109		17	max	-1.959	15	171.98	3	92.253	1	.012	3	.005	3	.451	3
110			min	-41.131	1	-317.09	2	4.33	15	-.016	2	-.017	1	-.867	2
111		18	max	-1.959	15	261.775	3	130.401	1	.012	3	.078	1	.264	3
112			min	-41.131	1	-503.591	2	6.099	15	-.016	2	.004	15	-.514	2
113		19	max	-1.959	15	351.569	3	168.549	1	.012	3	.207	1	0	2
114			min	-41.131	1	-690.092	2	7.867	15	-.016	2	.01	15	0	3
115	M16	1	max	-3.291	15	621.99	2	-7.56	15	.008	1	.174	1	0	2
116			min	-69.389	1	-291.627	3	-162.137	1	-.013	3	.008	15	0	3
117		2	max	-3.291	15	435.489	2	-5.791	15	.008	1	.051	1	.212	3
118			min	-69.389	1	-201.833	3	-123.989	1	-.013	3	.002	15	-.455	2
119		3	max	-3.291	15	248.988	2	-4.022	15	.008	1	.002	3	.348	3
120			min	-69.389	1	-112.039	3	-85.84	1	-.013	3	-.04	1	-.75	2
121		4	max	-3.291	15	62.487	2	-2.254	15	.008	1	-.003	12	.405	3
122			min	-69.389	1	-22.244	3	-47.692	1	-.013	3	-.097	1	-.884	2
123		5	max	-3.291	15	67.55	3	-.198	10	.008	1	-.005	12	.386	3
124			min	-69.389	1	-124.014	2	-9.544	1	-.013	3	-.122	1	-.858	2
125		6	max	-3.291	15	157.345	3	28.604	1	.008	1	-.005	15	.289	3
126			min	-69.389	1	-310.515	2	-.231	3	-.013	3	-.114	1	-.671	2
127		7	max	-3.291	15	247.139	3	66.752	1	.008	1	-.003	15	.115	3
128			min	-69.389	1	-497.016	2	1.732	12	-.013	3	-.073	1	-.323	2
129		8	max	-3.291	15	336.934	3	104.9	1	.008	1	.004	2	.185	2
130			min	-69.389	1	-683.518	2	3.53	12	-.013	3	-.005	3	-.137	3
131		9	max	-3.291	15	426.728	3	143.049	1	.008	1	.108	1	.854	2
132			min	-69.389	1	-870.019	2	5.327	12	-.013	3	0	3	-.465	3
133		10	max	-3.291	15	1056.52	2	-7.125	12	.013	3	.248	1	1.684	2
134			min	-69.389	1	-516.523	3	-181.197	1	-.008	1	.006	12	-.871	3
135		11	max	-3.291	15	870.019	2	-5.327	12	.013	3	.108	1	.854	2
136			min	-69.389	1	-426.728	3	-143.049	1	-.008	1	0	3	-.465	3
137		12	max	-3.291	15	683.518	2	-3.53	12	.013	3	.004	2	.185	2
138			min	-69.389	1	-336.934	3	-104.9	1	-.008	1	-.005	3	-.137	3
139		13	max	-3.291	15	497.016	2	-1.732	12	.013	3	-.003	15	.115	3
140			min	-69.389	1	-247.139	3	-66.752	1	-.008	1	-.073	1	-.323	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-3.291	15	310.515	2	.231	3	.013	3	-.005	15	.289	3
142			min	-69.389	1	-157.345	3	-28.604	1	-.008	1	-.114	1	-.671	2
143		15	max	-3.291	15	124.014	2	9.544	1	.013	3	-.005	12	.386	3
144			min	-69.389	1	-67.55	3	.198	10	-.008	1	-.122	1	-.858	2
145		16	max	-3.291	15	22.244	3	47.692	1	.013	3	-.003	12	.405	3
146			min	-69.389	1	-62.487	2	2.254	15	-.008	1	-.097	1	-.884	2
147		17	max	-3.291	15	112.039	3	85.84	1	.013	3	.002	3	.348	3
148			min	-69.389	1	-248.988	2	4.022	15	-.008	1	-.04	1	-.75	2
149		18	max	-3.291	15	201.833	3	123.989	1	.013	3	.051	1	.212	3
150			min	-69.389	1	-435.489	2	5.791	15	-.008	1	.002	15	-.455	2
151		19	max	-3.291	15	291.627	3	162.137	1	.013	3	.174	1	0	2
152			min	-69.389	1	-621.99	2	7.56	15	-.008	1	.008	15	0	3
153	M2	1	max	1055.368	2	2.024	4	.34	1	0	3	0	3	0	1
154			min	-1432.838	3	.476	15	.016	15	0	1	0	2	0	1
155		2	max	1055.898	2	1.953	4	.34	1	0	3	0	1	0	15
156			min	-1432.441	3	.459	15	.016	15	0	1	0	15	0	4
157		3	max	1056.427	2	1.882	4	.34	1	0	3	0	1	0	15
158			min	-1432.044	3	.443	15	.016	15	0	1	0	15	-.001	4
159		4	max	1056.956	2	1.811	4	.34	1	0	3	0	1	0	15
160			min	-1431.647	3	.426	15	.016	15	0	1	0	15	-.002	4
161		5	max	1057.486	2	1.74	4	.34	1	0	3	0	1	0	15
162			min	-1431.25	3	.409	15	.016	15	0	1	0	15	-.003	4
163		6	max	1058.015	2	1.669	4	.34	1	0	3	0	1	0	15
164			min	-1430.853	3	.392	15	.016	15	0	1	0	15	-.003	4
165		7	max	1058.544	2	1.598	4	.34	1	0	3	0	1	0	15
166			min	-1430.456	3	.376	15	.016	15	0	1	0	15	-.004	4
167		8	max	1059.073	2	1.527	4	.34	1	0	3	0	1	-.001	15
168			min	-1430.059	3	.359	15	.016	15	0	1	0	15	-.004	4
169		9	max	1059.603	2	1.456	4	.34	1	0	3	0	1	-.001	15
170			min	-1429.662	3	.342	15	.016	15	0	1	0	15	-.005	4
171		10	max	1060.132	2	1.385	4	.34	1	0	3	.001	1	-.001	15
172			min	-1429.265	3	.326	15	.016	15	0	1	0	15	-.006	4
173		11	max	1060.661	2	1.314	4	.34	1	0	3	.001	1	-.001	15
174			min	-1428.868	3	.309	15	.016	15	0	1	0	15	-.006	4
175		12	max	1061.191	2	1.243	4	.34	1	0	3	.001	1	-.002	15
176			min	-1428.472	3	.292	15	.016	15	0	1	0	15	-.006	4
177		13	max	1061.72	2	1.172	4	.34	1	0	3	.001	1	-.002	15
178			min	-1428.075	3	.273	12	.016	15	0	1	0	15	-.007	4
179		14	max	1062.249	2	1.101	4	.34	1	0	3	.002	1	-.002	15
180			min	-1427.678	3	.245	12	.016	15	0	1	0	15	-.007	4
181		15	max	1062.778	2	1.029	4	.34	1	0	3	.002	1	-.002	15
182			min	-1427.281	3	.218	12	.016	15	0	1	0	15	-.008	4
183		16	max	1063.308	2	.961	2	.34	1	0	3	.002	1	-.002	15
184			min	-1426.884	3	.19	12	.016	15	0	1	0	15	-.008	4
185		17	max	1063.837	2	.906	2	.34	1	0	3	.002	1	-.002	15
186			min	-1426.487	3	.162	12	.016	15	0	1	0	15	-.008	4
187		18	max	1064.366	2	.85	2	.34	1	0	3	.002	1	-.002	15
188			min	-1426.09	3	.135	12	.016	15	0	1	0	15	-.009	4
189		19	max	1064.896	2	.795	2	.34	1	0	3	.002	1	-.002	15
190			min	-1425.693	3	.107	12	.016	15	0	1	0	15	-.009	4
191	M3	1	max	788.434	2	8.875	4	.282	1	0	5	0	1	.009	4
192			min	-927.01	3	2.086	15	.013	15	0	1	0	15	.002	15
193		2	max	788.264	2	8.007	4	.282	1	0	5	0	1	.005	2
194			min	-927.138	3	1.882	15	.013	15	0	1	0	15	0	12
195		3	max	788.093	2	7.138	4	.282	1	0	5	0	1	.002	2
196			min	-927.266	3	1.678	15	.013	15	0	1	0	15	0	3
197		4	max	787.923	2	6.269	4	.282	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	-927.394	3	1.474	15	.013	15	0	1	0	15	-.003	3
199		5	max	787.752	2	5.4	4	.282	1	0	5	0	1	-.001	15
200			min	-927.522	3	1.269	15	.013	15	0	1	0	15	-.004	4
201		6	max	787.582	2	4.531	4	.282	1	0	5	0	1	-.002	15
202			min	-927.649	3	1.065	15	.013	15	0	1	0	15	-.007	4
203		7	max	787.412	2	3.662	4	.282	1	0	5	.001	1	-.002	15
204			min	-927.777	3	.861	15	.013	15	0	1	0	15	-.009	4
205		8	max	787.241	2	2.793	4	.282	1	0	5	.001	1	-.002	15
206			min	-927.905	3	.657	15	.013	15	0	1	0	15	-.01	4
207		9	max	787.071	2	1.924	4	.282	1	0	5	.001	1	-.003	15
208			min	-928.033	3	.452	15	.013	15	0	1	0	15	-.011	4
209		10	max	786.901	2	1.055	4	.282	1	0	5	.001	1	-.003	15
210			min	-928.16	3	.248	15	.013	15	0	1	0	15	-.012	4
211		11	max	786.73	2	.309	2	.282	1	0	5	.002	1	-.003	15
212			min	-928.288	3	-.115	3	.013	15	0	1	0	15	-.012	4
213		12	max	786.56	2	-.16	15	.282	1	0	5	.002	1	-.003	15
214			min	-928.416	3	-.682	4	.013	15	0	1	0	15	-.012	4
215		13	max	786.39	2	-.365	15	.282	1	0	5	.002	1	-.003	15
216			min	-928.544	3	-1.551	4	.013	15	0	1	0	15	-.012	4
217		14	max	786.219	2	-.569	15	.282	1	0	5	.002	1	-.003	15
218			min	-928.671	3	-2.42	4	.013	15	0	1	0	15	-.011	4
219		15	max	786.049	2	-.773	15	.282	1	0	5	.002	1	-.002	15
220			min	-928.799	3	-3.289	4	.013	15	0	1	0	15	-.009	4
221		16	max	785.879	2	-.977	15	.282	1	0	5	.002	1	-.002	15
222			min	-928.927	3	-4.158	4	.013	15	0	1	0	15	-.008	4
223		17	max	785.708	2	-1.182	15	.282	1	0	5	.002	1	-.001	15
224			min	-929.055	3	-5.027	4	.013	15	0	1	0	15	-.006	4
225		18	max	785.538	2	-1.386	15	.282	1	0	5	.002	1	0	15
226			min	-929.182	3	-5.896	4	.013	15	0	1	0	15	-.003	4
227		19	max	785.368	2	-1.59	15	.282	1	0	5	.003	1	0	1
228			min	-929.31	3	-6.765	4	.013	15	0	1	0	15	0	1
229	M4	1	max	966.868	1	0	1	-.522	15	0	1	.002	1	0	1
230			min	-21.091	3	0	1	-11.069	1	0	1	0	15	0	1
231		2	max	967.039	1	0	1	-.522	15	0	1	0	1	0	1
232			min	-20.963	3	0	1	-11.069	1	0	1	0	15	0	1
233		3	max	967.209	1	0	1	-.522	15	0	1	0	15	0	1
234			min	-20.835	3	0	1	-11.069	1	0	1	0	1	0	1
235		4	max	967.379	1	0	1	-.522	15	0	1	0	15	0	1
236			min	-20.707	3	0	1	-11.069	1	0	1	-.002	1	0	1
237		5	max	967.55	1	0	1	-.522	15	0	1	0	15	0	1
238			min	-20.58	3	0	1	-11.069	1	0	1	-.003	1	0	1
239		6	max	967.72	1	0	1	-.522	15	0	1	0	15	0	1
240			min	-20.452	3	0	1	-11.069	1	0	1	-.004	1	0	1
241		7	max	967.89	1	0	1	-.522	15	0	1	0	15	0	1
242			min	-20.324	3	0	1	-11.069	1	0	1	-.006	1	0	1
243		8	max	968.061	1	0	1	-.522	15	0	1	0	15	0	1
244			min	-20.196	3	0	1	-11.069	1	0	1	-.007	1	0	1
245		9	max	968.231	1	0	1	-.522	15	0	1	0	15	0	1
246			min	-20.069	3	0	1	-11.069	1	0	1	-.008	1	0	1
247		10	max	968.401	1	0	1	-.522	15	0	1	0	15	0	1
248			min	-19.941	3	0	1	-11.069	1	0	1	-.009	1	0	1
249		11	max	968.572	1	0	1	-.522	15	0	1	0	15	0	1
250			min	-19.813	3	0	1	-11.069	1	0	1	-.011	1	0	1
251		12	max	968.742	1	0	1	-.522	15	0	1	0	15	0	1
252			min	-19.685	3	0	1	-11.069	1	0	1	-.012	1	0	1
253		13	max	968.912	1	0	1	-.522	15	0	1	0	15	0	1
254			min	-19.558	3	0	1	-11.069	1	0	1	-.013	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	969.083	1	0	1	-.522	15	0	1	0	15	0	1
256			min	-19.43	3	0	1	-11.069	1	0	1	-.014	1	0	1
257		15	max	969.253	1	0	1	-.522	15	0	1	0	15	0	1
258			min	-19.302	3	0	1	-11.069	1	0	1	-.016	1	0	1
259		16	max	969.423	1	0	1	-.522	15	0	1	0	15	0	1
260			min	-19.174	3	0	1	-11.069	1	0	1	-.017	1	0	1
261		17	max	969.594	1	0	1	-.522	15	0	1	0	15	0	1
262			min	-19.047	3	0	1	-11.069	1	0	1	-.018	1	0	1
263		18	max	969.764	1	0	1	-.522	15	0	1	0	15	0	1
264			min	-18.919	3	0	1	-11.069	1	0	1	-.02	1	0	1
265		19	max	969.934	1	0	1	-.522	15	0	1	0	15	0	1
266			min	-18.791	3	0	1	-11.069	1	0	1	-.021	1	0	1
267	M6	1	max	3206.584	2	2.275	2	0	1	0	1	0	1	0	1
268			min	-4474.54	3	.23	12	0	1	0	1	0	1	0	1
269		2	max	3207.114	2	2.219	2	0	1	0	1	0	1	0	12
270			min	-4474.143	3	.203	12	0	1	0	1	0	1	0	2
271		3	max	3207.643	2	2.164	2	0	1	0	1	0	1	0	12
272			min	-4473.747	3	.175	12	0	1	0	1	0	1	-.002	2
273		4	max	3208.172	2	2.108	2	0	1	0	1	0	1	0	12
274			min	-4473.35	3	.147	12	0	1	0	1	0	1	-.002	2
275		5	max	3208.702	2	2.053	2	0	1	0	1	0	1	0	12
276			min	-4472.953	3	.119	12	0	1	0	1	0	1	-.003	2
277		6	max	3209.231	2	1.998	2	0	1	0	1	0	1	0	12
278			min	-4472.556	3	.082	3	0	1	0	1	0	1	-.004	2
279		7	max	3209.76	2	1.942	2	0	1	0	1	0	1	0	12
280			min	-4472.159	3	.041	3	0	1	0	1	0	1	-.005	2
281		8	max	3210.29	2	1.887	2	0	1	0	1	0	1	0	12
282			min	-4471.762	3	0	3	0	1	0	1	0	1	-.005	2
283		9	max	3210.819	2	1.832	2	0	1	0	1	0	1	0	12
284			min	-4471.365	3	-.042	3	0	1	0	1	0	1	-.006	2
285		10	max	3211.348	2	1.776	2	0	1	0	1	0	1	0	3
286			min	-4470.968	3	-.084	3	0	1	0	1	0	1	-.007	2
287		11	max	3211.877	2	1.721	2	0	1	0	1	0	1	0	3
288			min	-4470.571	3	-.126	3	0	1	0	1	0	1	-.007	2
289		12	max	3212.407	2	1.666	2	0	1	0	1	0	1	0	3
290			min	-4470.174	3	-.167	3	0	1	0	1	0	1	-.008	2
291		13	max	3212.936	2	1.61	2	0	1	0	1	0	1	0	3
292			min	-4469.777	3	-.209	3	0	1	0	1	0	1	-.008	2
293		14	max	3213.465	2	1.555	2	0	1	0	1	0	1	0	3
294			min	-4469.38	3	-.25	3	0	1	0	1	0	1	-.009	2
295		15	max	3213.995	2	1.5	2	0	1	0	1	0	1	0	3
296			min	-4468.983	3	-.292	3	0	1	0	1	0	1	-.009	2
297		16	max	3214.524	2	1.444	2	0	1	0	1	0	1	0	3
298			min	-4468.586	3	-.333	3	0	1	0	1	0	1	-.01	2
299		17	max	3215.053	2	1.389	2	0	1	0	1	0	1	0	3
300			min	-4468.189	3	-.375	3	0	1	0	1	0	1	-.011	2
301		18	max	3215.582	2	1.334	2	0	1	0	1	0	1	0	3
302			min	-4467.792	3	-.416	3	0	1	0	1	0	1	-.011	2
303		19	max	3216.112	2	1.278	2	0	1	0	1	0	1	0	3
304			min	-4467.395	3	-.458	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2639.106	2	8.9	4	0	1	0	1	0	1	.011	2
306			min	-2772.7	3	2.09	15	0	1	0	1	0	1	0	3
307		2	max	2638.935	2	8.031	4	0	1	0	1	0	1	.008	2
308			min	-2772.828	3	1.886	15	0	1	0	1	0	1	-.003	3
309		3	max	2638.765	2	7.162	4	0	1	0	1	0	1	.005	2
310			min	-2772.956	3	1.682	15	0	1	0	1	0	1	-.004	3
311		4	max	2638.595	2	6.293	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2773.084	3	1.477	15	0	1	0	1	0	1	-.006	3
313		5	max	2638.424	2	5.424	4	0	1	0	1	0	1	0	2
314			min	-2773.211	3	1.273	15	0	1	0	1	0	1	-.007	3
315		6	max	2638.254	2	4.555	4	0	1	0	1	0	1	-.002	15
316			min	-2773.339	3	1.069	15	0	1	0	1	0	1	-.008	3
317		7	max	2638.084	2	3.686	4	0	1	0	1	0	1	-.002	15
318			min	-2773.467	3	.865	15	0	1	0	1	0	1	-.009	3
319		8	max	2637.913	2	2.818	4	0	1	0	1	0	1	-.002	15
320			min	-2773.595	3	.66	15	0	1	0	1	0	1	-.01	4
321		9	max	2637.743	2	2.031	2	0	1	0	1	0	1	-.003	15
322			min	-2773.722	3	.324	12	0	1	0	1	0	1	-.011	4
323		10	max	2637.573	2	1.354	2	0	1	0	1	0	1	-.003	15
324			min	-2773.85	3	-.064	3	0	1	0	1	0	1	-.012	4
325		11	max	2637.402	2	.677	2	0	1	0	1	0	1	-.003	15
326			min	-2773.978	3	-.572	3	0	1	0	1	0	1	-.012	4
327		12	max	2637.232	2	0	2	0	1	0	1	0	1	-.003	15
328			min	-2774.106	3	-1.08	3	0	1	0	1	0	1	-.012	4
329		13	max	2637.062	2	-.361	15	0	1	0	1	0	1	-.003	15
330			min	-2774.233	3	-1.587	3	0	1	0	1	0	1	-.012	4
331		14	max	2636.891	2	-.565	15	0	1	0	1	0	1	-.003	15
332			min	-2774.361	3	-2.396	4	0	1	0	1	0	1	-.011	4
333		15	max	2636.721	2	-.769	15	0	1	0	1	0	1	-.002	15
334			min	-2774.489	3	-3.265	4	0	1	0	1	0	1	-.009	4
335		16	max	2636.551	2	-.974	15	0	1	0	1	0	1	-.002	15
336			min	-2774.617	3	-4.134	4	0	1	0	1	0	1	-.008	4
337		17	max	2636.38	2	-1.178	15	0	1	0	1	0	1	-.001	15
338			min	-2774.744	3	-5.002	4	0	1	0	1	0	1	-.006	4
339		18	max	2636.21	2	-1.382	15	0	1	0	1	0	1	0	15
340			min	-2774.872	3	-5.871	4	0	1	0	1	0	1	-.003	4
341		19	max	2636.039	2	-1.586	15	0	1	0	1	0	1	0	1
342			min	-2775	3	-6.74	4	0	1	0	1	0	1	0	1
343	M8	1	max	2504.728	1	0	1	0	1	0	1	0	1	0	1
344			min	-161.199	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2504.898	1	0	1	0	1	0	1	0	1	0	1
346			min	-161.071	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2505.069	1	0	1	0	1	0	1	0	1	0	1
348			min	-160.943	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2505.239	1	0	1	0	1	0	1	0	1	0	1
350			min	-160.815	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2505.41	1	0	1	0	1	0	1	0	1	0	1
352			min	-160.688	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2505.58	1	0	1	0	1	0	1	0	1	0	1
354			min	-160.56	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2505.75	1	0	1	0	1	0	1	0	1	0	1
356			min	-160.432	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2505.921	1	0	1	0	1	0	1	0	1	0	1
358			min	-160.304	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2506.091	1	0	1	0	1	0	1	0	1	0	1
360			min	-160.177	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2506.261	1	0	1	0	1	0	1	0	1	0	1
362			min	-160.049	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2506.432	1	0	1	0	1	0	1	0	1	0	1
364			min	-159.921	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2506.602	1	0	1	0	1	0	1	0	1	0	1
366			min	-159.793	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2506.772	1	0	1	0	1	0	1	0	1	0	1
368			min	-159.666	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	2506.943	1	0	1	0	1	0	1	0	1	0	1
370			min	-159.538	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2507.113	1	0	1	0	1	0	1	0	1	0	1
372			min	-159.41	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2507.283	1	0	1	0	1	0	1	0	1	0	1
374			min	-159.282	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2507.454	1	0	1	0	1	0	1	0	1	0	1
376			min	-159.155	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2507.624	1	0	1	0	1	0	1	0	1	0	1
378			min	-159.027	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2507.794	1	0	1	0	1	0	1	0	1	0	1
380			min	-158.899	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1055.368	2	2.024	4	-.016	15	0	1	0	2	0	1
382			min	-1432.838	3	.476	15	-.34	1	0	3	0	3	0	1
383		2	max	1055.898	2	1.953	4	-.016	15	0	1	0	15	0	15
384			min	-1432.441	3	.459	15	-.34	1	0	3	0	1	0	4
385		3	max	1056.427	2	1.882	4	-.016	15	0	1	0	15	0	15
386			min	-1432.044	3	.443	15	-.34	1	0	3	0	1	-.001	4
387		4	max	1056.956	2	1.811	4	-.016	15	0	1	0	15	0	15
388			min	-1431.647	3	.426	15	-.34	1	0	3	0	1	-.002	4
389		5	max	1057.486	2	1.74	4	-.016	15	0	1	0	15	0	15
390			min	-1431.25	3	.409	15	-.34	1	0	3	0	1	-.003	4
391		6	max	1058.015	2	1.669	4	-.016	15	0	1	0	15	0	15
392			min	-1430.853	3	.392	15	-.34	1	0	3	0	1	-.003	4
393		7	max	1058.544	2	1.598	4	-.016	15	0	1	0	15	0	15
394			min	-1430.456	3	.376	15	-.34	1	0	3	0	1	-.004	4
395		8	max	1059.073	2	1.527	4	-.016	15	0	1	0	15	-.001	15
396			min	-1430.059	3	.359	15	-.34	1	0	3	0	1	-.004	4
397		9	max	1059.603	2	1.456	4	-.016	15	0	1	0	15	-.001	15
398			min	-1429.662	3	.342	15	-.34	1	0	3	0	1	-.005	4
399		10	max	1060.132	2	1.385	4	-.016	15	0	1	0	15	-.001	15
400			min	-1429.265	3	.326	15	-.34	1	0	3	-.001	1	-.006	4
401		11	max	1060.661	2	1.314	4	-.016	15	0	1	0	15	-.001	15
402			min	-1428.868	3	.309	15	-.34	1	0	3	-.001	1	-.006	4
403		12	max	1061.191	2	1.243	4	-.016	15	0	1	0	15	-.002	15
404			min	-1428.472	3	.292	15	-.34	1	0	3	-.001	1	-.006	4
405		13	max	1061.72	2	1.172	4	-.016	15	0	1	0	15	-.002	15
406			min	-1428.075	3	.273	12	-.34	1	0	3	-.001	1	-.007	4
407		14	max	1062.249	2	1.101	4	-.016	15	0	1	0	15	-.002	15
408			min	-1427.678	3	.245	12	-.34	1	0	3	-.002	1	-.007	4
409		15	max	1062.778	2	1.029	4	-.016	15	0	1	0	15	-.002	15
410			min	-1427.281	3	.218	12	-.34	1	0	3	-.002	1	-.008	4
411		16	max	1063.308	2	.961	2	-.016	15	0	1	0	15	-.002	15
412			min	-1426.884	3	.19	12	-.34	1	0	3	-.002	1	-.008	4
413		17	max	1063.837	2	.906	2	-.016	15	0	1	0	15	-.002	15
414			min	-1426.487	3	.162	12	-.34	1	0	3	-.002	1	-.008	4
415		18	max	1064.366	2	.85	2	-.016	15	0	1	0	15	-.002	15
416			min	-1426.09	3	.135	12	-.34	1	0	3	-.002	1	-.009	4
417		19	max	1064.896	2	.795	2	-.016	15	0	1	0	15	-.002	15
418			min	-1425.693	3	.107	12	-.34	1	0	3	-.002	1	-.009	4
419	M11	1	max	788.434	2	8.875	4	-.013	15	0	1	0	15	.009	4
420			min	-927.01	3	2.086	15	-.282	1	0	5	0	1	.002	15
421		2	max	788.264	2	8.007	4	-.013	15	0	1	0	15	.005	2
422			min	-927.138	3	1.882	15	-.282	1	0	5	0	1	0	12
423		3	max	788.093	2	7.138	4	-.013	15	0	1	0	15	.002	2
424			min	-927.266	3	1.678	15	-.282	1	0	5	0	1	0	3
425		4	max	787.923	2	6.269	4	-.013	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	-927.394	3	1.474	15	-.282	1	0	5	0	1	-.003	3
427		5	max	787.752	2	5.4	4	-.013	15	0	1	0	15	-.001	15
428			min	-927.522	3	1.269	15	-.282	1	0	5	0	1	-.004	4
429		6	max	787.582	2	4.531	4	-.013	15	0	1	0	15	-.002	15
430			min	-927.649	3	1.065	15	-.282	1	0	5	0	1	-.007	4
431		7	max	787.412	2	3.662	4	-.013	15	0	1	0	15	-.002	15
432			min	-927.777	3	.861	15	-.282	1	0	5	-.001	1	-.009	4
433		8	max	787.241	2	2.793	4	-.013	15	0	1	0	15	-.002	15
434			min	-927.905	3	.657	15	-.282	1	0	5	-.001	1	-.01	4
435		9	max	787.071	2	1.924	4	-.013	15	0	1	0	15	-.003	15
436			min	-928.033	3	.452	15	-.282	1	0	5	-.001	1	-.011	4
437		10	max	786.901	2	1.055	4	-.013	15	0	1	0	15	-.003	15
438			min	-928.16	3	.248	15	-.282	1	0	5	-.001	1	-.012	4
439		11	max	786.73	2	.309	2	-.013	15	0	1	0	15	-.003	15
440			min	-928.288	3	-.115	3	-.282	1	0	5	-.002	1	-.012	4
441		12	max	786.56	2	-.16	15	-.013	15	0	1	0	15	-.003	15
442			min	-928.416	3	-.682	4	-.282	1	0	5	-.002	1	-.012	4
443		13	max	786.39	2	-.365	15	-.013	15	0	1	0	15	-.003	15
444			min	-928.544	3	-1.551	4	-.282	1	0	5	-.002	1	-.012	4
445		14	max	786.219	2	-.569	15	-.013	15	0	1	0	15	-.003	15
446			min	-928.671	3	-2.42	4	-.282	1	0	5	-.002	1	-.011	4
447		15	max	786.049	2	-.773	15	-.013	15	0	1	0	15	-.002	15
448			min	-928.799	3	-3.289	4	-.282	1	0	5	-.002	1	-.009	4
449		16	max	785.879	2	-.977	15	-.013	15	0	1	0	15	-.002	15
450			min	-928.927	3	-4.158	4	-.282	1	0	5	-.002	1	-.008	4
451		17	max	785.708	2	-1.182	15	-.013	15	0	1	0	15	-.001	15
452			min	-929.055	3	-5.027	4	-.282	1	0	5	-.002	1	-.006	4
453		18	max	785.538	2	-1.386	15	-.013	15	0	1	0	15	0	15
454			min	-929.182	3	-5.896	4	-.282	1	0	5	-.002	1	-.003	4
455		19	max	785.368	2	-1.59	15	-.013	15	0	1	0	15	0	1
456			min	-929.31	3	-6.765	4	-.282	1	0	5	-.003	1	0	1
457	M12	1	max	966.868	1	0	1	11.069	1	0	1	0	15	0	1
458			min	-21.091	3	0	1	.522	15	0	1	-.002	1	0	1
459		2	max	967.039	1	0	1	11.069	1	0	1	0	15	0	1
460			min	-20.963	3	0	1	.522	15	0	1	0	1	0	1
461		3	max	967.209	1	0	1	11.069	1	0	1	0	1	0	1
462			min	-20.835	3	0	1	.522	15	0	1	0	15	0	1
463		4	max	967.379	1	0	1	11.069	1	0	1	.002	1	0	1
464			min	-20.707	3	0	1	.522	15	0	1	0	15	0	1
465		5	max	967.55	1	0	1	11.069	1	0	1	.003	1	0	1
466			min	-20.58	3	0	1	.522	15	0	1	0	15	0	1
467		6	max	967.72	1	0	1	11.069	1	0	1	.004	1	0	1
468			min	-20.452	3	0	1	.522	15	0	1	0	15	0	1
469		7	max	967.89	1	0	1	11.069	1	0	1	.006	1	0	1
470			min	-20.324	3	0	1	.522	15	0	1	0	15	0	1
471		8	max	968.061	1	0	1	11.069	1	0	1	.007	1	0	1
472			min	-20.196	3	0	1	.522	15	0	1	0	15	0	1
473		9	max	968.231	1	0	1	11.069	1	0	1	.008	1	0	1
474			min	-20.069	3	0	1	.522	15	0	1	0	15	0	1
475		10	max	968.401	1	0	1	11.069	1	0	1	.009	1	0	1
476			min	-19.941	3	0	1	.522	15	0	1	0	15	0	1
477		11	max	968.572	1	0	1	11.069	1	0	1	.011	1	0	1
478			min	-19.813	3	0	1	.522	15	0	1	0	15	0	1
479		12	max	968.742	1	0	1	11.069	1	0	1	.012	1	0	1
480			min	-19.685	3	0	1	.522	15	0	1	0	15	0	1
481		13	max	968.912	1	0	1	11.069	1	0	1	.013	1	0	1
482			min	-19.558	3	0	1	.522	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	969.083	1	0	1	11.069	1	0	1	.014	1	0	1
484			min	-19.43	3	0	1	.522	15	0	1	0	15	0	1
485		15	max	969.253	1	0	1	11.069	1	0	1	.016	1	0	1
486			min	-19.302	3	0	1	.522	15	0	1	0	15	0	1
487		16	max	969.423	1	0	1	11.069	1	0	1	.017	1	0	1
488			min	-19.174	3	0	1	.522	15	0	1	0	15	0	1
489		17	max	969.594	1	0	1	11.069	1	0	1	.018	1	0	1
490			min	-19.047	3	0	1	.522	15	0	1	0	15	0	1
491		18	max	969.764	1	0	1	11.069	1	0	1	.02	1	0	1
492			min	-18.919	3	0	1	.522	15	0	1	0	15	0	1
493		19	max	969.934	1	0	1	11.069	1	0	1	.021	1	0	1
494			min	-18.791	3	0	1	.522	15	0	1	0	15	0	1
495	M1	1	max	161.543	1	741.491	3	-2.909	15	0	2	.171	1	0	15
496			min	7.543	15	-414.302	2	-61.169	1	0	3	.008	15	-.014	2
497		2	max	162.385	1	740.397	3	-2.909	15	0	2	.133	1	.243	2
498			min	7.797	15	-415.761	2	-61.169	1	0	3	.006	15	-.464	3
499		3	max	599.842	3	540.916	2	-2.893	15	0	3	.095	1	.491	2
500			min	-360.862	2	-575.26	3	-60.975	1	0	2	.005	15	-.909	3
501		4	max	600.474	3	539.457	2	-2.893	15	0	3	.057	1	.157	1
502			min	-360.019	2	-576.355	3	-60.975	1	0	2	.003	15	-.551	3
503		5	max	601.106	3	537.998	2	-2.893	15	0	3	.02	1	-.005	15
504			min	-359.177	2	-577.449	3	-60.975	1	0	2	0	15	-.193	3
505		6	max	601.737	3	536.538	2	-2.893	15	0	3	0	15	.165	3
506			min	-358.334	2	-578.543	3	-60.975	1	0	2	-.018	1	-.512	2
507		7	max	602.369	3	535.079	2	-2.893	15	0	3	-.003	15	.525	3
508			min	-357.492	2	-579.637	3	-60.975	1	0	2	-.056	1	-.844	2
509		8	max	603.001	3	533.62	2	-2.893	15	0	3	-.004	15	.885	3
510			min	-356.65	2	-580.732	3	-60.975	1	0	2	-.094	1	-1.176	2
511		9	max	618.777	3	50.633	2	-4.742	15	0	9	.061	1	1.03	3
512			min	-287.249	2	.446	15	-100.046	1	0	3	.003	15	-1.343	2
513		10	max	619.409	3	49.174	2	-4.742	15	0	9	0	15	1.008	3
514			min	-286.407	2	.006	15	-100.046	1	0	3	-.001	1	-1.374	2
515		11	max	620.041	3	47.715	2	-4.742	15	0	9	-.003	15	.987	3
516			min	-285.564	2	-1.772	4	-100.046	1	0	3	-.063	1	-1.404	2
517		12	max	635.54	3	391.196	3	-2.783	15	0	2	.092	1	.865	3
518			min	-216.057	2	-640.705	2	-58.938	1	0	3	.004	15	-1.246	2
519		13	max	636.172	3	390.102	3	-2.783	15	0	2	.056	1	.623	3
520			min	-215.215	2	-642.165	2	-58.938	1	0	3	.003	15	-.848	2
521		14	max	636.804	3	389.008	3	-2.783	15	0	2	.019	1	.381	3
522			min	-214.372	2	-643.624	2	-58.938	1	0	3	0	15	-.449	2
523		15	max	637.436	3	387.913	3	-2.783	15	0	2	0	15	.14	3
524			min	-213.53	2	-645.083	2	-58.938	1	0	3	-.018	1	-.07	1
525		16	max	638.068	3	386.819	3	-2.783	15	0	2	-.003	15	.352	2
526			min	-212.687	2	-646.542	2	-58.938	1	0	3	-.054	1	-.1	3
527		17	max	638.699	3	385.725	3	-2.783	15	0	2	-.004	15	.753	2
528			min	-211.845	2	-648.001	2	-58.938	1	0	3	-.091	1	-.34	3
529		18	max	-7.814	15	624.287	2	-3.291	15	0	3	-.006	15	.379	2
530			min	-162.974	1	-290.676	3	-69.477	1	0	2	-.131	1	-.167	3
531		19	max	-7.56	15	622.828	2	-3.291	15	0	3	-.008	15	.013	3
532			min	-162.132	1	-291.77	3	-69.477	1	0	2	-.174	1	-.008	1
533	M5	1	max	363.581	1	2451.741	3	0	1	0	1	0	1	.029	2
534			min	13.161	12	-1440.277	2	0	1	0	1	0	1	0	15
535		2	max	364.424	1	2450.647	3	0	1	0	1	0	1	.923	2
536			min	13.582	12	-1441.736	2	0	1	0	1	0	1	-1.513	3
537		3	max	1840.244	3	1443.917	2	0	1	0	1	0	1	1.787	2
538			min	-1147.73	2	-1682.312	3	0	1	0	1	0	1	-2.989	3
539		4	max	1840.875	3	1442.458	2	0	1	0	1	0	1	.891	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1146.888	2	-1683.406	3	0	1	0	1	0	1	-1.944	3
541		5	max	1841.507	3	1440.999	2	0	1	0	1	0	1	.043	1
542			min	-1146.046	2	-1684.501	3	0	1	0	1	0	1	-.899	3
543		6	max	1842.139	3	1439.539	2	0	1	0	1	0	1	.147	3
544			min	-1145.203	2	-1685.595	3	0	1	0	1	0	1	-.898	2
545		7	max	1842.771	3	1438.08	2	0	1	0	1	0	1	1.193	3
546			min	-1144.361	2	-1686.689	3	0	1	0	1	0	1	-1.791	2
547		8	max	1843.403	3	1436.621	2	0	1	0	1	0	1	2.24	3
548			min	-1143.518	2	-1687.783	3	0	1	0	1	0	1	-2.683	2
549		9	max	1862.279	3	171.992	2	0	1	0	1	0	1	2.581	3
550			min	-992.658	2	.44	15	0	1	0	1	0	1	-3.073	2
551		10	max	1862.911	3	170.532	2	0	1	0	1	0	1	2.496	3
552			min	-991.816	2	0	15	0	1	0	1	0	1	-3.18	2
553		11	max	1863.543	3	169.073	2	0	1	0	1	0	1	2.411	3
554			min	-990.973	2	-1.65	4	0	1	0	1	0	1	-3.285	2
555		12	max	1882.972	3	1097.277	3	0	1	0	1	0	1	2.111	3
556			min	-840.326	2	-1781.036	2	0	1	0	1	0	1	-2.937	2
557		13	max	1883.603	3	1096.183	3	0	1	0	1	0	1	1.431	3
558			min	-839.484	2	-1782.495	2	0	1	0	1	0	1	-1.831	2
559		14	max	1884.235	3	1095.089	3	0	1	0	1	0	1	.751	3
560			min	-838.642	2	-1783.954	2	0	1	0	1	0	1	-.724	2
561		15	max	1884.867	3	1093.994	3	0	1	0	1	0	1	.383	2
562			min	-837.799	2	-1785.413	2	0	1	0	1	0	1	0	15
563		16	max	1885.499	3	1092.9	3	0	1	0	1	0	1	1.492	2
564			min	-836.957	2	-1786.873	2	0	1	0	1	0	1	-.607	3
565		17	max	1886.13	3	1091.806	3	0	1	0	1	0	1	2.601	2
566			min	-836.115	2	-1788.332	2	0	1	0	1	0	1	-1.285	3
567		18	max	-14.67	12	2117.688	2	0	1	0	1	0	1	1.329	2
568			min	-363.246	1	-1032.437	3	0	1	0	1	0	1	-.668	3
569		19	max	-14.248	12	2116.229	2	0	1	0	1	0	1	.016	1
570			min	-362.403	1	-1033.531	3	0	1	0	1	0	1	-.027	3
571	M9	1	max	161.543	1	741.491	3	61.169	1	0	3	-.008	15	0	15
572			min	7.543	15	-414.302	2	2.909	15	0	2	-.171	1	-.014	2
573		2	max	162.385	1	740.397	3	61.169	1	0	3	-.006	15	.243	2
574			min	7.797	15	-415.761	2	2.909	15	0	2	-.133	1	-.464	3
575		3	max	599.842	3	540.916	2	60.975	1	0	2	-.005	15	.491	2
576			min	-360.862	2	-575.26	3	2.893	15	0	3	-.095	1	-.909	3
577		4	max	600.474	3	539.457	2	60.975	1	0	2	-.003	15	.157	1
578			min	-360.019	2	-576.355	3	2.893	15	0	3	-.057	1	-.551	3
579		5	max	601.106	3	537.998	2	60.975	1	0	2	0	15	-.005	15
580			min	-359.177	2	-577.449	3	2.893	15	0	3	-.02	1	-.193	3
581		6	max	601.737	3	536.538	2	60.975	1	0	2	.018	1	.165	3
582			min	-358.334	2	-578.543	3	2.893	15	0	3	0	15	-.512	2
583		7	max	602.369	3	535.079	2	60.975	1	0	2	.056	1	.525	3
584			min	-357.492	2	-579.637	3	2.893	15	0	3	.003	15	-.844	2
585		8	max	603.001	3	533.62	2	60.975	1	0	2	.094	1	.885	3
586			min	-356.65	2	-580.732	3	2.893	15	0	3	.004	15	-1.176	2
587		9	max	618.777	3	50.633	2	100.046	1	0	3	-.003	15	1.03	3
588			min	-287.249	2	.446	15	4.742	15	0	9	-.061	1	-1.343	2
589		10	max	619.409	3	49.174	2	100.046	1	0	3	.001	1	1.008	3
590			min	-286.407	2	.006	15	4.742	15	0	9	0	15	-1.374	2
591		11	max	620.041	3	47.715	2	100.046	1	0	3	.063	1	.987	3
592			min	-285.564	2	-1.772	4	4.742	15	0	9	.003	15	-1.404	2
593		12	max	635.54	3	391.196	3	58.938	1	0	3	-.004	15	.865	3
594			min	-216.057	2	-640.705	2	2.783	15	0	2	-.092	1	-1.246	2
595		13	max	636.172	3	390.102	3	58.938	1	0	3	-.003	15	.623	3
596			min	-215.215	2	-642.165	2	2.783	15	0	2	-.056	1	-.848	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	636.804	3	389.008	3	58.938	1	0	3	0	15	.381	3
598			min	-214.372	2	-643.624	2	2.783	15	0	2	-.019	1	-.449	2
599		15	max	637.436	3	387.913	3	58.938	1	0	3	.018	1	.14	3
600			min	-213.53	2	-645.083	2	2.783	15	0	2	0	15	-.07	1
601		16	max	638.068	3	386.819	3	58.938	1	0	3	.054	1	.352	2
602			min	-212.687	2	-646.542	2	2.783	15	0	2	.003	15	-.1	3
603		17	max	638.699	3	385.725	3	58.938	1	0	3	.091	1	.753	2
604			min	-211.845	2	-648.001	2	2.783	15	0	2	.004	15	-.34	3
605		18	max	-7.814	15	624.287	2	69.477	1	0	2	.131	1	.379	2
606			min	-162.974	1	-290.676	3	3.291	15	0	3	.006	15	-.167	3
607		19	max	-7.56	15	622.828	2	69.477	1	0	2	.174	1	.013	3
608			min	-162.132	1	-291.77	3	3.291	15	0	3	.008	15	-.008	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.209	2	.011	3	1.441e-2	2	NC	1	NC	1
2			min	0	15	-.06	3	-.007	2	-4.177e-3	3	NC	1	NC	1
3		2	max	0	1	.138	2	.019	1	1.55e-2	2	NC	4	NC	2
4			min	0	15	.004	15	-.003	10	-3.872e-3	3	1096.525	3	9544.322	1
5		3	max	0	1	.248	3	.044	1	1.658e-2	2	NC	5	NC	2
6			min	0	15	.002	15	0	10	-3.567e-3	3	603.622	3	4129.548	1
7		4	max	0	1	.335	3	.065	1	1.767e-2	2	NC	5	NC	3
8			min	0	15	.001	15	0	10	-3.262e-3	3	471.388	3	2816.51	1
9		5	max	0	1	.359	3	.075	1	1.875e-2	2	NC	5	NC	3
10			min	0	15	.001	15	0	10	-2.957e-3	3	443.848	3	2455.599	1
11		6	max	0	1	.323	3	.071	1	1.984e-2	2	NC	5	NC	5
12			min	0	15	.002	15	-.002	10	-2.652e-3	3	485.916	3	2608.443	1
13		7	max	0	1	.238	3	.053	1	2.093e-2	2	NC	4	NC	2
14			min	0	15	.004	15	-.005	10	-2.347e-3	3	624.141	3	3460.115	1
15		8	max	0	1	.255	2	.034	3	2.201e-2	2	NC	4	NC	2
16			min	0	15	.006	15	-.01	10	-2.042e-3	3	988.874	3	6641.392	1
17		9	max	0	1	.321	2	.034	3	2.31e-2	2	NC	4	NC	1
18			min	0	15	.007	15	-.019	2	-1.737e-3	3	1651.362	2	8145.239	3
19		10	max	0	1	.351	2	.034	3	2.419e-2	2	NC	4	NC	1
20			min	0	1	-.018	3	-.024	2	-1.432e-3	3	1308.632	2	8186.074	3
21		11	max	0	15	.321	2	.034	3	2.31e-2	2	NC	4	NC	1
22			min	0	1	.007	15	-.019	2	-1.737e-3	3	1651.362	2	8145.239	3
23		12	max	0	15	.255	2	.034	3	2.201e-2	2	NC	4	NC	2
24			min	0	1	.006	15	-.01	10	-2.042e-3	3	988.874	3	6641.392	1
25		13	max	0	15	.238	3	.053	1	2.093e-2	2	NC	4	NC	2
26			min	0	1	.004	15	-.005	10	-2.347e-3	3	624.141	3	3460.115	1
27		14	max	0	15	.323	3	.071	1	1.984e-2	2	NC	5	NC	5
28			min	0	1	.002	15	-.002	10	-2.652e-3	3	485.916	3	2608.443	1
29		15	max	0	15	.359	3	.075	1	1.875e-2	2	NC	5	NC	3
30			min	0	1	.001	15	0	10	-2.957e-3	3	443.848	3	2455.599	1
31		16	max	0	15	.335	3	.065	1	1.767e-2	2	NC	5	NC	3
32			min	0	1	.001	15	0	10	-3.262e-3	3	471.388	3	2816.51	1
33		17	max	0	15	.248	3	.044	1	1.658e-2	2	NC	5	NC	2
34			min	0	1	.002	15	0	10	-3.567e-3	3	603.622	3	4129.548	1
35		18	max	0	15	.138	2	.019	1	1.55e-2	2	NC	4	NC	2
36			min	0	1	.004	15	-.003	10	-3.872e-3	3	1096.525	3	9544.322	1
37		19	max	0	15	.209	2	.011	3	1.441e-2	2	NC	1	NC	1
38			min	0	1	-.06	3	-.007	2	-4.177e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.434	3	.01	3	7.981e-3	2	NC	1	NC	1
40			min	0	15	-.624	2	-.006	2	-6.44e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.655	3	.012	3	9.142e-3	2	NC	5	NC	1
42			min	0	15	-.842	2	-.003	10	-7.5e-3	3	840.444	3	NC	1
43		3	max	0	1	.851	3	.033	1	1.03e-2	2	NC	5	NC	2
44			min	0	15	-1.038	2	-.001	10	-8.56e-3	3	446.501	3	5510.276	1
45		4	max	0	1	1.001	3	.053	1	1.147e-2	2	NC	15	NC	3
46			min	0	15	-1.199	2	0	10	-9.62e-3	3	323.717	2	3461.99	1
47		5	max	0	1	1.098	3	.064	1	1.263e-2	2	NC	15	NC	3
48			min	0	15	-1.315	2	0	10	-1.068e-2	3	269.404	2	2882.416	1
49		6	max	0	1	1.139	3	.062	1	1.379e-2	2	NC	15	NC	3
50			min	0	15	-1.384	2	-.001	10	-1.174e-2	3	244.967	2	2971.457	1
51		7	max	0	1	1.132	3	.048	1	1.495e-2	2	NC	15	NC	2
52			min	0	15	-1.41	2	-.005	10	-1.28e-2	3	236.841	2	3855.625	1
53		8	max	0	1	1.092	3	.03	3	1.611e-2	2	NC	15	NC	2
54			min	0	15	-1.404	2	-.009	10	-1.386e-2	3	238.737	2	7246.971	1
55		9	max	0	1	1.043	3	.03	3	1.727e-2	2	NC	15	NC	1
56			min	0	15	-1.382	2	-.017	2	-1.492e-2	3	245.536	2	9228.385	3
57		10	max	0	1	1.018	3	.03	3	1.843e-2	2	NC	15	NC	1
58			min	0	1	-1.368	2	-.022	2	-1.598e-2	3	250.013	2	9260.255	3
59		11	max	0	15	1.043	3	.03	3	1.727e-2	2	NC	15	NC	1
60			min	0	1	-1.382	2	-.017	2	-1.492e-2	3	245.536	2	9228.385	3
61		12	max	0	15	1.092	3	.03	3	1.611e-2	2	NC	15	NC	2
62			min	0	1	-1.404	2	-.009	10	-1.386e-2	3	238.737	2	7246.971	1
63		13	max	0	15	1.132	3	.048	1	1.495e-2	2	NC	15	NC	2
64			min	0	1	-1.41	2	-.005	10	-1.28e-2	3	236.841	2	3855.625	1
65		14	max	0	15	1.139	3	.062	1	1.379e-2	2	NC	15	NC	3
66			min	0	1	-1.384	2	-.001	10	-1.174e-2	3	244.967	2	2971.457	1
67		15	max	0	15	1.098	3	.064	1	1.263e-2	2	NC	15	NC	3
68			min	0	1	-1.315	2	0	10	-1.068e-2	3	269.404	2	2882.416	1
69		16	max	0	15	1.001	3	.053	1	1.147e-2	2	NC	15	NC	3
70			min	0	1	-1.199	2	0	10	-9.62e-3	3	323.717	2	3461.99	1
71		17	max	0	15	.851	3	.033	1	1.03e-2	2	NC	5	NC	2
72			min	0	1	-1.038	2	-.001	10	-8.56e-3	3	446.501	3	5510.276	1
73		18	max	0	15	.655	3	.012	3	9.142e-3	2	NC	5	NC	1
74			min	0	1	-.842	2	-.003	10	-7.5e-3	3	840.444	3	NC	1
75		19	max	0	15	.434	3	.01	3	7.981e-3	2	NC	1	NC	1
76			min	0	1	-.624	2	-.006	2	-6.44e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.443	3	.009	3	5.527e-3	3	NC	1	NC	1
78			min	0	1	-.623	2	-.006	2	-8.317e-3	2	NC	1	NC	1
79		2	max	0	15	.609	3	.012	1	6.427e-3	3	NC	5	NC	1
80			min	0	1	-.885	2	-.003	10	-9.536e-3	2	709.316	2	NC	1
81		3	max	0	15	.759	3	.034	1	7.328e-3	3	NC	5	NC	2
82			min	0	1	-1.118	2	0	10	-1.076e-2	2	375.762	2	5473.855	1
83		4	max	0	15	.884	3	.054	1	8.229e-3	3	NC	15	NC	3
84			min	0	1	-1.3	2	0	10	-1.198e-2	2	274.531	2	3442.273	1
85		5	max	0	15	.976	3	.065	1	9.13e-3	3	NC	15	NC	3
86			min	0	1	-1.421	2	0	10	-1.319e-2	2	232.95	2	2865.824	1
87		6	max	0	15	1.033	3	.063	1	1.003e-2	3	NC	15	NC	3
88			min	0	1	-1.479	2	0	10	-1.441e-2	2	217.312	2	2951.473	1
89		7	max	0	15	1.059	3	.048	1	1.093e-2	3	NC	15	NC	2
90			min	0	1	-1.48	2	-.004	10	-1.563e-2	2	216.923	2	3819.203	1
91		8	max	0	15	1.06	3	.028	3	1.183e-2	3	NC	15	NC	2
92			min	0	1	-1.443	2	-.008	10	-1.685e-2	2	226.811	2	7112.863	1
93		9	max	0	15	1.048	3	.028	3	1.273e-2	3	NC	15	NC	1
94			min	0	1	-1.393	2	-.016	2	-1.807e-2	2	241.486	2	9970.32	3
95		10	max	0	1	1.039	3	.028	3	1.363e-2	3	NC	15	NC	1
96			min	0	1	-1.367	2	-.021	2	-1.929e-2	2	250.051	2	NC	1
97		11	max	0	1	1.048	3	.028	3	1.273e-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	-1.393	2	-.016	2	-1.807e-2	2	241.486	2	9970.32	3
99		12	max	0	1	1.06	3	.028	3	1.183e-2	3	NC	15	NC	2
100			min	0	15	-1.443	2	-.008	10	-1.685e-2	2	226.811	2	7112.863	1
101		13	max	0	1	1.059	3	.048	1	1.093e-2	3	NC	15	NC	2
102			min	0	15	-1.48	2	-.004	10	-1.563e-2	2	216.923	2	3819.203	1
103		14	max	0	1	1.033	3	.063	1	1.003e-2	3	NC	15	NC	3
104			min	0	15	-1.479	2	0	10	-1.441e-2	2	217.312	2	2951.473	1
105		15	max	0	1	.976	3	.065	1	9.13e-3	3	NC	15	NC	3
106			min	0	15	-1.421	2	0	10	-1.319e-2	2	232.95	2	2865.824	1
107		16	max	0	1	.884	3	.054	1	8.229e-3	3	NC	15	NC	3
108			min	0	15	-1.3	2	0	10	-1.198e-2	2	274.531	2	3442.273	1
109		17	max	0	1	.759	3	.034	1	7.328e-3	3	NC	5	NC	2
110			min	0	15	-1.118	2	0	10	-1.076e-2	2	375.762	2	5473.855	1
111		18	max	0	1	.609	3	.012	1	6.427e-3	3	NC	5	NC	1
112			min	0	15	-.885	2	-.003	10	-9.536e-3	2	709.316	2	NC	1
113		19	max	0	1	.443	3	.009	3	5.527e-3	3	NC	1	NC	1
114			min	0	15	-.623	2	-.006	2	-8.317e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.185	2	.008	3	1.049e-2	3	NC	1	NC	1
116			min	0	1	-.155	3	-.005	2	-1.208e-2	2	NC	1	NC	1
117		2	max	0	15	.073	1	.019	1	1.151e-2	3	NC	4	NC	2
118			min	0	1	-.112	3	-.002	10	-1.266e-2	2	1513.48	2	9639.102	1
119		3	max	0	15	.017	9	.044	1	1.253e-2	3	NC	5	NC	2
120			min	0	1	-.081	3	0	10	-1.323e-2	2	846.271	2	4141.665	1
121		4	max	0	15	.008	4	.066	1	1.355e-2	3	NC	5	NC	3
122			min	0	1	-.088	2	.003	10	-1.381e-2	2	680.482	2	2811.467	1
123		5	max	0	15	.009	9	.076	1	1.457e-2	3	NC	5	NC	3
124			min	0	1	-.091	2	.003	10	-1.439e-2	2	674.775	2	2439.561	1
125		6	max	0	15	.022	9	.072	1	1.559e-2	3	NC	4	NC	3
126			min	0	1	-.118	3	0	10	-1.497e-2	2	814.781	2	2574.302	1
127		7	max	0	15	.074	1	.055	1	1.66e-2	3	NC	3	NC	2
128			min	0	1	-.169	3	-.002	10	-1.554e-2	2	1307.567	2	3372.254	1
129		8	max	0	15	.157	1	.029	1	1.762e-2	3	NC	1	NC	2
130			min	0	1	-.227	3	-.006	10	-1.612e-2	2	2592.459	3	6240.011	1
131		9	max	0	15	.24	2	.024	3	1.864e-2	3	NC	4	NC	1
132			min	0	1	-.277	3	-.014	2	-1.67e-2	2	1534.393	3	NC	1
133		10	max	0	1	.281	2	.024	3	1.966e-2	3	NC	5	NC	1
134			min	0	1	-.298	3	-.019	2	-1.728e-2	2	1301.309	3	NC	1
135		11	max	0	1	.24	2	.024	3	1.864e-2	3	NC	4	NC	1
136			min	0	15	-.277	3	-.014	2	-1.67e-2	2	1534.393	3	NC	1
137		12	max	0	1	.157	1	.029	1	1.762e-2	3	NC	1	NC	2
138			min	0	15	-.227	3	-.006	10	-1.612e-2	2	2592.459	3	6240.011	1
139		13	max	0	1	.074	1	.055	1	1.66e-2	3	NC	3	NC	2
140			min	0	15	-.169	3	-.002	10	-1.554e-2	2	1307.567	2	3372.254	1
141		14	max	0	1	.022	9	.072	1	1.559e-2	3	NC	4	NC	3
142			min	0	15	-.118	3	0	10	-1.497e-2	2	814.781	2	2574.302	1
143		15	max	0	1	.009	9	.076	1	1.457e-2	3	NC	5	NC	3
144			min	0	15	-.091	2	.003	10	-1.439e-2	2	674.775	2	2439.561	1
145		16	max	0	1	.008	4	.066	1	1.355e-2	3	NC	5	NC	3
146			min	0	15	-.088	2	.003	10	-1.381e-2	2	680.482	2	2811.467	1
147		17	max	0	1	.017	9	.044	1	1.253e-2	3	NC	5	NC	2
148			min	0	15	-.081	3	0	10	-1.323e-2	2	846.271	2	4141.665	1
149		18	max	0	1	.073	1	.019	1	1.151e-2	3	NC	4	NC	2
150			min	0	15	-.112	3	-.002	10	-1.266e-2	2	1513.48	2	9639.102	1
151		19	max	0	1	.185	2	.008	3	1.049e-2	3	NC	1	NC	1
152			min	0	15	-.155	3	-.005	2	-1.208e-2	2	NC	1	NC	1
153	M2	1	max	.008	2	.011	2	.008	1	-8.54e-6	15	NC	1	NC	2
154			min	-.011	3	-.017	3	0	15	-1.797e-4	1	6929.631	2	9696.417	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	.01	2	.007	1	-8.118e-6	15	NC	1	NC	1
156			min	-.01	3	-.017	3	0	15	-1.708e-4	1	8086.292	2	NC	1
157		3	max	.007	2	.008	2	.007	1	-7.696e-6	15	NC	1	NC	1
158			min	-.009	3	-.016	3	0	15	-1.619e-4	1	9681.299	2	NC	1
159		4	max	.007	2	.006	2	.006	1	-7.273e-6	15	NC	1	NC	1
160			min	-.009	3	-.016	3	0	15	-1.53e-4	1	NC	1	NC	1
161		5	max	.006	2	.005	2	.005	1	-6.851e-6	15	NC	1	NC	1
162			min	-.008	3	-.015	3	0	15	-1.441e-4	1	NC	1	NC	1
163		6	max	.006	2	.004	2	.005	1	-6.429e-6	15	NC	1	NC	1
164			min	-.008	3	-.015	3	0	15	-1.352e-4	1	NC	1	NC	1
165		7	max	.005	2	.002	2	.004	1	-6.007e-6	15	NC	1	NC	1
166			min	-.007	3	-.014	3	0	15	-1.263e-4	1	NC	1	NC	1
167		8	max	.005	2	.001	2	.004	1	-5.584e-6	15	NC	1	NC	1
168			min	-.007	3	-.013	3	0	15	-1.174e-4	1	NC	1	NC	1
169		9	max	.004	2	0	2	.003	1	-5.162e-6	15	NC	1	NC	1
170			min	-.006	3	-.012	3	0	15	-1.085e-4	1	NC	1	NC	1
171		10	max	.004	2	0	2	.003	1	-4.74e-6	15	NC	1	NC	1
172			min	-.005	3	-.012	3	0	15	-9.961e-5	1	NC	1	NC	1
173		11	max	.004	2	-.002	2	.002	1	-4.317e-6	15	NC	1	NC	1
174			min	-.005	3	-.011	3	0	15	-9.072e-5	1	NC	1	NC	1
175		12	max	.003	2	-.002	15	.002	1	-3.895e-6	15	NC	1	NC	1
176			min	-.004	3	-.01	3	0	15	-8.183e-5	1	NC	1	NC	1
177		13	max	.003	2	-.002	15	.001	1	-3.473e-6	15	NC	1	NC	1
178			min	-.004	3	-.009	3	0	15	-7.293e-5	1	NC	1	NC	1
179		14	max	.002	2	-.002	15	0	1	-3.051e-6	15	NC	1	NC	1
180			min	-.003	3	-.007	3	0	15	-6.404e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-2.628e-6	15	NC	1	NC	1
182			min	-.002	3	-.006	3	0	15	-5.515e-5	1	NC	1	NC	1
183		16	max	.001	2	-.001	15	0	1	-2.206e-6	15	NC	1	NC	1
184			min	-.002	3	-.005	3	0	15	-4.625e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-1.784e-6	15	NC	1	NC	1
186			min	-.001	3	-.003	4	0	15	-3.736e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-1.361e-6	15	NC	1	NC	1
188			min	0	3	-.002	4	0	15	-2.847e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-9.392e-7	15	NC	1	NC	1
190			min	0	1	0	1	0	1	-1.957e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	3.906e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	1.879e-7	15	NC	1	NC	1
193		2	max	0	3	0	15	0	15	2.442e-5	1	NC	1	NC	1
194			min	0	2	-.003	4	0	1	1.153e-6	15	NC	1	NC	1
195		3	max	.001	3	-.001	15	0	15	4.493e-5	1	NC	1	NC	1
196			min	0	2	-.006	4	0	1	2.119e-6	15	NC	1	NC	1
197		4	max	.002	3	-.002	15	0	15	6.544e-5	1	NC	1	NC	1
198			min	-.001	2	-.009	4	0	1	3.084e-6	15	NC	1	NC	1
199		5	max	.002	3	-.003	15	0	15	8.595e-5	1	NC	1	NC	1
200			min	-.002	2	-.012	4	0	1	4.05e-6	15	8390.057	4	NC	1
201		6	max	.003	3	-.004	15	0	15	1.065e-4	1	NC	5	NC	1
202			min	-.002	2	-.015	4	0	1	5.015e-6	15	6808.112	4	NC	1
203		7	max	.003	3	-.004	15	0	15	1.27e-4	1	NC	5	NC	1
204			min	-.003	2	-.018	4	0	1	5.981e-6	15	5854.939	4	NC	1
205		8	max	.004	3	-.005	15	0	10	1.475e-4	1	NC	5	NC	1
206			min	-.003	2	-.02	4	0	3	6.947e-6	15	5267.229	4	NC	1
207		9	max	.004	3	-.005	15	0	1	1.68e-4	1	NC	5	NC	1
208			min	-.003	2	-.021	4	0	3	7.912e-6	15	4921.018	4	NC	1
209		10	max	.005	3	-.005	15	0	1	1.885e-4	1	NC	5	NC	1
210			min	-.004	2	-.022	4	0	12	8.878e-6	15	4756.268	4	NC	1
211		11	max	.005	3	-.005	15	0	1	2.09e-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	-.022	4	0	15	9.843e-6	15	4748.797	4	NC	1
213		12	max	.006	3	-.005	15	.001	1	2.295e-4	1	NC	5	NC	1
214			min	-.005	2	-.021	4	0	15	1.081e-5	15	4901.006	4	NC	1
215		13	max	.006	3	-.005	15	.002	1	2.5e-4	1	NC	5	NC	1
216			min	-.005	2	-.02	4	0	15	1.177e-5	15	5244.002	4	NC	1
217		14	max	.007	3	-.004	15	.002	1	2.705e-4	1	NC	5	NC	1
218			min	-.006	2	-.018	4	0	15	1.274e-5	15	5853.601	4	NC	1
219		15	max	.007	3	-.004	15	.003	1	2.911e-4	1	NC	3	NC	1
220			min	-.006	2	-.015	4	0	15	1.371e-5	15	6897.383	4	NC	1
221		16	max	.008	3	-.003	15	.004	1	3.116e-4	1	NC	1	NC	1
222			min	-.006	2	-.012	4	0	15	1.467e-5	15	8780.86	4	NC	1
223		17	max	.008	3	-.002	15	.005	1	3.321e-4	1	NC	1	NC	1
224			min	-.007	2	-.009	4	0	15	1.564e-5	15	NC	1	NC	1
225		18	max	.009	3	-.001	15	.006	1	3.526e-4	1	NC	1	NC	1
226			min	-.007	2	-.005	3	0	15	1.66e-5	15	NC	1	NC	1
227		19	max	.009	3	0	10	.007	1	3.731e-4	1	NC	1	NC	1
228			min	-.008	2	-.002	3	0	15	1.757e-5	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	1.402e-4	1	NC	1	NC	3
230			min	0	3	-.009	3	-.007	1	6.637e-6	15	NC	1	3318.355	1
231		2	max	.002	1	.007	2	0	15	1.402e-4	1	NC	1	NC	3
232			min	0	3	-.009	3	-.007	1	6.637e-6	15	NC	1	3600.377	1
233		3	max	.002	1	.007	2	0	15	1.402e-4	1	NC	1	NC	2
234			min	0	3	-.008	3	-.006	1	6.637e-6	15	NC	1	3936.536	1
235		4	max	.002	1	.006	2	0	15	1.402e-4	1	NC	1	NC	2
236			min	0	3	-.008	3	-.006	1	6.637e-6	15	NC	1	4340.806	1
237		5	max	.002	1	.006	2	0	15	1.402e-4	1	NC	1	NC	2
238			min	0	3	-.007	3	-.005	1	6.637e-6	15	NC	1	4832.183	1
239		6	max	.002	1	.005	2	0	15	1.402e-4	1	NC	1	NC	2
240			min	0	3	-.007	3	-.005	1	6.637e-6	15	NC	1	5437.013	1
241		7	max	.002	1	.005	2	0	15	1.402e-4	1	NC	1	NC	2
242			min	0	3	-.006	3	-.004	1	6.637e-6	15	NC	1	6192.692	1
243		8	max	.001	1	.005	2	0	15	1.402e-4	1	NC	1	NC	2
244			min	0	3	-.006	3	-.003	1	6.637e-6	15	NC	1	7153.753	1
245		9	max	.001	1	.004	2	0	15	1.402e-4	1	NC	1	NC	2
246			min	0	3	-.005	3	-.003	1	6.637e-6	15	NC	1	8402.275	1
247		10	max	.001	1	.004	2	0	15	1.402e-4	1	NC	1	NC	1
248			min	0	3	-.005	3	-.002	1	6.637e-6	15	NC	1	NC	1
249		11	max	.001	1	.003	2	0	15	1.402e-4	1	NC	1	NC	1
250			min	0	3	-.004	3	-.002	1	6.637e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	1.402e-4	1	NC	1	NC	1
252			min	0	3	-.004	3	-.002	1	6.637e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	1.402e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	-.001	1	6.637e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	1.402e-4	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	6.637e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	1.402e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	6.637e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	1.402e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	6.637e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.402e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	6.637e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.402e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	6.637e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.402e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	6.637e-6	15	NC	1	NC	1
267	M6	1	max	.024	2	.037	2	0	1	0	1	NC	3	NC	1
268			min	-.033	3	-.052	3	0	1	0	1	2076.654	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	.023	2	.034	2	0	1	0	1	NC	3	NC	1
270			min	-.031	3	-.049	3	0	1	0	1	2282.02	2	NC	1
271		3	max	.021	2	.031	2	0	1	0	1	NC	3	NC	1
272			min	-.03	3	-.047	3	0	1	0	1	2530.275	2	NC	1
273		4	max	.02	2	.027	2	0	1	0	1	NC	3	NC	1
274			min	-.028	3	-.044	3	0	1	0	1	2833.711	2	NC	1
275		5	max	.019	2	.024	2	0	1	0	1	NC	3	NC	1
276			min	-.026	3	-.041	3	0	1	0	1	3209.512	2	NC	1
277		6	max	.017	2	.021	2	0	1	0	1	NC	3	NC	1
278			min	-.024	3	-.038	3	0	1	0	1	3682.296	2	NC	1
279		7	max	.016	2	.018	2	0	1	0	1	NC	3	NC	1
280			min	-.022	3	-.035	3	0	1	0	1	4288.351	2	NC	1
281		8	max	.015	2	.015	2	0	1	0	1	NC	1	NC	1
282			min	-.02	3	-.032	3	0	1	0	1	5083.004	2	NC	1
283		9	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
284			min	-.019	3	-.029	3	0	1	0	1	6154.091	2	NC	1
285		10	max	.012	2	.01	2	0	1	0	1	NC	1	NC	1
286			min	-.017	3	-.026	3	0	1	0	1	7648.109	2	NC	1
287		11	max	.011	2	.008	2	0	1	0	1	NC	1	NC	1
288			min	-.015	3	-.024	3	0	1	0	1	9824.948	2	NC	1
289		12	max	.009	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.013	3	-.021	3	0	1	0	1	NC	1	NC	1
291		13	max	.008	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.018	3	0	1	0	1	NC	1	NC	1
293		14	max	.007	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.015	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	-.007	3	-.012	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	-.006	3	-.009	3	0	1	0	1	NC	1	NC	1
299		17	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.002	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	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	NC	1
313		5	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.006	2	-.014	3	0	1	0	1	8136.622	3	NC	1
315		6	max	.008	3	-.004	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.017	3	0	1	0	1	6862.833	3	NC	1
317		7	max	.009	3	-.004	15	0	1	0	1	NC	2	NC	1
318			min	-.009	2	-.019	3	0	1	0	1	5934.701	4	NC	1
319		8	max	.011	3	-.005	15	0	1	0	1	NC	2	NC	1
320			min	-.01	2	-.021	3	0	1	0	1	5333.899	4	NC	1
321		9	max	.012	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.011	2	-.022	3	0	1	0	1	4979.348	4	NC	1
323		10	max	.014	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.013	2	-.022	3	0	1	0	1	4809.433	4	NC	1
325		11	max	.015	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	-.014	2	-.022	3	0	1	0	1	4799.174	4	NC	1
327		12	max	.017	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.016	2	-.022	3	0	1	0	1	4950.641	4	NC	1
329		13	max	.018	3	-.005	15	0	1	0	1	NC	5	NC	1
330			min	-.017	2	-.021	3	0	1	0	1	5294.992	4	NC	1
331		14	max	.02	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.019	2	-.019	3	0	1	0	1	5908.551	4	NC	1
333		15	max	.021	3	-.004	15	0	1	0	1	NC	1	NC	1
334			min	-.02	2	-.017	3	0	1	0	1	6960.238	4	NC	1
335		16	max	.023	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.021	2	-.015	3	0	1	0	1	8858.982	4	NC	1
337		17	max	.024	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.023	2	-.012	3	0	1	0	1	NC	1	NC	1
339		18	max	.026	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.024	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.027	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.026	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.025	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.028	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.024	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.026	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	1	.022	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.025	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.021	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.023	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.02	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.022	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	1	.018	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.017	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.015	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	1	.014	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.013	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.01	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.006	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.002	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	.008	2	.011	2	0	15	1.797e-4	1	NC	1	NC	2
382			min	-.011	3	-.017	3	-.008	1	8.54e-6	15	6929.631	2	9696.417	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	.01	2	0	15	1.708e-4	1	NC	1	NC	1
384			min	-.01	3	-.017	3	-.007	1	8.118e-6	15	8086.292	2	NC	1
385		3	max	.007	2	.008	2	0	15	1.619e-4	1	NC	1	NC	1
386			min	-.009	3	-.016	3	-.007	1	7.696e-6	15	9681.299	2	NC	1
387		4	max	.007	2	.006	2	0	15	1.53e-4	1	NC	1	NC	1
388			min	-.009	3	-.016	3	-.006	1	7.273e-6	15	NC	1	NC	1
389		5	max	.006	2	.005	2	0	15	1.441e-4	1	NC	1	NC	1
390			min	-.008	3	-.015	3	-.005	1	6.851e-6	15	NC	1	NC	1
391		6	max	.006	2	.004	2	0	15	1.352e-4	1	NC	1	NC	1
392			min	-.008	3	-.015	3	-.005	1	6.429e-6	15	NC	1	NC	1
393		7	max	.005	2	.002	2	0	15	1.263e-4	1	NC	1	NC	1
394			min	-.007	3	-.014	3	-.004	1	6.007e-6	15	NC	1	NC	1
395		8	max	.005	2	.001	2	0	15	1.174e-4	1	NC	1	NC	1
396			min	-.007	3	-.013	3	-.004	1	5.584e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	1.085e-4	1	NC	1	NC	1
398			min	-.006	3	-.012	3	-.003	1	5.162e-6	15	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	9.961e-5	1	NC	1	NC	1
400			min	-.005	3	-.012	3	-.003	1	4.74e-6	15	NC	1	NC	1
401		11	max	.004	2	-.002	2	0	15	9.072e-5	1	NC	1	NC	1
402			min	-.005	3	-.011	3	-.002	1	4.317e-6	15	NC	1	NC	1
403		12	max	.003	2	-.002	15	0	15	8.183e-5	1	NC	1	NC	1
404			min	-.004	3	-.01	3	-.002	1	3.895e-6	15	NC	1	NC	1
405		13	max	.003	2	-.002	15	0	15	7.293e-5	1	NC	1	NC	1
406			min	-.004	3	-.009	3	-.001	1	3.473e-6	15	NC	1	NC	1
407		14	max	.002	2	-.002	15	0	15	6.404e-5	1	NC	1	NC	1
408			min	-.003	3	-.007	3	0	1	3.051e-6	15	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	5.515e-5	1	NC	1	NC	1
410			min	-.002	3	-.006	3	0	1	2.628e-6	15	NC	1	NC	1
411		16	max	.001	2	-.001	15	0	15	4.625e-5	1	NC	1	NC	1
412			min	-.002	3	-.005	3	0	1	2.206e-6	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	3.736e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	4	0	1	1.784e-6	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	2.847e-5	1	NC	1	NC	1
416			min	0	3	-.002	4	0	1	1.361e-6	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	1.957e-5	1	NC	1	NC	1
418			min	0	1	0	1	0	1	9.392e-7	15	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-1.879e-7	15	NC	1	NC	1
420			min	0	1	0	1	0	1	-3.906e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-1.153e-6	15	NC	1	NC	1
422			min	0	2	-.003	4	0	15	-2.442e-5	1	NC	1	NC	1
423		3	max	.001	3	-.001	15	0	1	-2.119e-6	15	NC	1	NC	1
424			min	0	2	-.006	4	0	15	-4.493e-5	1	NC	1	NC	1
425		4	max	.002	3	-.002	15	0	1	-3.084e-6	15	NC	1	NC	1
426			min	-.001	2	-.009	4	0	15	-6.544e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	0	1	-4.05e-6	15	NC	1	NC	1
428			min	-.002	2	-.012	4	0	15	-8.595e-5	1	8390.057	4	NC	1
429		6	max	.003	3	-.004	15	0	1	-5.015e-6	15	NC	5	NC	1
430			min	-.002	2	-.015	4	0	15	-1.065e-4	1	6808.112	4	NC	1
431		7	max	.003	3	-.004	15	0	1	-5.981e-6	15	NC	5	NC	1
432			min	-.003	2	-.018	4	0	15	-1.27e-4	1	5854.939	4	NC	1
433		8	max	.004	3	-.005	15	0	3	-6.947e-6	15	NC	5	NC	1
434			min	-.003	2	-.02	4	0	10	-1.475e-4	1	5267.229	4	NC	1
435		9	max	.004	3	-.005	15	0	3	-7.912e-6	15	NC	5	NC	1
436			min	-.003	2	-.021	4	0	1	-1.68e-4	1	4921.018	4	NC	1
437		10	max	.005	3	-.005	15	0	12	-8.878e-6	15	NC	5	NC	1
438			min	-.004	2	-.022	4	0	1	-1.885e-4	1	4756.268	4	NC	1
439		11	max	.005	3	-.005	15	0	15	-9.843e-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	-.022	4	0	1	-2.09e-4	1	4748.797	4	NC	1
441		12	max	.006	3	-.005	15	0	15	-1.081e-5	15	NC	5	NC	1
442			min	-.005	2	-.021	4	-.001	1	-2.295e-4	1	4901.006	4	NC	1
443		13	max	.006	3	-.005	15	0	15	-1.177e-5	15	NC	5	NC	1
444			min	-.005	2	-.02	4	-.002	1	-2.5e-4	1	5244.002	4	NC	1
445		14	max	.007	3	-.004	15	0	15	-1.274e-5	15	NC	5	NC	1
446			min	-.006	2	-.018	4	-.002	1	-2.705e-4	1	5853.601	4	NC	1
447		15	max	.007	3	-.004	15	0	15	-1.371e-5	15	NC	3	NC	1
448			min	-.006	2	-.015	4	-.003	1	-2.911e-4	1	6897.383	4	NC	1
449		16	max	.008	3	-.003	15	0	15	-1.467e-5	15	NC	1	NC	1
450			min	-.006	2	-.012	4	-.004	1	-3.116e-4	1	8780.86	4	NC	1
451		17	max	.008	3	-.002	15	0	15	-1.564e-5	15	NC	1	NC	1
452			min	-.007	2	-.009	4	-.005	1	-3.321e-4	1	NC	1	NC	1
453		18	max	.009	3	-.001	15	0	15	-1.66e-5	15	NC	1	NC	1
454			min	-.007	2	-.005	3	-.006	1	-3.526e-4	1	NC	1	NC	1
455		19	max	.009	3	0	10	0	15	-1.757e-5	15	NC	1	NC	1
456			min	-.008	2	-.002	3	-.007	1	-3.731e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.007	1	-6.637e-6	15	NC	1	NC	3
458			min	0	3	-.009	3	0	15	-1.402e-4	1	NC	1	3318.355	1
459		2	max	.002	1	.007	2	.007	1	-6.637e-6	15	NC	1	NC	3
460			min	0	3	-.009	3	0	15	-1.402e-4	1	NC	1	3600.377	1
461		3	max	.002	1	.007	2	.006	1	-6.637e-6	15	NC	1	NC	2
462			min	0	3	-.008	3	0	15	-1.402e-4	1	NC	1	3936.536	1
463		4	max	.002	1	.006	2	.006	1	-6.637e-6	15	NC	1	NC	2
464			min	0	3	-.008	3	0	15	-1.402e-4	1	NC	1	4340.806	1
465		5	max	.002	1	.006	2	.005	1	-6.637e-6	15	NC	1	NC	2
466			min	0	3	-.007	3	0	15	-1.402e-4	1	NC	1	4832.183	1
467		6	max	.002	1	.005	2	.005	1	-6.637e-6	15	NC	1	NC	2
468			min	0	3	-.007	3	0	15	-1.402e-4	1	NC	1	5437.013	1
469		7	max	.002	1	.005	2	.004	1	-6.637e-6	15	NC	1	NC	2
470			min	0	3	-.006	3	0	15	-1.402e-4	1	NC	1	6192.692	1
471		8	max	.001	1	.005	2	.003	1	-6.637e-6	15	NC	1	NC	2
472			min	0	3	-.006	3	0	15	-1.402e-4	1	NC	1	7153.753	1
473		9	max	.001	1	.004	2	.003	1	-6.637e-6	15	NC	1	NC	2
474			min	0	3	-.005	3	0	15	-1.402e-4	1	NC	1	8402.275	1
475		10	max	.001	1	.004	2	.002	1	-6.637e-6	15	NC	1	NC	1
476			min	0	3	-.005	3	0	15	-1.402e-4	1	NC	1	NC	1
477		11	max	.001	1	.003	2	.002	1	-6.637e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-1.402e-4	1	NC	1	NC	1
479		12	max	0	1	.003	2	.002	1	-6.637e-6	15	NC	1	NC	1
480			min	0	3	-.004	3	0	15	-1.402e-4	1	NC	1	NC	1
481		13	max	0	1	.002	2	.001	1	-6.637e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-1.402e-4	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-6.637e-6	15	NC	1	NC	1
484			min	0	3	-.003	3	0	15	-1.402e-4	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-6.637e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-1.402e-4	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-6.637e-6	15	NC	1	NC	1
488			min	0	3	-.002	3	0	15	-1.402e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-6.637e-6	15	NC	1	NC	1
490			min	0	3	-.001	3	0	15	-1.402e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-6.637e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.402e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-6.637e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.402e-4	1	NC	1	NC	1
495	M1	1	max	.011	3	.209	2	0	1	7.168e-3	2	NC	1	NC	1
496			min	-.007	2	-.06	3	0	15	-1.703e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.011	3	.101	2	0	15	3.512e-3	2	NC	5	NC	1
498			min	-.007	2	-.028	3	-.006	1	-8.454e-3	3	1258.061	2	NC	1
499		3	max	.011	3	.018	3	0	15	1.88e-5	10	NC	5	NC	1
500			min	-.007	2	-.014	2	-.008	1	-1.508e-4	1	609.733	2	NC	1
501		4	max	.011	3	.086	3	0	15	3.961e-3	2	NC	15	NC	1
502			min	-.007	2	-.14	2	-.007	1	-4.141e-3	3	388.444	2	NC	1
503		5	max	.011	3	.17	3	0	15	7.932e-3	2	NC	15	NC	1
504			min	-.007	2	-.271	2	-.005	1	-8.179e-3	3	282.417	2	NC	1
505		6	max	.011	3	.258	3	0	15	1.19e-2	2	8787.568	15	NC	1
506			min	-.007	2	-.397	2	-.002	1	-1.222e-2	3	223.682	2	NC	1
507		7	max	.011	3	.343	3	0	1	1.587e-2	2	7430.422	15	NC	1
508			min	-.006	2	-.509	2	0	3	-1.626e-2	3	188.861	2	NC	1
509		8	max	.01	3	.412	3	0	1	1.985e-2	2	6625.923	15	NC	1
510			min	-.006	2	-.598	2	0	15	-2.029e-2	3	168.205	2	NC	1
511		9	max	.01	3	.458	3	0	15	2.228e-2	2	6204.296	15	NC	1
512			min	-.006	2	-.653	2	0	1	-2.087e-2	3	157.419	2	NC	1
513		10	max	.01	3	.474	3	0	1	2.369e-2	2	6075.2	15	NC	1
514			min	-.006	2	-.672	2	0	15	-1.912e-2	3	154.264	2	NC	1
515		11	max	.01	3	.463	3	0	1	2.509e-2	2	6203.863	15	NC	1
516			min	-.006	2	-.653	2	0	15	-1.737e-2	3	158.001	2	NC	1
517		12	max	.009	3	.424	3	0	15	2.403e-2	2	6624.991	15	NC	1
518			min	-.006	2	-.595	2	0	1	-1.511e-2	3	169.912	2	NC	1
519		13	max	.009	3	.362	3	0	15	1.927e-2	2	7428.772	15	NC	1
520			min	-.006	2	-.502	2	0	1	-1.209e-2	3	192.89	2	NC	1
521		14	max	.009	3	.282	3	.002	1	1.452e-2	2	8784.757	15	NC	1
522			min	-.006	2	-.386	2	0	15	-9.067e-3	3	232.104	2	NC	1
523		15	max	.009	3	.192	3	.005	1	9.763e-3	2	NC	15	NC	1
524			min	-.006	2	-.257	2	0	15	-6.046e-3	3	299.404	2	NC	1
525		16	max	.008	3	.098	3	.007	1	5.008e-3	2	NC	15	NC	1
526			min	-.006	2	-.128	2	0	15	-3.025e-3	3	423.478	2	NC	1
527		17	max	.008	3	.006	3	.007	1	5.009e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-3.167e-6	3	687.118	2	NC	1
529		18	max	.008	3	.094	2	.005	1	6.235e-3	2	NC	5	NC	1
530			min	-.005	2	-.077	3	0	15	-2.164e-3	3	1452.515	2	NC	1
531		19	max	.008	3	.185	2	0	15	1.241e-2	2	NC	1	NC	1
532			min	-.005	2	-.155	3	0	1	-4.417e-3	3	NC	1	NC	1
533	M5	1	max	.034	3	.351	2	0	1	0	1	NC	1	NC	1
534			min	-.024	2	-.018	3	0	1	0	1	NC	1	NC	1
535		2	max	.034	3	.168	2	0	1	0	1	NC	5	NC	1
536			min	-.024	2	-.003	3	0	1	0	1	747.753	2	NC	1
537		3	max	.034	3	.053	3	0	1	0	1	NC	5	NC	1
538			min	-.024	2	-.041	2	0	1	0	1	348.985	2	NC	1
539		4	max	.033	3	.186	3	0	1	0	1	9371.595	15	NC	1
540			min	-.024	2	-.294	2	0	1	0	1	211.627	2	NC	1
541		5	max	.033	3	.372	3	0	1	0	1	6506.265	15	NC	1
542			min	-.023	2	-.572	2	0	1	0	1	147.735	2	NC	1
543		6	max	.032	3	.583	3	0	1	0	1	4980.041	15	NC	1
544			min	-.023	2	-.85	2	0	1	0	1	113.486	2	NC	1
545		7	max	.031	3	.79	3	0	1	0	1	4103.918	15	NC	1
546			min	-.023	2	-1.103	2	0	1	0	1	93.726	2	NC	1
547		8	max	.031	3	.964	3	0	1	0	1	3596.938	15	NC	1
548			min	-.022	2	-1.306	2	0	1	0	1	82.25	2	NC	1
549		9	max	.03	3	1.077	3	0	1	0	1	3337.552	15	NC	1
550			min	-.022	2	-1.436	2	0	1	0	1	76.364	2	NC	1
551		10	max	.029	3	1.117	3	0	1	0	1	3259.447	15	NC	1
552			min	-.021	2	-1.48	2	0	1	0	1	74.65	2	NC	1
553		11	max	.028	3	1.089	3	0	1	0	1	3337.802	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	-.021	2	-1.436	2	0	1	0	1	76.681	2	NC	1
555		12	max	.028	3	.993	3	0	1	0	1	3597.524	15	NC	1
556			min	-.021	2	-1.301	2	0	1	0	1	83.298	2	NC	1
557		13	max	.027	3	.839	3	0	1	0	1	4105.079	15	NC	1
558			min	-.02	2	-1.085	2	0	1	0	1	96.479	2	NC	1
559		14	max	.026	3	.646	3	0	1	0	1	4982.26	15	NC	1
560			min	-.02	2	-.819	2	0	1	0	1	119.796	2	NC	1
561		15	max	.025	3	.432	3	0	1	0	1	6510.595	15	NC	1
562			min	-.02	2	-.532	2	0	1	0	1	161.794	2	NC	1
563		16	max	.025	3	.217	3	0	1	0	1	9380.615	15	NC	1
564			min	-.019	2	-.256	2	0	1	0	1	244.331	2	NC	1
565		17	max	.024	3	.018	3	0	1	0	1	NC	5	NC	1
566			min	-.019	2	-.021	2	0	1	0	1	432.426	2	NC	1
567		18	max	.024	3	.148	2	0	1	0	1	NC	5	NC	1
568			min	-.019	2	-.15	3	0	1	0	1	981.417	2	NC	1
569		19	max	.024	3	.281	2	0	1	0	1	NC	1	NC	1
570			min	-.019	2	-.298	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.011	3	.209	2	0	15	1.703e-2	3	NC	1	NC	1
572			min	-.007	2	-.06	3	0	1	-7.168e-3	2	NC	1	NC	1
573		2	max	.011	3	.101	2	.006	1	8.454e-3	3	NC	5	NC	1
574			min	-.007	2	-.028	3	0	15	-3.512e-3	2	1258.061	2	NC	1
575		3	max	.011	3	.018	3	.008	1	1.508e-4	1	NC	5	NC	1
576			min	-.007	2	-.014	2	0	15	-1.88e-5	10	609.733	2	NC	1
577		4	max	.011	3	.086	3	.007	1	4.141e-3	3	NC	15	NC	1
578			min	-.007	2	-.14	2	0	15	-3.961e-3	2	388.444	2	NC	1
579		5	max	.011	3	.17	3	.005	1	8.179e-3	3	NC	15	NC	1
580			min	-.007	2	-.271	2	0	15	-7.932e-3	2	282.417	2	NC	1
581		6	max	.011	3	.258	3	.002	1	1.222e-2	3	8787.568	15	NC	1
582			min	-.007	2	-.397	2	0	15	-1.19e-2	2	223.682	2	NC	1
583		7	max	.011	3	.343	3	0	3	1.626e-2	3	7430.422	15	NC	1
584			min	-.006	2	-.509	2	0	1	-1.587e-2	2	188.861	2	NC	1
585		8	max	.01	3	.412	3	0	15	2.029e-2	3	6625.923	15	NC	1
586			min	-.006	2	-.598	2	0	1	-1.985e-2	2	168.205	2	NC	1
587		9	max	.01	3	.458	3	0	1	2.087e-2	3	6204.296	15	NC	1
588			min	-.006	2	-.653	2	0	15	-2.228e-2	2	157.419	2	NC	1
589		10	max	.01	3	.474	3	0	15	1.912e-2	3	6075.2	15	NC	1
590			min	-.006	2	-.672	2	0	1	-2.369e-2	2	154.264	2	NC	1
591		11	max	.01	3	.463	3	0	15	1.737e-2	3	6203.863	15	NC	1
592			min	-.006	2	-.653	2	0	1	-2.509e-2	2	158.001	2	NC	1
593		12	max	.009	3	.424	3	0	1	1.511e-2	3	6624.991	15	NC	1
594			min	-.006	2	-.595	2	0	15	-2.403e-2	2	169.912	2	NC	1
595		13	max	.009	3	.362	3	0	1	1.209e-2	3	7428.772	15	NC	1
596			min	-.006	2	-.502	2	0	15	-1.927e-2	2	192.89	2	NC	1
597		14	max	.009	3	.282	3	0	15	9.067e-3	3	8784.757	15	NC	1
598			min	-.006	2	-.386	2	-.002	1	-1.452e-2	2	232.104	2	NC	1
599		15	max	.009	3	.192	3	0	15	6.046e-3	3	NC	15	NC	1
600			min	-.006	2	-.257	2	-.005	1	-9.763e-3	2	299.404	2	NC	1
601		16	max	.008	3	.098	3	0	15	3.025e-3	3	NC	15	NC	1
602			min	-.006	2	-.128	2	-.007	1	-5.008e-3	2	423.478	2	NC	1
603		17	max	.008	3	.006	3	0	15	3.167e-6	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.007	1	-5.009e-4	1	687.118	2	NC	1
605		18	max	.008	3	.094	2	0	15	2.164e-3	3	NC	5	NC	1
606			min	-.005	2	-.077	3	-.005	1	-6.235e-3	2	1452.515	2	NC	1
607		19	max	.008	3	.185	2	0	1	4.417e-3	3	NC	1	NC	1
608			min	-.005	2	-.155	3	0	15	-1.241e-2	2	NC	1	NC	1

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

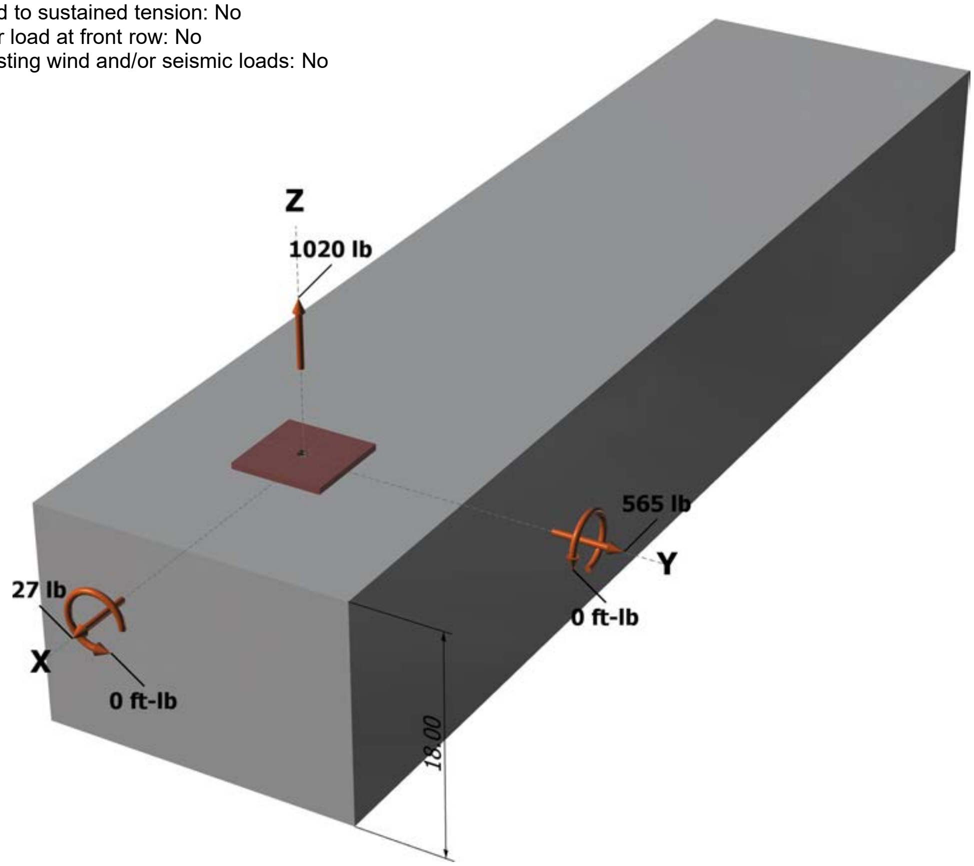
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

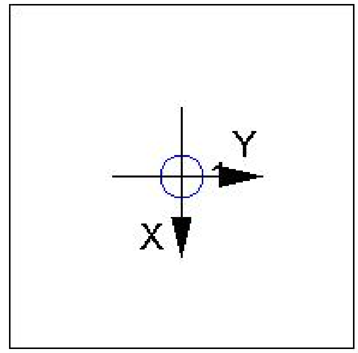
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

SIMPSON Strong-Tie	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, 32-40 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

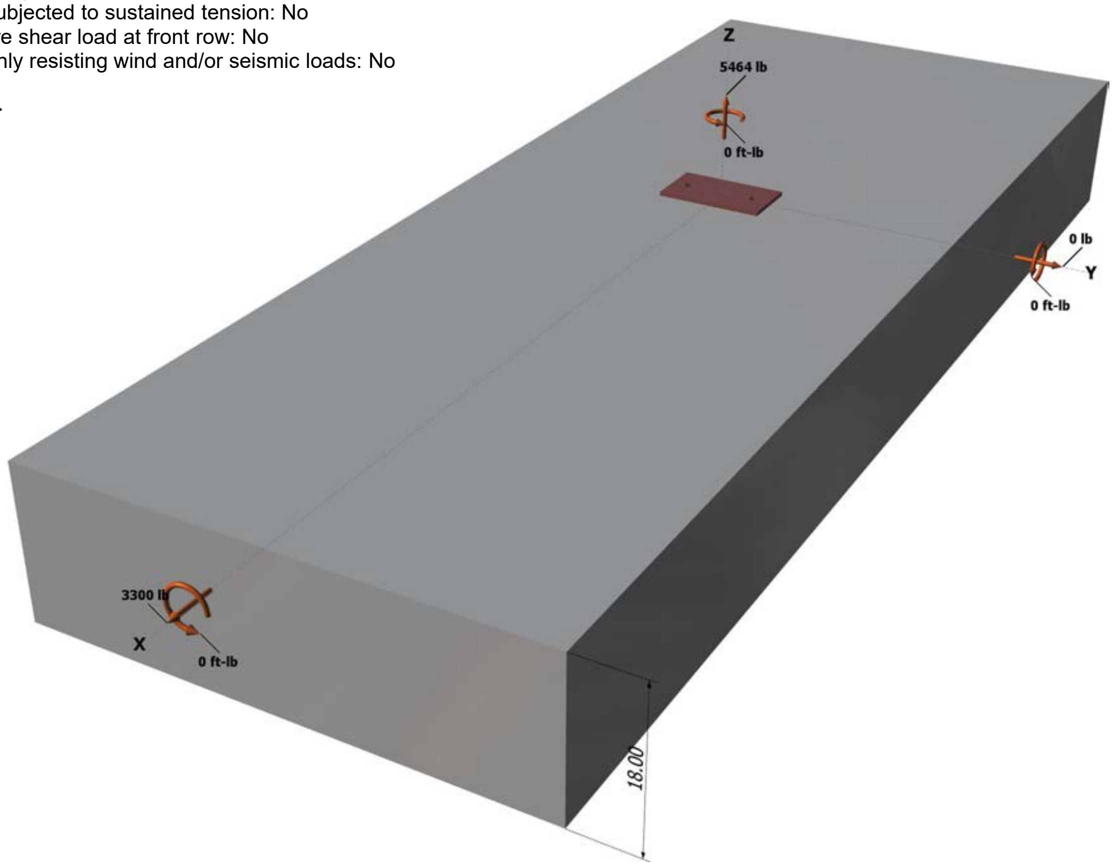
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

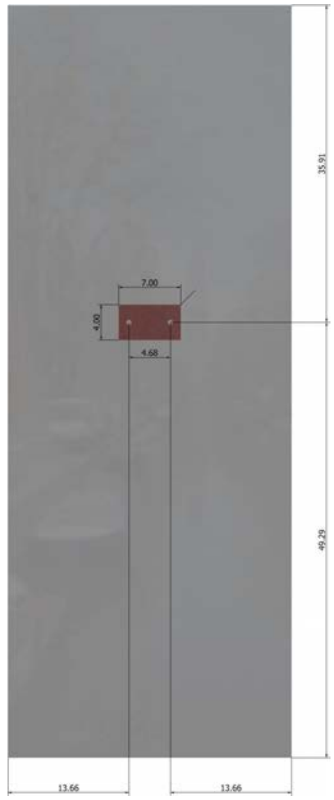
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

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

<Figure 1>



<Figure 2>



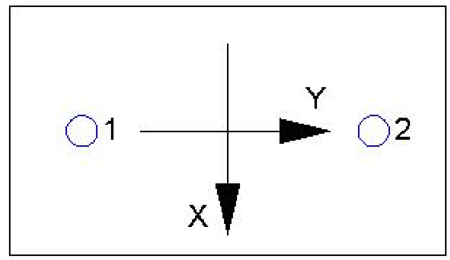
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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, ϕN_n (lb)	Ratio	Status
Steel	2732	6071	0.45	Pass
Concrete breakout	5464	10231	0.53	Pass
Adhesive	**5464**	**8093**	**0.68**	**Pass (Governs)**

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

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

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.68	0.52	119.8 %	1.2	Pass

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

12. Warnings

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

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

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