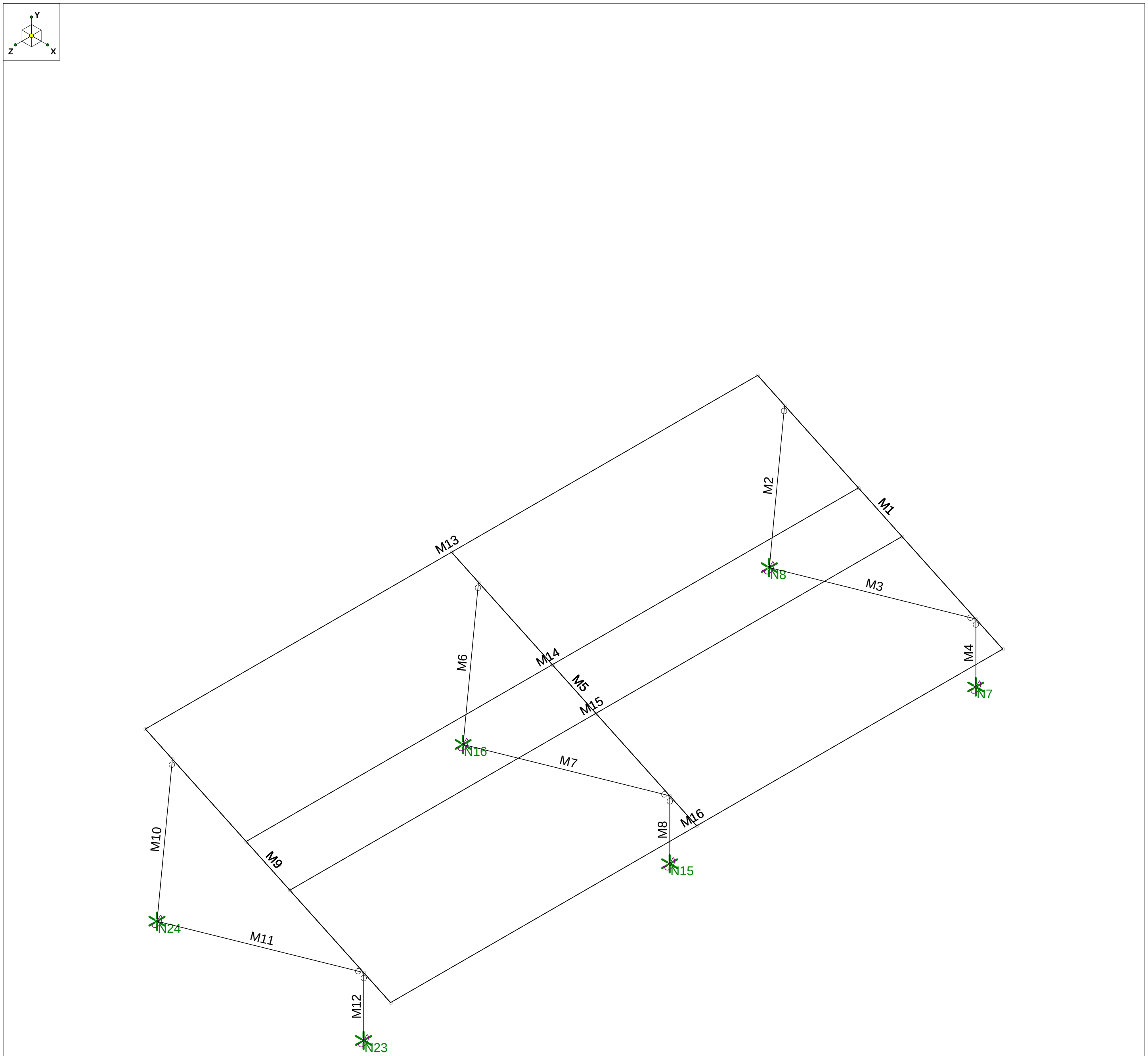


Schletter, Inc.		25ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

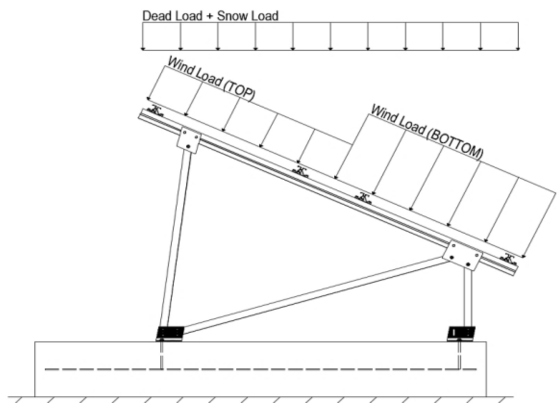
1.2 Construction

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

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	1700 mm	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	1.75 psf

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



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	18.56 psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00	
C_s =	0.82	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V = 160 mph — Exposure Category = C
Height < 15 ft — Importance Category = II

Peak Velocity Pressure, q_z = 40.19 psf — *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

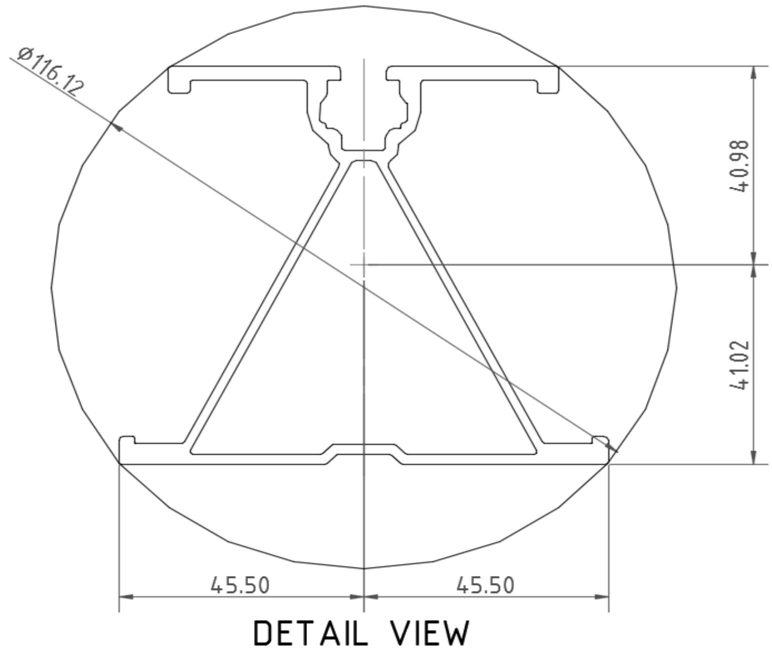
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

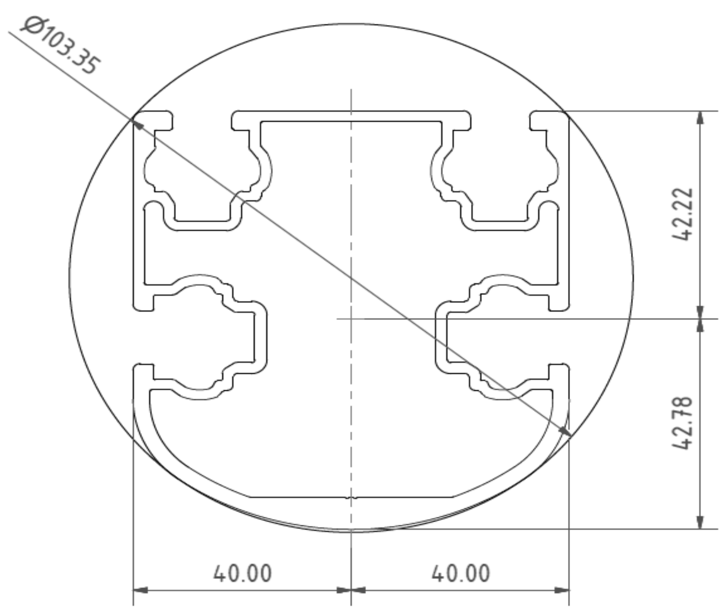
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	99	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-2.330	k-ft
M_z =	0.004	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	84%	



4.2 Girder Design

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

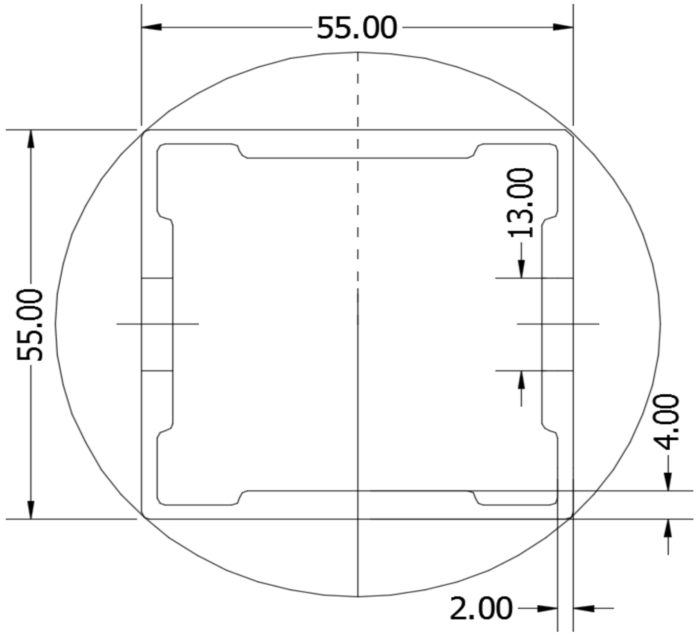
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.271	k-ft
M_z =	0.000	k-ft
P_n =	-0.885	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	96%	



4.3 Front Strut Design

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

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.009	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	11%	

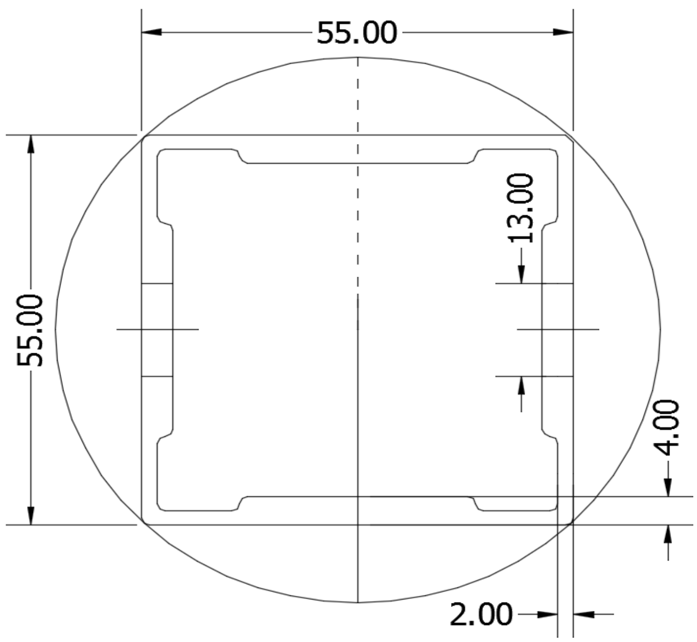


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.011	k-ft
M_z =	0.000	k-ft
P_n =	2.506	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	35%	

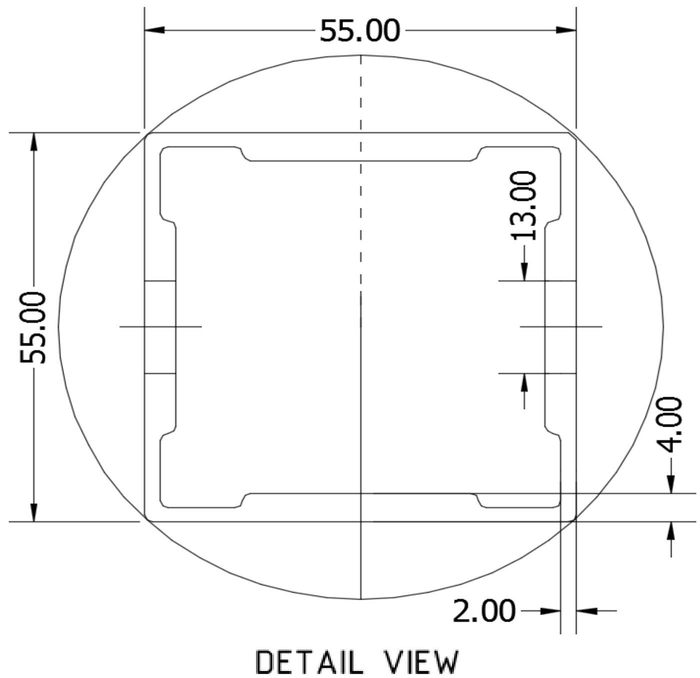


DETAIL VIEW

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 =	63.42	in
$\Phi F_{ty\ AXIAL}$ =	12.77	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 =	3.525	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	12.545	k
Utilization =	29%	



5. FOUNDATION DESIGN CALCULATIONS

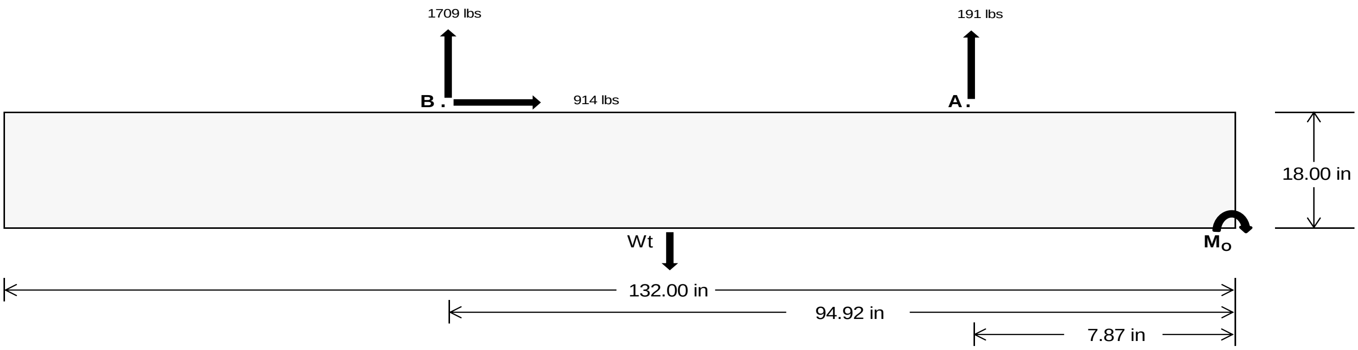
5.1 Helical Pile Foundations

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 =	848.00	7419.79	k
Compressive Load =	3912.19	5459.55	k
Lateral Load =	9.26	3962.95	k
Moment (Weak Axis) =	0.02	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (3) #5 rebar.

Overturning Check

M_O =	180154.6 in-lbs
Resisting Force Required =	2729.61 lbs
S.F. =	1.67
Weight Required =	4549.36 lbs
Minimum Width =	38 in in
Weight Provided =	7576.25 lbs

A minimum 132in long x 38in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	914.33 lbs
Friction =	0.4
Weight Required =	2285.83 lbs
Resisting Weight =	7576.25 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 38in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	914.33 lbs
Cohesion =	130 psf
Area =	34.83 ft^2
Resisting =	3788.13 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 38in 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			
	38 in	39 in	40 in	41 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3.17 ft) =	7576 lbs	7776 lbs	7975 lbs	8174 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in	38 in	39 in	40 in	41 in
F_A	1145 lbs	1145 lbs	1145 lbs	1145 lbs	1588 lbs	1588 lbs	1588 lbs	1588 lbs	1942 lbs	1942 lbs	1942 lbs	1942 lbs	-383 lbs	-383 lbs	-383 lbs	-383 lbs
F_B	1128 lbs	1128 lbs	1128 lbs	1128 lbs	2303 lbs	2303 lbs	2303 lbs	2303 lbs	2468 lbs	2468 lbs	2468 lbs	2468 lbs	-3417 lbs	-3417 lbs	-3417 lbs	-3417 lbs
F_V	145 lbs	145 lbs	145 lbs	145 lbs	1632 lbs	1632 lbs	1632 lbs	1632 lbs	1321 lbs	1321 lbs	1321 lbs	1321 lbs	-1829 lbs	-1829 lbs	-1829 lbs	-1829 lbs
P_{total}	9850 lbs	10049 lbs	10249 lbs	10448 lbs	11467 lbs	11667 lbs	11866 lbs	12065 lbs	11986 lbs	12185 lbs	12384 lbs	12584 lbs	745 lbs	865 lbs	985 lbs	1104 lbs
M	3046 lbs-ft	3046 lbs-ft	3046 lbs-ft	3046 lbs-ft	4587 lbs-ft	4587 lbs-ft	4587 lbs-ft	4587 lbs-ft	5438 lbs-ft	5438 lbs-ft	5438 lbs-ft	5438 lbs-ft	3638 lbs-ft	3638 lbs-ft	3638 lbs-ft	3638 lbs-ft
e	0.31 ft	0.30 ft	0.30 ft	0.29 ft	0.40 ft	0.39 ft	0.39 ft	0.38 ft	0.45 ft	0.45 ft	0.44 ft	0.43 ft	4.88 ft	4.21 ft	3.69 ft	3.29 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	235.1 psf	234.6 psf	234.2 psf	233.8 psf	257.4 psf	256.3 psf	255.4 psf	254.5 psf	258.9 psf	257.9 psf	256.9 psf	255.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	330.5 psf	327.6 psf	324.8 psf	322.2 psf	401.0 psf	396.3 psf	391.9 psf	387.6 psf	429.2 psf	423.8 psf	418.7 psf	413.7 psf	253.3 psf	137.1 psf	109.1 psf	97.7 psf

Maximum Bearing Pressure =	429 psf
Allowable Bearing Pressure =	1500 psf

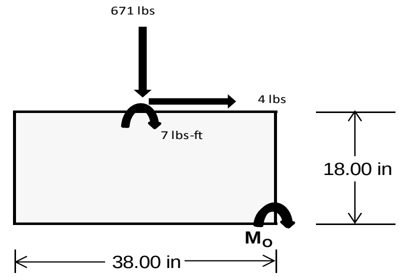
Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1049.5 ft-lbs
Resisting Force Required = 662.84 lbs
S.F. = 1.67
Weight Required = 1104.73 lbs
Minimum Width = 38 in in
Weight Provided = 7576.25 lbs

A minimum 132in long x 38in 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	38 in			38 in			38 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	212 lbs	530 lbs	212 lbs	671 lbs	1889 lbs	671 lbs	62 lbs	155 lbs	62 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9592 lbs	7576 lbs	9592 lbs	9599 lbs	7576 lbs	9599 lbs	2805 lbs	7576 lbs	2805 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	13 lbs-ft	0 lbs-ft	13 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft	0.53 ft
f_{min}	275.2 psf	217.5 psf	275.2 psf	274.9 psf	217.5 psf	274.9 psf	80.5 psf	217.5 psf	80.5 psf
f_{max}	275.5 psf	217.5 psf	275.5 psf	276.3 psf	217.5 psf	276.3 psf	80.5 psf	217.5 psf	80.5 psf

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

Use a 132in long x 38in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 38in wide x 18in tall ballast foundation and fiber reinforcing with (3) #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.

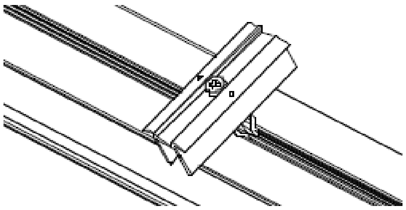
6. DESIGN OF JOINTS AND CONNECTIONS

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.

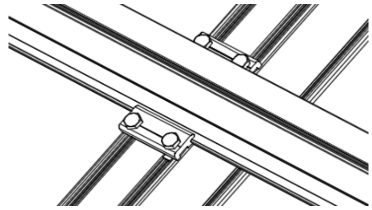
<u>Fastening of Modules to Purlins</u>

Maximum Uplifting Force =	0.950	k
Allowable Uplift =	1.214	k
Utilization =	<u>78%</u>	



<u>Fastening of Purlins to Girders</u>

Maximum Uplifting Force =	2.808	k
Allowable Uplift =	4.357	k
Utilization =	<u>64%</u>	



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.

<u>Front Strut</u>

Maximum Axial Load =	3.009	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>41%</u>	

<u>Rear Strut</u>

Maximum Axial Load =	5.024	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>68%</u>	

<u>Diagonal Strut</u>

Maximum Axial Load =	2.631	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>35%</u>	

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.

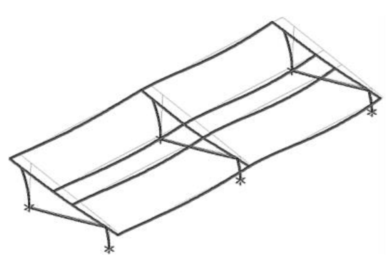
7. SEISMIC DESIGN

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} =	46.89	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.938	in
Max Drift, Δ_{MAX} =	0.024	in
<u>N/A</u>		

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 = 99 in

J = 0.432

273.88

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.0 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 99

J = 0.432

174.171

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.1

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= φb[Bt-Dt*√(Rb/t)]

φF_L= 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

M_{max}St = 3.363 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

M_{max}Wk = 3.904 k-ft

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L= φc[Bt-Dt*√(Rb/t)]

φF_L= 31.09 ksi

φF_L= 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:		Weak Axis:	
3.4.14		**3.4.14**	
L_b =	24.8 in	L_b =	24.8
J =	0.942	J =	0.942
	38.7028		38.7028
$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$		$S1 = \left(\frac{Bc - \frac{\theta_y}{\theta_b}Fcy}{1.6Dc}\right)^2$	
S1 =	0.51461	S1 =	0.51461
$S2 = \left(\frac{C_c}{1.6}\right)^2$		$S2 = \left(\frac{C_c}{1.6}\right)^2$	
S2 =	1701.56	S2 =	1701.56
φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]	φF_L=	φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L=	31.4 ksi	φF_L=	31.4
3.4.16		**3.4.16**	
b/t =	24.5	b/t =	24.5
$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$		$S1 = \frac{Bp - \frac{\theta_y}{\theta_b}Fcy}{1.6Dp}$	
S1 =	12.2	S1 =	12.2
$S2 = \frac{k_1 Bp}{1.6Dp}$		$S2 = \frac{k_1 Bp}{1.6Dp}$	
S2 =	46.7	S2 =	46.7
φF_L=	φb[Bp-1.6Dp*b/t]	φF_L=	φb[Bp-1.6Dp*b/t]
φF_L=	28.2 ksi	φF_L=	28.2 ksi
3.4.16.1	Not Used	**3.4.16.1**	
Rb/t =	0.0	N/A for Weak Direction	
$S1 = \left(\frac{Bt - 1.17\frac{\theta_y}{\theta_b}Fcy}{1.6Dt}\right)^2$			
S1 =	1.1		
$S2 = C_t$			
S2 =	141.0		
φF_L=	1.17φyFcy		
φF_L=	38.9 ksi		
3.4.18		**3.4.18**	
h/t =	24.5	h/t =	24.5
$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \frac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	27.5	C_0 =	27.5
Cc =	27.5	Cc =	27.5
$S2 = \frac{k_1 Bbr}{mDbr}$		$S2 = \frac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	28.2 ksi	φF_LWk=	28.2 ksi
Ix =	279836 mm^4	Iy =	279836 mm^4
	0.672 in^4		0.672 in^4
y =	27.5 mm	x =	27.5 mm
Sx =	0.621 in^3	Sy =	0.621 in^3
M_{max}St =	1.460 k-ft	M_{max}Wk =	1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **<u>55x55</u>**

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 63.42 in
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2 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

Weak Axis:

3.4.14

L_b = 63.42
J = 0.942
98.9729

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 30.2

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.46712

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.7854

φF_L= (φccFcy)/(λ²)

φF_L= 12.7711 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

$\varphi F_L =$ 12.77 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 13.14 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	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-46.9	-46.9	0	0
2	M14	Y	-46.9	-46.9	0	0
3	M15	Y	-46.9	-46.9	0	0
4	M16	Y	-46.9	-46.9	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	-123.3	-123.3	0	0
2	M14	y	-123.3	-123.3	0	0
3	M15	y	-190.554	-190.554	0	0
4	M16	y	-190.554	-190.554	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	280.227	280.227	0	0
2	M14	y	212.973	212.973	0	0
3	M15	y	112.091	112.091	0	0
4	M16	y	112.091	112.091	0	0

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	804.773	2	1320.623	2	.504	1	.002	1	0	1	0	1
2		min	-976.652	3	-1776.361	3	.024	15	0	15	0	1	0	1
3	N7	max	.025	9	1052.731	1	-.306	15	0	15	0	1	0	1
4		min	-.235	2	-177.006	3	-7.126	1	-.014	1	0	1	0	1
5	N15	max	.023	9	3009.374	2	0	1	0	1	0	1	0	1
6		min	-2.502	2	-652.309	3	0	11	0	11	0	1	0	1
7	N16	max	2770.559	2	4199.657	2	0	2	0	2	0	1	0	1
8		min	-3048.421	3	-5707.533	3	0	3	0	3	0	1	0	1
9	N23	max	.025	9	1052.731	1	7.126	1	.014	1	0	1	0	1
10		min	-.235	2	-177.006	3	.306	15	0	15	0	1	0	1
11	N24	max	804.773	2	1320.623	2	-.024	15	0	15	0	1	0	1
12		min	-976.652	3	-1776.361	3	-.504	1	-.002	1	0	1	0	1
13	Totals:	max	4377.134	2	11859.589	2	0	1						
14		min	-5002.449	3	-10266.576	3	0	11						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	70.871	1	471.529	2	-5.957	15	0	15	.169	1	0	2
2			min	2.97	15	-853.473	3	-144.014	1	-.015	2	.007	15	0	3
3		2	max	70.871	1	329.183	2	-4.572	15	0	15	.052	1	.667	3
4			min	2.97	15	-601.05	3	-110.355	1	-.015	2	.002	15	-.367	2
5		3	max	70.871	1	186.836	2	-3.188	15	0	15	.003	3	1.102	3
6			min	2.97	15	-348.628	3	-76.696	1	-.015	2	-.034	1	-.603	2
7		4	max	70.871	1	44.489	2	-1.804	15	0	15	-.002	12	1.306	3
8			min	2.97	15	-96.205	3	-43.037	1	-.015	2	-.089	1	-.71	2
9		5	max	70.871	1	156.218	3	-.168	10	0	15	-.004	12	1.278	3
10			min	2.97	15	-97.858	2	-9.378	1	-.015	2	-.113	1	-.685	2
11		6	max	70.871	1	408.641	3	24.281	1	0	15	-.004	15	1.019	3
12			min	2.97	15	-240.204	2	-.775	3	-.015	2	-.106	1	-.53	2
13		7	max	70.871	1	661.064	3	57.94	1	0	15	-.003	15	.529	3
14			min	2.97	15	-382.551	2	1.013	12	-.015	2	-.068	1	-.245	2
15		8	max	70.871	1	913.487	3	91.599	1	0	15	.003	2	.171	2
16			min	2.97	15	-524.898	2	2.397	12	-.015	2	-.006	3	-.193	3
17		9	max	70.871	1	1165.909	3	125.258	1	0	15	.1	1	.718	2
18			min	2.97	15	-667.245	2	3.781	12	-.015	2	-.002	3	-1.146	3
19		10	max	70.871	1	809.591	2	-5.165	12	.015	2	.23	1	1.395	2
20			min	2.97	15	-1418.332	3	-158.917	1	-.001	3	.004	12	-2.33	3
21		11	max	70.871	1	667.245	2	-3.781	12	.015	2	.1	1	.718	2
22			min	2.97	15	-1165.909	3	-125.258	1	0	15	-.002	3	-1.146	3
23		12	max	70.871	1	524.898	2	-2.397	12	.015	2	.003	2	.171	2
24			min	2.97	15	-913.487	3	-91.599	1	0	15	-.006	3	-.193	3
25		13	max	70.871	1	382.551	2	-1.013	12	.015	2	-.003	15	.529	3
26			min	2.97	15	-661.064	3	-57.94	1	0	15	-.068	1	-.245	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	70.871	1	240.204	2	.775	3	.015	2	-.004	15	1.019	3
28			min	2.97	15	-408.641	3	-24.281	1	0	15	-.106	1	-.53	2
29		15	max	70.871	1	97.858	2	9.378	1	.015	2	-.004	12	1.278	3
30			min	2.97	15	-156.218	3	.168	10	0	15	-.113	1	-.685	2
31		16	max	70.871	1	96.205	3	43.037	1	.015	2	-.002	12	1.306	3
32			min	2.97	15	-44.489	2	1.804	15	0	15	-.089	1	-.71	2
33		17	max	70.871	1	348.628	3	76.696	1	.015	2	.003	3	1.102	3
34			min	2.97	15	-186.836	2	3.188	15	0	15	-.034	1	-.603	2
35		18	max	70.871	1	601.05	3	110.355	1	.015	2	.052	1	.667	3
36			min	2.97	15	-329.183	2	4.572	15	0	15	.002	15	-.367	2
37		19	max	70.871	1	853.473	3	144.014	1	.015	2	.169	1	0	2
38			min	2.97	15	-471.529	2	5.957	15	0	15	.007	15	0	3
39	M14	1	max	37.128	1	521.426	2	-6.172	15	.012	3	.197	1	0	1
40			min	1.553	15	-675.17	3	-149.228	1	-.013	2	.008	15	0	3
41		2	max	37.128	1	379.079	2	-4.788	15	.012	3	.076	1	.531	3
42			min	1.553	15	-484.397	3	-115.569	1	-.013	2	.003	15	-.413	2
43		3	max	37.128	1	236.732	2	-3.404	15	.012	3	.004	3	.888	3
44			min	1.553	15	-293.624	3	-81.91	1	-.013	2	-.015	1	-.695	2
45		4	max	37.128	1	94.386	2	-2.019	15	.012	3	-.001	12	1.07	3
46			min	1.553	15	-102.85	3	-48.251	1	-.013	2	-.074	1	-.847	2
47		5	max	37.128	1	87.923	3	-.635	15	.012	3	-.004	12	1.077	3
48			min	1.553	15	-47.961	2	-14.592	1	-.013	2	-.103	1	-.868	2
49		6	max	37.128	1	278.696	3	19.067	1	.012	3	-.004	15	.909	3
50			min	1.553	15	-190.308	2	-1.108	3	-.013	2	-.101	1	-.759	2
51		7	max	37.128	1	469.47	3	52.726	1	.012	3	-.003	15	.566	3
52			min	1.553	15	-332.655	2	.792	12	-.013	2	-.068	1	-.519	2
53		8	max	37.128	1	660.243	3	86.385	1	.012	3	.002	10	.048	3
54			min	1.553	15	-475.001	2	2.176	12	-.013	2	-.006	3	-.149	2
55		9	max	37.128	1	851.016	3	120.044	1	.012	3	.09	1	.352	2
56			min	1.553	15	-617.348	2	3.56	12	-.013	2	-.002	3	-.645	3
57		10	max	37.128	1	759.695	2	-4.944	12	.013	2	.216	1	.983	2
58			min	1.553	15	-1041.79	3	-153.703	1	-.012	3	.003	12	-1.512	3
59		11	max	37.128	1	617.348	2	-3.56	12	.013	2	.09	1	.352	2
60			min	1.553	15	-851.016	3	-120.044	1	-.012	3	-.002	3	-.645	3
61		12	max	37.128	1	475.001	2	-2.176	12	.013	2	.002	10	.048	3
62			min	1.553	15	-660.243	3	-86.385	1	-.012	3	-.006	3	-.149	2
63		13	max	37.128	1	332.655	2	-.792	12	.013	2	-.003	15	.566	3
64			min	1.553	15	-469.47	3	-52.726	1	-.012	3	-.068	1	-.519	2
65		14	max	37.128	1	190.308	2	1.108	3	.013	2	-.004	15	.909	3
66			min	1.553	15	-278.696	3	-19.067	1	-.012	3	-.101	1	-.759	2
67		15	max	37.128	1	47.961	2	14.592	1	.013	2	-.004	12	1.077	3
68			min	1.553	15	-87.923	3	.635	15	-.012	3	-.103	1	-.868	2
69		16	max	37.128	1	102.85	3	48.251	1	.013	2	-.001	12	1.07	3
70			min	1.553	15	-94.386	2	2.019	15	-.012	3	-.074	1	-.847	2
71		17	max	37.128	1	293.624	3	81.91	1	.013	2	.004	3	.888	3
72			min	1.553	15	-236.732	2	3.404	15	-.012	3	-.015	1	-.695	2
73		18	max	37.128	1	484.397	3	115.569	1	.013	2	.076	1	.531	3
74			min	1.553	15	-379.079	2	4.788	15	-.012	3	.003	15	-.413	2
75		19	max	37.128	1	675.17	3	149.228	1	.013	2	.197	1	0	1
76			min	1.553	15	-521.426	2	6.172	15	-.012	3	.008	15	0	3
77	M15	1	max	-1.623	15	729.555	2	-6.17	15	.014	2	.197	1	0	2
78			min	-38.601	1	-363.536	3	-149.235	1	-.01	3	.008	15	0	3
79		2	max	-1.623	15	525.558	2	-4.786	15	.014	2	.076	1	.288	3
80			min	-38.601	1	-265.237	3	-115.576	1	-.01	3	.003	15	-.575	2
81		3	max	-1.623	15	321.562	2	-3.402	15	.014	2	.004	3	.486	3
82			min	-38.601	1	-166.939	3	-81.917	1	-.01	3	-.015	1	-.964	2
83		4	max	-1.623	15	117.566	2	-2.018	15	.014	2	-.001	12	.594	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	-38.601	1	-68.641	3	-48.258	1	-.01	3	-.074	1	-1.165	2
85		5	max	-1.623	15	29.657	3	-.634	15	.014	2	-.004	12	.612	3
86			min	-38.601	1	-86.43	2	-14.599	1	-.01	3	-.103	1	-1.179	2
87		6	max	-1.623	15	127.955	3	19.06	1	.014	2	-.004	15	.54	3
88			min	-38.601	1	-290.427	2	-.932	3	-.01	3	-.101	1	-1.006	2
89		7	max	-1.623	15	226.253	3	52.719	1	.014	2	-.003	15	.378	3
90			min	-38.601	1	-494.423	2	.898	12	-.01	3	-.068	1	-.647	2
91		8	max	-1.623	15	324.552	3	86.378	1	.014	2	.002	10	.125	3
92			min	-38.601	1	-698.419	2	2.282	12	-.01	3	-.005	3	-.1	2
93		9	max	-1.623	15	422.85	3	120.037	1	.014	2	.09	1	.634	2
94			min	-38.601	1	-902.415	2	3.666	12	-.01	3	-.001	3	-.217	3
95		10	max	-1.623	15	1106.412	2	-5.05	12	.01	3	.216	1	1.555	2
96			min	-38.601	1	-521.148	3	-153.696	1	-.014	2	.004	12	-.65	3
97		11	max	-1.623	15	902.415	2	-3.666	12	.01	3	.09	1	.634	2
98			min	-38.601	1	-422.85	3	-120.037	1	-.014	2	-.001	3	-.217	3
99		12	max	-1.623	15	698.419	2	-2.282	12	.01	3	.002	10	.125	3
100			min	-38.601	1	-324.552	3	-86.378	1	-.014	2	-.005	3	-.1	2
101		13	max	-1.623	15	494.423	2	-.898	12	.01	3	-.003	15	.378	3
102			min	-38.601	1	-226.253	3	-52.719	1	-.014	2	-.068	1	-.647	2
103		14	max	-1.623	15	290.427	2	.932	3	.01	3	-.004	15	.54	3
104			min	-38.601	1	-127.955	3	-19.06	1	-.014	2	-.101	1	-1.006	2
105		15	max	-1.623	15	86.43	2	14.599	1	.01	3	-.004	12	.612	3
106			min	-38.601	1	-29.657	3	.634	15	-.014	2	-.103	1	-1.179	2
107		16	max	-1.623	15	68.641	3	48.258	1	.01	3	-.001	12	.594	3
108			min	-38.601	1	-117.566	2	2.018	15	-.014	2	-.074	1	-1.165	2
109		17	max	-1.623	15	166.939	3	81.917	1	.01	3	.004	3	.486	3
110			min	-38.601	1	-321.562	2	3.402	15	-.014	2	-.015	1	-.964	2
111		18	max	-1.623	15	265.237	3	115.576	1	.01	3	.076	1	.288	3
112			min	-38.601	1	-525.558	2	4.786	15	-.014	2	.003	15	-.575	2
113		19	max	-1.623	15	363.536	3	149.235	1	.01	3	.197	1	0	2
114			min	-38.601	1	-729.555	2	6.17	15	-.014	2	.008	15	0	3
115	M16	1	max	-3.183	15	681.6	2	-5.963	15	.011	2	.17	1	0	2
116			min	-76.019	1	-323.439	3	-144.343	1	-.013	3	.007	15	0	3
117		2	max	-3.183	15	477.603	2	-4.579	15	.011	2	.053	1	.251	3
118			min	-76.019	1	-225.141	3	-110.684	1	-.013	3	.002	15	-.531	2
119		3	max	-3.183	15	273.607	2	-3.195	15	.011	2	.001	3	.413	3
120			min	-76.019	1	-126.843	3	-77.025	1	-.013	3	-.033	1	-.876	2
121		4	max	-3.183	15	69.611	2	-1.811	15	.011	2	-.002	12	.484	3
122			min	-76.019	1	-28.545	3	-43.367	1	-.013	3	-.088	1	-1.033	2
123		5	max	-3.183	15	69.753	3	-.383	10	.011	2	-.004	12	.465	3
124			min	-76.019	1	-134.385	2	-9.708	1	-.013	3	-.112	1	-1.003	2
125		6	max	-3.183	15	168.051	3	23.951	1	.011	2	-.004	15	.356	3
126			min	-76.019	1	-338.382	2	-.184	3	-.013	3	-.106	1	-.787	2
127		7	max	-3.183	15	266.35	3	57.61	1	.011	2	-.003	15	.157	3
128			min	-76.019	1	-542.378	2	1.368	12	-.013	3	-.068	1	-.383	2
129		8	max	-3.183	15	364.648	3	91.269	1	.011	2	.003	2	.208	2
130			min	-76.019	1	-746.374	2	2.752	12	-.013	3	-.004	3	-.132	3
131		9	max	-3.183	15	462.946	3	124.928	1	.011	2	.099	1	.986	2
132			min	-76.019	1	-950.37	2	4.136	12	-.013	3	0	3	-.512	3
133		10	max	-3.183	15	1154.367	2	-5.52	12	.013	3	.229	1	1.95	2
134			min	-76.019	1	-561.244	3	-158.587	1	-.011	2	.005	12	-.981	3
135		11	max	-3.183	15	950.37	2	-4.136	12	.013	3	.099	1	.986	2
136			min	-76.019	1	-462.946	3	-124.928	1	-.011	2	0	3	-.512	3
137		12	max	-3.183	15	746.374	2	-2.752	12	.013	3	.003	2	.208	2
138			min	-76.019	1	-364.648	3	-91.269	1	-.011	2	-.004	3	-.132	3
139		13	max	-3.183	15	542.378	2	-1.368	12	.013	3	-.003	15	.157	3
140			min	-76.019	1	-266.35	3	-57.61	1	-.011	2	-.068	1	-.383	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	-3.183	15	338.382	2	.184	3	.013	3	-.004	15	.356	3
142			min	-76.019	1	-168.051	3	-23.951	1	-.011	2	-.106	1	-.787	2
143		15	max	-3.183	15	134.385	2	9.708	1	.013	3	-.004	12	.465	3
144			min	-76.019	1	-69.753	3	.383	10	-.011	2	-.112	1	-1.003	2
145		16	max	-3.183	15	28.545	3	43.367	1	.013	3	-.002	12	.484	3
146			min	-76.019	1	-69.611	2	1.811	15	-.011	2	-.088	1	-1.033	2
147		17	max	-3.183	15	126.843	3	77.025	1	.013	3	.001	3	.413	3
148			min	-76.019	1	-273.607	2	3.195	15	-.011	2	-.033	1	-.876	2
149		18	max	-3.183	15	225.141	3	110.684	1	.013	3	.053	1	.251	3
150			min	-76.019	1	-477.603	2	4.579	15	-.011	2	.002	15	-.531	2
151		19	max	-3.183	15	323.439	3	144.343	1	.013	3	.17	1	0	2
152			min	-76.019	1	-681.6	2	5.963	15	-.011	2	.007	15	0	3
153	M2	1	max	1116.177	2	1.923	4	.458	1	0	3	0	3	0	1
154			min	-1562.247	3	.453	15	.019	15	0	1	0	2	0	1
155		2	max	1116.606	2	1.866	4	.458	1	0	3	0	1	0	15
156			min	-1561.925	3	.439	15	.019	15	0	1	0	15	0	4
157		3	max	1117.034	2	1.81	4	.458	1	0	3	0	1	0	15
158			min	-1561.604	3	.426	15	.019	15	0	1	0	15	-.001	4
159		4	max	1117.463	2	1.753	4	.458	1	0	3	0	1	0	15
160			min	-1561.283	3	.413	15	.019	15	0	1	0	15	-.002	4
161		5	max	1117.891	2	1.696	4	.458	1	0	3	0	1	0	15
162			min	-1560.961	3	.399	15	.019	15	0	1	0	15	-.002	4
163		6	max	1118.32	2	1.639	4	.458	1	0	3	0	1	0	15
164			min	-1560.64	3	.386	15	.019	15	0	1	0	15	-.003	4
165		7	max	1118.748	2	1.583	4	.458	1	0	3	0	1	0	15
166			min	-1560.319	3	.373	15	.019	15	0	1	0	15	-.003	4
167		8	max	1119.177	2	1.526	4	.458	1	0	3	0	1	0	15
168			min	-1559.997	3	.358	12	.019	15	0	1	0	15	-.004	4
169		9	max	1119.605	2	1.469	4	.458	1	0	3	.001	1	0	15
170			min	-1559.676	3	.336	12	.019	15	0	1	0	15	-.004	4
171		10	max	1120.034	2	1.412	4	.458	1	0	3	.001	1	-.001	15
172			min	-1559.355	3	.314	12	.019	15	0	1	0	15	-.004	4
173		11	max	1120.462	2	1.355	4	.458	1	0	3	.001	1	-.001	15
174			min	-1559.033	3	.292	12	.019	15	0	1	0	15	-.005	4
175		12	max	1120.891	2	1.304	2	.458	1	0	3	.001	1	-.001	15
176			min	-1558.712	3	.269	12	.019	15	0	1	0	15	-.005	4
177		13	max	1121.319	2	1.26	2	.458	1	0	3	.002	1	-.001	15
178			min	-1558.39	3	.247	12	.019	15	0	1	0	15	-.006	4
179		14	max	1121.748	2	1.215	2	.458	1	0	3	.002	1	-.001	15
180			min	-1558.069	3	.225	12	.019	15	0	1	0	15	-.006	4
181		15	max	1122.176	2	1.171	2	.458	1	0	3	.002	1	-.001	12
182			min	-1557.748	3	.203	12	.019	15	0	1	0	15	-.006	4
183		16	max	1122.605	2	1.127	2	.458	1	0	3	.002	1	-.002	12
184			min	-1557.426	3	.181	12	.019	15	0	1	0	15	-.007	4
185		17	max	1123.033	2	1.083	2	.458	1	0	3	.002	1	-.002	12
186			min	-1557.105	3	.159	12	.019	15	0	1	0	15	-.007	4
187		18	max	1123.462	2	1.038	2	.458	1	0	3	.002	1	-.002	12
188			min	-1556.784	3	.137	12	.019	15	0	1	0	15	-.007	4
189		19	max	1123.89	2	.994	2	.458	1	0	3	.002	1	-.002	12
190			min	-1556.462	3	.115	12	.019	15	0	1	0	15	-.007	4
191	M3	1	max	717.688	2	7.884	4	.12	1	0	3	0	1	.007	4
192			min	-847.84	3	1.854	15	.005	15	0	1	0	15	.002	12
193		2	max	717.517	2	7.116	4	.12	1	0	3	0	1	.005	2
194			min	-847.968	3	1.673	15	.005	15	0	1	0	15	0	12
195		3	max	717.347	2	6.349	4	.12	1	0	3	0	1	.002	2
196			min	-848.095	3	1.493	15	.005	15	0	1	0	15	-.001	3
197		4	max	717.176	2	5.582	4	.12	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-848.223	3	1.313	15	.005	15	0	1	0	15	-.002	3
199		5	max	717.006	2	4.815	4	.12	1	0	3	0	1	0	15
200			min	-848.351	3	1.132	15	.005	15	0	1	0	15	-.004	3
201		6	max	716.836	2	4.047	4	.12	1	0	3	0	1	-.001	15
202			min	-848.479	3	.952	15	.005	15	0	1	0	15	-.005	4
203		7	max	716.665	2	3.28	4	.12	1	0	3	0	1	-.002	15
204			min	-848.606	3	.771	15	.005	15	0	1	0	15	-.007	4
205		8	max	716.495	2	2.513	4	.12	1	0	3	0	1	-.002	15
206			min	-848.734	3	.591	15	.005	15	0	1	0	15	-.008	4
207		9	max	716.325	2	1.746	4	.12	1	0	3	0	1	-.002	15
208			min	-848.862	3	.411	15	.005	15	0	1	0	15	-.009	4
209		10	max	716.154	2	.979	4	.12	1	0	3	0	1	-.002	15
210			min	-848.99	3	.217	12	.005	15	0	1	0	15	-.009	4
211		11	max	715.984	2	.367	2	.12	1	0	3	0	1	-.002	15
212			min	-849.117	3	-.15	3	.005	15	0	1	0	15	-.01	4
213		12	max	715.814	2	-.13	15	.12	1	0	3	0	1	-.002	15
214			min	-849.245	3	-.598	3	.005	15	0	1	0	15	-.01	4
215		13	max	715.643	2	-.311	15	.12	1	0	3	0	1	-.002	15
216			min	-849.373	3	-1.323	4	.005	15	0	1	0	15	-.009	4
217		14	max	715.473	2	-.491	15	.12	1	0	3	0	1	-.002	15
218			min	-849.501	3	-2.09	4	.005	15	0	1	0	15	-.008	4
219		15	max	715.303	2	-.671	15	.12	1	0	3	0	1	-.002	15
220			min	-849.628	3	-2.858	4	.005	15	0	1	0	15	-.007	4
221		16	max	715.132	2	-.852	15	.12	1	0	3	.001	1	-.001	15
222			min	-849.756	3	-3.625	4	.005	15	0	1	0	15	-.006	4
223		17	max	714.962	2	-1.032	15	.12	1	0	3	.001	1	-.001	15
224			min	-849.884	3	-4.392	4	.005	15	0	1	0	15	-.004	4
225		18	max	714.792	2	-1.212	15	.12	1	0	3	.001	1	0	15
226			min	-850.012	3	-5.159	4	.005	15	0	1	0	15	-.002	4
227		19	max	714.621	2	-1.393	15	.12	1	0	3	.001	1	0	1
228			min	-850.14	3	-5.926	4	.005	15	0	1	0	15	0	1
229	M4	1	max	1049.665	1	0	1	-.307	15	0	1	0	1	0	1
230			min	-179.306	3	0	1	-7.349	1	0	1	0	15	0	1
231		2	max	1049.835	1	0	1	-.307	15	0	1	0	3	0	1
232			min	-179.178	3	0	1	-7.349	1	0	1	0	2	0	1
233		3	max	1050.005	1	0	1	-.307	15	0	1	0	15	0	1
234			min	-179.051	3	0	1	-7.349	1	0	1	0	1	0	1
235		4	max	1050.176	1	0	1	-.307	15	0	1	0	15	0	1
236			min	-178.923	3	0	1	-7.349	1	0	1	-.002	1	0	1
237		5	max	1050.346	1	0	1	-.307	15	0	1	0	15	0	1
238			min	-178.795	3	0	1	-7.349	1	0	1	-.003	1	0	1
239		6	max	1050.516	1	0	1	-.307	15	0	1	0	15	0	1
240			min	-178.667	3	0	1	-7.349	1	0	1	-.003	1	0	1
241		7	max	1050.687	1	0	1	-.307	15	0	1	0	15	0	1
242			min	-178.54	3	0	1	-7.349	1	0	1	-.004	1	0	1
243		8	max	1050.857	1	0	1	-.307	15	0	1	0	15	0	1
244			min	-178.412	3	0	1	-7.349	1	0	1	-.005	1	0	1
245		9	max	1051.027	1	0	1	-.307	15	0	1	0	15	0	1
246			min	-178.284	3	0	1	-7.349	1	0	1	-.006	1	0	1
247		10	max	1051.198	1	0	1	-.307	15	0	1	0	15	0	1
248			min	-178.156	3	0	1	-7.349	1	0	1	-.007	1	0	1
249		11	max	1051.368	1	0	1	-.307	15	0	1	0	15	0	1
250			min	-178.029	3	0	1	-7.349	1	0	1	-.008	1	0	1
251		12	max	1051.538	1	0	1	-.307	15	0	1	0	15	0	1
252			min	-177.901	3	0	1	-7.349	1	0	1	-.008	1	0	1
253		13	max	1051.709	1	0	1	-.307	15	0	1	0	15	0	1
254			min	-177.773	3	0	1	-7.349	1	0	1	-.009	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	1051.879	1	0	1	-.307	15	0	1	0	15	0	1
256			min	-177.645	3	0	1	-7.349	1	0	1	-.01	1	0	1
257		15	max	1052.049	1	0	1	-.307	15	0	1	0	15	0	1
258			min	-177.517	3	0	1	-7.349	1	0	1	-.011	1	0	1
259		16	max	1052.22	1	0	1	-.307	15	0	1	0	15	0	1
260			min	-177.39	3	0	1	-7.349	1	0	1	-.012	1	0	1
261		17	max	1052.39	1	0	1	-.307	15	0	1	0	15	0	1
262			min	-177.262	3	0	1	-7.349	1	0	1	-.013	1	0	1
263		18	max	1052.56	1	0	1	-.307	15	0	1	0	15	0	1
264			min	-177.134	3	0	1	-7.349	1	0	1	-.014	1	0	1
265		19	max	1052.731	1	0	1	-.307	15	0	1	0	15	0	1
266			min	-177.006	3	0	1	-7.349	1	0	1	-.014	1	0	1
267	M6	1	max	3517.304	2	2.486	2	0	1	0	1	0	1	0	1
268			min	-5023.693	3	-.121	3	0	1	0	1	0	1	0	1
269		2	max	3517.732	2	2.442	2	0	1	0	1	0	1	0	3
270			min	-5023.372	3	-.154	3	0	1	0	1	0	1	0	2
271		3	max	3518.161	2	2.397	2	0	1	0	1	0	1	0	3
272			min	-5023.05	3	-.187	3	0	1	0	1	0	1	-.001	2
273		4	max	3518.589	2	2.353	2	0	1	0	1	0	1	0	3
274			min	-5022.729	3	-.22	3	0	1	0	1	0	1	-.002	2
275		5	max	3519.018	2	2.309	2	0	1	0	1	0	1	0	3
276			min	-5022.408	3	-.253	3	0	1	0	1	0	1	-.003	2
277		6	max	3519.446	2	2.265	2	0	1	0	1	0	1	0	3
278			min	-5022.086	3	-.286	3	0	1	0	1	0	1	-.003	2
279		7	max	3519.875	2	2.22	2	0	1	0	1	0	1	0	3
280			min	-5021.765	3	-.32	3	0	1	0	1	0	1	-.004	2
281		8	max	3520.303	2	2.176	2	0	1	0	1	0	1	0	3
282			min	-5021.443	3	-.353	3	0	1	0	1	0	1	-.005	2
283		9	max	3520.732	2	2.132	2	0	1	0	1	0	1	0	3
284			min	-5021.122	3	-.386	3	0	1	0	1	0	1	-.005	2
285		10	max	3521.16	2	2.088	2	0	1	0	1	0	1	0	3
286			min	-5020.801	3	-.419	3	0	1	0	1	0	1	-.006	2
287		11	max	3521.589	2	2.043	2	0	1	0	1	0	1	0	3
288			min	-5020.479	3	-.452	3	0	1	0	1	0	1	-.007	2
289		12	max	3522.017	2	1.999	2	0	1	0	1	0	1	0	3
290			min	-5020.158	3	-.486	3	0	1	0	1	0	1	-.007	2
291		13	max	3522.446	2	1.955	2	0	1	0	1	0	1	.001	3
292			min	-5019.837	3	-.519	3	0	1	0	1	0	1	-.008	2
293		14	max	3522.874	2	1.911	2	0	1	0	1	0	1	.001	3
294			min	-5019.515	3	-.552	3	0	1	0	1	0	1	-.008	2
295		15	max	3523.303	2	1.866	2	0	1	0	1	0	1	.001	3
296			min	-5019.194	3	-.585	3	0	1	0	1	0	1	-.009	2
297		16	max	3523.731	2	1.822	2	0	1	0	1	0	1	.002	3
298			min	-5018.873	3	-.618	3	0	1	0	1	0	1	-.009	2
299		17	max	3524.16	2	1.778	2	0	1	0	1	0	1	.002	3
300			min	-5018.551	3	-.652	3	0	1	0	1	0	1	-.01	2
301		18	max	3524.588	2	1.734	2	0	1	0	1	0	1	.002	3
302			min	-5018.23	3	-.685	3	0	1	0	1	0	1	-.01	2
303		19	max	3525.017	2	1.689	2	0	1	0	1	0	1	.002	3
304			min	-5017.908	3	-.718	3	0	1	0	1	0	1	-.011	2
305	M7	1	max	2506.155	2	7.911	4	0	1	0	1	0	1	.011	2
306			min	-2628.582	3	1.858	15	0	1	0	1	0	1	-.002	3
307		2	max	2505.984	2	7.144	4	0	1	0	1	0	1	.008	2
308			min	-2628.709	3	1.677	15	0	1	0	1	0	1	-.004	3
309		3	max	2505.814	2	6.377	4	0	1	0	1	0	1	.006	2
310			min	-2628.837	3	1.497	15	0	1	0	1	0	1	-.005	3
311		4	max	2505.644	2	5.61	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2628.965	3	1.317	15	0	1	0	1	0	1	-.006	3
313		5	max	2505.473	2	4.843	4	0	1	0	1	0	1	.001	2
314			min	-2629.093	3	1.136	15	0	1	0	1	0	1	-.007	3
315		6	max	2505.303	2	4.075	4	0	1	0	1	0	1	0	2
316			min	-2629.22	3	.956	15	0	1	0	1	0	1	-.008	3
317		7	max	2505.133	2	3.308	4	0	1	0	1	0	1	-.002	15
318			min	-2629.348	3	.761	12	0	1	0	1	0	1	-.008	3
319		8	max	2504.962	2	2.642	2	0	1	0	1	0	1	-.002	15
320			min	-2629.476	3	.462	12	0	1	0	1	0	1	-.009	3
321		9	max	2504.792	2	2.044	2	0	1	0	1	0	1	-.002	15
322			min	-2629.604	3	.158	3	0	1	0	1	0	1	-.009	3
323		10	max	2504.621	2	1.447	2	0	1	0	1	0	1	-.002	15
324			min	-2629.731	3	-.29	3	0	1	0	1	0	1	-.009	4
325		11	max	2504.451	2	.849	2	0	1	0	1	0	1	-.002	15
326			min	-2629.859	3	-.739	3	0	1	0	1	0	1	-.009	4
327		12	max	2504.281	2	.251	2	0	1	0	1	0	1	-.002	15
328			min	-2629.987	3	-1.187	3	0	1	0	1	0	1	-.009	4
329		13	max	2504.11	2	-.307	15	0	1	0	1	0	1	-.002	15
330			min	-2630.115	3	-1.636	3	0	1	0	1	0	1	-.009	4
331		14	max	2503.94	2	-.487	15	0	1	0	1	0	1	-.002	15
332			min	-2630.242	3	-2.084	3	0	1	0	1	0	1	-.008	4
333		15	max	2503.77	2	-.667	15	0	1	0	1	0	1	-.002	15
334			min	-2630.37	3	-2.83	4	0	1	0	1	0	1	-.007	4
335		16	max	2503.599	2	-.848	15	0	1	0	1	0	1	-.001	15
336			min	-2630.498	3	-3.597	4	0	1	0	1	0	1	-.006	4
337		17	max	2503.429	2	-1.028	15	0	1	0	1	0	1	-.001	15
338			min	-2630.626	3	-4.364	4	0	1	0	1	0	1	-.004	4
339		18	max	2503.259	2	-1.208	15	0	1	0	1	0	1	0	15
340			min	-2630.753	3	-5.131	4	0	1	0	1	0	1	-.002	4
341		19	max	2503.088	2	-1.389	15	0	1	0	1	0	1	0	1
342			min	-2630.881	3	-5.899	4	0	1	0	1	0	1	0	1
343	M8	1	max	3006.308	2	0	1	0	1	0	1	0	1	0	1
344			min	-654.608	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3006.478	2	0	1	0	1	0	1	0	1	0	1
346			min	-654.481	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3006.649	2	0	1	0	1	0	1	0	1	0	1
348			min	-654.353	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3006.819	2	0	1	0	1	0	1	0	1	0	1
350			min	-654.225	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3006.989	2	0	1	0	1	0	1	0	1	0	1
352			min	-654.097	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3007.16	2	0	1	0	1	0	1	0	1	0	1
354			min	-653.97	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3007.33	2	0	1	0	1	0	1	0	1	0	1
356			min	-653.842	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3007.5	2	0	1	0	1	0	1	0	1	0	1
358			min	-653.714	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3007.671	2	0	1	0	1	0	1	0	1	0	1
360			min	-653.586	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3007.841	2	0	1	0	1	0	1	0	1	0	1
362			min	-653.459	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3008.011	2	0	1	0	1	0	1	0	1	0	1
364			min	-653.331	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3008.182	2	0	1	0	1	0	1	0	1	0	1
366			min	-653.203	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3008.352	2	0	1	0	1	0	1	0	1	0	1
368			min	-653.075	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	3008.522	2	0	1	0	1	0	1	0	1	0	1
370			min	-652.948	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3008.693	2	0	1	0	1	0	1	0	1	0	1
372			min	-652.82	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3008.863	2	0	1	0	1	0	1	0	1	0	1
374			min	-652.692	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3009.033	2	0	1	0	1	0	1	0	1	0	1
376			min	-652.564	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3009.204	2	0	1	0	1	0	1	0	1	0	1
378			min	-652.436	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3009.374	2	0	1	0	1	0	1	0	1	0	1
380			min	-652.309	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1116.177	2	1.923	4	-.019	15	0	1	0	2	0	1
382			min	-1562.247	3	.453	15	-.458	1	0	3	0	3	0	1
383		2	max	1116.606	2	1.866	4	-.019	15	0	1	0	15	0	15
384			min	-1561.925	3	.439	15	-.458	1	0	3	0	1	0	4
385		3	max	1117.034	2	1.81	4	-.019	15	0	1	0	15	0	15
386			min	-1561.604	3	.426	15	-.458	1	0	3	0	1	-.001	4
387		4	max	1117.463	2	1.753	4	-.019	15	0	1	0	15	0	15
388			min	-1561.283	3	.413	15	-.458	1	0	3	0	1	-.002	4
389		5	max	1117.891	2	1.696	4	-.019	15	0	1	0	15	0	15
390			min	-1560.961	3	.399	15	-.458	1	0	3	0	1	-.002	4
391		6	max	1118.32	2	1.639	4	-.019	15	0	1	0	15	0	15
392			min	-1560.64	3	.386	15	-.458	1	0	3	0	1	-.003	4
393		7	max	1118.748	2	1.583	4	-.019	15	0	1	0	15	0	15
394			min	-1560.319	3	.373	15	-.458	1	0	3	0	1	-.003	4
395		8	max	1119.177	2	1.526	4	-.019	15	0	1	0	15	0	15
396			min	-1559.997	3	.358	12	-.458	1	0	3	0	1	-.004	4
397		9	max	1119.605	2	1.469	4	-.019	15	0	1	0	15	0	15
398			min	-1559.676	3	.336	12	-.458	1	0	3	-.001	1	-.004	4
399		10	max	1120.034	2	1.412	4	-.019	15	0	1	0	15	-.001	15
400			min	-1559.355	3	.314	12	-.458	1	0	3	-.001	1	-.004	4
401		11	max	1120.462	2	1.355	4	-.019	15	0	1	0	15	-.001	15
402			min	-1559.033	3	.292	12	-.458	1	0	3	-.001	1	-.005	4
403		12	max	1120.891	2	1.304	2	-.019	15	0	1	0	15	-.001	15
404			min	-1558.712	3	.269	12	-.458	1	0	3	-.001	1	-.005	4
405		13	max	1121.319	2	1.26	2	-.019	15	0	1	0	15	-.001	15
406			min	-1558.39	3	.247	12	-.458	1	0	3	-.002	1	-.006	4
407		14	max	1121.748	2	1.215	2	-.019	15	0	1	0	15	-.001	15
408			min	-1558.069	3	.225	12	-.458	1	0	3	-.002	1	-.006	4
409		15	max	1122.176	2	1.171	2	-.019	15	0	1	0	15	-.001	12
410			min	-1557.748	3	.203	12	-.458	1	0	3	-.002	1	-.006	4
411		16	max	1122.605	2	1.127	2	-.019	15	0	1	0	15	-.002	12
412			min	-1557.426	3	.181	12	-.458	1	0	3	-.002	1	-.007	4
413		17	max	1123.033	2	1.083	2	-.019	15	0	1	0	15	-.002	12
414			min	-1557.105	3	.159	12	-.458	1	0	3	-.002	1	-.007	4
415		18	max	1123.462	2	1.038	2	-.019	15	0	1	0	15	-.002	12
416			min	-1556.784	3	.137	12	-.458	1	0	3	-.002	1	-.007	4
417		19	max	1123.89	2	.994	2	-.019	15	0	1	0	15	-.002	12
418			min	-1556.462	3	.115	12	-.458	1	0	3	-.002	1	-.007	4
419	M11	1	max	717.688	2	7.884	4	-.005	15	0	1	0	15	.007	4
420			min	-847.84	3	1.854	15	-.12	1	0	3	0	1	.002	12
421		2	max	717.517	2	7.116	4	-.005	15	0	1	0	15	.005	2
422			min	-847.968	3	1.673	15	-.12	1	0	3	0	1	0	12
423		3	max	717.347	2	6.349	4	-.005	15	0	1	0	15	.002	2
424			min	-848.095	3	1.493	15	-.12	1	0	3	0	1	-.001	3
425		4	max	717.176	2	5.582	4	-.005	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	-848.223	3	1.313	15	-.12	1	0	3	0	1	-.002	3
427		5	max	717.006	2	4.815	4	-.005	15	0	1	0	15	0	15
428			min	-848.351	3	1.132	15	-.12	1	0	3	0	1	-.004	3
429		6	max	716.836	2	4.047	4	-.005	15	0	1	0	15	-.001	15
430			min	-848.479	3	.952	15	-.12	1	0	3	0	1	-.005	4
431		7	max	716.665	2	3.28	4	-.005	15	0	1	0	15	-.002	15
432			min	-848.606	3	.771	15	-.12	1	0	3	0	1	-.007	4
433		8	max	716.495	2	2.513	4	-.005	15	0	1	0	15	-.002	15
434			min	-848.734	3	.591	15	-.12	1	0	3	0	1	-.008	4
435		9	max	716.325	2	1.746	4	-.005	15	0	1	0	15	-.002	15
436			min	-848.862	3	.411	15	-.12	1	0	3	0	1	-.009	4
437		10	max	716.154	2	.979	4	-.005	15	0	1	0	15	-.002	15
438			min	-848.99	3	.217	12	-.12	1	0	3	0	1	-.009	4
439		11	max	715.984	2	.367	2	-.005	15	0	1	0	15	-.002	15
440			min	-849.117	3	-.15	3	-.12	1	0	3	0	1	-.01	4
441		12	max	715.814	2	-.13	15	-.005	15	0	1	0	15	-.002	15
442			min	-849.245	3	-.598	3	-.12	1	0	3	0	1	-.01	4
443		13	max	715.643	2	-.311	15	-.005	15	0	1	0	15	-.002	15
444			min	-849.373	3	-1.323	4	-.12	1	0	3	0	1	-.009	4
445		14	max	715.473	2	-.491	15	-.005	15	0	1	0	15	-.002	15
446			min	-849.501	3	-2.09	4	-.12	1	0	3	0	1	-.008	4
447		15	max	715.303	2	-.671	15	-.005	15	0	1	0	15	-.002	15
448			min	-849.628	3	-2.858	4	-.12	1	0	3	0	1	-.007	4
449		16	max	715.132	2	-.852	15	-.005	15	0	1	0	15	-.001	15
450			min	-849.756	3	-3.625	4	-.12	1	0	3	-.001	1	-.006	4
451		17	max	714.962	2	-1.032	15	-.005	15	0	1	0	15	-.001	15
452			min	-849.884	3	-4.392	4	-.12	1	0	3	-.001	1	-.004	4
453		18	max	714.792	2	-1.212	15	-.005	15	0	1	0	15	0	15
454			min	-850.012	3	-5.159	4	-.12	1	0	3	-.001	1	-.002	4
455		19	max	714.621	2	-1.393	15	-.005	15	0	1	0	15	0	1
456			min	-850.14	3	-5.926	4	-.12	1	0	3	-.001	1	0	1
457	M12	1	max	1049.665	1	0	1	7.349	1	0	1	0	15	0	1
458			min	-179.306	3	0	1	.307	15	0	1	0	1	0	1
459		2	max	1049.835	1	0	1	7.349	1	0	1	0	2	0	1
460			min	-179.178	3	0	1	.307	15	0	1	0	3	0	1
461		3	max	1050.005	1	0	1	7.349	1	0	1	0	1	0	1
462			min	-179.051	3	0	1	.307	15	0	1	0	15	0	1
463		4	max	1050.176	1	0	1	7.349	1	0	1	.002	1	0	1
464			min	-178.923	3	0	1	.307	15	0	1	0	15	0	1
465		5	max	1050.346	1	0	1	7.349	1	0	1	.003	1	0	1
466			min	-178.795	3	0	1	.307	15	0	1	0	15	0	1
467		6	max	1050.516	1	0	1	7.349	1	0	1	.003	1	0	1
468			min	-178.667	3	0	1	.307	15	0	1	0	15	0	1
469		7	max	1050.687	1	0	1	7.349	1	0	1	.004	1	0	1
470			min	-178.54	3	0	1	.307	15	0	1	0	15	0	1
471		8	max	1050.857	1	0	1	7.349	1	0	1	.005	1	0	1
472			min	-178.412	3	0	1	.307	15	0	1	0	15	0	1
473		9	max	1051.027	1	0	1	7.349	1	0	1	.006	1	0	1
474			min	-178.284	3	0	1	.307	15	0	1	0	15	0	1
475		10	max	1051.198	1	0	1	7.349	1	0	1	.007	1	0	1
476			min	-178.156	3	0	1	.307	15	0	1	0	15	0	1
477		11	max	1051.368	1	0	1	7.349	1	0	1	.008	1	0	1
478			min	-178.029	3	0	1	.307	15	0	1	0	15	0	1
479		12	max	1051.538	1	0	1	7.349	1	0	1	.008	1	0	1
480			min	-177.901	3	0	1	.307	15	0	1	0	15	0	1
481		13	max	1051.709	1	0	1	7.349	1	0	1	.009	1	0	1
482			min	-177.773	3	0	1	.307	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	1051.879	1	0	1	7.349	1	0	1	.01	1	0	1
484			min	-177.645	3	0	1	.307	15	0	1	0	15	0	1
485		15	max	1052.049	1	0	1	7.349	1	0	1	.011	1	0	1
486			min	-177.517	3	0	1	.307	15	0	1	0	15	0	1
487		16	max	1052.22	1	0	1	7.349	1	0	1	.012	1	0	1
488			min	-177.39	3	0	1	.307	15	0	1	0	15	0	1
489		17	max	1052.39	1	0	1	7.349	1	0	1	.013	1	0	1
490			min	-177.262	3	0	1	.307	15	0	1	0	15	0	1
491		18	max	1052.56	1	0	1	7.349	1	0	1	.014	1	0	1
492			min	-177.134	3	0	1	.307	15	0	1	0	15	0	1
493		19	max	1052.731	1	0	1	7.349	1	0	1	.014	1	0	1
494			min	-177.006	3	0	1	.307	15	0	1	0	15	0	1
495	M1	1	max	144.019	1	853.436	3	-2.97	15	0	2	.169	1	0	15
496			min	5.957	15	-470.935	2	-70.801	1	0	3	.007	15	-.015	2
497		2	max	144.624	1	852.463	3	-2.97	15	0	2	.131	1	.233	2
498			min	6.139	15	-472.233	2	-70.801	1	0	3	.006	15	-.451	3
499		3	max	523.744	3	577.612	2	-2.951	15	0	3	.094	1	.47	2
500			min	-305.353	2	-628.545	3	-70.47	1	0	2	.004	15	-.883	3
501		4	max	524.198	3	576.314	2	-2.951	15	0	3	.057	1	.166	2
502			min	-304.747	2	-629.519	3	-70.47	1	0	2	.002	15	-.551	3
503		5	max	524.652	3	575.016	2	-2.951	15	0	3	.02	1	-.004	15
504			min	-304.142	2	-630.492	3	-70.47	1	0	2	0	15	-.219	3
505		6	max	525.106	3	573.717	2	-2.951	15	0	3	0	15	.114	3
506			min	-303.537	2	-631.466	3	-70.47	1	0	2	-.018	1	-.441	2
507		7	max	525.56	3	572.419	2	-2.951	15	0	3	-.002	15	.448	3
508			min	-302.931	2	-632.44	3	-70.47	1	0	2	-.055	1	-.743	2
509		8	max	526.014	3	571.121	2	-2.951	15	0	3	-.004	15	.782	3
510			min	-302.326	2	-633.413	3	-70.47	1	0	2	-.092	1	-1.045	2
511		9	max	537.955	3	51.964	2	-4.504	15	0	9	.056	1	.913	3
512			min	-242.464	2	.395	15	-107.629	1	0	3	.002	15	-1.195	2
513		10	max	538.409	3	50.666	2	-4.504	15	0	9	0	10	.889	3
514			min	-241.859	2	.004	15	-107.629	1	0	3	0	1	-1.222	2
515		11	max	538.863	3	49.368	2	-4.504	15	0	9	-.002	15	.867	3
516			min	-241.254	2	-1.603	4	-107.629	1	0	3	-.057	1	-1.249	2
517		12	max	550.63	3	409.845	3	-2.882	15	0	2	.091	1	.757	3
518			min	-181.317	2	-679.51	2	-69.048	1	0	3	.004	15	-1.107	2
519		13	max	551.084	3	408.871	3	-2.882	15	0	2	.055	1	.541	3
520			min	-180.711	2	-680.808	2	-69.048	1	0	3	.002	15	-.748	2
521		14	max	551.538	3	407.898	3	-2.882	15	0	2	.018	1	.325	3
522			min	-180.106	2	-682.106	2	-69.048	1	0	3	0	15	-.389	2
523		15	max	551.992	3	406.924	3	-2.882	15	0	2	0	15	.11	3
524			min	-179.501	2	-683.405	2	-69.048	1	0	3	-.018	1	-.046	1
525		16	max	552.446	3	405.95	3	-2.882	15	0	2	-.002	15	.332	2
526			min	-178.895	2	-684.703	2	-69.048	1	0	3	-.055	1	-.104	3
527		17	max	552.9	3	404.977	3	-2.882	15	0	2	-.004	15	.694	2
528			min	-178.29	2	-686.001	2	-69.048	1	0	3	-.091	1	-.318	3
529		18	max	-6.146	15	683.417	2	-3.183	15	0	3	-.005	15	.35	2
530			min	-144.944	1	-322.542	3	-76.087	1	0	2	-.13	1	-.157	3
531		19	max	-5.963	15	682.119	2	-3.183	15	0	3	-.007	15	.013	3
532			min	-144.339	1	-323.516	3	-76.087	1	0	2	-.17	1	-.011	2
533	M5	1	max	317.823	1	2836.605	3	0	1	0	1	0	1	.031	2
534			min	10.332	12	-1616.019	2	0	1	0	1	0	1	0	15
535		2	max	318.428	1	2835.631	3	0	1	0	1	0	1	.884	2
536			min	10.635	12	-1617.317	2	0	1	0	1	0	1	-1.494	3
537		3	max	1656.964	3	1673.241	2	0	1	0	1	0	1	1.698	2
538			min	-1017.359	2	-1946.903	3	0	1	0	1	0	1	-2.932	3
539		4	max	1657.418	3	1671.943	2	0	1	0	1	0	1	.816	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	-1016.754	2	-1947.877	3	0	1	0	1	0	1	-1.905	3
541		5	max	1657.872	3	1670.644	2	0	1	0	1	0	1	.017	9
542			min	-1016.148	2	-1948.851	3	0	1	0	1	0	1	-.877	3
543		6	max	1658.326	3	1669.346	2	0	1	0	1	0	1	.152	3
544			min	-1015.543	2	-1949.824	3	0	1	0	1	0	1	-.948	2
545		7	max	1658.78	3	1668.048	2	0	1	0	1	0	1	1.181	3
546			min	-1014.938	2	-1950.798	3	0	1	0	1	0	1	-1.828	2
547		8	max	1659.234	3	1666.75	2	0	1	0	1	0	1	2.211	3
548			min	-1014.332	2	-1951.772	3	0	1	0	1	0	1	-2.708	2
549		9	max	1674.081	3	174.887	2	0	1	0	1	0	1	2.546	3
550			min	-886.126	2	.39	15	0	1	0	1	0	1	-3.088	2
551		10	max	1674.535	3	173.589	2	0	1	0	1	0	1	2.46	3
552			min	-885.521	2	-.001	15	0	1	0	1	0	1	-3.18	2
553		11	max	1674.99	3	172.291	2	0	1	0	1	0	1	2.375	3
554			min	-884.915	2	-1.533	4	0	1	0	1	0	1	-3.271	2
555		12	max	1690.185	3	1240.126	3	0	1	0	1	0	1	2.083	3
556			min	-756.859	2	-2019.914	2	0	1	0	1	0	1	-2.928	2
557		13	max	1690.639	3	1239.152	3	0	1	0	1	0	1	1.429	3
558			min	-756.254	2	-2021.212	2	0	1	0	1	0	1	-1.862	2
559		14	max	1691.093	3	1238.179	3	0	1	0	1	0	1	.775	3
560			min	-755.648	2	-2022.51	2	0	1	0	1	0	1	-.795	2
561		15	max	1691.547	3	1237.205	3	0	1	0	1	0	1	.273	2
562			min	-755.043	2	-2023.808	2	0	1	0	1	0	1	-.002	13
563		16	max	1692.001	3	1236.231	3	0	1	0	1	0	1	1.341	2
564			min	-754.438	2	-2025.107	2	0	1	0	1	0	1	-.531	3
565		17	max	1692.455	3	1235.258	3	0	1	0	1	0	1	2.41	2
566			min	-753.832	2	-2026.405	2	0	1	0	1	0	1	-1.183	3
567		18	max	-11.341	12	2312.576	2	0	1	0	1	0	1	1.241	2
568			min	-317.788	1	-1121.843	3	0	1	0	1	0	1	-.619	3
569		19	max	-11.039	12	2311.278	2	0	1	0	1	0	1	.021	2
570			min	-317.183	1	-1122.817	3	0	1	0	1	0	1	-.027	3
571	M9	1	max	144.019	1	853.436	3	70.801	1	0	3	-.007	15	0	15
572			min	5.957	15	-470.935	2	2.97	15	0	2	-.169	1	-.015	2
573		2	max	144.624	1	852.463	3	70.801	1	0	3	-.006	15	.233	2
574			min	6.139	15	-472.233	2	2.97	15	0	2	-.131	1	-.451	3
575		3	max	523.744	3	577.612	2	70.47	1	0	2	-.004	15	.47	2
576			min	-305.353	2	-628.545	3	2.951	15	0	3	-.094	1	-.883	3
577		4	max	524.198	3	576.314	2	70.47	1	0	2	-.002	15	.166	2
578			min	-304.747	2	-629.519	3	2.951	15	0	3	-.057	1	-.551	3
579		5	max	524.652	3	575.016	2	70.47	1	0	2	0	15	-.004	15
580			min	-304.142	2	-630.492	3	2.951	15	0	3	-.02	1	-.219	3
581		6	max	525.106	3	573.717	2	70.47	1	0	2	.018	1	.114	3
582			min	-303.537	2	-631.466	3	2.951	15	0	3	0	15	-.441	2
583		7	max	525.56	3	572.419	2	70.47	1	0	2	.055	1	.448	3
584			min	-302.931	2	-632.44	3	2.951	15	0	3	.002	15	-.743	2
585		8	max	526.014	3	571.121	2	70.47	1	0	2	.092	1	.782	3
586			min	-302.326	2	-633.413	3	2.951	15	0	3	.004	15	-1.045	2
587		9	max	537.955	3	51.964	2	107.629	1	0	3	-.002	15	.913	3
588			min	-242.464	2	.395	15	4.504	15	0	9	-.056	1	-1.195	2
589		10	max	538.409	3	50.666	2	107.629	1	0	3	0	1	.889	3
590			min	-241.859	2	.004	15	4.504	15	0	9	0	10	-1.222	2
591		11	max	538.863	3	49.368	2	107.629	1	0	3	.057	1	.867	3
592			min	-241.254	2	-1.603	4	4.504	15	0	9	.002	15	-1.249	2
593		12	max	550.63	3	409.845	3	69.048	1	0	3	-.004	15	.757	3
594			min	-181.317	2	-679.51	2	2.882	15	0	2	-.091	1	-1.107	2
595		13	max	551.084	3	408.871	3	69.048	1	0	3	-.002	15	.541	3
596			min	-180.711	2	-680.808	2	2.882	15	0	2	-.055	1	-.748	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	551.538	3	407.898	3	69.048	1	0	3	0	15	.325	3
598			min	-180.106	2	-682.106	2	2.882	15	0	2	-.018	1	-.389	2
599		15	max	551.992	3	406.924	3	69.048	1	0	3	.018	1	.11	3
600			min	-179.501	2	-683.405	2	2.882	15	0	2	0	15	-.046	1
601		16	max	552.446	3	405.95	3	69.048	1	0	3	.055	1	.332	2
602			min	-178.895	2	-684.703	2	2.882	15	0	2	.002	15	-.104	3
603		17	max	552.9	3	404.977	3	69.048	1	0	3	.091	1	.694	2
604			min	-178.29	2	-686.001	2	2.882	15	0	2	.004	15	-.318	3
605		18	max	-6.146	15	683.417	2	76.087	1	0	2	.13	1	.35	2
606			min	-144.944	1	-322.542	3	3.183	15	0	3	.005	15	-.157	3
607		19	max	-5.963	15	682.119	2	76.087	1	0	2	.17	1	.013	3
608			min	-144.339	1	-323.516	3	3.183	15	0	3	.007	15	-.011	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.128	2	.009	3	1.052e-2	2	NC	1	NC	1
2			min	0	15	-.025	3	-.005	2	-2.259e-3	3	NC	1	NC	1
3		2	max	0	1	.204	3	.019	1	1.177e-2	2	NC	4	NC	1
4			min	0	15	-.001	9	-.002	10	-2.156e-3	3	862.968	3	NC	1
5		3	max	0	1	.39	3	.046	1	1.302e-2	2	NC	5	NC	2
6			min	0	15	-.067	1	0	10	-2.053e-3	3	476.288	3	4322.017	1
7		4	max	0	1	.505	3	.068	1	1.427e-2	2	NC	5	NC	3
8			min	0	15	-.107	1	.002	10	-1.95e-3	3	373.726	3	2903.015	1
9		5	max	0	1	.533	3	.079	1	1.551e-2	2	NC	5	NC	3
10			min	0	15	-.104	1	.002	10	-1.847e-3	3	354.775	3	2503.965	1
11		6	max	0	1	.477	3	.075	1	1.676e-2	2	NC	5	NC	3
12			min	0	15	-.061	1	0	10	-1.745e-3	3	394.07	3	2632.904	1
13		7	max	0	1	.355	3	.057	1	1.801e-2	2	NC	4	NC	2
14			min	0	15	-.004	9	-.003	10	-1.642e-3	3	520.902	3	3443.315	1
15		8	max	0	1	.199	3	.031	1	1.926e-2	2	NC	1	NC	2
16			min	0	15	.002	15	-.007	10	-1.539e-3	3	884.814	3	6381.868	1
17		9	max	0	1	.224	2	.029	3	2.051e-2	2	NC	4	NC	1
18			min	0	15	.004	15	-.014	2	-1.436e-3	3	2049.642	2	NC	1
19		10	max	0	1	.263	2	.028	3	2.175e-2	2	NC	3	NC	1
20			min	0	1	-.008	3	-.02	2	-1.333e-3	3	1460.15	2	NC	1
21		11	max	0	15	.224	2	.029	3	2.051e-2	2	NC	4	NC	1
22			min	0	1	.004	15	-.014	2	-1.436e-3	3	2049.642	2	NC	1
23		12	max	0	15	.199	3	.031	1	1.926e-2	2	NC	1	NC	2
24			min	0	1	.002	15	-.007	10	-1.539e-3	3	884.814	3	6381.868	1
25		13	max	0	15	.355	3	.057	1	1.801e-2	2	NC	4	NC	2
26			min	0	1	-.004	9	-.003	10	-1.642e-3	3	520.902	3	3443.315	1
27		14	max	0	15	.477	3	.075	1	1.676e-2	2	NC	5	NC	3
28			min	0	1	-.061	1	0	10	-1.745e-3	3	394.07	3	2632.904	1
29		15	max	0	15	.533	3	.079	1	1.551e-2	2	NC	5	NC	3
30			min	0	1	-.104	1	.002	10	-1.847e-3	3	354.775	3	2503.965	1
31		16	max	0	15	.505	3	.068	1	1.427e-2	2	NC	5	NC	3
32			min	0	1	-.107	1	.002	10	-1.95e-3	3	373.726	3	2903.015	1
33		17	max	0	15	.39	3	.046	1	1.302e-2	2	NC	5	NC	2
34			min	0	1	-.067	1	0	10	-2.053e-3	3	476.288	3	4322.017	1
35		18	max	0	15	.204	3	.019	1	1.177e-2	2	NC	4	NC	1
36			min	0	1	-.001	9	-.002	10	-2.156e-3	3	862.968	3	NC	1
37		19	max	0	15	.128	2	.009	3	1.052e-2	2	NC	1	NC	1
38			min	0	1	-.025	3	-.005	2	-2.259e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.274	3	.008	3	6.049e-3	2	NC	1	NC	1
40			min	0	15	-.401	2	-.005	2	-4.854e-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	.522	3	.013	1	7.123e-3	2	NC	5	NC	1
42			min	0	15	-.63	2	-.002	10	-5.807e-3	3	799.083	3	NC	1
43		3	max	0	1	.735	3	.036	1	8.197e-3	2	NC	5	NC	2
44			min	0	15	-.831	2	0	10	-6.759e-3	3	429.406	3	5552.319	1
45		4	max	0	1	.891	3	.057	1	9.271e-3	2	NC	5	NC	3
46			min	0	15	-.987	2	.001	10	-7.711e-3	3	321.337	3	3466.749	1
47		5	max	0	1	.975	3	.069	1	1.035e-2	2	NC	15	NC	3
48			min	0	15	-1.088	2	.002	10	-8.664e-3	3	282.498	3	2871.76	1
49		6	max	0	1	.989	3	.067	1	1.142e-2	2	NC	15	NC	3
50			min	0	15	-1.131	2	0	10	-9.616e-3	3	271.431	2	2941.989	1
51		7	max	0	1	.943	3	.053	1	1.249e-2	2	NC	15	NC	2
52			min	0	15	-1.124	2	-.003	10	-1.057e-2	3	273.966	2	3774.936	1
53		8	max	0	1	.861	3	.029	1	1.357e-2	2	NC	5	NC	2
54			min	0	15	-1.083	2	-.006	10	-1.152e-2	3	290.29	2	6873.721	1
55		9	max	0	1	.776	3	.025	3	1.464e-2	2	NC	5	NC	1
56			min	0	15	-1.034	2	-.013	2	-1.247e-2	3	313.177	2	NC	1
57		10	max	0	1	.736	3	.025	3	1.572e-2	2	NC	5	NC	1
58			min	0	1	-1.008	2	-.018	2	-1.343e-2	3	326.43	2	NC	1
59		11	max	0	15	.776	3	.025	3	1.464e-2	2	NC	5	NC	1
60			min	0	1	-1.034	2	-.013	2	-1.247e-2	3	313.177	2	NC	1
61		12	max	0	15	.861	3	.029	1	1.357e-2	2	NC	5	NC	2
62			min	0	1	-1.083	2	-.006	10	-1.152e-2	3	290.29	2	6873.721	1
63		13	max	0	15	.943	3	.053	1	1.249e-2	2	NC	15	NC	2
64			min	0	1	-1.124	2	-.003	10	-1.057e-2	3	273.966	2	3774.936	1
65		14	max	0	15	.989	3	.067	1	1.142e-2	2	NC	15	NC	3
66			min	0	1	-1.131	2	0	10	-9.616e-3	3	271.431	2	2941.989	1
67		15	max	0	15	.975	3	.069	1	1.035e-2	2	NC	15	NC	3
68			min	0	1	-1.088	2	.002	10	-8.664e-3	3	282.498	3	2871.76	1
69		16	max	0	15	.891	3	.057	1	9.271e-3	2	NC	5	NC	3
70			min	0	1	-.987	2	.001	10	-7.711e-3	3	321.337	3	3466.749	1
71		17	max	0	15	.735	3	.036	1	8.197e-3	2	NC	5	NC	2
72			min	0	1	-.831	2	0	10	-6.759e-3	3	429.406	3	5552.319	1
73		18	max	0	15	.522	3	.013	1	7.123e-3	2	NC	5	NC	1
74			min	0	1	-.63	2	-.002	10	-5.807e-3	3	799.083	3	NC	1
75		19	max	0	15	.274	3	.008	3	6.049e-3	2	NC	1	NC	1
76			min	0	1	-.401	2	-.005	2	-4.854e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.28	3	.008	3	4.13e-3	3	NC	1	NC	1
78			min	0	1	-.4	2	-.005	2	-6.294e-3	2	NC	1	NC	1
79		2	max	0	15	.447	3	.013	1	4.941e-3	3	NC	5	NC	1
80			min	0	1	-.684	2	-.002	10	-7.416e-3	2	697.969	2	NC	1
81		3	max	0	15	.594	3	.036	1	5.752e-3	3	NC	5	NC	2
82			min	0	1	-.93	2	0	10	-8.539e-3	2	373.555	2	5530.708	1
83		4	max	0	15	.71	3	.057	1	6.562e-3	3	NC	5	NC	3
84			min	0	1	-1.114	2	.002	10	-9.662e-3	2	277.624	2	3454.64	1
85		5	max	0	15	.786	3	.069	1	7.373e-3	3	NC	15	NC	3
86			min	0	1	-1.22	2	.002	10	-1.078e-2	2	241.546	2	2861.218	1
87		6	max	0	15	.823	3	.068	1	8.184e-3	3	NC	15	NC	3
88			min	0	1	-1.249	2	0	10	-1.191e-2	2	233.308	2	2928.934	1
89		7	max	0	15	.823	3	.053	1	8.994e-3	3	NC	15	NC	2
90			min	0	1	-1.212	2	-.002	10	-1.303e-2	2	243.979	2	3750.822	1
91		8	max	0	15	.799	3	.029	1	9.805e-3	3	NC	5	NC	2
92			min	0	1	-1.133	2	-.006	10	-1.415e-2	2	270.363	2	6787.747	1
93		9	max	0	15	.768	3	.024	3	1.062e-2	3	NC	5	NC	1
94			min	0	1	-1.048	2	-.012	2	-1.527e-2	2	305.776	2	NC	1
95		10	max	0	1	.751	3	.024	3	1.143e-2	3	NC	5	NC	1
96			min	0	1	-1.006	2	-.017	2	-1.64e-2	2	326.723	2	NC	1
97		11	max	0	1	.768	3	.024	3	1.062e-2	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.048	2	-.012	2	-1.527e-2	2	305.776	2	NC	1
99		12	max	0	1	.799	3	.029	1	9.805e-3	3	NC	5	NC	2
100			min	0	15	-1.133	2	-.006	10	-1.415e-2	2	270.363	2	6787.747	1
101		13	max	0	1	.823	3	.053	1	8.994e-3	3	NC	15	NC	2
102			min	0	15	-1.212	2	-.002	10	-1.303e-2	2	243.979	2	3750.822	1
103		14	max	0	1	.823	3	.068	1	8.184e-3	3	NC	15	NC	3
104			min	0	15	-1.249	2	0	10	-1.191e-2	2	233.308	2	2928.934	1
105		15	max	0	1	.786	3	.069	1	7.373e-3	3	NC	15	NC	3
106			min	0	15	-1.22	2	.002	10	-1.078e-2	2	241.546	2	2861.218	1
107		16	max	0	1	.71	3	.057	1	6.562e-3	3	NC	5	NC	3
108			min	0	15	-1.114	2	.002	10	-9.662e-3	2	277.624	2	3454.64	1
109		17	max	0	1	.594	3	.036	1	5.752e-3	3	NC	5	NC	2
110			min	0	15	-.93	2	0	10	-8.539e-3	2	373.555	2	5530.708	1
111		18	max	0	1	.447	3	.013	1	4.941e-3	3	NC	5	NC	1
112			min	0	15	-.684	2	-.002	10	-7.416e-3	2	697.969	2	NC	1
113		19	max	0	1	.28	3	.008	3	4.13e-3	3	NC	1	NC	1
114			min	0	15	-.4	2	-.005	2	-6.294e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.114	2	.007	3	7.589e-3	3	NC	1	NC	1
116			min	0	1	-.095	3	-.004	2	-8.853e-3	2	NC	1	NC	1
117		2	max	0	15	.003	4	.019	1	8.678e-3	3	NC	4	NC	1
118			min	0	1	-.051	2	-.001	10	-9.717e-3	2	1197.503	2	NC	1
119		3	max	0	15	.024	3	.046	1	9.767e-3	3	NC	5	NC	2
120			min	0	1	-.182	2	.001	10	-1.058e-2	2	668.24	2	4321.081	1
121		4	max	0	15	.048	3	.068	1	1.086e-2	3	NC	5	NC	3
122			min	0	1	-.256	2	.003	15	-1.145e-2	2	535.264	2	2893.884	1
123		5	max	0	15	.04	3	.08	1	1.195e-2	3	NC	5	NC	3
124			min	0	1	-.262	2	.003	10	-1.231e-2	2	527.035	2	2488.23	1
125		6	max	0	15	.004	12	.076	1	1.303e-2	3	NC	5	NC	3
126			min	0	1	-.202	2	.002	10	-1.317e-2	2	627.363	2	2604.368	1
127		7	max	0	15	.003	4	.059	1	1.412e-2	3	NC	4	NC	2
128			min	0	1	-.09	2	0	10	-1.404e-2	2	970.019	2	3376	1
129		8	max	0	15	.063	1	.032	1	1.521e-2	3	NC	4	NC	2
130			min	0	1	-.131	3	-.005	10	-1.49e-2	2	2905.648	2	6101.187	1
131		9	max	0	15	.167	2	.021	3	1.63e-2	3	NC	4	NC	1
132			min	0	1	-.193	3	-.01	2	-1.577e-2	2	2009.921	3	NC	1
133		10	max	0	1	.221	2	.021	3	1.739e-2	3	NC	4	NC	1
134			min	0	1	-.221	3	-.016	2	-1.663e-2	2	1571.119	3	NC	1
135		11	max	0	1	.167	2	.021	3	1.63e-2	3	NC	4	NC	1
136			min	0	15	-.193	3	-.01	2	-1.577e-2	2	2009.921	3	NC	1
137		12	max	0	1	.063	1	.032	1	1.521e-2	3	NC	4	NC	2
138			min	0	15	-.131	3	-.005	10	-1.49e-2	2	2905.648	2	6101.187	1
139		13	max	0	1	.003	4	.059	1	1.412e-2	3	NC	4	NC	2
140			min	0	15	-.09	2	0	10	-1.404e-2	2	970.019	2	3376	1
141		14	max	0	1	.004	12	.076	1	1.303e-2	3	NC	5	NC	3
142			min	0	15	-.202	2	.002	10	-1.317e-2	2	627.363	2	2604.368	1
143		15	max	0	1	.04	3	.08	1	1.195e-2	3	NC	5	NC	3
144			min	0	15	-.262	2	.003	10	-1.231e-2	2	527.035	2	2488.23	1
145		16	max	0	1	.048	3	.068	1	1.086e-2	3	NC	5	NC	3
146			min	0	15	-.256	2	.003	15	-1.145e-2	2	535.264	2	2893.884	1
147		17	max	0	1	.024	3	.046	1	9.767e-3	3	NC	5	NC	2
148			min	0	15	-.182	2	.001	10	-1.058e-2	2	668.24	2	4321.081	1
149		18	max	0	1	.003	4	.019	1	8.678e-3	3	NC	4	NC	1
150			min	0	15	-.051	2	-.001	10	-9.717e-3	2	1197.503	2	NC	1
151		19	max	0	1	.114	2	.007	3	7.589e-3	3	NC	1	NC	1
152			min	0	15	-.095	3	-.004	2	-8.853e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.008	2	.006	1	-6.087e-6	15	NC	1	NC	1
154			min	-.009	3	-.013	3	0	15	-1.452e-4	1	7807.748	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	2	.007	2	.005	1	-5.716e-6	15	NC	1	NC	1
156			min	-.009	3	-.012	3	0	15	-1.363e-4	1	8894.8	2	NC	1
157		3	max	.006	2	.006	2	.005	1	-5.345e-6	15	NC	1	NC	1
158			min	-.008	3	-.012	3	0	15	-1.274e-4	1	NC	1	NC	1
159		4	max	.006	2	.005	2	.004	1	-4.973e-6	15	NC	1	NC	1
160			min	-.008	3	-.011	3	0	15	-1.185e-4	1	NC	1	NC	1
161		5	max	.005	2	.004	2	.004	1	-4.602e-6	15	NC	1	NC	1
162			min	-.007	3	-.011	3	0	15	-1.097e-4	1	NC	1	NC	1
163		6	max	.005	2	.003	2	.003	1	-4.23e-6	15	NC	1	NC	1
164			min	-.007	3	-.01	3	0	15	-1.008e-4	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.003	1	-3.859e-6	15	NC	1	NC	1
166			min	-.006	3	-.01	3	0	15	-9.192e-5	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.002	1	-3.488e-6	15	NC	1	NC	1
168			min	-.006	3	-.009	3	0	15	-8.305e-5	1	NC	1	NC	1
169		9	max	.004	2	.001	2	.002	1	-3.116e-6	15	NC	1	NC	1
170			min	-.005	3	-.008	3	0	15	-7.418e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.002	1	-2.745e-6	15	NC	1	NC	1
172			min	-.005	3	-.008	3	0	15	-6.531e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	.001	1	-2.373e-6	15	NC	1	NC	1
174			min	-.004	3	-.007	3	0	15	-5.644e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	.001	1	-2.002e-6	15	NC	1	NC	1
176			min	-.004	3	-.006	3	0	15	-4.756e-5	1	NC	1	NC	1
177		13	max	.002	2	0	2	0	1	-1.631e-6	15	NC	1	NC	1
178			min	-.003	3	-.006	3	0	15	-3.869e-5	1	NC	1	NC	1
179		14	max	.002	2	0	15	0	1	-1.259e-6	15	NC	1	NC	1
180			min	-.003	3	-.005	3	0	15	-2.982e-5	1	NC	1	NC	1
181		15	max	.002	2	0	15	0	1	-8.877e-7	15	NC	1	NC	1
182			min	-.002	3	-.004	3	0	15	-2.095e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-5.163e-7	15	NC	1	NC	1
184			min	-.002	3	-.003	3	0	15	-1.208e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-8.466e-8	10	NC	1	NC	1
186			min	-.001	3	-.002	3	0	15	-3.207e-6	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	5.664e-6	1	NC	1	NC	1
188			min	0	3	-.001	3	0	15	-1.096e-7	3	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.454e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	5.979e-7	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.05e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.966e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.086e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	4.54e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.67e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	15	1.113e-6	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	4.253e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	15	1.772e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	5.836e-5	1	NC	1	NC	1
200			min	-.001	2	-.007	4	0	15	2.431e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	7.419e-5	1	NC	1	NC	1
202			min	-.002	2	-.009	4	0	15	3.09e-6	15	NC	1	NC	1
203		7	max	.002	3	-.003	15	0	1	9.002e-5	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	3.749e-6	15	8615.008	4	NC	1
205		8	max	.003	3	-.003	15	0	1	1.059e-4	1	NC	1	NC	1
206			min	-.002	2	-.012	4	0	15	4.408e-6	15	7734.004	4	NC	1
207		9	max	.003	3	-.003	15	.001	1	1.217e-4	1	NC	2	NC	1
208			min	-.003	2	-.013	4	0	15	5.067e-6	15	7213.036	4	NC	1
209		10	max	.004	3	-.003	15	.001	1	1.375e-4	1	NC	2	NC	1
210			min	-.003	2	-.013	4	0	15	5.726e-6	15	6961.331	4	NC	1
211		11	max	.004	3	-.003	15	.002	1	1.533e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.003	2	-.013	4	0	15	6.385e-6	15	6941.802	4	NC	1
213		12	max	.005	3	-.003	15	.002	1	1.692e-4	1	NC	2	NC	1
214			min	-.004	2	-.013	4	0	15	7.044e-6	15	7156.825	4	NC	1
215		13	max	.005	3	-.003	15	.002	1	1.85e-4	1	NC	1	NC	1
216			min	-.004	2	-.012	4	0	15	7.703e-6	15	7650.977	4	NC	1
217		14	max	.005	3	-.003	15	.003	1	2.008e-4	1	NC	1	NC	1
218			min	-.005	2	-.011	4	0	15	8.362e-6	15	8534.145	4	NC	1
219		15	max	.006	3	-.002	15	.003	1	2.167e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	9.021e-6	15	NC	1	NC	1
221		16	max	.006	3	-.002	15	.004	1	2.325e-4	1	NC	1	NC	1
222			min	-.005	2	-.008	4	0	15	9.68e-6	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.004	1	2.483e-4	1	NC	1	NC	1
224			min	-.006	2	-.005	4	0	15	1.034e-5	15	NC	1	NC	1
225		18	max	.007	3	0	15	.005	1	2.642e-4	1	NC	1	NC	1
226			min	-.006	2	-.004	1	0	15	1.1e-5	15	NC	1	NC	1
227		19	max	.007	3	0	15	.005	1	2.8e-4	1	NC	1	NC	1
228			min	-.006	2	-.002	1	0	15	1.166e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.006	2	0	15	4.572e-5	1	NC	1	NC	2
230			min	0	3	-.008	3	-.005	1	1.918e-6	15	NC	1	4697.87	1
231		2	max	.002	1	.005	2	0	15	4.572e-5	1	NC	1	NC	2
232			min	0	3	-.007	3	-.005	1	1.918e-6	15	NC	1	5106.66	1
233		3	max	.002	1	.005	2	0	15	4.572e-5	1	NC	1	NC	2
234			min	0	3	-.007	3	-.004	1	1.918e-6	15	NC	1	5593.297	1
235		4	max	.002	1	.005	2	0	15	4.572e-5	1	NC	1	NC	2
236			min	0	3	-.006	3	-.004	1	1.918e-6	15	NC	1	6177.984	1
237		5	max	.002	1	.005	2	0	15	4.572e-5	1	NC	1	NC	2
238			min	0	3	-.006	3	-.004	1	1.918e-6	15	NC	1	6888.177	1
239		6	max	.002	1	.004	2	0	15	4.572e-5	1	NC	1	NC	2
240			min	0	3	-.005	3	-.003	1	1.918e-6	15	NC	1	7761.952	1
241		7	max	.002	1	.004	2	0	15	4.572e-5	1	NC	1	NC	2
242			min	0	3	-.005	3	-.003	1	1.918e-6	15	NC	1	8853.356	1
243		8	max	.002	1	.004	2	0	15	4.572e-5	1	NC	1	NC	1
244			min	0	3	-.005	3	-.002	1	1.918e-6	15	NC	1	NC	1
245		9	max	.001	1	.003	2	0	15	4.572e-5	1	NC	1	NC	1
246			min	0	3	-.004	3	-.002	1	1.918e-6	15	NC	1	NC	1
247		10	max	.001	1	.003	2	0	15	4.572e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.002	1	1.918e-6	15	NC	1	NC	1
249		11	max	.001	1	.003	2	0	15	4.572e-5	1	NC	1	NC	1
250			min	0	3	-.003	3	-.001	1	1.918e-6	15	NC	1	NC	1
251		12	max	0	1	.002	2	0	15	4.572e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	-.001	1	1.918e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	4.572e-5	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	1.918e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	4.572e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	1.918e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	4.572e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	1.918e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	4.572e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	1.918e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	4.572e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	1.918e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	4.572e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	1.918e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	4.572e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	1.918e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.028	2	0	1	0	1	NC	4	NC	1
268			min	-.03	3	-.04	3	0	1	0	1	1548.684	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.026	2	0	1	0	1	NC	4	NC	1
270			min	-.029	3	-.038	3	0	1	0	1	1643.693	3	NC	1
271		3	max	.019	2	.024	2	0	1	0	1	NC	4	NC	1
272			min	-.027	3	-.036	3	0	1	0	1	1751.077	3	NC	1
273		4	max	.018	2	.021	2	0	1	0	1	NC	4	NC	1
274			min	-.025	3	-.033	3	0	1	0	1	1873.366	3	NC	1
275		5	max	.017	2	.019	2	0	1	0	1	NC	4	NC	1
276			min	-.024	3	-.031	3	0	1	0	1	2013.809	3	NC	1
277		6	max	.015	2	.017	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.029	3	0	1	0	1	2176.662	3	NC	1
279		7	max	.014	2	.015	2	0	1	0	1	NC	4	NC	1
280			min	-.02	3	-.026	3	0	1	0	1	2367.601	3	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.019	3	-.024	3	0	1	0	1	2594.372	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.022	3	0	1	0	1	2867.824	3	NC	1
285		10	max	.011	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.02	3	0	1	0	1	3203.636	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.013	3	-.017	3	0	1	0	1	3625.334	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.015	3	0	1	0	1	4169.903	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.013	3	0	1	0	1	4898.998	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.008	3	-.011	3	0	1	0	1	5923.621	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.008	3	0	1	0	1	7465.81	3	NC	1
297		16	max	.004	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	2	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	9946.526	3	NC	1
315		6	max	.006	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.006	2	-.012	3	0	1	0	1	8452.306	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.007	2	-.014	3	0	1	0	1	7559.546	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.008	2	-.015	3	0	1	0	1	7032.912	3	NC	1
321		9	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.01	2	-.016	3	0	1	0	1	6763.375	3	NC	1
323		10	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6702.259	3	NC	1
325		11	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.012	2	-.016	3	0	1	0	1	6837.741	3	NC	1
327		12	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.013	2	-.016	3	0	1	0	1	7189.427	3	NC	1
329		13	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.015	2	-.015	3	0	1	0	1	7749.895	4	NC	1
331		14	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.016	2	-.014	3	0	1	0	1	8640.574	4	NC	1
333		15	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.017	2	-.012	3	0	1	0	1	NC	1	NC	1
335		16	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.018	2	-.011	3	0	1	0	1	NC	1	NC	1
337		17	max	.02	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.019	2	-.009	3	0	1	0	1	NC	1	NC	1
339		18	max	.022	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.021	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.023	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.022	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.007	2	.021	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.023	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	2	.019	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.022	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	2	.018	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.021	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	2	.017	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.019	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	2	.016	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.018	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	2	.015	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.017	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	2	.014	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.016	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	2	.013	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	2	.011	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	2	.01	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	2	.009	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	2	.008	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	2	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.008	2	0	15	1.452e-4	1	NC	1	NC	1
382			min	-.009	3	-.013	3	-.006	1	6.087e-6	15	7807.748	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	2	.007	2	0	15	1.363e-4	1	NC	1	NC	1
384			min	-.009	3	-.012	3	-.005	1	5.716e-6	15	8894.8	2	NC	1
385		3	max	.006	2	.006	2	0	15	1.274e-4	1	NC	1	NC	1
386			min	-.008	3	-.012	3	-.005	1	5.345e-6	15	NC	1	NC	1
387		4	max	.006	2	.005	2	0	15	1.185e-4	1	NC	1	NC	1
388			min	-.008	3	-.011	3	-.004	1	4.973e-6	15	NC	1	NC	1
389		5	max	.005	2	.004	2	0	15	1.097e-4	1	NC	1	NC	1
390			min	-.007	3	-.011	3	-.004	1	4.602e-6	15	NC	1	NC	1
391		6	max	.005	2	.003	2	0	15	1.008e-4	1	NC	1	NC	1
392			min	-.007	3	-.01	3	-.003	1	4.23e-6	15	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	9.192e-5	1	NC	1	NC	1
394			min	-.006	3	-.01	3	-.003	1	3.859e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	8.305e-5	1	NC	1	NC	1
396			min	-.006	3	-.009	3	-.002	1	3.488e-6	15	NC	1	NC	1
397		9	max	.004	2	.001	2	0	15	7.418e-5	1	NC	1	NC	1
398			min	-.005	3	-.008	3	-.002	1	3.116e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	6.531e-5	1	NC	1	NC	1
400			min	-.005	3	-.008	3	-.002	1	2.745e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	5.644e-5	1	NC	1	NC	1
402			min	-.004	3	-.007	3	-.001	1	2.373e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	4.756e-5	1	NC	1	NC	1
404			min	-.004	3	-.006	3	-.001	1	2.002e-6	15	NC	1	NC	1
405		13	max	.002	2	0	2	0	15	3.869e-5	1	NC	1	NC	1
406			min	-.003	3	-.006	3	0	1	1.631e-6	15	NC	1	NC	1
407		14	max	.002	2	0	15	0	15	2.982e-5	1	NC	1	NC	1
408			min	-.003	3	-.005	3	0	1	1.259e-6	15	NC	1	NC	1
409		15	max	.002	2	0	15	0	15	2.095e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	3	0	1	8.877e-7	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.208e-5	1	NC	1	NC	1
412			min	-.002	3	-.003	3	0	1	5.163e-7	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	3.207e-6	1	NC	1	NC	1
414			min	-.001	3	-.002	3	0	1	8.466e-8	10	NC	1	NC	1
415		18	max	0	2	0	15	0	15	1.096e-7	3	NC	1	NC	1
416			min	0	3	-.001	3	0	1	-5.664e-6	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-5.979e-7	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.454e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	4.966e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.05e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-4.54e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.086e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-1.113e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-2.67e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	15	-1.772e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	1	-4.253e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	15	-2.431e-6	15	NC	1	NC	1
428			min	-.001	2	-.007	4	0	1	-5.836e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-3.09e-6	15	NC	1	NC	1
430			min	-.002	2	-.009	4	0	1	-7.419e-5	1	NC	1	NC	1
431		7	max	.002	3	-.003	15	0	15	-3.749e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-9.002e-5	1	8615.008	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-4.408e-6	15	NC	1	NC	1
434			min	-.002	2	-.012	4	0	1	-1.059e-4	1	7734.004	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-5.067e-6	15	NC	2	NC	1
436			min	-.003	2	-.013	4	-.001	1	-1.217e-4	1	7213.036	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-5.726e-6	15	NC	2	NC	1
438			min	-.003	2	-.013	4	-.001	1	-1.375e-4	1	6961.331	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-6.385e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.003	2	-.013	4	-.002	1	-1.533e-4	1	6941.802	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-7.044e-6	15	NC	2	NC	1
442			min	-.004	2	-.013	4	-.002	1	-1.692e-4	1	7156.825	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-7.703e-6	15	NC	1	NC	1
444			min	-.004	2	-.012	4	-.002	1	-1.85e-4	1	7650.977	4	NC	1
445		14	max	.005	3	-.003	15	0	15	-8.362e-6	15	NC	1	NC	1
446			min	-.005	2	-.011	4	-.003	1	-2.008e-4	1	8534.145	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-9.021e-6	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.003	1	-2.167e-4	1	NC	1	NC	1
449		16	max	.006	3	-.002	15	0	15	-9.68e-6	15	NC	1	NC	1
450			min	-.005	2	-.008	4	-.004	1	-2.325e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-1.034e-5	15	NC	1	NC	1
452			min	-.006	2	-.005	4	-.004	1	-2.483e-4	1	NC	1	NC	1
453		18	max	.007	3	0	15	0	15	-1.1e-5	15	NC	1	NC	1
454			min	-.006	2	-.004	1	-.005	1	-2.642e-4	1	NC	1	NC	1
455		19	max	.007	3	0	15	0	15	-1.166e-5	15	NC	1	NC	1
456			min	-.006	2	-.002	1	-.005	1	-2.8e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.006	2	.005	1	-1.918e-6	15	NC	1	NC	2
458			min	0	3	-.008	3	0	15	-4.572e-5	1	NC	1	4697.87	1
459		2	max	.002	1	.005	2	.005	1	-1.918e-6	15	NC	1	NC	2
460			min	0	3	-.007	3	0	15	-4.572e-5	1	NC	1	5106.66	1
461		3	max	.002	1	.005	2	.004	1	-1.918e-6	15	NC	1	NC	2
462			min	0	3	-.007	3	0	15	-4.572e-5	1	NC	1	5593.297	1
463		4	max	.002	1	.005	2	.004	1	-1.918e-6	15	NC	1	NC	2
464			min	0	3	-.006	3	0	15	-4.572e-5	1	NC	1	6177.984	1
465		5	max	.002	1	.005	2	.004	1	-1.918e-6	15	NC	1	NC	2
466			min	0	3	-.006	3	0	15	-4.572e-5	1	NC	1	6888.177	1
467		6	max	.002	1	.004	2	.003	1	-1.918e-6	15	NC	1	NC	2
468			min	0	3	-.005	3	0	15	-4.572e-5	1	NC	1	7761.952	1
469		7	max	.002	1	.004	2	.003	1	-1.918e-6	15	NC	1	NC	2
470			min	0	3	-.005	3	0	15	-4.572e-5	1	NC	1	8853.356	1
471		8	max	.002	1	.004	2	.002	1	-1.918e-6	15	NC	1	NC	1
472			min	0	3	-.005	3	0	15	-4.572e-5	1	NC	1	NC	1
473		9	max	.001	1	.003	2	.002	1	-1.918e-6	15	NC	1	NC	1
474			min	0	3	-.004	3	0	15	-4.572e-5	1	NC	1	NC	1
475		10	max	.001	1	.003	2	.002	1	-1.918e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-4.572e-5	1	NC	1	NC	1
477		11	max	.001	1	.003	2	.001	1	-1.918e-6	15	NC	1	NC	1
478			min	0	3	-.003	3	0	15	-4.572e-5	1	NC	1	NC	1
479		12	max	0	1	.002	2	.001	1	-1.918e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-4.572e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-1.918e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-4.572e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-1.918e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-4.572e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-1.918e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-4.572e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-1.918e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-4.572e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-1.918e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-4.572e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-1.918e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-4.572e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-1.918e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-4.572e-5	1	NC	1	NC	1
495	M1	1	max	.009	3	.128	2	0	1	1.001e-2	2	NC	1	NC	1
496			min	-.005	2	-.025	3	0	15	-2.165e-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	.009	3	.061	2	0	15	4.916e-3	2	NC	4	NC	1
498			min	-.005	2	-.01	3	-.004	1	-1.071e-2	3	1723.773	2	NC	1
499		3	max	.009	3	.014	3	0	15	3.29e-5	10	NC	5	NC	1
500			min	-.005	2	-.011	2	-.006	1	-1.182e-4	3	832.384	2	NC	1
501		4	max	.009	3	.054	3	0	15	3.955e-3	2	NC	5	NC	1
502			min	-.005	2	-.091	2	-.005	1	-4.383e-3	3	526.922	2	NC	1
503		5	max	.009	3	.106	3	0	15	7.885e-3	2	NC	5	NC	1
504			min	-.005	2	-.174	2	-.004	1	-8.648e-3	3	381.192	2	NC	1
505		6	max	.009	3	.162	3	0	15	1.181e-2	2	NC	15	NC	1
506			min	-.005	2	-.255	2	-.002	1	-1.291e-2	3	300.777	2	NC	1
507		7	max	.008	3	.216	3	0	1	1.574e-2	2	NC	15	NC	1
508			min	-.005	2	-.327	2	0	3	-1.718e-2	3	253.241	2	NC	1
509		8	max	.008	3	.261	3	0	1	1.967e-2	2	NC	15	NC	1
510			min	-.005	2	-.384	2	0	15	-2.144e-2	3	225.093	2	NC	1
511		9	max	.008	3	.29	3	0	15	2.222e-2	2	9560.833	15	NC	1
512			min	-.005	2	-.42	2	0	1	-2.17e-2	3	210.428	2	NC	1
513		10	max	.008	3	.3	3	0	1	2.385e-2	2	9359.984	15	NC	1
514			min	-.005	2	-.432	2	0	15	-1.93e-2	3	206.125	2	NC	1
515		11	max	.008	3	.293	3	0	1	2.548e-2	2	9560.373	15	NC	1
516			min	-.005	2	-.42	2	0	15	-1.689e-2	3	211.131	2	NC	1
517		12	max	.008	3	.268	3	0	15	2.452e-2	2	NC	15	NC	1
518			min	-.005	2	-.382	2	0	1	-1.431e-2	3	227.214	2	NC	1
519		13	max	.007	3	.229	3	0	15	1.966e-2	2	NC	15	NC	1
520			min	-.004	2	-.323	2	0	1	-1.145e-2	3	258.364	2	NC	1
521		14	max	.007	3	.178	3	.001	1	1.48e-2	2	NC	15	NC	1
522			min	-.004	2	-.248	2	0	15	-8.6e-3	3	311.65	2	NC	1
523		15	max	.007	3	.121	3	.003	1	9.942e-3	2	NC	5	NC	1
524			min	-.004	2	-.166	2	0	15	-5.745e-3	3	403.421	2	NC	1
525		16	max	.007	3	.062	3	.005	1	5.083e-3	2	NC	5	NC	1
526			min	-.004	2	-.083	2	0	15	-2.891e-3	3	573.436	2	NC	1
527		17	max	.007	3	.005	3	.005	1	3.831e-4	1	NC	5	NC	1
528			min	-.004	2	-.006	2	0	15	-3.628e-5	3	936.988	2	NC	1
529		18	max	.007	3	.057	2	.004	1	7.799e-3	2	NC	4	NC	1
530			min	-.004	2	-.047	3	0	15	-3.16e-3	3	1988.677	2	NC	1
531		19	max	.007	3	.114	2	0	15	1.567e-2	2	NC	1	NC	1
532			min	-.004	2	-.095	3	0	1	-6.424e-3	3	NC	1	NC	1
533	M5	1	max	.028	3	.263	2	0	1	0	1	NC	1	NC	1
534			min	-.02	2	-.008	3	0	1	0	1	NC	1	NC	1
535		2	max	.028	3	.124	2	0	1	0	1	NC	5	NC	1
536			min	-.02	2	.002	15	0	1	0	1	831.281	2	NC	1
537		3	max	.028	3	.043	3	0	1	0	1	NC	5	NC	1
538			min	-.02	2	-.033	2	0	1	0	1	390.39	2	NC	1
539		4	max	.028	3	.139	3	0	1	0	1	NC	15	NC	1
540			min	-.019	2	-.222	2	0	1	0	1	238.37	2	NC	1
541		5	max	.027	3	.273	3	0	1	0	1	8664.305	15	NC	1
542			min	-.019	2	-.427	2	0	1	0	1	167.453	2	NC	1
543		6	max	.027	3	.424	3	0	1	0	1	6660.402	15	NC	1
544			min	-.019	2	-.63	2	0	1	0	1	129.252	2	NC	1
545		7	max	.026	3	.572	3	0	1	0	1	5505.212	15	NC	1
546			min	-.018	2	-.815	2	0	1	0	1	107.115	2	NC	1
547		8	max	.026	3	.697	3	0	1	0	1	4834.426	15	NC	1
548			min	-.018	2	-.963	2	0	1	0	1	94.212	2	NC	1
549		9	max	.025	3	.777	3	0	1	0	1	4490.775	15	NC	1
550			min	-.018	2	-1.057	2	0	1	0	1	87.585	2	NC	1
551		10	max	.024	3	.806	3	0	1	0	1	4387.301	15	NC	1
552			min	-.018	2	-1.089	2	0	1	0	1	85.646	2	NC	1
553		11	max	.024	3	.786	3	0	1	0	1	4490.978	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	-.017	2	-1.057	2	0	1	0	1	87.896	2	NC	1
555		12	max	.023	3	.718	3	0	1	0	1	4834.895	15	NC	1
556			min	-.017	2	-.959	2	0	1	0	1	95.241	2	NC	1
557		13	max	.023	3	.608	3	0	1	0	1	5506.14	15	NC	1
558			min	-.017	2	-.803	2	0	1	0	1	109.799	2	NC	1
559		14	max	.022	3	.47	3	0	1	0	1	6662.173	15	NC	1
560			min	-.016	2	-.609	2	0	1	0	1	135.335	2	NC	1
561		15	max	.022	3	.316	3	0	1	0	1	8667.744	15	NC	1
562			min	-.016	2	-.4	2	0	1	0	1	180.79	2	NC	1
563		16	max	.021	3	.16	3	0	1	0	1	NC	15	NC	1
564			min	-.016	2	-.196	2	0	1	0	1	268.73	2	NC	1
565		17	max	.021	3	.014	3	0	1	0	1	NC	5	NC	1
566			min	-.016	2	-.019	2	0	1	0	1	465.922	2	NC	1
567		18	max	.021	3	.114	2	0	1	0	1	NC	5	NC	1
568			min	-.016	2	-.109	3	0	1	0	1	1037.446	2	NC	1
569		19	max	.021	3	.221	2	0	1	0	1	NC	1	NC	1
570			min	-.016	2	-.221	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.009	3	.128	2	0	15	2.165e-2	3	NC	1	NC	1
572			min	-.005	2	-.025	3	0	1	-1.001e-2	2	NC	1	NC	1
573		2	max	.009	3	.061	2	.004	1	1.071e-2	3	NC	4	NC	1
574			min	-.005	2	-.01	3	0	15	-4.916e-3	2	1723.773	2	NC	1
575		3	max	.009	3	.014	3	.006	1	1.182e-4	3	NC	5	NC	1
576			min	-.005	2	-.011	2	0	15	-3.29e-5	10	832.384	2	NC	1
577		4	max	.009	3	.054	3	.005	1	4.383e-3	3	NC	5	NC	1
578			min	-.005	2	-.091	2	0	15	-3.955e-3	2	526.922	2	NC	1
579		5	max	.009	3	.106	3	.004	1	8.648e-3	3	NC	5	NC	1
580			min	-.005	2	-.174	2	0	15	-7.885e-3	2	381.192	2	NC	1
581		6	max	.009	3	.162	3	.002	1	1.291e-2	3	NC	15	NC	1
582			min	-.005	2	-.255	2	0	15	-1.181e-2	2	300.777	2	NC	1
583		7	max	.008	3	.216	3	0	3	1.718e-2	3	NC	15	NC	1
584			min	-.005	2	-.327	2	0	1	-1.574e-2	2	253.241	2	NC	1
585		8	max	.008	3	.261	3	0	15	2.144e-2	3	NC	15	NC	1
586			min	-.005	2	-.384	2	0	1	-1.967e-2	2	225.093	2	NC	1
587		9	max	.008	3	.29	3	0	1	2.17e-2	3	9560.833	15	NC	1
588			min	-.005	2	-.42	2	0	15	-2.222e-2	2	210.428	2	NC	1
589		10	max	.008	3	.3	3	0	15	1.93e-2	3	9359.984	15	NC	1
590			min	-.005	2	-.432	2	0	1	-2.385e-2	2	206.125	2	NC	1
591		11	max	.008	3	.293	3	0	15	1.689e-2	3	9560.373	15	NC	1
592			min	-.005	2	-.42	2	0	1	-2.548e-2	2	211.131	2	NC	1
593		12	max	.008	3	.268	3	0	1	1.431e-2	3	NC	15	NC	1
594			min	-.005	2	-.382	2	0	15	-2.452e-2	2	227.214	2	NC	1
595		13	max	.007	3	.229	3	0	1	1.145e-2	3	NC	15	NC	1
596			min	-.004	2	-.323	2	0	15	-1.966e-2	2	258.364	2	NC	1
597		14	max	.007	3	.178	3	0	15	8.6e-3	3	NC	15	NC	1
598			min	-.004	2	-.248	2	-.001	1	-1.48e-2	2	311.65	2	NC	1
599		15	max	.007	3	.121	3	0	15	5.745e-3	3	NC	5	NC	1
600			min	-.004	2	-.166	2	-.003	1	-9.942e-3	2	403.421	2	NC	1
601		16	max	.007	3	.062	3	0	15	2.891e-3	3	NC	5	NC	1
602			min	-.004	2	-.083	2	-.005	1	-5.083e-3	2	573.436	2	NC	1
603		17	max	.007	3	.005	3	0	15	3.628e-5	3	NC	5	NC	1
604			min	-.004	2	-.006	2	-.005	1	-3.831e-4	1	936.988	2	NC	1
605		18	max	.007	3	.057	2	0	15	3.16e-3	3	NC	4	NC	1
606			min	-.004	2	-.047	3	-.004	1	-7.799e-3	2	1988.677	2	NC	1
607		19	max	.007	3	.114	2	0	1	6.424e-3	3	NC	1	NC	1
608			min	-.004	2	-.095	3	0	15	-1.567e-2	2	NC	1	NC	1

SIMPSON Strong-Tie Anchor Designer™ Software Version 2.4.5673.0	Company:	Schletter, Inc.	Date:	11/17/2015
	Engineer:	HCV	Page:	1/5
	Project:	Standard PVMax - Worst Case, 14-42 Inch Width		
	Address:			
	Phone:			
	E-mail:			

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

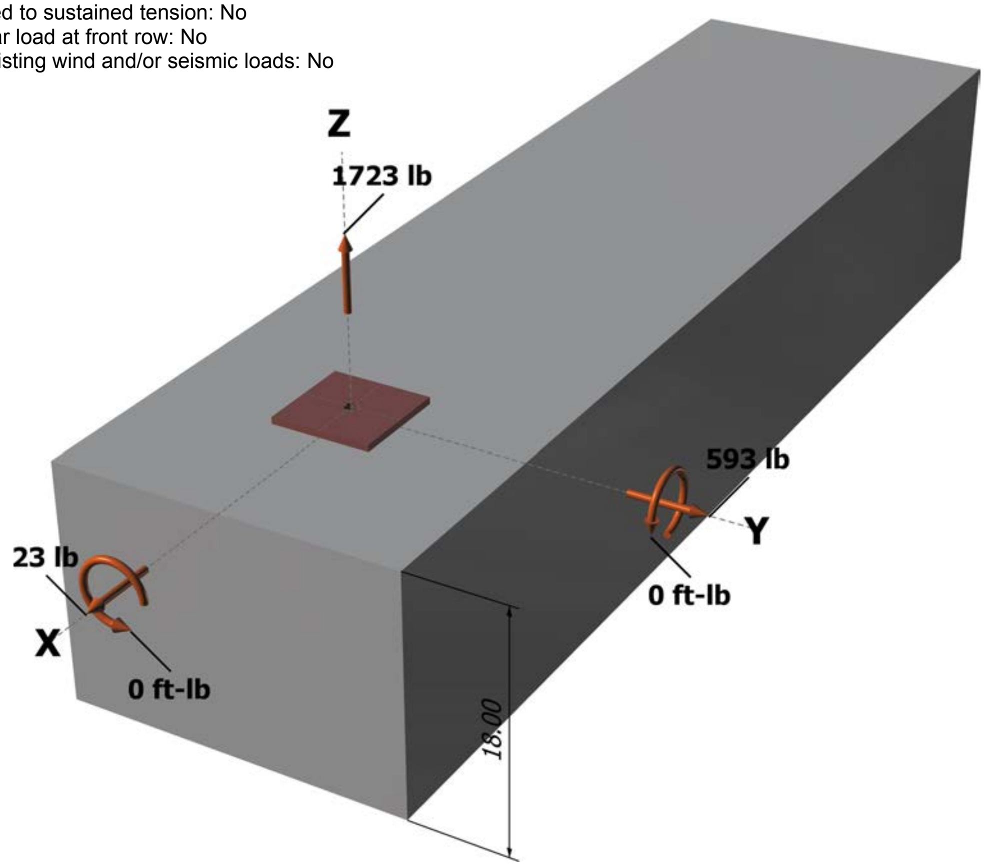
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 14-42 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>

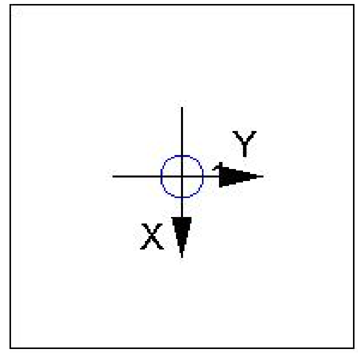
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

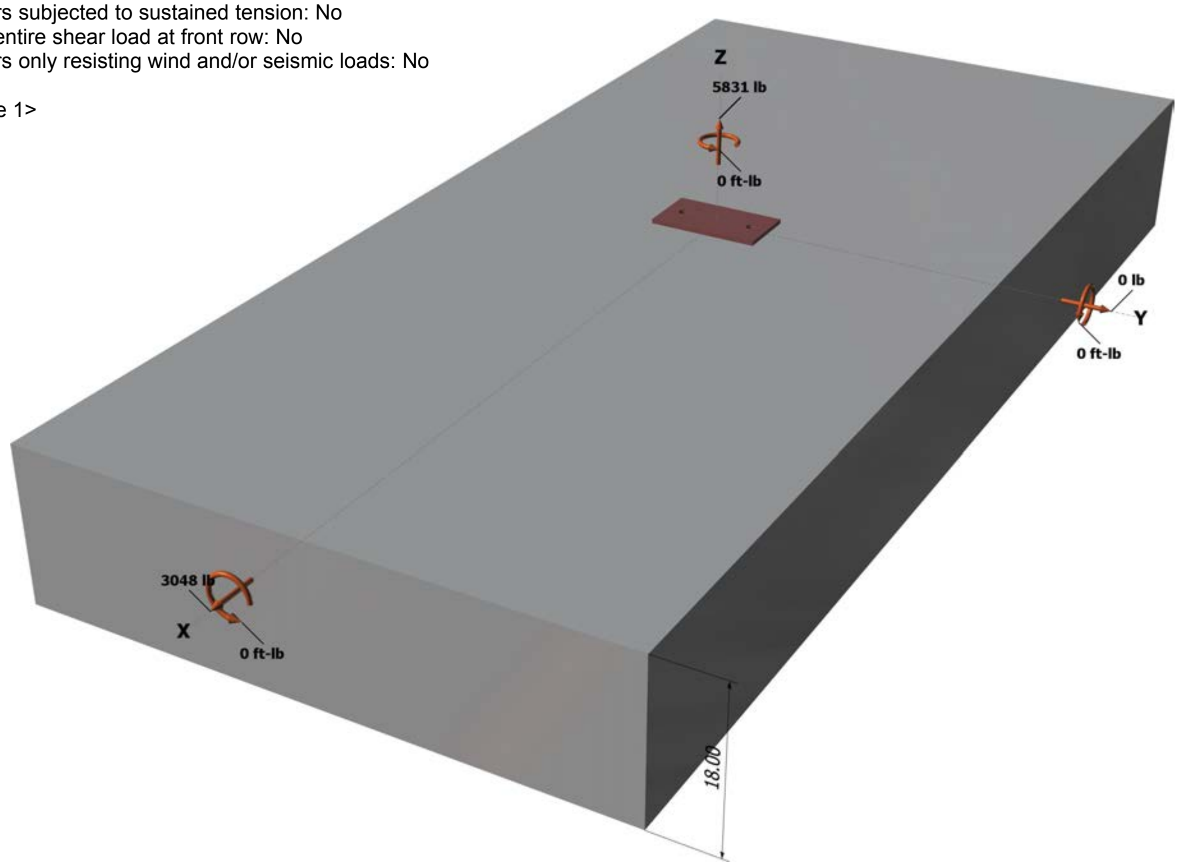
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

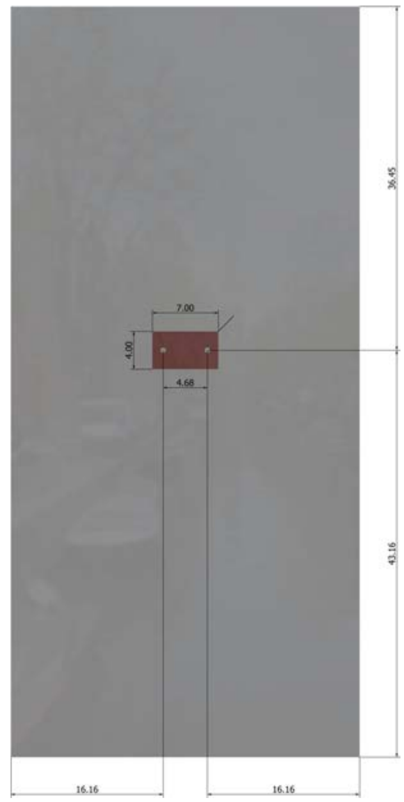
<Figure 1>



Anchor Designer™
Software
Version 2.4.5673.0

Company:	Schletter, Inc.	Date:	11/17/2015
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 37-42 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



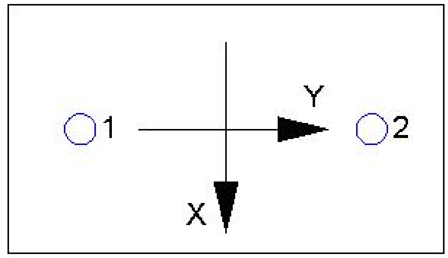
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2915.5	1524.0	0.0	1524.0
2	2915.5	1524.0	0.0	1524.0
Sum	5831.0	3048.0	0.0	3048.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5831
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)
666.00	648.00	1.000	0.969	1.000	1.000	15593	0.70	10875

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	16.16	24369

$\phi V_{cbx} = \phi\, (2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
872.64	1175.16	1.000	1.000	1.000	24369	0.70	25334

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	2916	6071	0.48	Pass
Concrete breakout	5831	10231	0.57	Pass
Adhesive	**5831**	**8093**	**0.72**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**1524**	**3156**	**0.48**	**Pass (Governs)**
T Concrete breakout x+	3048	10875	0.28	Pass
|| Concrete breakout y-	1524	25334	0.06	Pass
Pryout	3048	20601	0.15	Pass

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

Sec. D.7.3	0.72	0.48	120.3 %	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.