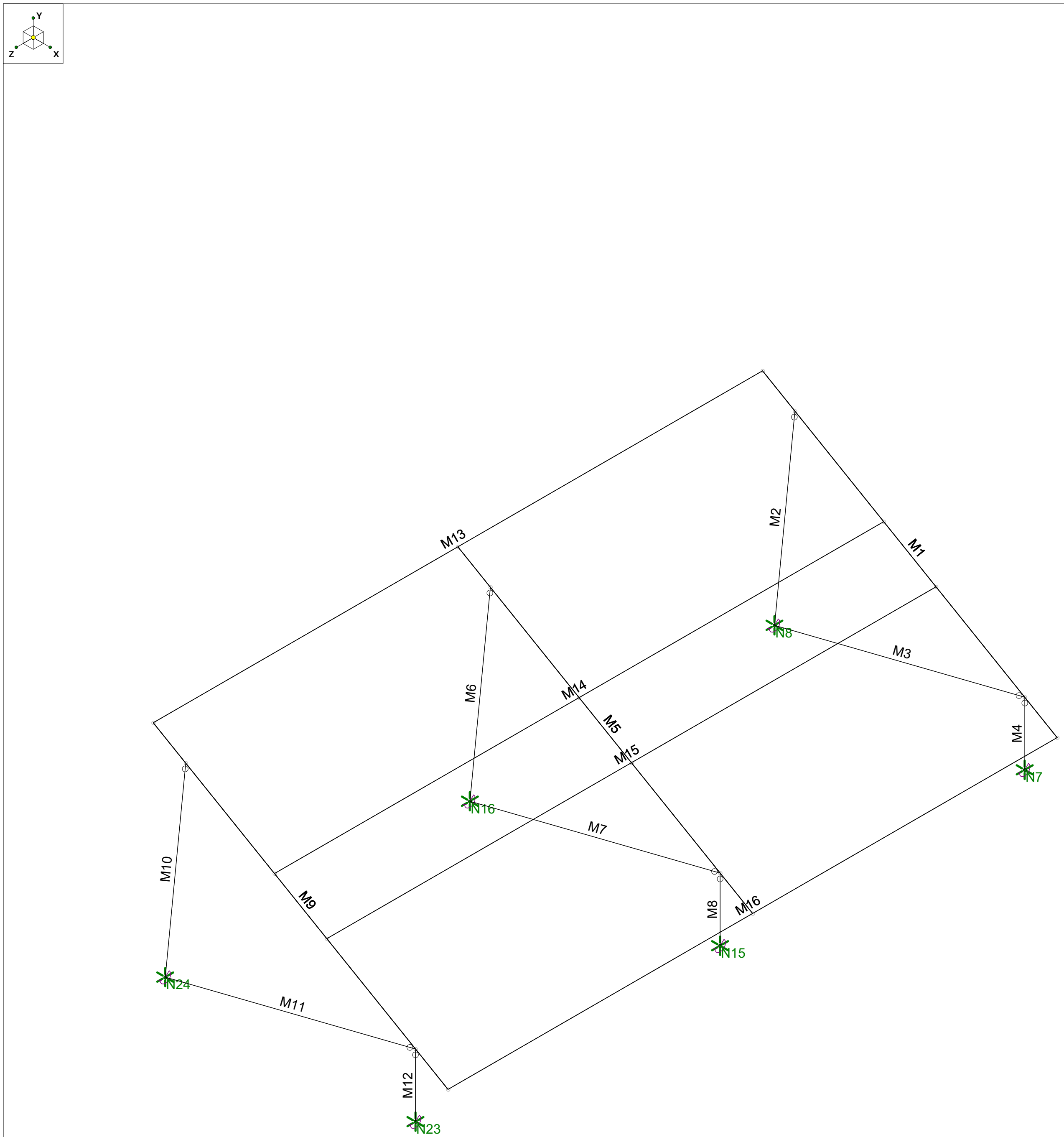


Schletter, Inc.	Standard PVMax Racking System	30° Tilt w/ Seismic Design
HCV	Representative Calculations - ASCE 7-10	

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.

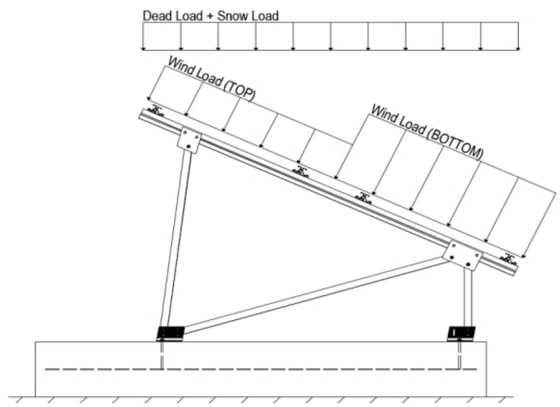
1.2 Construction

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

Modules Per Row = 2
Module Tilt = 30°
Maximum Height Above Grade = 3 ft



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

1.3 Technical Codes

- ASCE 7-10 - 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 = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 140 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

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

Pressure Coefficients

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

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

2.4 Seismic Loads

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.07	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

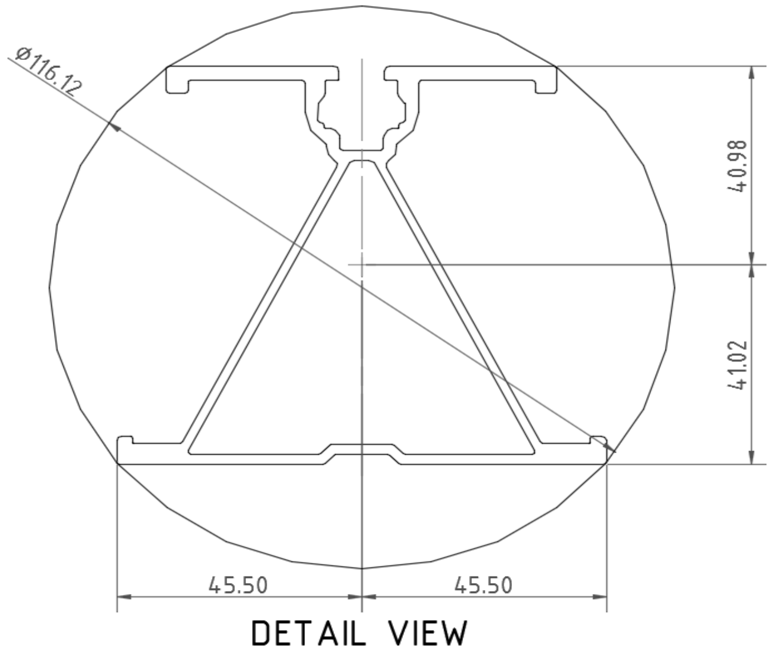
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

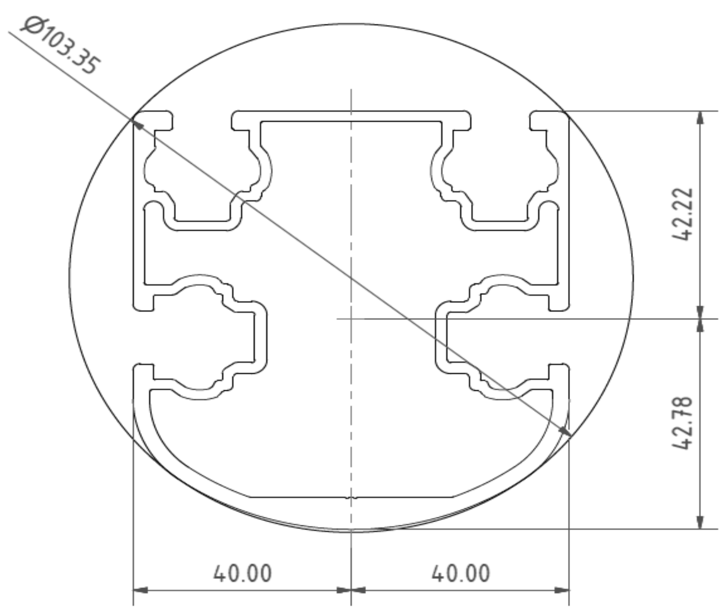
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	93	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.701	k-ft
M_z =	0.110	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	71%	



4.2 Girder Design

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

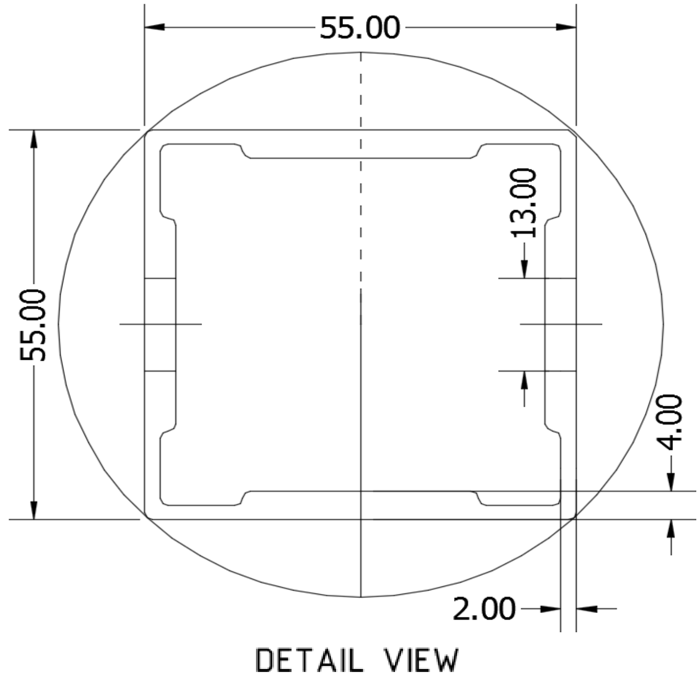
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.318	k-ft
M_z =	0.000	k-ft
P_n =	-1.004	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	99%	



4.3 Front Strut Design

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

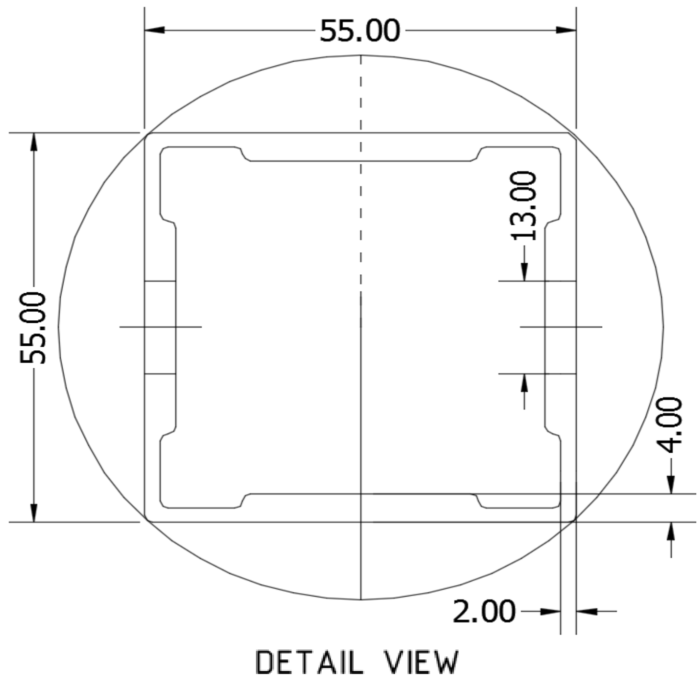
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.513	k-ft
P_n =	0.379	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	38%	



4.4 Diagonal Strut Design

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

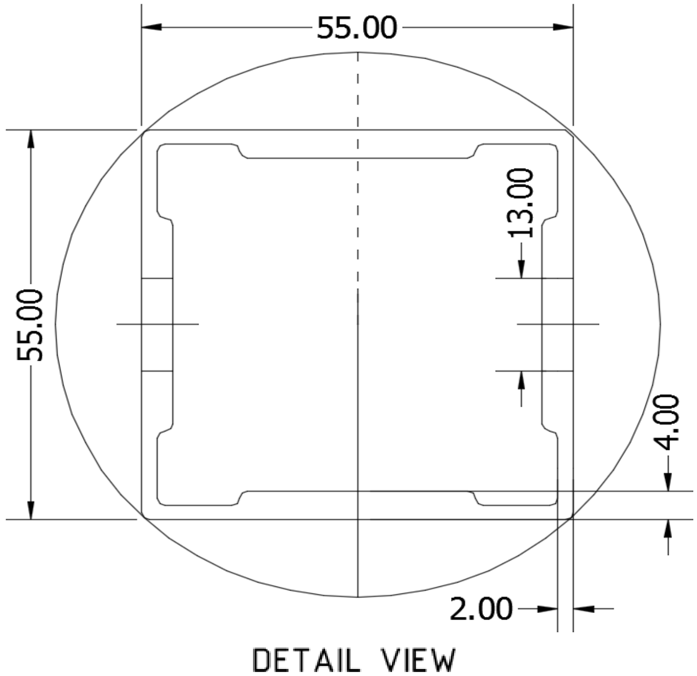
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	2.672	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	45%	



4.5 Rear Strut Design

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

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.35	in
$\Phi F_{ty\ AXIAL}$ =	8.88	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.012	k-ft
M_z =	0.000	k-ft
P_n =	3.248	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.726	k
Utilization =	38%	



5. FOUNDATION DESIGN CALCULATIONS

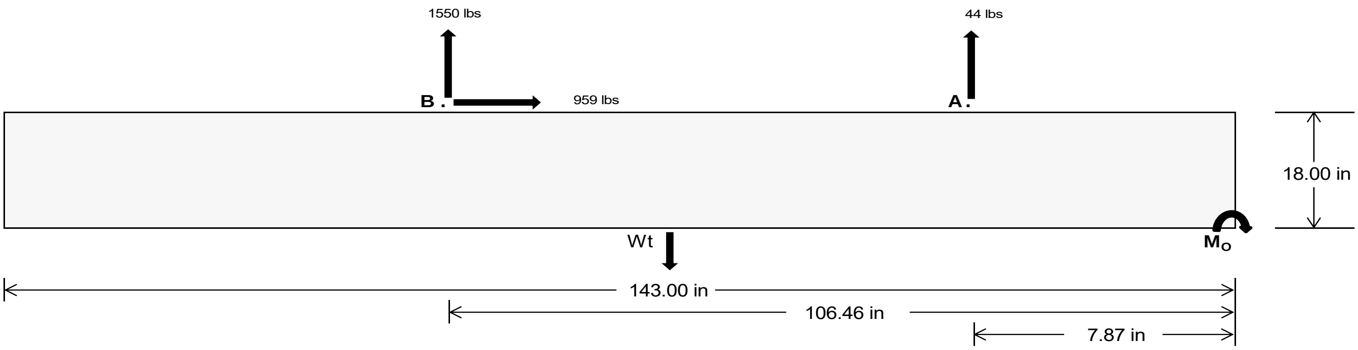
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	211.30	6733.68	k
Compressive Load =	3274.01	5055.80	k
Lateral Load =	350.93	4156.64	k
Moment (Weak Axis) =	0.68	0.24	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		Footing Reinforcement
Weight of Concrete =	145 pcf	*Use fiber reinforcing with (2) #5 rebar.*
Compressive Strength =	2500 psi	
Yield Strength =	60000 psi	

Overturning Check		
M_O =	182656.8 in-lbs	
Resisting Force Required =	2554.64 lbs	*A minimum 143in long x 35in wide x 18in tall ballast foundation is required to resist overturning.*
S.F. =	1.67	
Weight Required =	4257.74 lbs	
Minimum Width =	35 in in	
Weight Provided =	7559.64 lbs	

Sliding		
Force =	959.23 lbs	
Friction =	0.4	*Use a 143in long x 35in wide x 18in tall ballast foundation to resist sliding. Friction is OK.*
Weight Required =	2398.09 lbs	
Resisting Weight =	7559.64 lbs	
Additional Weight Required =	0 lbs	

Cohesion		
Sliding Force =	959.23 lbs	
Cohesion =	130 psf	
Area =	34.76 ft^2	*Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.*
Resisting =	3779.82 lbs	
Additional Weight Required =	0 lbs	

Shear Key		
Additional Force =	0 lbs	
Lateral Bearing Pressure =	200 psf/ft	
Required Depth =	0.00 ft	*Shear key is not required.*
f'_c =	2500 psi	
Length =	8 in	

Bearing Pressure

	Ballast Width			
	35 in	36 in	37 in	38 in
P_{ftg} = (145 pcf)(11.92 ft)(1.5 ft)(2.92 ft) =	7560 lbs	7776 lbs	7992 lbs	8208 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1087 lbs	1087 lbs	1087 lbs	1087 lbs	1279 lbs	1279 lbs	1279 lbs	1279 lbs	1659 lbs	1659 lbs	1659 lbs	1659 lbs	-89 lbs	-89 lbs	-89 lbs	-89 lbs
F_B	1066 lbs	1066 lbs	1066 lbs	1066 lbs	2143 lbs	2143 lbs	2143 lbs	2143 lbs	2294 lbs	2294 lbs	2294 lbs	2294 lbs	-3101 lbs	-3101 lbs	-3101 lbs	-3101 lbs
F_V	142 lbs	142 lbs	142 lbs	142 lbs	1728 lbs	1728 lbs	1728 lbs	1728 lbs	1389 lbs	1389 lbs	1389 lbs	1389 lbs	-1918 lbs	-1918 lbs	-1918 lbs	-1918 lbs
P_{total}	9713 lbs	9929 lbs	10145 lbs	10361 lbs	10982 lbs	11198 lbs	11414 lbs	11630 lbs	11513 lbs	11729 lbs	11945 lbs	12161 lbs	1347 lbs	1476 lbs	1606 lbs	1735 lbs
M	2872 lbs-ft	2872 lbs-ft	2872 lbs-ft	2872 lbs-ft	3130 lbs-ft	3130 lbs-ft	3130 lbs-ft	3130 lbs-ft	4196 lbs-ft	4196 lbs-ft	4196 lbs-ft	4196 lbs-ft	5685 lbs-ft	5685 lbs-ft	5685 lbs-ft	5685 lbs-ft
e	0.30 ft	0.29 ft	0.28 ft	0.28 ft	0.29 ft	0.28 ft	0.27 ft	0.27 ft	0.36 ft	0.36 ft	0.35 ft	0.35 ft	4.22 ft	3.85 ft	3.54 ft	3.28 ft
L/6	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft	1.99 ft
f_{min}	237.8 psf	237.3 psf	236.7 psf	236.2 psf	270.6 psf	269.1 psf	267.7 psf	266.4 psf	270.5 psf	269.0 psf	267.6 psf	266.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	321.1 psf	318.2 psf	315.5 psf	312.9 psf	361.3 psf	357.3 psf	353.5 psf	349.9 psf	392.0 psf	387.2 psf	382.6 psf	378.2 psf	177.2 psf	155.7 psf	143.6 psf	136.2 psf

Maximum Bearing Pressure = 392 psf
Allowable Bearing Pressure = 1500 psf

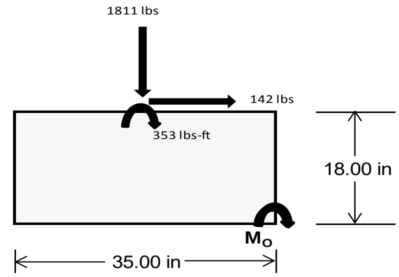
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 2076.0 ft-lbs
Resisting Force Required = 1423.52 lbs
S.F. = 1.67
Weight Required = 2372.53 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

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



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	35 in			35 in			35 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	304 lbs	566 lbs	173 lbs	731 lbs	1811 lbs	630 lbs	135 lbs	165 lbs	4 lbs
F_V	197 lbs	192 lbs	201 lbs	144 lbs	142 lbs	156 lbs	198 lbs	193 lbs	199 lbs
P_{total}	9663 lbs	9925 lbs	9532 lbs	9640 lbs	10720 lbs	9539 lbs	2872 lbs	2902 lbs	2741 lbs
M	763 lbs-ft	750 lbs-ft	774 lbs-ft	566 lbs-ft	565 lbs-ft	605 lbs-ft	764 lbs-ft	747 lbs-ft	768 lbs-ft
e	0.08 ft	0.08 ft	0.08 ft	0.06 ft	0.05 ft	0.06 ft	0.27 ft	0.26 ft	0.28 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	232.8 psf	241.2 psf	228.4 psf	243.8 psf	275.0 psf	238.6 psf	37.4 psf	39.3 psf	33.4 psf
f_{max}	323.2 psf	329.9 psf	320.1 psf	310.9 psf	341.9 psf	310.3 psf	127.8 psf	127.7 psf	124.3 psf

Maximum Bearing Pressure = 342 psf
Allowable Bearing Pressure = 1500 psf

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

Foundation Requirements: 143in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

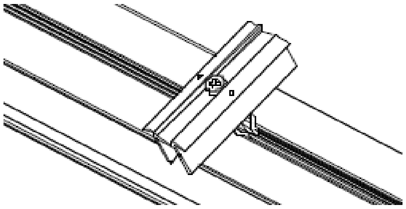
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

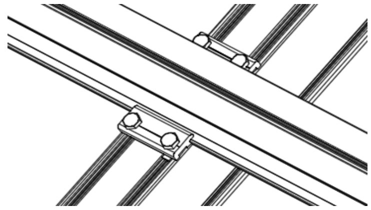
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.887	k
Allowable Uplift =	1.214	k
Utilization =	73%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	2.456	k
Allowable Uplift =	4.357	k
Utilization =	56%	



6.2 Strut Connections

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

Front Strut

Maximum Axial Load =	2.518	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	34%	

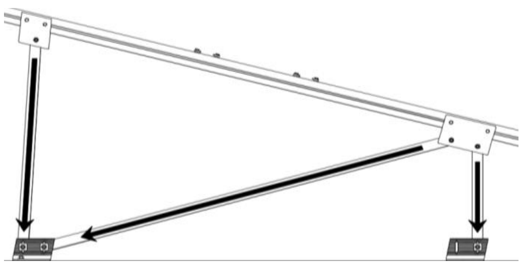
Rear Strut

Maximum Axial Load =	4.531	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	61%	

Diagonal Strut

Maximum Axial Load =	2.809	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	38%	

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

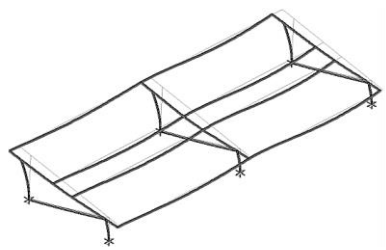
7.1 Seismic Drift

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

Mean Height, h_{sx} =	60.93	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	1.219	in
Max Drift, Δ_{MAX} =	0.7	in

$0.7 \leq 1.219$, OK.

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 93 in

J = 0.432

257.282

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.1 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

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 = 93

J = 0.432

163.616

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.2

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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 = 104.56 in
J = 1.08
179.85

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

S1 = 0.51461

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

S2 = 1701.56
φF_L= φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L= 29.0 ksi

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 104.56
J = 1.08
190.335

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$S2 = C_t$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L St$ = 29.0 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St$ = 3.323 k-ft

$\varphi F_L Wk$ = 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 28.2 ksi

3.4.16 (Weak)

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

$\varphi F_L = \varphi b[Bp-1.6Dp*b/t]$

$\varphi F_L =$ 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

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 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

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

$M_{max}Wk$ = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

$\varphi F_L = (\varphi ccFcy)/(\lambda^2)$

$\varphi F_L =$ 6.10803 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 78.35 in
J = 0.942
122.273

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.35
J = 0.942
122.273

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 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 = 1.8125

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83375

φF_L= (φccFcy)/(λ²)

φF_L= 8.88278 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.88 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.14 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				4		
2	Dead Load, Min	DL		-1				4		
3	Snow Load	SL						4		
4	Wind Load - Pressure	WL						4		
5	Wind Load - Suction	WL						4		
6	Seismic - Lateral	EL			.8			8		

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-9.843	-9.843	0	0
2	M14	Y	-9.843	-9.843	0	0
3	M15	Y	-9.843	-9.843	0	0
4	M16	Y	-9.843	-9.843	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-5.454	-5.454	0	0
2	M14	Y	-5.454	-5.454	0	0
3	M15	Y	-5.454	-5.454	0	0
4	M16	Y	-5.454	-5.454	0	0

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-46.866	-46.866	0	0
2	M14	Y	-46.866	-46.866	0	0
3	M15	Y	-46.866	-46.866	0	0
4	M16	Y	-46.866	-46.866	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-116.109	-116.109	0	0
2	M14	y	-116.109	-116.109	0	0
3	M15	y	-186.784	-186.784	0	0
4	M16	y	-186.784	-186.784	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	262.507	262.507	0	0
2	M14	y	201.928	201.928	0	0
3	M15	y	111.061	111.061	0	0
4	M16	y	111.061	111.061	0	0

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	7.874	7.874	0	0
2	M14	Z	7.874	7.874	0	0
3	M15	Z	7.874	7.874	0	0
4	M16	Z	7.874	7.874	0	0
5	M13	Z	0	0	0	0
6	M14	Z	0	0	0	0
7	M15	Z	0	0	0	0
8	M16	Z	0	0	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												
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	885.665	2	1271.08	2	.544	1	.002	1	0	1	0	1
2		min	-1061.598	3	-1660.332	3	-31.352	5	-.185	4	0	1	0	1
3	N7	max	.026	9	973.289	1	-.826	12	-.002	12	0	1	0	1
4		min	-.26	2	-78.934	5	-269.946	4	-.526	4	0	1	0	1
5	N15	max	.014	9	2518.471	1	0	12	0	12	0	1	0	1
6		min	-2.515	2	-162.54	3	-254.82	4	-.504	4	0	1	0	1
7	N16	max	2926.545	2	3889.078	2	0	2	0	2	0	1	0	1
8		min	-3197.418	3	-5179.75	3	-31.514	5	-.187	4	0	1	0	1
9	N23	max	.04	14	973.289	1	10.774	1	.021	1	0	1	0	1
10		min	-.26	2	-19.873	3	-261.468	5	-.513	4	0	1	0	1
11	N24	max	885.665	2	1271.08	2	-.055	12	0	12	0	1	0	1
12		min	-1061.598	3	-1660.332	3	-32.084	5	-.186	4	0	1	0	1
13	Totals:	max	4694.841	2	10595.392	2	0	1						
14		min	-5320.817	3	-8702.699	3	-876.031	5						

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	67.527	4	419.286	2	-9.544	12	0	15	.182	4	0	4
2			min	5.349	12	-750.938	3	-161.522	1	-.014	2	.015	12	0	3
3		2	max	61.244	1	291.674	2	-7.746	12	0	15	.117	4	.551	3
4			min	5.349	12	-529.56	3	-123.374	1	-.014	2	.003	10	-.306	2
5		3	max	61.244	1	164.061	2	-5.949	12	0	15	.07	5	.912	3
6			min	5.349	12	-308.183	3	-85.226	1	-.014	2	-.041	1	-.502	2
7		4	max	61.244	1	36.449	2	-4.151	12	0	15	.039	5	1.082	3
8			min	5.349	12	-86.805	3	-47.078	1	-.014	2	-.098	1	-.589	2
9		5	max	61.244	1	134.573	3	.11	10	0	15	.011	5	1.062	3
10			min	5.349	12	-91.163	2	-34.569	4	-.014	2	-.122	1	-.565	2
11		6	max	61.244	1	355.95	3	29.218	1	0	15	-.007	12	.85	3
12			min	1.197	15	-218.775	2	-28.996	5	-.014	2	-.114	1	-.432	2
13		7	max	61.244	1	577.328	3	67.367	1	0	15	-.006	12	.448	3
14			min	-8.212	5	-346.388	2	-26.26	5	-.014	2	-.072	1	-.188	2
15		8	max	61.244	1	798.705	3	105.515	1	0	15	.005	2	.165	2
16			min	-18.373	5	-474	2	-23.524	5	-.014	2	-.062	4	-.144	3
17		9	max	61.244	1	1020.083	3	143.663	1	0	15	.11	1	.628	2
18			min	-28.535	5	-601.612	2	-20.788	5	-.014	2	-.08	5	-.927	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
19		10	max	61.75	4	729.224	2	-6.634	12	.014	2	.25	1	1.201	2
20			min	5.349	12	-1241.461	3	-181.811	1	-.004	3	.004	12	-1.901	3
21		11	max	61.244	1	601.612	2	-4.836	12	.014	2	.121	4	.628	2
22			min	5.349	12	-1020.083	3	-143.663	1	0	15	-.003	3	-.927	3
23		12	max	61.244	1	474	2	-3.039	12	.014	2	.061	4	.165	2
24			min	5.349	12	-798.705	3	-105.515	1	0	15	-.008	3	-.144	3
25		13	max	61.244	1	346.388	2	-1.241	12	.014	2	.029	5	.448	3
26			min	5.349	12	-577.328	3	-67.367	1	0	15	-.072	1	-.188	2
27		14	max	61.244	1	218.775	2	1.142	3	.014	2	0	15	.85	3
28			min	4.532	15	-355.95	3	-40.004	4	0	15	-.114	1	-.432	2
29		15	max	61.244	1	91.163	2	8.93	1	.014	2	-.005	12	1.062	3
30			min	-3.31	5	-134.573	3	-30.283	5	0	15	-.122	1	-.565	2
31		16	max	61.244	1	86.805	3	47.078	1	.014	2	-.003	12	1.082	3
32			min	-13.471	5	-36.449	2	-27.547	5	0	15	-.098	1	-.589	2
33		17	max	61.244	1	308.183	3	85.226	1	.014	2	.003	3	.912	3
34			min	-23.633	5	-164.061	2	-24.811	5	0	15	-.086	4	-.502	2
35		18	max	61.244	1	529.56	3	123.374	1	.014	2	.049	1	.551	3
36			min	-33.794	5	-291.674	2	-22.075	5	0	15	-.096	5	-.306	2
37		19	max	61.244	1	750.938	3	161.522	1	.014	2	.171	1	0	2
38			min	-43.956	5	-419.286	2	-19.339	5	0	15	-.114	5	0	3
39	M14	1	max	42.152	4	491.832	2	-9.914	12	.014	3	.266	4	0	4
40			min	2.879	12	-619.437	3	-168.55	1	-.015	2	.017	12	0	3
41		2	max	39.016	1	364.22	2	-8.116	12	.014	3	.182	4	.461	3
42			min	2.879	12	-450.225	3	-130.402	1	-.015	2	.006	10	-.369	2
43		3	max	39.016	1	236.608	2	-6.319	12	.014	3	.11	5	.775	3
44			min	2.879	12	-281.013	3	-92.253	1	-.015	2	-.017	1	-.627	2
45		4	max	39.016	1	108.995	2	-4.521	12	.014	3	.062	5	.945	3
46			min	1.772	15	-111.8	3	-68.297	4	-.015	2	-.08	1	-.776	2
47		5	max	39.016	1	57.412	3	-.722	10	.014	3	.016	5	.968	3
48			min	-7.541	5	-20.745	1	-56.737	4	-.015	2	-.11	1	-.815	2
49		6	max	39.016	1	226.624	3	22.191	1	.014	3	-.006	12	.846	3
50			min	-17.703	5	-146.229	2	-49.171	5	-.015	2	-.108	1	-.744	2
51		7	max	39.016	1	395.837	3	60.339	1	.014	3	-.006	12	.578	3
52			min	-27.864	5	-273.841	2	-46.435	5	-.015	2	-.087	4	-.563	2
53		8	max	39.016	1	565.049	3	98.487	1	.014	3	.003	2	.164	3
54			min	-38.026	5	-401.454	2	-43.699	5	-.015	2	-.111	4	-.272	2
55		9	max	39.016	1	734.261	3	136.635	1	.014	3	.097	1	.143	1
56			min	-48.187	5	-529.066	2	-40.963	5	-.015	2	-.144	5	-.396	3
57		10	max	72.796	4	656.678	2	-6.264	12	.015	2	.266	4	.639	2
58			min	2.879	12	-903.474	3	-174.784	1	-.014	3	.003	12	-1.101	3
59		11	max	62.634	4	529.066	2	-4.466	12	.015	2	.181	4	.143	1
60			min	2.879	12	-734.261	3	-136.635	1	-.014	3	-.003	3	-.396	3
61		12	max	52.473	4	401.454	2	-2.669	12	.015	2	.107	4	.164	3
62			min	2.879	12	-565.049	3	-98.487	1	-.014	3	-.007	3	-.272	2
63		13	max	42.311	4	273.841	2	-.871	12	.015	2	.058	5	.578	3
64			min	2.879	12	-395.837	3	-69.439	4	-.014	3	-.072	1	-.563	2
65		14	max	39.016	1	146.229	2	1.703	3	.015	2	.012	5	.846	3
66			min	2.879	12	-226.624	3	-57.879	4	-.014	3	-.108	1	-.744	2
67		15	max	39.016	1	20.745	1	15.957	1	.015	2	-.004	12	.968	3
68			min	2.879	12	-57.412	3	-49.443	5	-.014	3	-.11	1	-.815	2
69		16	max	39.016	1	111.8	3	54.105	1	.015	2	-.001	12	.945	3
70			min	1.638	15	-108.995	2	-46.707	5	-.014	3	-.093	4	-.776	2
71		17	max	39.016	1	281.013	3	92.253	1	.015	2	.006	3	.775	3
72			min	-7.699	5	-236.608	2	-43.971	5	-.014	3	-.118	4	-.627	2
73		18	max	39.016	1	450.225	3	130.402	1	.015	2	.079	1	.461	3
74			min	-17.861	5	-364.22	2	-41.235	5	-.014	3	-.149	5	-.369	2
75		19	max	39.016	1	619.437	3	168.55	1	.015	2	.207	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
76			min	-28.022	5	-491.832	2	-38.499	5	-.014	3	-.183	5	0	3
77	M15	1	max	82.561	5	697.332	2	-9.744	12	.016	2	.334	4	0	2
78			min	-41.118	1	-356.195	3	-168.535	1	-.012	3	.017	12	0	3
79		2	max	72.399	5	508.861	2	-7.947	12	.016	2	.235	4	.268	3
80			min	-41.118	1	-265.229	3	-130.387	1	-.012	3	.006	10	-.519	2
81		3	max	62.238	5	320.39	2	-6.149	12	.016	2	.148	5	.457	3
82			min	-41.118	1	-174.263	3	-96.866	4	-.012	3	-.017	1	-.876	2
83		4	max	52.076	5	131.918	2	-4.352	12	.016	2	.085	5	.568	3
84			min	-41.118	1	-83.298	3	-85.306	4	-.012	3	-.08	1	-1.071	2
85		5	max	41.914	5	7.668	3	-.801	10	.016	2	.025	5	.6	3
86			min	-41.118	1	-56.553	2	-73.747	4	-.012	3	-.111	1	-1.104	2
87		6	max	31.753	5	98.634	3	22.206	1	.016	2	-.006	12	.554	3
88			min	-41.118	1	-245.024	2	-66.123	5	-.012	3	-.108	1	-.974	2
89		7	max	21.591	5	189.6	3	60.354	1	.016	2	-.006	12	.43	3
90			min	-41.118	1	-433.496	2	-63.387	5	-.012	3	-.107	4	-.682	2
91		8	max	11.43	5	280.565	3	98.502	1	.016	2	.002	2	.228	3
92			min	-41.118	1	-621.967	2	-60.651	5	-.012	3	-.146	4	-.227	2
93		9	max	1.268	5	371.531	3	136.651	1	.016	2	.097	1	.39	2
94			min	-41.118	1	-810.438	2	-57.915	5	-.012	3	-.193	5	-.053	3
95		10	max	-3.669	12	998.909	2	-6.434	12	.012	3	.331	4	1.169	2
96			min	-41.118	1	-462.497	3	-174.799	1	-.016	2	.004	12	-.412	3
97		11	max	-3.669	12	810.438	2	-4.636	12	.012	3	.231	4	.39	2
98			min	-41.118	1	-371.531	3	-136.651	1	-.016	2	-.002	3	-.053	3
99		12	max	-3.669	12	621.967	2	-2.839	12	.012	3	.142	4	.228	3
100			min	-41.118	1	-280.565	3	-98.502	1	-.016	2	-.007	3	-.227	2
101		13	max	-3.669	12	433.496	2	-1.041	12	.012	3	.078	5	.43	3
102			min	-41.118	1	-189.6	3	-86.496	4	-.016	2	-.072	1	-.682	2
103		14	max	-3.669	12	245.024	2	1.421	3	.012	3	.018	5	.554	3
104			min	-48.915	4	-98.634	3	-74.936	4	-.016	2	-.108	1	-.974	2
105		15	max	-3.669	12	56.553	2	15.942	1	.012	3	-.005	12	.6	3
106			min	-59.077	4	-7.668	3	-66.4	5	-.016	2	-.111	1	-1.104	2
107		16	max	-3.669	12	83.298	3	54.09	1	.012	3	-.002	12	.568	3
108			min	-69.238	4	-131.918	2	-63.664	5	-.016	2	-.116	4	-1.071	2
109		17	max	-3.669	12	174.263	3	92.238	1	.012	3	.005	3	.457	3
110			min	-79.4	4	-320.39	2	-60.928	5	-.016	2	-.156	4	-.876	2
111		18	max	-3.669	12	265.229	3	130.387	1	.012	3	.078	1	.268	3
112			min	-89.561	4	-508.861	2	-58.192	5	-.016	2	-.202	5	-.519	2
113		19	max	-3.669	12	356.195	3	168.535	1	.012	3	.207	1	0	2
114			min	-99.723	4	-697.332	2	-55.456	5	-.016	2	-.251	5	0	5
115	M16	1	max	76.996	5	628.583	2	-9.014	12	.008	1	.239	4	0	2
116			min	-69.372	1	-295.414	3	-162.125	1	-.014	3	.013	12	0	3
117		2	max	66.834	5	440.111	2	-7.217	12	.008	1	.162	4	.215	3
118			min	-69.372	1	-204.448	3	-123.977	1	-.014	3	.004	10	-.46	2
119		3	max	56.673	5	251.64	2	-5.419	12	.008	1	.103	5	.352	3
120			min	-69.372	1	-113.482	3	-85.829	1	-.014	3	-.04	1	-.758	2
121		4	max	46.511	5	63.169	2	-3.622	12	.008	1	.06	5	.411	3
122			min	-69.372	1	-22.516	3	-60.313	4	-.014	3	-.097	1	-.894	2
123		5	max	36.349	5	68.449	3	-.23	10	.008	1	.019	5	.391	3
124			min	-69.372	1	-125.302	2	-48.753	4	-.014	3	-.122	1	-.867	2
125		6	max	26.188	5	159.415	3	28.615	1	.008	1	-.006	12	.293	3
126			min	-69.372	1	-313.774	2	-42.967	5	-.014	3	-.114	1	-.678	2
127		7	max	16.026	5	250.381	3	66.764	1	.008	1	-.005	12	.116	3
128			min	-69.372	1	-502.245	2	-40.231	5	-.014	3	-.073	4	-.326	2
129		8	max	5.865	5	341.347	3	104.912	1	.008	1	.004	2	.187	2
130			min	-69.372	1	-690.716	2	-37.495	5	-.014	3	-.09	4	-.138	3
131		9	max	-2.812	15	432.312	3	143.06	1	.008	1	.108	1	.863	2
132			min	-69.372	1	-879.187	2	-34.759	5	-.014	3	-.119	5	-.472	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
133		10	max	-5.331	12	1067.659	2	-7.163	12	.014	3	.248	1	1.701	2
134			min	-69.372	1	-523.278	3	-181.208	1	-.008	1	.006	12	-.883	3
135		11	max	-3.741	15	879.187	2	-5.366	12	.014	3	.161	4	.863	2
136			min	-69.372	1	-432.312	3	-143.06	1	-.008	1	0	3	-.472	3
137		12	max	-5.331	12	690.716	2	-3.568	12	.014	3	.089	4	.187	2
138			min	-69.372	1	-341.347	3	-104.912	1	-.008	1	-.005	3	-.138	3
139		13	max	-5.331	12	502.245	2	-1.771	12	.014	3	.044	5	.116	3
140			min	-69.372	1	-250.381	3	-66.764	1	-.008	1	-.073	1	-.326	2
141		14	max	-5.331	12	313.774	2	.258	3	.014	3	.003	5	.293	3
142			min	-69.372	1	-159.415	3	-53.991	4	-.008	1	-.114	1	-.678	2
143		15	max	-5.331	12	125.302	2	9.533	1	.014	3	-.005	12	.391	3
144			min	-69.372	1	-68.449	3	-44.222	5	-.008	1	-.122	1	-.867	2
145		16	max	-5.331	12	22.516	3	47.681	1	.014	3	-.003	12	.411	3
146			min	-73.668	4	-63.169	2	-41.486	5	-.008	1	-.097	1	-.894	2
147		17	max	-5.331	12	113.482	3	85.829	1	.014	3	.002	3	.352	3
148			min	-83.83	4	-251.64	2	-38.75	5	-.008	1	-.118	4	-.758	2
149		18	max	-5.331	12	204.448	3	123.977	1	.014	3	.051	1	.215	3
150			min	-93.992	4	-440.111	2	-36.014	5	-.008	1	-.14	5	-.46	2
151		19	max	-5.331	12	295.414	3	162.125	1	.014	3	.174	1	0	2
152			min	-104.153	4	-628.583	2	-33.278	5	-.008	1	-.17	5	0	5
153	M2	1	max	1065.613	2	2.06	4	.34	1	0	3	0	3	0	1
154			min	-1451.205	3	.5	15	-25.399	4	0	4	0	2	0	1
155		2	max	1066.142	2	1.989	4	.34	1	0	3	0	1	0	15
156			min	-1450.808	3	.483	15	-25.86	4	0	4	-.009	4	0	4
157		3	max	1066.671	2	1.918	4	.34	1	0	3	0	1	0	15
158			min	-1450.411	3	.466	15	-26.321	4	0	4	-.019	4	-.001	4
159		4	max	1067.2	2	1.847	4	.34	1	0	3	0	1	0	15
160			min	-1450.014	3	.449	15	-26.782	4	0	4	-.028	4	-.002	4
161		5	max	1067.73	2	1.775	4	.34	1	0	3	0	1	0	15
162			min	-1449.617	3	.433	15	-27.243	4	0	4	-.038	4	-.003	4
163		6	max	1068.259	2	1.704	4	.34	1	0	3	0	1	0	15
164			min	-1449.22	3	.416	15	-27.705	4	0	4	-.048	4	-.003	4
165		7	max	1068.788	2	1.633	4	.34	1	0	3	0	1	0	15
166			min	-1448.823	3	.399	15	-28.166	4	0	4	-.058	4	-.004	4
167		8	max	1069.318	2	1.562	4	.34	1	0	3	0	1	-.001	15
168			min	-1448.426	3	.383	15	-28.627	4	0	4	-.068	4	-.005	4
169		9	max	1069.847	2	1.491	4	.34	1	0	3	0	1	-.001	15
170			min	-1448.029	3	.366	15	-29.088	4	0	4	-.078	4	-.005	4
171		10	max	1070.376	2	1.42	4	.34	1	0	3	.001	1	-.001	15
172			min	-1447.632	3	.349	15	-29.55	4	0	4	-.089	4	-.006	4
173		11	max	1070.905	2	1.349	4	.34	1	0	3	.001	1	-.001	15
174			min	-1447.235	3	.333	15	-30.011	4	0	4	-.099	4	-.006	4
175		12	max	1071.435	2	1.278	4	.34	1	0	3	.001	1	-.002	15
176			min	-1446.838	3	.306	12	-30.472	4	0	4	-.11	4	-.007	4
177		13	max	1071.964	2	1.207	4	.34	1	0	3	.001	1	-.002	15
178			min	-1446.441	3	.278	12	-30.933	4	0	4	-.121	4	-.007	4
179		14	max	1072.493	2	1.136	4	.34	1	0	3	.002	1	-.002	15
180			min	-1446.044	3	.251	12	-31.394	4	0	4	-.132	4	-.007	4
181		15	max	1073.023	2	1.065	4	.34	1	0	3	.002	1	-.002	15
182			min	-1445.648	3	.223	12	-31.856	4	0	4	-.144	4	-.008	4
183		16	max	1073.552	2	.994	4	.34	1	0	3	.002	1	-.002	15
184			min	-1445.251	3	.195	12	-32.317	4	0	4	-.155	4	-.008	4
185		17	max	1074.081	2	.923	4	.34	1	0	3	.002	1	-.002	15
186			min	-1444.854	3	.167	12	-32.778	4	0	4	-.167	4	-.009	4
187		18	max	1074.61	2	.853	2	.34	1	0	3	.002	1	-.002	15
188			min	-1444.457	3	.14	12	-33.239	4	0	4	-.179	4	-.009	4
189		19	max	1075.14	2	.798	2	.34	1	0	3	.002	1	-.002	15

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
190			min	-1444.06	3	.112	12	-33.701	4	0	4	-.191	4	-.009	4
191	M3	1	max	799.085	2	8.903	4	1.468	4	0	12	0	1	.009	4
192			min	-938.363	3	2.104	15	.022	12	0	4	-.02	4	.002	15
193		2	max	798.914	2	8.034	4	2.073	4	0	12	0	1	.005	2
194			min	-938.491	3	1.9	15	.022	12	0	4	-.02	4	0	12
195		3	max	798.744	2	7.165	4	2.678	4	0	12	0	1	.002	2
196			min	-938.619	3	1.696	15	.022	12	0	4	-.019	4	0	3
197		4	max	798.573	2	6.296	4	3.284	4	0	12	0	1	0	2
198			min	-938.747	3	1.492	15	.022	12	0	4	-.017	4	-.003	3
199		5	max	798.403	2	5.427	4	3.889	4	0	12	0	1	0	15
200			min	-938.874	3	1.287	15	.022	12	0	4	-.015	5	-.004	6
201		6	max	798.233	2	4.558	4	4.494	4	0	12	0	1	-.001	15
202			min	-939.002	3	1.083	15	.022	12	0	4	-.014	5	-.007	6
203		7	max	798.062	2	3.689	4	5.099	4	0	12	.001	1	-.002	15
204			min	-939.13	3	.879	15	.022	12	0	4	-.011	5	-.009	6
205		8	max	797.892	2	2.82	4	5.704	4	0	12	.001	1	-.002	15
206			min	-939.258	3	.675	15	.022	12	0	4	-.009	5	-.01	6
207		9	max	797.722	2	1.952	4	6.309	4	0	12	.001	1	-.003	15
208			min	-939.386	3	.47	15	.022	12	0	4	-.006	5	-.011	6
209		10	max	797.551	2	1.083	4	6.914	4	0	12	.001	1	-.003	15
210			min	-939.513	3	.266	15	.022	12	0	4	-.003	5	-.012	6
211		11	max	797.381	2	.311	2	7.519	4	0	12	.002	1	-.003	15
212			min	-939.641	3	-.118	3	.022	12	0	4	0	12	-.012	6
213		12	max	797.211	2	-.142	15	8.124	4	0	12	.004	4	-.003	15
214			min	-939.769	3	-.656	6	.022	12	0	4	0	12	-.012	6
215		13	max	797.04	2	-.347	15	8.729	4	0	12	.008	4	-.003	15
216			min	-939.897	3	-1.525	6	.022	12	0	4	0	12	-.012	6
217		14	max	796.87	2	-.551	15	9.334	4	0	12	.013	4	-.002	15
218			min	-940.024	3	-2.394	6	.022	12	0	4	0	12	-.011	6
219		15	max	796.7	2	-.755	15	9.939	4	0	12	.017	4	-.002	15
220			min	-940.152	3	-3.263	6	.022	12	0	4	0	12	-.009	6
221		16	max	796.529	2	-.959	15	10.544	4	0	12	.022	4	-.002	15
222			min	-940.28	3	-4.132	6	.022	12	0	4	0	12	-.008	6
223		17	max	796.359	2	-1.164	15	11.149	4	0	12	.027	4	-.001	15
224			min	-940.408	3	-5.001	6	.022	12	0	4	0	12	-.006	6
225		18	max	796.189	2	-1.368	15	11.755	4	0	12	.032	4	0	15
226			min	-940.535	3	-5.87	6	.022	12	0	4	0	12	-.003	6
227		19	max	796.018	2	-1.572	15	12.36	4	0	12	.038	4	0	1
228			min	-940.663	3	-6.738	6	.022	12	0	4	0	12	0	1
229	M4	1	max	970.223	1	0	1	-.826	12	0	1	.031	4	0	1
230			min	-80.365	5	0	1	-268.022	4	0	1	0	12	0	1
231		2	max	970.394	1	0	1	-.826	12	0	1	0	1	0	1
232			min	-80.286	5	0	1	-268.17	4	0	1	0	5	0	1
233		3	max	970.564	1	0	1	-.826	12	0	1	0	12	0	1
234			min	-80.206	5	0	1	-268.318	4	0	1	-.031	4	0	1
235		4	max	970.734	1	0	1	-.826	12	0	1	0	12	0	1
236			min	-80.127	5	0	1	-268.465	4	0	1	-.062	4	0	1
237		5	max	970.905	1	0	1	-.826	12	0	1	0	12	0	1
238			min	-80.047	5	0	1	-268.613	4	0	1	-.093	4	0	1
239		6	max	971.075	1	0	1	-.826	12	0	1	0	12	0	1
240			min	-79.968	5	0	1	-268.76	4	0	1	-.123	4	0	1
241		7	max	971.245	1	0	1	-.826	12	0	1	0	12	0	1
242			min	-79.888	5	0	1	-268.908	4	0	1	-.154	4	0	1
243		8	max	971.416	1	0	1	-.826	12	0	1	0	12	0	1
244			min	-79.809	5	0	1	-269.056	4	0	1	-.185	4	0	1
245		9	max	971.586	1	0	1	-.826	12	0	1	0	12	0	1
246			min	-79.729	5	0	1	-269.203	4	0	1	-.216	4	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
247		10	max	971.756	1	0	1	-.826	12	0	1	0	12	0	1
248			min	-79.65	5	0	1	-269.351	4	0	1	-.247	4	0	1
249		11	max	971.927	1	0	1	-.826	12	0	1	0	12	0	1
250			min	-79.57	5	0	1	-269.499	4	0	1	-.278	4	0	1
251		12	max	972.097	1	0	1	-.826	12	0	1	0	12	0	1
252			min	-79.491	5	0	1	-269.646	4	0	1	-.309	4	0	1
253		13	max	972.267	1	0	1	-.826	12	0	1	0	12	0	1
254			min	-79.411	5	0	1	-269.794	4	0	1	-.34	4	0	1
255		14	max	972.438	1	0	1	-.826	12	0	1	-.001	12	0	1
256			min	-79.332	5	0	1	-269.941	4	0	1	-.371	4	0	1
257		15	max	972.608	1	0	1	-.826	12	0	1	-.001	12	0	1
258			min	-79.252	5	0	1	-270.089	4	0	1	-.402	4	0	1
259		16	max	972.778	1	0	1	-.826	12	0	1	-.001	12	0	1
260			min	-79.173	5	0	1	-270.237	4	0	1	-.433	4	0	1
261		17	max	972.949	1	0	1	-.826	12	0	1	-.001	12	0	1
262			min	-79.093	5	0	1	-270.384	4	0	1	-.464	4	0	1
263		18	max	973.119	1	0	1	-.826	12	0	1	-.001	12	0	1
264			min	-79.014	5	0	1	-270.532	4	0	1	-.495	4	0	1
265		19	max	973.289	1	0	1	-.826	12	0	1	-.002	12	0	1
266			min	-78.934	5	0	1	-270.68	4	0	1	-.526	4	0	1
267	M6	1	max	3238.028	2	2.283	2	0	1	0	1	0	4	0	1
268			min	-4531.446	3	.246	12	-25.687	4	0	4	0	1	0	1
269		2	max	3238.558	2	2.227	2	0	1	0	1	0	1	0	12
270			min	-4531.049	3	.218	12	-26.148	4	0	4	-.009	4	0	2
271		3	max	3239.087	2	2.172	2	0	1	0	1	0	1	0	12
272			min	-4530.652	3	.191	12	-26.609	4	0	4	-.019	4	-.002	2
273		4	max	3239.616	2	2.117	2	0	1	0	1	0	1	0	12
274			min	-4530.255	3	.154	3	-27.071	4	0	4	-.028	4	-.002	2
275		5	max	3240.146	2	2.061	2	0	1	0	1	0	1	0	12
276			min	-4529.858	3	.112	3	-27.532	4	0	4	-.038	4	-.003	2
277		6	max	3240.675	2	2.006	2	0	1	0	1	0	1	0	3
278			min	-4529.461	3	.071	3	-27.993	4	0	4	-.048	4	-.004	2
279		7	max	3241.204	2	1.951	2	0	1	0	1	0	1	0	3
280			min	-4529.064	3	.029	3	-28.454	4	0	4	-.058	4	-.005	2
281		8	max	3241.734	2	1.895	2	0	1	0	1	0	1	0	3
282			min	-4528.667	3	-.012	3	-28.915	4	0	4	-.069	4	-.005	2
283		9	max	3242.263	2	1.84	2	0	1	0	1	0	1	0	3
284			min	-4528.27	3	-.054	3	-29.377	4	0	4	-.079	4	-.006	2
285		10	max	3242.792	2	1.785	2	0	1	0	1	0	1	0	3
286			min	-4527.873	3	-.095	3	-29.838	4	0	4	-.09	4	-.007	2
287		11	max	3243.321	2	1.729	2	0	1	0	1	0	1	0	3
288			min	-4527.476	3	-.137	3	-30.299	4	0	4	-.1	4	-.007	2
289		12	max	3243.851	2	1.674	2	0	1	0	1	0	1	0	3
290			min	-4527.079	3	-.178	3	-30.76	4	0	4	-.111	4	-.008	2
291		13	max	3244.38	2	1.618	2	0	1	0	1	0	1	0	3
292			min	-4526.682	3	-.22	3	-31.222	4	0	4	-.122	4	-.008	2
293		14	max	3244.909	2	1.563	2	0	1	0	1	0	1	0	3
294			min	-4526.286	3	-.261	3	-31.683	4	0	4	-.134	4	-.009	2
295		15	max	3245.439	2	1.508	2	0	1	0	1	0	1	0	3
296			min	-4525.889	3	-.303	3	-32.144	4	0	4	-.145	4	-.01	2
297		16	max	3245.968	2	1.452	2	0	1	0	1	0	1	0	3
298			min	-4525.492	3	-.344	3	-32.605	4	0	4	-.157	4	-.01	2
299		17	max	3246.497	2	1.397	2	0	1	0	1	0	1	0	3
300			min	-4525.095	3	-.386	3	-33.066	4	0	4	-.169	4	-.011	2
301		18	max	3247.026	2	1.342	2	0	1	0	1	0	1	0	3
302			min	-4524.698	3	-.427	3	-33.528	4	0	4	-.181	4	-.011	2
303		19	max	3247.556	2	1.286	2	0	1	0	1	0	1	0	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
304			min	-4524.301	3	-.469	3	-33.989	4	0	4	-.193	4	-.012	2
305	M7	1	max	2671.639	2	8.9	6	1.056	4	0	1	0	1	.012	2
306			min	-2807.014	3	2.09	15	0	1	0	4	-.021	4	0	3
307		2	max	2671.468	2	8.031	6	1.661	4	0	1	0	1	.008	2
308			min	-2807.142	3	1.886	15	0	1	0	4	-.02	4	-.003	3
309		3	max	2671.298	2	7.162	6	2.266	4	0	1	0	1	.005	2
310			min	-2807.27	3	1.682	15	0	1	0	4	-.019	4	-.004	3
311		4	max	2671.128	2	6.293	6	2.871	4	0	1	0	1	.002	2
312			min	-2807.397	3	1.477	15	0	1	0	4	-.018	4	-.006	3
313		5	max	2670.957	2	5.424	6	3.476	4	0	1	0	1	0	2
314			min	-2807.525	3	1.273	15	0	1	0	4	-.016	4	-.007	3
315		6	max	2670.787	2	4.555	6	4.081	4	0	1	0	1	-.002	15
316			min	-2807.653	3	1.069	15	0	1	0	4	-.015	4	-.008	3
317		7	max	2670.617	2	3.686	6	4.686	4	0	1	0	1	-.002	15
318			min	-2807.781	3	.865	15	0	1	0	4	-.013	4	-.009	3
319		8	max	2670.446	2	2.818	6	5.291	4	0	1	0	1	-.002	15
320			min	-2807.908	3	.66	15	0	1	0	4	-.01	4	-.01	4
321		9	max	2670.276	2	2.037	2	5.896	4	0	1	0	1	-.003	15
322			min	-2808.036	3	.336	12	0	1	0	4	-.008	4	-.011	4
323		10	max	2670.106	2	1.36	2	6.501	4	0	1	0	1	-.003	15
324			min	-2808.164	3	-.073	3	0	1	0	4	-.005	5	-.012	4
325		11	max	2669.935	2	.683	2	7.107	4	0	1	0	1	-.003	15
326			min	-2808.292	3	-.58	3	0	1	0	4	-.002	5	-.012	4
327		12	max	2669.765	2	.006	2	7.712	4	0	1	.002	4	-.003	15
328			min	-2808.42	3	-1.088	3	0	1	0	4	0	1	-.012	4
329		13	max	2669.595	2	-.361	15	8.317	4	0	1	.006	4	-.003	15
330			min	-2808.547	3	-1.596	3	0	1	0	4	0	1	-.012	4
331		14	max	2669.424	2	-.565	15	8.922	4	0	1	.01	4	-.003	15
332			min	-2808.675	3	-2.396	4	0	1	0	4	0	1	-.011	4
333		15	max	2669.254	2	-.769	15	9.527	4	0	1	.014	4	-.002	15
334			min	-2808.803	3	-3.265	4	0	1	0	4	0	1	-.009	4
335		16	max	2669.083	2	-.974	15	10.132	4	0	1	.019	4	-.002	15
336			min	-2808.931	3	-4.134	4	0	1	0	4	0	1	-.008	4
337		17	max	2668.913	2	-1.178	15	10.737	4	0	1	.024	4	-.001	15
338			min	-2809.058	3	-5.002	4	0	1	0	4	0	1	-.006	4
339		18	max	2668.743	2	-1.382	15	11.342	4	0	1	.029	4	0	15
340			min	-2809.186	3	-5.871	4	0	1	0	4	0	1	-.003	4
341		19	max	2668.572	2	-1.586	15	11.947	4	0	1	.034	4	0	1
342			min	-2809.314	3	-6.74	4	0	1	0	4	0	1	0	1
343	M8	1	max	2515.404	1	0	1	0	1	0	1	.028	4	0	1
344			min	-164.84	3	0	1	-256.072	4	0	1	0	1	0	1
345		2	max	2515.575	1	0	1	0	1	0	1	0	1	0	1
346			min	-164.712	3	0	1	-256.22	4	0	1	-.002	4	0	1
347		3	max	2515.745	1	0	1	0	1	0	1	0	1	0	1
348			min	-164.584	3	0	1	-256.368	4	0	1	-.031	4	0	1
349		4	max	2515.915	1	0	1	0	1	0	1	0	1	0	1
350			min	-164.456	3	0	1	-256.515	4	0	1	-.061	4	0	1
351		5	max	2516.086	1	0	1	0	1	0	1	0	1	0	1
352			min	-164.329	3	0	1	-256.663	4	0	1	-.09	4	0	1
353		6	max	2516.256	1	0	1	0	1	0	1	0	1	0	1
354			min	-164.201	3	0	1	-256.811	4	0	1	-.12	4	0	1
355		7	max	2516.426	1	0	1	0	1	0	1	0	1	0	1
356			min	-164.073	3	0	1	-256.958	4	0	1	-.149	4	0	1
357		8	max	2516.597	1	0	1	0	1	0	1	0	1	0	1
358			min	-163.945	3	0	1	-257.106	4	0	1	-.179	4	0	1
359		9	max	2516.767	1	0	1	0	1	0	1	0	1	0	1
360			min	-163.818	3	0	1	-257.254	4	0	1	-.208	4	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
361		10	max	2516.937	1	0	1	0	1	0	1	0	1	0	1
362			min	-163.69	3	0	1	-257.401	4	0	1	-.238	4	0	1
363		11	max	2517.108	1	0	1	0	1	0	1	0	1	0	1
364			min	-163.562	3	0	1	-257.549	4	0	1	-.267	4	0	1
365		12	max	2517.278	1	0	1	0	1	0	1	0	1	0	1
366			min	-163.434	3	0	1	-257.696	4	0	1	-.297	4	0	1
367		13	max	2517.449	1	0	1	0	1	0	1	0	1	0	1
368			min	-163.307	3	0	1	-257.844	4	0	1	-.326	4	0	1
369		14	max	2517.619	1	0	1	0	1	0	1	0	1	0	1
370			min	-163.179	3	0	1	-257.992	4	0	1	-.356	4	0	1
371		15	max	2517.789	1	0	1	0	1	0	1	0	1	0	1
372			min	-163.051	3	0	1	-258.139	4	0	1	-.386	4	0	1
373		16	max	2517.96	1	0	1	0	1	0	1	0	1	0	1
374			min	-162.923	3	0	1	-258.287	4	0	1	-.415	4	0	1
375		17	max	2518.13	1	0	1	0	1	0	1	0	1	0	1
376			min	-162.796	3	0	1	-258.435	4	0	1	-.445	4	0	1
377		18	max	2518.3	1	0	1	0	1	0	1	0	1	0	1
378			min	-162.668	3	0	1	-258.582	4	0	1	-.475	4	0	1
379		19	max	2518.471	1	0	1	0	1	0	1	0	1	0	1
380			min	-162.54	3	0	1	-258.73	4	0	1	-.504	4	0	1
381	M10	1	max	1065.613	2	1.99	6	-.028	12	0	1	0	4	0	1
382			min	-1451.205	3	.452	15	-25.61	4	0	5	0	3	0	1
383		2	max	1066.142	2	1.919	6	-.028	12	0	1	0	10	0	15
384			min	-1450.808	3	.436	15	-26.071	4	0	5	-.009	4	0	6
385		3	max	1066.671	2	1.848	6	-.028	12	0	1	0	10	0	15
386			min	-1450.411	3	.419	15	-26.532	4	0	5	-.019	4	-.001	6
387		4	max	1067.2	2	1.777	6	-.028	12	0	1	0	10	0	15
388			min	-1450.014	3	.402	15	-26.993	4	0	5	-.028	4	-.002	6
389		5	max	1067.73	2	1.705	6	-.028	12	0	1	0	10	0	15
390			min	-1449.617	3	.385	15	-27.454	4	0	5	-.038	4	-.003	6
391		6	max	1068.259	2	1.634	6	-.028	12	0	1	0	10	0	15
392			min	-1449.22	3	.369	15	-27.916	4	0	5	-.048	4	-.003	6
393		7	max	1068.788	2	1.563	6	-.028	12	0	1	0	12	0	15
394			min	-1448.823	3	.352	15	-28.377	4	0	5	-.058	4	-.004	6
395		8	max	1069.318	2	1.492	6	-.028	12	0	1	0	12	0	15
396			min	-1448.426	3	.335	15	-28.838	4	0	5	-.068	4	-.004	6
397		9	max	1069.847	2	1.421	6	-.028	12	0	1	0	12	-.001	15
398			min	-1448.029	3	.319	15	-29.299	4	0	5	-.079	4	-.005	6
399		10	max	1070.376	2	1.35	6	-.028	12	0	1	0	12	-.001	15
400			min	-1447.632	3	.302	15	-29.761	4	0	5	-.089	4	-.005	6
401		11	max	1070.905	2	1.279	6	-.028	12	0	1	0	12	-.001	15
402			min	-1447.235	3	.285	15	-30.222	4	0	5	-.1	4	-.006	6
403		12	max	1071.435	2	1.208	6	-.028	12	0	1	0	12	-.001	15
404			min	-1446.838	3	.269	15	-30.683	4	0	5	-.111	4	-.006	6
405		13	max	1071.964	2	1.137	6	-.028	12	0	1	0	12	-.002	15
406			min	-1446.441	3	.252	15	-31.144	4	0	5	-.122	4	-.007	6
407		14	max	1072.493	2	1.074	2	-.028	12	0	1	0	12	-.002	15
408			min	-1446.044	3	.235	15	-31.605	4	0	5	-.133	4	-.007	6
409		15	max	1073.023	2	1.019	2	-.028	12	0	1	0	12	-.002	15
410			min	-1445.648	3	.219	15	-32.067	4	0	5	-.145	4	-.007	6
411		16	max	1073.552	2	.964	2	-.028	12	0	1	0	12	-.002	15
412			min	-1445.251	3	.195	12	-32.528	4	0	5	-.156	4	-.008	6
413		17	max	1074.081	2	.908	2	-.028	12	0	1	0	12	-.002	15
414			min	-1444.854	3	.167	12	-32.989	4	0	5	-.168	4	-.008	6
415		18	max	1074.61	2	.853	2	-.028	12	0	1	0	12	-.002	15
416			min	-1444.457	3	.14	12	-33.45	4	0	5	-.18	4	-.008	6
417		19	max	1075.14	2	.798	2	-.028	12	0	1	0	12	-.002	15

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
418			min	-1444.06	3	.112	12	-33.912	4	0	5	-.192	4	-.009	6
419	M11	1	max	799.085	2	8.849	6	1.294	4	0	1	0	12	.009	6
420			min	-938.363	3	2.068	15	-.282	1	0	4	-.021	4	.002	15
421		2	max	798.914	2	7.98	6	1.899	4	0	1	0	12	.005	2
422			min	-938.491	3	1.864	15	-.282	1	0	4	-.02	4	0	12
423		3	max	798.744	2	7.112	6	2.504	4	0	1	0	12	.002	2
424			min	-938.619	3	1.66	15	-.282	1	0	4	-.019	4	0	3
425		4	max	798.573	2	6.243	6	3.109	4	0	1	0	12	0	2
426			min	-938.747	3	1.456	15	-.282	1	0	4	-.017	4	-.003	3
427		5	max	798.403	2	5.374	6	3.714	4	0	1	0	12	-.001	15
428			min	-938.874	3	1.251	15	-.282	1	0	4	-.016	4	-.005	4
429		6	max	798.233	2	4.505	6	4.319	4	0	1	0	12	-.002	15
430			min	-939.002	3	1.047	15	-.282	1	0	4	-.014	4	-.007	4
431		7	max	798.062	2	3.636	6	4.925	4	0	1	0	12	-.002	15
432			min	-939.13	3	.843	15	-.282	1	0	4	-.012	4	-.009	4
433		8	max	797.892	2	2.767	6	5.53	4	0	1	0	12	-.003	15
434			min	-939.258	3	.639	15	-.282	1	0	4	-.009	4	-.01	4
435		9	max	797.722	2	1.898	6	6.135	4	0	1	0	12	-.003	15
436			min	-939.386	3	.434	15	-.282	1	0	4	-.007	4	-.012	4
437		10	max	797.551	2	1.029	6	6.74	4	0	1	0	12	-.003	15
438			min	-939.513	3	.23	15	-.282	1	0	4	-.004	4	-.012	4
439		11	max	797.381	2	.311	2	7.345	4	0	1	0	5	-.003	15
440			min	-939.641	3	-.118	3	-.282	1	0	4	-.002	1	-.012	4
441		12	max	797.211	2	-.178	15	7.95	4	0	1	.004	5	-.003	15
442			min	-939.769	3	-.71	4	-.282	1	0	4	-.002	1	-.012	4
443		13	max	797.04	2	-.383	15	8.555	4	0	1	.007	5	-.003	15
444			min	-939.897	3	-1.578	4	-.282	1	0	4	-.002	1	-.012	4
445		14	max	796.87	2	-.587	15	9.16	4	0	1	.012	5	-.003	15
446			min	-940.024	3	-2.447	4	-.282	1	0	4	-.002	1	-.011	4
447		15	max	796.7	2	-.791	15	9.765	4	0	1	.016	5	-.002	15
448			min	-940.152	3	-3.316	4	-.282	1	0	4	-.002	1	-.01	4
449		16	max	796.529	2	-.995	15	10.37	4	0	1	.021	5	-.002	15
450			min	-940.28	3	-4.185	4	-.282	1	0	4	-.002	1	-.008	4
451		17	max	796.359	2	-1.2	15	10.975	4	0	1	.026	5	-.001	15
452			min	-940.408	3	-5.054	4	-.282	1	0	4	-.002	1	-.006	4
453		18	max	796.189	2	-1.404	15	11.58	4	0	1	.031	5	0	15
454			min	-940.535	3	-5.923	4	-.282	1	0	4	-.002	1	-.003	4
455		19	max	796.018	2	-1.608	15	12.185	4	0	1	.037	5	0	1
456			min	-940.663	3	-6.792	4	-.282	1	0	4	-.003	1	0	1
457	M12	1	max	970.223	1	0	1	11.066	1	0	1	.03	5	0	1
458			min	-22.172	3	0	1	-261.149	4	0	1	-.002	1	0	1
459		2	max	970.394	1	0	1	11.066	1	0	1	0	12	0	1
460			min	-22.044	3	0	1	-261.297	4	0	1	0	1	0	1
461		3	max	970.564	1	0	1	11.066	1	0	1	0	1	0	1
462			min	-21.917	3	0	1	-261.445	4	0	1	-.031	4	0	1
463		4	max	970.734	1	0	1	11.066	1	0	1	.002	1	0	1
464			min	-21.789	3	0	1	-261.592	4	0	1	-.061	4	0	1
465		5	max	970.905	1	0	1	11.066	1	0	1	.003	1	0	1
466			min	-21.661	3	0	1	-261.74	4	0	1	-.091	4	0	1
467		6	max	971.075	1	0	1	11.066	1	0	1	.004	1	0	1
468			min	-21.533	3	0	1	-261.887	4	0	1	-.121	4	0	1
469		7	max	971.245	1	0	1	11.066	1	0	1	.006	1	0	1
470			min	-21.406	3	0	1	-262.035	4	0	1	-.151	4	0	1
471		8	max	971.416	1	0	1	11.066	1	0	1	.007	1	0	1
472			min	-21.278	3	0	1	-262.183	4	0	1	-.181	4	0	1
473		9	max	971.586	1	0	1	11.066	1	0	1	.008	1	0	1
474			min	-21.15	3	0	1	-262.33	4	0	1	-.211	4	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
475		10	max	971.756	1	0	1	11.066	1	0	1	.009	1	0	1
476			min	-21.022	3	0	1	-262.478	4	0	1	-.241	4	0	1
477		11	max	971.927	1	0	1	11.066	1	0	1	.011	1	0	1
478			min	-20.895	3	0	1	-262.626	4	0	1	-.271	4	0	1
479		12	max	972.097	1	0	1	11.066	1	0	1	.012	1	0	1
480			min	-20.767	3	0	1	-262.773	4	0	1	-.302	4	0	1
481		13	max	972.267	1	0	1	11.066	1	0	1	.013	1	0	1
482			min	-20.639	3	0	1	-262.921	4	0	1	-.332	4	0	1
483		14	max	972.438	1	0	1	11.066	1	0	1	.014	1	0	1
484			min	-20.511	3	0	1	-263.069	4	0	1	-.362	4	0	1
485		15	max	972.608	1	0	1	11.066	1	0	1	.016	1	0	1
486			min	-20.384	3	0	1	-263.216	4	0	1	-.392	4	0	1
487		16	max	972.778	1	0	1	11.066	1	0	1	.017	1	0	1
488			min	-20.256	3	0	1	-263.364	4	0	1	-.422	4	0	1
489		17	max	972.949	1	0	1	11.066	1	0	1	.018	1	0	1
490			min	-20.128	3	0	1	-263.511	4	0	1	-.453	4	0	1
491		18	max	973.119	1	0	1	11.066	1	0	1	.02	1	0	1
492			min	-20	3	0	1	-263.659	4	0	1	-.483	4	0	1
493		19	max	973.289	1	0	1	11.066	1	0	1	.021	1	0	1
494			min	-19.873	3	0	1	-263.807	4	0	1	-.513	4	0	1
495	M1	1	max	161.528	1	750.853	3	43.901	5	0	2	.171	1	0	15
496			min	-19.339	5	-418.32	2	-61.151	1	0	3	-.114	5	-.014	2
497		2	max	162.371	1	749.759	3	45.362	5	0	2	.133	1	.246	2
498			min	-18.946	5	-419.779	2	-61.151	1	0	3	-.086	5	-.47	3
499		3	max	607.349	3	546.127	2	22.086	5	0	3	.095	1	.496	2
500			min	-365.063	2	-582.841	3	-60.957	1	0	2	-.058	5	-.92	3
501		4	max	607.981	3	544.668	2	23.546	5	0	3	.057	1	.158	1
502			min	-364.22	2	-583.936	3	-60.957	1	0	2	-.044	5	-.558	3
503		5	max	608.612	3	543.209	2	25.006	5	0	3	.02	1	-.005	15
504			min	-363.378	2	-585.03	3	-60.957	1	0	2	-.029	5	-.195	3
505		6	max	609.244	3	541.75	2	26.466	5	0	3	-.001	12	.168	3
506			min	-362.536	2	-586.124	3	-60.957	1	0	2	-.018	1	-.517	2
507		7	max	609.876	3	540.291	2	27.926	5	0	3	.004	5	.532	3
508			min	-361.693	2	-587.218	3	-60.957	1	0	2	-.056	1	-.853	2
509		8	max	610.508	3	538.832	2	29.386	5	0	3	.022	5	.897	3
510			min	-360.851	2	-588.313	3	-60.957	1	0	2	-.094	1	-1.187	2
511		9	max	626.322	3	51.24	2	58.685	5	0	9	.061	1	1.044	3
512			min	-291.481	2	.437	15	-100.019	1	0	3	-.132	5	-1.356	2
513		10	max	626.954	3	49.781	2	60.145	5	0	9	0	10	1.022	3
514			min	-290.638	2	-.007	5	-100.019	1	0	3	-.096	4	-1.387	2
515		11	max	627.586	3	48.322	2	61.605	5	0	9	-.005	12	1.001	3
516			min	-289.796	2	-1.833	4	-100.019	1	0	3	-.073	4	-1.418	2
517		12	max	643.121	3	396.431	3	151.993	5	0	2	.092	1	.877	3
518			min	-220.317	2	-647.242	2	-58.924	1	0	3	-.247	5	-1.258	2
519		13	max	643.753	3	395.337	3	153.453	5	0	2	.056	1	.632	3
520			min	-219.475	2	-648.701	2	-58.924	1	0	3	-.153	5	-.856	2
521		14	max	644.385	3	394.243	3	154.913	5	0	2	.019	1	.387	3
522			min	-218.632	2	-650.16	2	-58.924	1	0	3	-.057	5	-.453	2
523		15	max	645.017	3	393.148	3	156.373	5	0	2	.04	5	.142	3
524			min	-217.79	2	-651.619	2	-58.924	1	0	3	-.018	1	-.07	1
525		16	max	645.648	3	392.054	3	157.834	5	0	2	.137	5	.356	2
526			min	-216.948	2	-653.078	2	-58.924	1	0	3	-.054	1	-.101	3
527		17	max	646.28	3	390.96	3	159.294	5	0	2	.236	5	.761	2
528			min	-216.105	2	-654.537	2	-58.924	1	0	3	-.091	1	-.344	3
529		18	max	32.884	5	630.888	2	-5.331	12	0	5	.224	5	.383	2
530			min	-162.963	1	-294.464	3	-105.635	4	0	2	-.131	1	-.169	3
531		19	max	33.277	5	629.429	2	-5.331	12	0	5	.17	5	.014	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
532			min	-162.12	1	-295.559	3	-104.175	4	0	2	-.174	1	-.008	1
533	M5	1	max	363.61	1	2482.832	3	86.261	5	0	1	0	1	.029	2
534			min	13.269	12	-1454.231	2	0	1	0	4	-.231	4	0	15
535		2	max	364.452	1	2481.738	3	87.721	5	0	1	0	1	.932	2
536			min	13.69	12	-1455.69	2	0	1	0	4	-.178	4	-1.532	3
537		3	max	1863.261	3	1457.839	2	67.061	4	0	4	0	1	1.804	2
538			min	-1160.501	2	-1704.401	3	0	1	0	1	-.123	4	-3.027	3
539		4	max	1863.892	3	1456.38	2	68.521	4	0	4	0	1	.9	2
540			min	-1159.659	2	-1705.495	3	0	1	0	1	-.081	4	-1.968	3
541		5	max	1864.524	3	1454.921	2	69.981	4	0	4	0	1	.043	1
542			min	-1158.816	2	-1706.589	3	0	1	0	1	-.038	4	-.91	3
543		6	max	1865.156	3	1453.462	2	71.441	4	0	4	.006	4	.15	3
544			min	-1157.974	2	-1707.683	3	0	1	0	1	0	1	-.906	2
545		7	max	1865.788	3	1452.003	2	72.901	4	0	4	.051	4	1.21	3
546			min	-1157.131	2	-1708.778	3	0	1	0	1	0	1	-1.808	2
547		8	max	1866.42	3	1450.544	2	74.361	4	0	4	.096	4	2.271	3
548			min	-1156.289	2	-1709.872	3	0	1	0	1	0	1	-2.709	2
549		9	max	1885.218	3	174.099	2	198.342	4	0	1	0	1	2.616	3
550			min	-1005.368	2	.44	15	0	1	0	1	-.206	4	-3.103	2
551		10	max	1885.85	3	172.64	2	199.802	4	0	1	0	1	2.53	3
552			min	-1004.525	2	0	15	0	1	0	1	-.083	4	-3.211	2
553		11	max	1886.482	3	171.181	2	201.262	4	0	1	.042	4	2.444	3
554			min	-1003.683	2	-1.649	6	0	1	0	1	0	1	-3.318	2
555		12	max	1905.84	3	1112.066	3	213.288	4	0	1	0	1	2.14	3
556			min	-852.979	2	-1799.214	2	0	1	0	4	-.354	4	-2.966	2
557		13	max	1906.472	3	1110.971	3	214.748	4	0	1	0	1	1.451	3
558			min	-852.137	2	-1800.673	2	0	1	0	4	-.221	4	-1.849	2
559		14	max	1907.104	3	1109.877	3	216.208	4	0	1	0	1	.761	3
560			min	-851.294	2	-1802.132	2	0	1	0	4	-.087	4	-.731	2
561		15	max	1907.735	3	1108.783	3	217.668	4	0	1	.047	4	.388	2
562			min	-850.452	2	-1803.591	2	0	1	0	4	0	1	0	15
563		16	max	1908.367	3	1107.688	3	219.128	4	0	1	.183	4	1.508	2
564			min	-849.61	2	-1805.05	2	0	1	0	4	0	1	-.615	3
565		17	max	1908.999	3	1106.594	3	220.589	4	0	1	.319	4	2.628	2
566			min	-848.767	2	-1806.509	2	0	1	0	4	0	1	-1.302	3
567		18	max	-14.746	12	2139.995	2	0	1	0	4	.348	4	1.343	2
568			min	-363.269	1	-1045.953	3	-20.364	5	0	1	0	1	-.677	3
569		19	max	-14.325	12	2138.536	2	0	1	0	4	.336	4	.016	1
570			min	-362.426	1	-1047.048	3	-18.903	5	0	1	0	1	-.027	3
571	M9	1	max	161.528	1	750.853	3	67.749	4	0	3	-.015	12	0	15
572			min	9.543	12	-418.32	2	5.349	12	0	4	-.182	4	-.014	2
573		2	max	162.371	1	749.759	3	69.209	4	0	3	-.012	12	.246	2
574			min	9.964	12	-419.779	2	5.349	12	0	4	-.139	4	-.47	3
575		3	max	607.349	3	546.127	2	60.957	1	0	2	-.008	12	.496	2
576			min	-365.063	2	-582.841	3	5.32	12	0	3	-.096	4	-.92	3
577		4	max	607.981	3	544.668	2	60.957	1	0	2	-.005	12	.158	1
578			min	-364.22	2	-583.936	3	5.32	12	0	3	-.067	4	-.558	3
579		5	max	608.612	3	543.209	2	60.957	1	0	2	-.002	12	-.005	15
580			min	-363.378	2	-585.03	3	5.32	12	0	3	-.036	4	-.195	3
581		6	max	609.244	3	541.75	2	60.957	1	0	2	.018	1	.168	3
582			min	-362.536	2	-586.124	3	5.32	12	0	3	-.01	5	-.517	2
583		7	max	609.876	3	540.291	2	60.957	1	0	2	.056	1	.532	3
584			min	-361.693	2	-587.218	3	5.32	12	0	3	.005	12	-.853	2
585		8	max	610.508	3	538.832	2	60.957	1	0	2	.094	1	.897	3
586			min	-360.851	2	-588.313	3	5.32	12	0	3	.008	12	-1.187	2
587		9	max	626.322	3	51.24	2	100.019	1	0	3	-.005	12	1.044	3
588			min	-291.481	2	.454	15	8.192	12	0	9	-.157	4	-1.356	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
589		10	max	626.954	3	49.781	2	100.019	1	0	3	.001	1	1.022	3
590			min	-290.638	2	.014	15	8.192	12	0	9	-.096	4	-1.387	2
591		11	max	627.586	3	48.322	2	100.801	4	0	3	.063	1	1.001	3
592			min	-289.796	2	-1.712	6	8.192	12	0	9	-.048	5	-1.418	2
593		12	max	643.121	3	396.431	3	176.602	4	0	3	-.007	12	.877	3
594			min	-220.317	2	-647.242	2	4.529	12	0	2	-.286	4	-1.258	2
595		13	max	643.753	3	395.337	3	178.062	4	0	3	-.004	12	.632	3
596			min	-219.475	2	-648.701	2	4.529	12	0	2	-.176	4	-.856	2
597		14	max	644.385	3	394.243	3	179.523	4	0	3	-.002	12	.387	3
598			min	-218.632	2	-650.16	2	4.529	12	0	2	-.065	4	-.453	2
599		15	max	645.017	3	393.148	3	180.983	4	0	3	.047	4	.142	3
600			min	-217.79	2	-651.619	2	4.529	12	0	2	.001	12	-.07	1
601		16	max	645.648	3	392.054	3	182.443	4	0	3	.16	4	.356	2
602			min	-216.948	2	-653.078	2	4.529	12	0	2	.004	12	-.101	3
603		17	max	646.28	3	390.96	3	183.903	4	0	3	.274	4	.761	2
604			min	-216.105	2	-654.537	2	4.529	12	0	2	.007	12	-.344	3
605		18	max	-9.436	12	630.888	2	69.46	1	0	2	.278	4	.383	2
606			min	-162.963	1	-294.464	3	-78.699	5	0	3	.01	12	-.169	3
607		19	max	-9.015	12	629.429	2	69.46	1	0	2	.239	4	.014	3
608			min	-162.12	1	-295.559	3	-77.239	5	0	3	.013	12	-.008	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.211	2	.012	3	1.455e-2	2	NC	1	NC	1
2			min	-.727	4	-.061	3	-.007	2	-4.246e-3	3	NC	1	NC	1
3		2	max	0	1	.139	2	.019	1	1.565e-2	2	NC	4	NC	2
4			min	-.727	4	.004	15	-.014	5	-3.939e-3	3	1083.143	3	9547.554	1
5		3	max	0	1	.251	3	.044	1	1.674e-2	2	NC	5	NC	2
6			min	-.728	4	.003	15	-.018	5	-3.632e-3	3	596.271	3	4131.19	1
7		4	max	0	1	.338	3	.065	1	1.784e-2	2	NC	5	NC	3
8			min	-.728	4	.002	15	-.014	5	-3.326e-3	3	465.67	3	2817.895	1
9		5	max	0	1	.363	3	.075	1	1.894e-2	2	NC	5	NC	3
10			min	-.728	4	.002	15	-.005	5	-3.019e-3	3	438.5	3	2457.183	1
11		6	max	0	1	.326	3	.07	1	2.003e-2	2	NC	5	NC	5
12			min	-.728	4	.003	15	-.001	10	-2.713e-3	3	480.13	3	2610.842	1
13		7	max	0	1	.24	3	.053	1	2.113e-2	2	NC	4	NC	2
14			min	-.728	4	.004	15	-.005	10	-2.406e-3	3	616.882	3	3465.339	1
15		8	max	0	1	.257	2	.035	3	2.223e-2	2	NC	4	NC	2
16			min	-.728	4	.006	15	-.009	10	-2.1e-3	3	978.007	3	6663.744	1
17		9	max	0	1	.324	2	.035	3	2.333e-2	2	NC	4	NC	1
18			min	-.728	4	.007	15	-.019	2	-1.793e-3	3	1635.908	2	8049.359	3
19		10	max	0	1	.354	2	.035	3	2.442e-2	2	NC	4	NC	1
20			min	-.728	4	-.019	3	-.025	2	-1.486e-3	3	1296.325	2	8086.173	3
21		11	max	0	12	.324	2	.035	3	2.333e-2	2	NC	4	NC	1
22			min	-.728	4	.007	15	-.019	2	-1.793e-3	3	1635.908	2	8049.359	3
23		12	max	0	12	.257	2	.035	3	2.223e-2	2	NC	4	NC	2
24			min	-.728	4	.005	15	-.011	5	-2.1e-3	3	978.007	3	6663.744	1
25		13	max	0	12	.24	3	.053	1	2.113e-2	2	NC	4	NC	2
26			min	-.728	4	.004	15	-.005	10	-2.406e-3	3	616.882	3	3465.339	1
27		14	max	0	12	.326	3	.07	1	2.003e-2	2	NC	5	NC	5
28			min	-.728	4	.002	15	-.001	10	-2.713e-3	3	480.13	3	2610.842	1
29		15	max	0	12	.363	3	.075	1	1.894e-2	2	NC	5	NC	3
30			min	-.728	4	.001	15	0	10	-3.019e-3	3	438.5	3	2457.183	1
31		16	max	0	12	.338	3	.065	1	1.784e-2	2	NC	5	NC	3
32			min	-.728	4	0	15	0	10	-3.326e-3	3	465.67	3	2817.895	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
33		17	max	0	12	.251	3	.044	1	1.674e-2	2	NC	5	NC	2
34			min	-.728	4	.002	15	0	10	-3.632e-3	3	596.271	3	4131.19	1
35		18	max	0	12	.139	2	.023	4	1.565e-2	2	NC	4	NC	2
36			min	-.728	4	.003	15	-.003	10	-3.939e-3	3	1083.143	3	7647.549	4
37		19	max	0	12	.211	2	.012	3	1.455e-2	2	NC	1	NC	1
38			min	-.728	4	-.061	3	-.007	2	-4.246e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.44	3	.01	3	8.059e-3	2	NC	1	NC	1
40			min	-.54	4	-.631	2	-.006	2	-6.527e-3	3	NC	1	NC	1
41		2	max	0	1	.664	3	.012	3	9.232e-3	2	NC	5	NC	1
42			min	-.54	4	-.85	2	-.022	5	-7.602e-3	3	829.456	3	7675.083	5
43		3	max	0	1	.862	3	.033	1	1.04e-2	2	NC	5	NC	2
44			min	-.54	4	-1.049	2	-.027	5	-8.676e-3	3	440.652	3	5512.408	1
45		4	max	0	1	1.015	3	.053	1	1.158e-2	2	NC	15	NC	3
46			min	-.54	4	-1.211	2	-.02	5	-9.751e-3	3	320.604	2	3463.668	1
47		5	max	0	1	1.113	3	.064	1	1.275e-2	2	NC	15	NC	3
48			min	-.54	4	-1.328	2	-.005	5	-1.083e-2	3	266.813	2	2884.261	1
49		6	max	0	1	1.155	3	.062	1	1.392e-2	2	NC	15	NC	3
50			min	-.54	4	-1.397	2	-.001	10	-1.19e-2	3	242.611	2	2974.175	1
51		7	max	0	1	1.148	3	.048	1	1.51e-2	2	NC	15	NC	2
52			min	-.54	4	-1.423	2	-.004	10	-1.297e-2	3	234.563	2	3861.41	1
53		8	max	0	1	1.107	3	.04	4	1.627e-2	2	NC	15	NC	2
54			min	-.54	4	-1.417	2	-.008	10	-1.405e-2	3	236.439	2	4502.738	4
55		9	max	0	1	1.058	3	.031	3	1.744e-2	2	NC	15	NC	1
56			min	-.54	4	-1.395	2	-.017	2	-1.512e-2	3	243.173	2	6399.868	4
57		10	max	0	1	1.032	3	.031	3	1.861e-2	2	NC	15	NC	1
58			min	-.54	4	-1.382	2	-.022	2	-1.62e-2	3	247.607	2	9147.363	3
59		11	max	0	12	1.058	3	.031	3	1.744e-2	2	NC	15	NC	1
60			min	-.54	4	-1.395	2	-.022	5	-1.512e-2	3	243.173	2	8349.404	5
61		12	max	0	12	1.107	3	.03	3	1.627e-2	2	NC	15	NC	2
62			min	-.54	4	-1.417	2	-.026	5	-1.405e-2	3	236.439	2	7172.378	5
63		13	max	0	12	1.148	3	.048	1	1.51e-2	2	NC	15	NC	2
64			min	-.54	4	-1.423	2	-.017	5	-1.297e-2	3	234.563	2	3861.41	1
65		14	max	0	12	1.155	3	.062	1	1.392e-2	2	NC	15	NC	3
66			min	-.54	4	-1.397	2	-.002	5	-1.19e-2	3	242.611	2	2974.175	1
67		15	max	0	12	1.113	3	.064	1	1.275e-2	2	NC	15	NC	3
68			min	-.54	4	-1.328	2	0	10	-1.083e-2	3	266.813	2	2884.261	1
69		16	max	0	12	1.015	3	.053	1	1.158e-2	2	NC	15	NC	3
70			min	-.54	4	-1.211	2	0	10	-9.751e-3	3	320.604	2	3463.668	1
71		17	max	0	12	.862	3	.042	4	1.04e-2	2	NC	5	NC	2
72			min	-.54	4	-1.049	2	-.001	10	-8.676e-3	3	440.652	3	4277.389	4
73		18	max	0	12	.664	3	.028	4	9.232e-3	2	NC	5	NC	1
74			min	-.54	4	-.85	2	-.003	10	-7.602e-3	3	829.456	3	6298.136	4
75		19	max	0	12	.44	3	.01	3	8.059e-3	2	NC	1	NC	1
76			min	-.54	4	-.631	2	-.006	2	-6.527e-3	3	NC	1	NC	1
77	M15	1	max	0	12	.449	3	.01	3	5.602e-3	3	NC	1	NC	1
78			min	-.436	4	-.629	2	-.006	2	-8.399e-3	2	NC	1	NC	1
79		2	max	0	12	.617	3	.012	1	6.516e-3	3	NC	5	NC	1
80			min	-.436	4	-.894	2	-.031	5	-9.63e-3	2	702.174	2	5631.788	5
81		3	max	0	12	.77	3	.034	1	7.429e-3	3	NC	5	NC	2
82			min	-.436	4	-1.129	2	-.039	5	-1.086e-2	2	371.985	2	4560.066	5
83		4	max	0	12	.896	3	.054	1	8.342e-3	3	NC	15	NC	3
84			min	-.436	4	-1.313	2	-.029	5	-1.209e-2	2	271.78	2	3443.855	1
85		5	max	0	12	.989	3	.064	1	9.255e-3	3	NC	15	NC	3
86			min	-.437	4	-1.435	2	-.01	5	-1.332e-2	2	230.625	2	2867.556	1
87		6	max	0	12	1.047	3	.063	1	1.017e-2	3	NC	15	NC	3
88			min	-.437	4	-1.493	2	0	10	-1.456e-2	2	215.156	2	2954.014	1
89		7	max	0	12	1.073	3	.048	1	1.108e-2	3	NC	15	NC	2

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
90			min	-.437	4	-1.495	2	-.004	10	-1.579e-2	2	214.787	2	3824.576	1
91		8	max	0	12	1.074	3	.049	4	1.2e-2	3	NC	15	NC	2
92			min	-.437	4	-1.457	2	-.008	10	-1.702e-2	2	224.597	2	3721.148	4
93		9	max	0	12	1.062	3	.035	4	1.291e-2	3	NC	15	NC	1
94			min	-.437	4	-1.407	2	-.016	2	-1.825e-2	2	239.149	2	5124.388	4
95		10	max	0	1	1.054	3	.028	3	1.382e-2	3	NC	15	NC	1
96			min	-.437	4	-1.38	2	-.021	2	-1.948e-2	2	247.642	2	9916.263	3
97		11	max	0	1	1.062	3	.028	3	1.291e-2	3	NC	15	NC	1
98			min	-.437	4	-1.407	2	-.03	5	-1.825e-2	2	239.149	2	6286.802	5
99		12	max	0	1	1.074	3	.028	3	1.2e-2	3	NC	15	NC	2
100			min	-.437	4	-1.457	2	-.035	5	-1.702e-2	2	224.597	2	5360.402	5
101		13	max	0	1	1.073	3	.048	1	1.108e-2	3	NC	15	NC	2
102			min	-.437	4	-1.495	2	-.023	5	-1.579e-2	2	214.787	2	3824.576	1
103		14	max	0	1	1.047	3	.063	1	1.017e-2	3	NC	15	NC	3
104			min	-.436	4	-1.493	2	-.003	5	-1.456e-2	2	215.156	2	2954.014	1
105		15	max	0	1	.989	3	.064	1	9.255e-3	3	NC	15	NC	3
106			min	-.436	4	-1.435	2	0	10	-1.332e-2	2	230.625	2	2867.556	1
107		16	max	0	1	.896	3	.054	1	8.342e-3	3	NC	15	NC	3
108			min	-.436	4	-1.313	2	0	10	-1.209e-2	2	271.78	2	3443.855	1
109		17	max	0	1	.77	3	.054	4	7.429e-3	3	NC	5	NC	2
110			min	-.436	4	-1.129	2	0	10	-1.086e-2	2	371.985	2	3383.6	4
111		18	max	0	1	.617	3	.037	4	6.516e-3	3	NC	5	NC	1
112			min	-.436	4	-.894	2	-.003	10	-9.63e-3	2	702.174	2	4842.101	4
113		19	max	0	1	.449	3	.01	3	5.602e-3	3	NC	1	NC	1
114			min	-.436	4	-.629	2	-.006	2	-8.399e-3	2	NC	1	NC	1
115	M16	1	max	0	12	.187	2	.008	3	1.064e-2	3	NC	1	NC	1
116			min	-.127	4	-.158	3	-.005	2	-1.219e-2	2	NC	1	NC	1
117		2	max	0	12	.074	1	.019	1	1.167e-2	3	NC	4	NC	2
118			min	-.127	4	-.114	3	-.022	5	-1.277e-2	2	1497.111	2	7762.862	5
119		3	max	0	12	.017	9	.044	1	1.271e-2	3	NC	5	NC	2
120			min	-.127	4	-.083	3	-.029	5	-1.335e-2	2	837.086	2	4142.929	1
121		4	max	0	12	.008	4	.066	1	1.374e-2	3	NC	5	NC	3
122			min	-.127	4	-.09	2	-.023	5	-1.394e-2	2	673.048	2	2812.532	1
123		5	max	0	12	.009	14	.076	1	1.477e-2	3	NC	5	NC	3
124			min	-.127	4	-.092	2	-.011	5	-1.452e-2	2	667.314	2	2440.772	1
125		6	max	0	12	.022	9	.072	1	1.581e-2	3	NC	4	NC	3
126			min	-.127	4	-.12	3	.001	10	-1.51e-2	2	805.55	2	2576.117	1
127		7	max	0	12	.074	1	.055	1	1.684e-2	3	NC	3	NC	2
128			min	-.127	4	-.172	3	-.002	10	-1.568e-2	2	1291.806	2	3376.115	1
129		8	max	0	12	.157	1	.032	4	1.787e-2	3	NC	1	NC	2
130			min	-.127	4	-.23	3	-.006	10	-1.626e-2	2	2551.949	3	5630.816	4
131		9	max	0	12	.242	2	.025	3	1.891e-2	3	NC	4	NC	1
132			min	-.127	4	-.281	3	-.014	2	-1.684e-2	2	1512	3	8056.906	4
133		10	max	0	1	.284	2	.024	3	1.994e-2	3	NC	5	NC	1
134			min	-.127	4	-.303	3	-.019	2	-1.743e-2	2	1282.622	3	NC	1
135		11	max	0	1	.242	2	.025	3	1.891e-2	3	NC	4	NC	1
136			min	-.127	4	-.281	3	-.016	5	-1.684e-2	2	1512	3	NC	1
137		12	max	0	1	.157	1	.029	1	1.787e-2	3	NC	1	NC	2
138			min	-.127	4	-.23	3	-.017	5	-1.626e-2	2	2551.949	3	6255.382	1
139		13	max	0	1	.074	1	.055	1	1.684e-2	3	NC	3	NC	2
140			min	-.127	4	-.172	3	-.008	5	-1.568e-2	2	1291.806	2	3376.115	1
141		14	max	0	1	.022	9	.072	1	1.581e-2	3	NC	4	NC	3
142			min	-.126	4	-.12	3	.001	10	-1.51e-2	2	805.55	2	2576.117	1
143		15	max	0	1	.009	9	.076	1	1.477e-2	3	NC	5	NC	3
144			min	-.126	4	-.092	2	.003	10	-1.452e-2	2	667.314	2	2440.772	1
145		16	max	0	1	.007	6	.066	1	1.374e-2	3	NC	5	NC	3
146			min	-.126	4	-.09	2	.003	10	-1.394e-2	2	673.048	2	2812.532	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
147		17	max	0	1	.017	9	.048	4	1.271e-2	3	NC	5	NC	2
148			min	-.126	4	-.083	3	0	10	-1.335e-2	2	837.086	2	3832.886	4
149		18	max	0	1	.074	1	.031	4	1.167e-2	3	NC	4	NC	2
150			min	-.126	4	-.114	3	-.002	10	-1.277e-2	2	1497.111	2	5832.056	4
151		19	max	0	1	.187	2	.008	3	1.064e-2	3	NC	1	NC	1
152			min	-.126	4	-.158	3	-.005	2	-1.219e-2	2	NC	1	NC	1
153	M2	1	max	.008	2	.011	2	.008	1	2.185e-3	5	NC	1	NC	2
154			min	-.011	3	-.018	3	-.682	4	-1.796e-4	1	6838.641	2	113.545	4
155		2	max	.008	2	.01	2	.007	1	2.213e-3	5	NC	1	NC	1
156			min	-.01	3	-.017	3	-.627	4	-1.707e-4	1	7970.819	2	123.567	4
157		3	max	.007	2	.008	2	.007	1	2.241e-3	5	NC	1	NC	1
158			min	-.01	3	-.016	3	-.572	4	-1.618e-4	1	9527.859	2	135.458	4
159		4	max	.007	2	.007	2	.006	1	2.269e-3	5	NC	1	NC	1
160			min	-.009	3	-.016	3	-.518	4	-1.529e-4	1	NC	1	149.705	4
161		5	max	.006	2	.005	2	.005	1	2.297e-3	5	NC	1	NC	1
162			min	-.008	3	-.015	3	-.464	4	-1.44e-4	1	NC	1	166.968	4
163		6	max	.006	2	.004	2	.005	1	2.326e-3	5	NC	1	NC	1
164			min	-.008	3	-.015	3	-.412	4	-1.351e-4	1	NC	1	188.163	4
165		7	max	.005	2	.002	2	.004	1	2.354e-3	5	NC	1	NC	1
166			min	-.007	3	-.014	3	-.361	4	-1.263e-4	1	NC	1	214.587	4
167		8	max	.005	2	.001	2	.004	1	2.382e-3	5	NC	1	NC	1
168			min	-.007	3	-.013	3	-.312	4	-1.174e-4	1	NC	1	248.13	4
169		9	max	.004	2	0	2	.003	1	2.41e-3	5	NC	1	NC	1
170			min	-.006	3	-.012	3	-.266	4	-1.085e-4	1	NC	1	291.634	4
171		10	max	.004	2	0	2	.003	1	2.44e-3	4	NC	1	NC	1
172			min	-.005	3	-.012	3	-.222	4	-9.958e-5	1	NC	1	349.538	4
173		11	max	.004	2	-.001	15	.002	1	2.471e-3	4	NC	1	NC	1
174			min	-.005	3	-.011	3	-.181	4	-9.069e-5	1	NC	1	429.091	4
175		12	max	.003	2	-.001	15	.002	1	2.502e-3	4	NC	1	NC	1
176			min	-.004	3	-.01	3	-.143	4	-8.18e-5	1	NC	1	542.816	4
177		13	max	.003	2	-.001	15	.001	1	2.533e-3	4	NC	1	NC	1
178			min	-.004	3	-.009	3	-.109	4	-7.291e-5	1	NC	1	713.91	4
179		14	max	.002	2	-.001	15	0	1	2.563e-3	4	NC	1	NC	1
180			min	-.003	3	-.007	3	-.078	4	-6.402e-5	1	NC	1	989.459	4
181		15	max	.002	2	-.001	15	0	1	2.594e-3	4	NC	1	NC	1
182			min	-.002	3	-.006	3	-.052	4	-5.513e-5	1	NC	1	1477.683	4
183		16	max	.001	2	0	15	0	1	2.625e-3	4	NC	1	NC	1
184			min	-.002	3	-.005	3	-.031	4	-4.624e-5	1	NC	1	2476.51	4
185		17	max	0	2	0	15	0	1	2.656e-3	4	NC	1	NC	1
186			min	-.001	3	-.003	3	-.015	4	-3.735e-5	1	NC	1	5083.584	4
187		18	max	0	2	0	15	0	1	2.687e-3	4	NC	1	NC	1
188			min	0	3	-.002	6	-.005	4	-2.846e-5	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.718e-3	4	NC	1	NC	1
190			min	0	1	0	1	0	1	-1.956e-5	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	3.904e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	-5.886e-4	4	NC	1	NC	1
193		2	max	0	3	0	15	.015	4	4.036e-5	4	NC	1	NC	1
194			min	0	2	-.003	6	0	1	1.888e-6	12	NC	1	NC	1
195		3	max	.001	3	-.001	15	.028	4	6.693e-4	4	NC	1	NC	1
196			min	0	2	-.006	6	0	1	3.379e-6	12	NC	1	7159.399	14
197		4	max	.002	3	-.002	15	.04	4	1.298e-3	4	NC	1	NC	1
198			min	-.001	2	-.009	6	0	1	4.87e-6	12	NC	1	4959.508	14
199		5	max	.002	3	-.003	15	.052	4	1.927e-3	4	NC	1	NC	1
200			min	-.002	2	-.012	6	0	1	6.361e-6	12	8536.588	6	3862.696	14
201		6	max	.003	3	-.003	15	.062	4	2.556e-3	4	NC	2	NC	1
202			min	-.002	2	-.015	6	0	1	7.852e-6	12	6916.436	6	3205.629	14
203		7	max	.003	3	-.004	15	.072	4	3.185e-3	4	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
204			min	-.003	2	-.017	6	0	1	9.343e-6	12	5940.713	6	2766.857	14
205		8	max	.004	3	-.004	15	.081	4	3.814e-3	4	NC	5	NC	1
206			min	-.003	2	-.019	6	0	3	1.083e-5	12	5338.92	6	2451.166	14
207		9	max	.004	3	-.004	15	.09	4	4.443e-3	4	NC	5	NC	1
208			min	-.003	2	-.02	6	0	3	1.233e-5	12	4983.736	6	2210.679	14
209		10	max	.005	3	-.005	15	.098	4	5.072e-3	4	NC	5	NC	1
210			min	-.004	2	-.021	6	0	12	1.382e-5	12	4813.43	6	2018.586	14
211		11	max	.005	3	-.005	15	.107	4	5.701e-3	4	NC	5	NC	1
212			min	-.004	2	-.021	6	0	12	1.531e-5	12	4802.959	6	1858.659	14
213		12	max	.006	3	-.004	15	.115	4	6.33e-3	4	NC	5	NC	1
214			min	-.005	2	-.02	6	0	12	1.68e-5	12	4954.369	6	1720.514	14
215		13	max	.006	3	-.004	15	.123	4	6.959e-3	4	NC	5	NC	1
216			min	-.005	2	-.019	6	0	12	1.829e-5	12	5298.82	6	1597.273	14
217		14	max	.007	3	-.004	15	.132	4	7.588e-3	4	NC	5	NC	1
218			min	-.006	2	-.017	6	0	12	1.978e-5	12	5912.674	6	1484.312	14
219		15	max	.007	3	-.003	15	.142	4	8.216e-3	4	NC	3	NC	1
220			min	-.006	2	-.015	6	0	12	2.127e-5	12	6964.953	6	1378.565	14
221		16	max	.008	3	-.002	15	.153	4	8.845e-3	4	NC	1	NC	1
222			min	-.007	2	-.011	6	0	12	2.276e-5	12	8864.841	6	1278.09	14
223		17	max	.008	3	-.001	15	.164	4	9.474e-3	4	NC	1	NC	1
224			min	-.007	2	-.008	6	0	12	2.425e-5	12	NC	1	1181.777	14
225		18	max	.009	3	0	15	.178	4	1.01e-2	4	NC	1	NC	1
226			min	-.007	2	-.005	3	0	12	2.575e-5	12	NC	1	1089.133	14
227		19	max	.009	3	0	5	.193	4	1.073e-2	4	NC	1	NC	1
228			min	-.008	2	-.002	3	0	12	2.724e-5	12	NC	1	1000.093	14
229	M4	1	max	.002	1	.008	2	0	12	1.771e-4	4	NC	1	NC	3
230			min	0	5	-.009	3	-.193	4	1.109e-5	12	NC	1	128.484	4
231		2	max	.002	1	.007	2	0	12	1.771e-4	4	NC	1	NC	3
232			min	0	5	-.009	3	-.178	4	1.109e-5	12	NC	1	139.654	4
233		3	max	.002	1	.007	2	0	12	1.771e-4	4	NC	1	NC	2
234			min	0	5	-.008	3	-.162	4	1.109e-5	12	NC	1	152.95	4
235		4	max	.002	1	.006	2	0	12	1.771e-4	4	NC	1	NC	2
236			min	0	5	-.008	3	-.147	4	1.109e-5	12	NC	1	168.925	4
237		5	max	.002	1	.006	2	0	12	1.771e-4	4	NC	1	NC	2
238			min	0	5	-.007	3	-.132	4	1.109e-5	12	NC	1	188.328	4
239		6	max	.002	1	.005	2	0	12	1.771e-4	4	NC	1	NC	2
240			min	0	5	-.007	3	-.117	4	1.109e-5	12	NC	1	212.199	4
241		7	max	.002	1	.005	2	0	12	1.771e-4	4	NC	1	NC	2
242			min	0	5	-.006	3	-.102	4	1.109e-5	12	NC	1	242.015	4
243		8	max	.001	1	.005	2	0	12	1.771e-4	4	NC	1	NC	2
244			min	0	5	-.006	3	-.089	4	1.109e-5	12	NC	1	279.928	4
245		9	max	.001	1	.004	2	0	12	1.771e-4	4	NC	1	NC	2
246			min	0	5	-.005	3	-.075	4	1.109e-5	12	NC	1	329.178	4
247		10	max	.001	1	.004	2	0	12	1.771e-4	4	NC	1	NC	1
248			min	0	5	-.005	3	-.063	4	1.109e-5	12	NC	1	394.832	4
249		11	max	.001	1	.003	2	0	12	1.771e-4	4	NC	1	NC	1
250			min	0	5	-.004	3	-.051	4	1.109e-5	12	NC	1	485.174	4
251		12	max	0	1	.003	2	0	12	1.771e-4	4	NC	1	NC	1
252			min	0	5	-.004	3	-.04	4	1.109e-5	12	NC	1	614.537	4
253		13	max	0	1	.003	2	0	12	1.771e-4	4	NC	1	NC	1
254			min	0	5	-.003	3	-.031	4	1.109e-5	12	NC	1	809.516	4
255		14	max	0	1	.002	2	0	12	1.771e-4	4	NC	1	NC	1
256			min	0	5	-.003	3	-.022	4	1.109e-5	12	NC	1	1124.211	4
257		15	max	0	1	.002	2	0	12	1.771e-4	4	NC	1	NC	1
258			min	0	5	-.002	3	-.015	4	1.109e-5	12	NC	1	1683.307	4
259		16	max	0	1	.001	2	0	12	1.771e-4	4	NC	1	NC	1
260			min	0	5	-.002	3	-.009	4	1.109e-5	12	NC	1	2831.394	4

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
261		17	max	0	1	0	2	0	12	1.771e-4	4	NC	1	NC	1
262			min	0	5	-.001	3	-.004	4	1.109e-5	12	NC	1	5845.674	4
263		18	max	0	1	0	2	0	12	1.771e-4	4	NC	1	NC	1
264			min	0	5	0	3	-.001	4	1.109e-5	12	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.771e-4	4	NC	1	NC	1
266			min	0	1	0	1	0	1	1.109e-5	12	NC	1	NC	1
267	M6	1	max	.024	2	.038	2	0	1	2.287e-3	4	NC	3	NC	1
268			min	-.034	3	-.053	3	-.689	4	0	1	2051.798	2	112.383	4
269		2	max	.023	2	.034	2	0	1	2.314e-3	4	NC	3	NC	1
270			min	-.032	3	-.05	3	-.634	4	0	1	2254.023	2	122.303	4
271		3	max	.021	2	.031	2	0	1	2.34e-3	4	NC	3	NC	1
272			min	-.03	3	-.047	3	-.578	4	0	1	2498.33	2	134.073	4
273		4	max	.02	2	.028	2	0	1	2.367e-3	4	NC	3	NC	1
274			min	-.028	3	-.044	3	-.523	4	0	1	2796.729	2	148.174	4
275		5	max	.019	2	.024	2	0	1	2.394e-3	4	NC	3	NC	1
276			min	-.026	3	-.041	3	-.469	4	0	1	3165.99	2	165.261	4
277		6	max	.017	2	.021	2	0	1	2.42e-3	4	NC	3	NC	1
278			min	-.024	3	-.038	3	-.416	4	0	1	3630.099	2	186.24	4
279		7	max	.016	2	.018	2	0	1	2.447e-3	4	NC	3	NC	1
280			min	-.023	3	-.036	3	-.365	4	0	1	4224.354	2	212.393	4
281		8	max	.015	2	.015	2	0	1	2.473e-3	4	NC	1	NC	1
282			min	-.021	3	-.033	3	-.316	4	0	1	5002.45	2	245.593	4
283		9	max	.013	2	.013	2	0	1	2.5e-3	4	NC	1	NC	1
284			min	-.019	3	-.03	3	-.268	4	0	1	6049.405	2	288.651	4
285		10	max	.012	2	.01	2	0	1	2.527e-3	4	NC	1	NC	1
286			min	-.017	3	-.027	3	-.224	4	0	1	7506.544	2	345.96	4
287		11	max	.011	2	.008	2	0	1	2.553e-3	4	NC	1	NC	1
288			min	-.015	3	-.024	3	-.182	4	0	1	9623.48	2	424.692	4
289		12	max	.009	2	.006	2	0	1	2.58e-3	4	NC	1	NC	1
290			min	-.013	3	-.021	3	-.144	4	0	1	NC	1	537.238	4
291		13	max	.008	2	.004	2	0	1	2.606e-3	4	NC	1	NC	1
292			min	-.011	3	-.018	3	-.11	4	0	1	NC	1	706.546	4
293		14	max	.007	2	.003	2	0	1	2.633e-3	4	NC	1	NC	1
294			min	-.009	3	-.015	3	-.079	4	0	1	NC	1	979.194	4
295		15	max	.005	2	.002	2	0	1	2.66e-3	4	NC	1	NC	1
296			min	-.008	3	-.012	3	-.053	4	0	1	NC	1	1462.21	4
297		16	max	.004	2	0	2	0	1	2.686e-3	4	NC	1	NC	1
298			min	-.006	3	-.009	3	-.032	4	0	1	NC	1	2450.169	4
299		17	max	.003	2	0	2	0	1	2.713e-3	4	NC	1	NC	1
300			min	-.004	3	-.006	3	-.015	4	0	1	NC	1	5027.91	4
301		18	max	.001	2	0	2	0	1	2.739e-3	4	NC	1	NC	1
302			min	-.002	3	-.003	3	-.005	4	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	2.766e-3	4	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	-5.996e-4	4	NC	1	NC	1
307		2	max	.002	3	0	15	.015	4	9.955e-6	4	NC	1	NC	1
308			min	-.001	2	-.004	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	-.001	15	.028	4	6.195e-4	4	NC	1	NC	1
310			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
311		4	max	.005	3	-.002	15	.041	4	1.229e-3	4	NC	1	NC	1
312			min	-.004	2	-.011	3	0	1	0	1	NC	1	9984.883	4
313		5	max	.006	3	-.003	15	.053	4	1.839e-3	4	NC	1	NC	1
314			min	-.006	2	-.014	3	0	1	0	1	8092.865	3	8864.422	4
315		6	max	.008	3	-.004	15	.063	4	2.448e-3	4	NC	1	NC	1
316			min	-.007	2	-.017	3	0	1	0	1	6827.82	3	8594.001	4
317		7	max	.009	3	-.004	15	.073	4	3.058e-3	4	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
318			min	-.009	2	-.019	3	0	1	0	1	5934.696	4	8945.345	4
319		8	max	.011	3	-.005	15	.082	4	3.668e-3	4	NC	2	NC	1
320			min	-.01	2	-.021	3	0	1	0	1	5333.895	4	9968.897	5
321		9	max	.012	3	-.005	15	.091	4	4.277e-3	4	NC	5	NC	1
322			min	-.012	2	-.022	3	0	1	0	1	4979.344	4	NC	1
323		10	max	.014	3	-.005	15	.099	4	4.887e-3	4	NC	5	NC	1
324			min	-.013	2	-.022	3	0	1	0	1	4809.43	4	NC	1
325		11	max	.015	3	-.005	15	.107	4	5.496e-3	4	NC	5	NC	1
326			min	-.015	2	-.022	3	0	1	0	1	4799.171	4	NC	1
327		12	max	.017	3	-.005	15	.115	4	6.106e-3	4	NC	5	NC	1
328			min	-.016	2	-.022	3	0	1	0	1	4950.639	4	NC	1
329		13	max	.018	3	-.005	15	.122	4	6.715e-3	4	NC	5	NC	1
330			min	-.017	2	-.021	3	0	1	0	1	5294.989	4	NC	1
331		14	max	.02	3	-.004	15	.131	4	7.325e-3	4	NC	2	NC	1
332			min	-.019	2	-.019	3	0	1	0	1	5908.547	4	NC	1
333		15	max	.021	3	-.004	15	.139	4	7.935e-3	4	NC	1	NC	1
334			min	-.02	2	-.017	3	0	1	0	1	6960.234	4	NC	1
335		16	max	.023	3	-.003	15	.149	4	8.544e-3	4	NC	1	NC	1
336			min	-.022	2	-.015	3	0	1	0	1	8858.977	4	NC	1
337		17	max	.024	3	-.002	15	.16	4	9.154e-3	4	NC	1	NC	1
338			min	-.023	2	-.012	3	0	1	0	1	NC	1	NC	1
339		18	max	.026	3	-.001	15	.172	4	9.763e-3	4	NC	1	NC	1
340			min	-.025	2	-.01	3	0	1	0	1	NC	1	NC	1
341		19	max	.027	3	0	10	.185	4	1.037e-2	4	NC	1	NC	1
342			min	-.026	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.025	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.028	3	-.185	4	-3.079e-5	5	NC	1	133.807	4
345		2	max	.006	1	.024	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.027	3	-.171	4	-3.079e-5	5	NC	1	145.46	4
347		3	max	.005	1	.023	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.025	3	-.156	4	-3.079e-5	5	NC	1	159.33	4
349		4	max	.005	1	.021	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.024	3	-.141	4	-3.079e-5	5	NC	1	175.993	4
351		5	max	.005	1	.02	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.022	3	-.126	4	-3.079e-5	5	NC	1	196.231	4
353		6	max	.004	1	.018	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.02	3	-.112	4	-3.079e-5	5	NC	1	221.129	4
355		7	max	.004	1	.017	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.019	3	-.098	4	-3.079e-5	5	NC	1	252.226	4
357		8	max	.004	1	.016	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.017	3	-.085	4	-3.079e-5	5	NC	1	291.768	4
359		9	max	.003	1	.014	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.016	3	-.072	4	-3.079e-5	5	NC	1	343.135	4
361		10	max	.003	1	.013	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.014	3	-.06	4	-3.079e-5	5	NC	1	411.61	4
363		11	max	.003	1	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.013	3	-.049	4	-3.079e-5	5	NC	1	505.837	4
365		12	max	.002	1	.01	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.011	3	-.039	4	-3.079e-5	5	NC	1	640.764	4
367		13	max	.002	1	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.009	3	-.029	4	-3.079e-5	5	NC	1	844.134	4
369		14	max	.002	1	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.008	3	-.021	4	-3.079e-5	5	NC	1	1172.383	4
371		15	max	.001	1	.006	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.006	3	-.014	4	-3.079e-5	5	NC	1	1755.582	4
373		16	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.005	3	-.008	4	-3.079e-5	5	NC	1	2953.223	4

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
375		17	max	0	1	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	-.004	4	-3.079e-5	5	NC	1	6097.818	4
377		18	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.002	3	-.001	4	-3.079e-5	5	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	-3.079e-5	5	NC	1	NC	1
381	M10	1	max	.008	2	.011	2	0	12	2.274e-3	4	NC	1	NC	2
382			min	-.011	3	-.018	3	-.687	4	1.709e-5	12	6838.641	2	112.725	4
383		2	max	.008	2	.01	2	0	12	2.3e-3	4	NC	1	NC	1
384			min	-.01	3	-.017	3	-.632	4	1.625e-5	12	7970.819	2	122.676	4
385		3	max	.007	2	.008	2	0	12	2.325e-3	4	NC	1	NC	1
386			min	-.01	3	-.016	3	-.576	4	1.541e-5	12	9527.859	2	134.483	4
387		4	max	.007	2	.007	2	0	12	2.35e-3	4	NC	1	NC	1
388			min	-.009	3	-.016	3	-.521	4	1.457e-5	12	NC	1	148.629	4
389		5	max	.006	2	.005	2	0	12	2.375e-3	4	NC	1	NC	1
390			min	-.008	3	-.015	3	-.467	4	1.372e-5	12	NC	1	165.77	4
391		6	max	.006	2	.004	2	0	12	2.401e-3	4	NC	1	NC	1
392			min	-.008	3	-.015	3	-.415	4	1.288e-5	12	NC	1	186.816	4
393		7	max	.005	2	.002	2	0	12	2.426e-3	4	NC	1	NC	1
394			min	-.007	3	-.014	3	-.364	4	1.204e-5	12	NC	1	213.054	4
395		8	max	.005	2	.001	2	0	12	2.451e-3	4	NC	1	NC	1
396			min	-.007	3	-.013	3	-.315	4	1.12e-5	12	NC	1	246.362	4
397		9	max	.004	2	0	2	0	12	2.477e-3	4	NC	1	NC	1
398			min	-.006	3	-.012	3	-.268	4	1.036e-5	12	NC	1	289.563	4
399		10	max	.004	2	0	2	0	12	2.502e-3	4	NC	1	NC	1
400			min	-.005	3	-.012	3	-.223	4	9.515e-6	12	NC	1	347.064	4
401		11	max	.004	2	-.002	2	0	12	2.527e-3	4	NC	1	NC	1
402			min	-.005	3	-.011	3	-.182	4	8.673e-6	12	NC	1	426.066	4
403		12	max	.003	2	-.002	2	0	12	2.552e-3	4	NC	1	NC	1
404			min	-.004	3	-.01	3	-.144	4	7.831e-6	12	NC	1	539.005	4
405		13	max	.003	2	-.002	15	0	12	2.578e-3	4	NC	1	NC	1
406			min	-.004	3	-.009	3	-.109	4	6.989e-6	12	NC	1	708.924	4
407		14	max	.002	2	-.002	15	0	12	2.603e-3	4	NC	1	NC	1
408			min	-.003	3	-.007	3	-.079	4	6.148e-6	12	NC	1	982.593	4
409		15	max	.002	2	-.002	15	0	12	2.628e-3	4	NC	1	NC	1
410			min	-.002	3	-.006	4	-.053	4	5.306e-6	12	NC	1	1467.514	4
411		16	max	.001	2	-.001	15	0	12	2.654e-3	4	NC	1	NC	1
412			min	-.002	3	-.005	4	-.032	4	4.464e-6	12	NC	1	2459.671	4
413		17	max	0	2	0	15	0	12	2.679e-3	4	NC	1	NC	1
414			min	-.001	3	-.004	4	-.015	4	3.622e-6	12	NC	1	5049.702	4
415		18	max	0	2	0	15	0	12	2.704e-3	4	NC	1	NC	1
416			min	0	3	-.002	4	-.005	4	2.779e-6	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	2.729e-3	4	NC	1	NC	1
418			min	0	1	0	1	0	1	1.909e-6	10	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-3.775e-7	10	NC	1	NC	1
420			min	0	1	0	1	0	1	-5.909e-4	4	NC	1	NC	1
421		2	max	0	3	0	15	.015	4	2.929e-5	5	NC	1	NC	1
422			min	0	2	-.003	4	0	10	-2.441e-5	1	NC	1	NC	1
423		3	max	.001	3	-.002	15	.028	4	6.421e-4	5	NC	1	NC	1
424			min	0	2	-.006	4	0	10	-4.492e-5	1	NC	1	NC	1
425		4	max	.002	3	-.002	15	.041	4	1.258e-3	4	NC	1	NC	1
426			min	-.001	2	-.009	4	0	10	-6.542e-5	1	NC	1	NC	1
427		5	max	.002	3	-.003	15	.052	4	1.874e-3	4	NC	1	NC	1
428			min	-.002	2	-.013	4	0	10	-8.593e-5	1	8242.903	4	NC	1
429		6	max	.003	3	-.004	15	.062	4	2.49e-3	4	NC	2	NC	1
430			min	-.002	2	-.016	4	0	10	-1.064e-4	1	6698.993	4	NC	1
431		7	max	.003	3	-.004	15	.072	4	3.106e-3	4	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
432			min	-.003	2	-.018	4	0	10	-1.269e-4	1	5768.32	4	NC	1
433		8	max	.004	3	-.005	15	.081	4	3.722e-3	4	NC	5	NC	1
434			min	-.003	2	-.02	4	0	10	-1.474e-4	1	5194.682	4	NC	1
435		9	max	.004	3	-.005	15	.09	4	4.338e-3	4	NC	5	NC	1
436			min	-.003	2	-.022	4	0	1	-1.68e-4	1	4857.441	4	NC	1
437		10	max	.005	3	-.006	15	.098	4	4.955e-3	4	NC	5	NC	1
438			min	-.004	2	-.022	4	0	1	-1.885e-4	1	4698.24	4	NC	1
439		11	max	.005	3	-.006	15	.106	4	5.571e-3	4	NC	5	NC	1
440			min	-.004	2	-.022	4	0	1	-2.09e-4	1	4693.747	4	NC	1
441		12	max	.006	3	-.005	15	.114	4	6.187e-3	4	NC	5	NC	1
442			min	-.005	2	-.022	4	-.001	1	-2.295e-4	1	4846.712	4	NC	1
443		13	max	.006	3	-.005	15	.122	4	6.803e-3	4	NC	5	NC	1
444			min	-.005	2	-.021	4	-.002	1	-2.5e-4	1	5188.179	4	NC	1
445		14	max	.007	3	-.005	15	.131	4	7.419e-3	4	NC	5	NC	1
446			min	-.006	2	-.019	4	-.002	1	-2.705e-4	1	5793.403	4	NC	1
447		15	max	.007	3	-.004	15	.14	4	8.036e-3	4	NC	3	NC	1
448			min	-.006	2	-.016	4	-.003	1	-2.91e-4	1	6828.485	4	NC	1
449		16	max	.008	3	-.003	15	.15	4	8.652e-3	4	NC	1	NC	1
450			min	-.007	2	-.013	4	-.004	1	-3.115e-4	1	8695.189	4	NC	1
451		17	max	.008	3	-.002	15	.161	4	9.268e-3	4	NC	1	NC	1
452			min	-.007	2	-.009	4	-.005	1	-3.32e-4	1	NC	1	NC	1
453		18	max	.009	3	-.002	15	.174	4	9.884e-3	4	NC	1	NC	1
454			min	-.007	2	-.006	4	-.006	1	-3.525e-4	1	NC	1	NC	1
455		19	max	.009	3	0	10	.188	4	1.05e-2	4	NC	1	NC	1
456			min	-.008	2	-.002	3	-.007	1	-3.73e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.008	2	.007	1	1.197e-4	5	NC	1	NC	3
458			min	0	3	-.009	3	-.188	4	-1.402e-4	1	NC	1	131.65	4
459		2	max	.002	1	.007	2	.007	1	1.197e-4	5	NC	1	NC	3
460			min	0	3	-.009	3	-.173	4	-1.402e-4	1	NC	1	143.102	4
461		3	max	.002	1	.007	2	.006	1	1.197e-4	5	NC	1	NC	2
462			min	0	3	-.008	3	-.158	4	-1.402e-4	1	NC	1	156.733	4
463		4	max	.002	1	.006	2	.006	1	1.197e-4	5	NC	1	NC	2
464			min	0	3	-.008	3	-.143	4	-1.402e-4	1	NC	1	173.11	4
465		5	max	.002	1	.006	2	.005	1	1.197e-4	5	NC	1	NC	2
466			min	0	3	-.007	3	-.129	4	-1.402e-4	1	NC	1	193	4
467		6	max	.002	1	.005	2	.005	1	1.197e-4	5	NC	1	NC	2
468			min	0	3	-.007	3	-.114	4	-1.402e-4	1	NC	1	217.471	4
469		7	max	.002	1	.005	2	.004	1	1.197e-4	5	NC	1	NC	2
470			min	0	3	-.006	3	-.1	4	-1.402e-4	1	NC	1	248.036	4
471		8	max	.001	1	.005	2	.003	1	1.197e-4	5	NC	1	NC	2
472			min	0	3	-.006	3	-.086	4	-1.402e-4	1	NC	1	286.901	4
473		9	max	.001	1	.004	2	.003	1	1.197e-4	5	NC	1	NC	2
474			min	0	3	-.005	3	-.074	4	-1.402e-4	1	NC	1	337.389	4
475		10	max	.001	1	.004	2	.002	1	1.197e-4	5	NC	1	NC	1
476			min	0	3	-.005	3	-.061	4	-1.402e-4	1	NC	1	404.691	4
477		11	max	.001	1	.003	2	.002	1	1.197e-4	5	NC	1	NC	1
478			min	0	3	-.004	3	-.05	4	-1.402e-4	1	NC	1	497.303	4
479		12	max	0	1	.003	2	.002	1	1.197e-4	5	NC	1	NC	1
480			min	0	3	-.004	3	-.039	4	-1.402e-4	1	NC	1	629.917	4
481		13	max	0	1	.003	2	.001	1	1.197e-4	5	NC	1	NC	1
482			min	0	3	-.003	3	-.03	4	-1.402e-4	1	NC	1	829.796	4
483		14	max	0	1	.002	2	0	1	1.197e-4	5	NC	1	NC	1
484			min	0	3	-.003	3	-.022	4	-1.402e-4	1	NC	1	1152.404	4
485		15	max	0	1	.002	2	0	1	1.197e-4	5	NC	1	NC	1
486			min	0	3	-.002	3	-.014	4	-1.402e-4	1	NC	1	1725.565	4
487		16	max	0	1	.001	2	0	1	1.197e-4	5	NC	1	NC	1
488			min	0	3	-.002	3	-.009	4	-1.402e-4	1	NC	1	2902.551	4

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
489		17	max	0	1	0	2	0	1	1.197e-4	5	NC	1	NC	1
490			min	0	3	-.001	3	-.004	4	-1.402e-4	1	NC	1	5992.77	4
491		18	max	0	1	0	2	0	1	1.197e-4	5	NC	1	NC	1
492			min	0	3	0	3	-.001	4	-1.402e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.197e-4	5	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.402e-4	1	NC	1	NC	1
495	M1	1	max	.012	3	.211	2	.728	4	7.238e-3	2	NC	1	NC	1
496			min	-.007	2	-.061	3	0	12	-1.724e-2	3	NC	1	NC	1
497		2	max	.012	3	.102	2	.706	4	6.975e-3	4	NC	5	NC	1
498			min	-.007	2	-.028	3	-.006	1	-8.558e-3	3	1245.976	2	NC	1
499		3	max	.012	3	.018	3	.682	4	1.26e-2	4	NC	5	NC	1
500			min	-.007	2	-.014	2	-.008	1	-1.504e-4	1	603.877	2	5868.621	5
501		4	max	.011	3	.087	3	.657	4	1.084e-2	4	NC	15	NC	1
502			min	-.007	2	-.142	2	-.007	1	-4.195e-3	3	384.713	2	4293.568	5
503		5	max	.011	3	.172	3	.631	4	9.074e-3	4	NC	15	NC	1
504			min	-.007	2	-.274	2	-.005	1	-8.287e-3	3	279.704	2	3499.332	5
505		6	max	.011	3	.262	3	.605	4	1.202e-2	2	8809.571	15	NC	1
506			min	-.007	2	-.401	2	-.002	1	-1.238e-2	3	221.534	2	3009.053	5
507		7	max	.011	3	.347	3	.578	4	1.603e-2	2	7448.517	15	NC	1
508			min	-.007	2	-.514	2	0	3	-1.647e-2	3	187.048	2	2644.889	4
509		8	max	.01	3	.418	3	.551	4	2.004e-2	2	6641.751	15	NC	1
510			min	-.006	2	-.603	2	0	12	-2.056e-2	3	166.589	2	2356.673	4
511		9	max	.01	3	.464	3	.523	4	2.25e-2	2	6218.968	15	NC	1
512			min	-.006	2	-.66	2	0	1	-2.114e-2	3	155.907	2	2148.823	4
513		10	max	.01	3	.481	3	.492	4	2.392e-2	2	6089.544	15	NC	1
514			min	-.006	2	-.679	2	0	10	-1.937e-2	3	152.783	2	2072.724	4
515		11	max	.01	3	.469	3	.458	4	2.535e-2	2	6218.567	15	NC	1
516			min	-.006	2	-.659	2	0	12	-1.76e-2	3	156.485	2	2091.032	4
517		12	max	.009	3	.43	3	.421	4	2.427e-2	2	6640.804	15	NC	1
518			min	-.006	2	-.601	2	0	1	-1.531e-2	3	168.285	2	2202.157	4
519		13	max	.009	3	.367	3	.379	4	1.947e-2	2	7446.684	15	NC	1
520			min	-.006	2	-.507	2	0	1	-1.225e-2	3	191.049	2	2580.311	4
521		14	max	.009	3	.286	3	.332	4	1.466e-2	2	8806.237	15	NC	1
522			min	-.006	2	-.39	2	0	12	-9.19e-3	3	229.898	2	3451.392	4
523		15	max	.009	3	.194	3	.284	4	9.861e-3	2	NC	15	NC	1
524			min	-.006	2	-.26	2	0	12	-6.128e-3	3	296.576	2	5549.012	4
525		16	max	.008	3	.099	3	.237	4	8.465e-3	4	NC	15	NC	1
526			min	-.006	2	-.129	2	0	12	-3.066e-3	3	419.512	2	NC	1
527		17	max	.008	3	.006	3	.194	4	9.69e-3	4	NC	5	NC	1
528			min	-.006	2	-.008	2	0	12	-3.653e-6	3	680.748	2	NC	1
529		18	max	.008	3	.095	2	.157	4	6.302e-3	2	NC	5	NC	1
530			min	-.005	2	-.078	3	0	12	-2.191e-3	3	1439.156	2	NC	1
531		19	max	.008	3	.187	2	.126	4	1.254e-2	2	NC	1	NC	1
532			min	-.005	2	-.158	3	0	1	-4.472e-3	3	NC	1	NC	1
533	M5	1	max	.035	3	.354	2	.728	4	0	1	NC	1	NC	1
534			min	-.025	2	-.019	3	0	1	-1.308e-5	4	NC	1	NC	1
535		2	max	.035	3	.169	2	.711	4	6.451e-3	4	NC	5	NC	1
536			min	-.025	2	-.004	3	0	1	0	1	740.62	2	8005.991	4
537		3	max	.035	3	.054	3	.689	4	1.276e-2	4	NC	5	NC	1
538			min	-.025	2	-.042	2	0	1	0	1	345.655	2	4750.785	4
539		4	max	.034	3	.189	3	.663	4	1.04e-2	4	9371.619	15	NC	1
540			min	-.024	2	-.297	2	0	1	0	1	209.607	2	3724.491	4
541		5	max	.033	3	.377	3	.635	4	8.032e-3	4	6506.28	15	NC	1
542			min	-.024	2	-.578	2	0	1	0	1	146.324	2	3240.894	4
543		6	max	.032	3	.591	3	.606	4	5.668e-3	4	4980.051	15	NC	1
544			min	-.023	2	-.858	2	0	1	0	1	112.402	2	2939.297	4
545		7	max	.032	3	.801	3	.577	4	3.305e-3	4	4103.926	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
546			min	-.023	2	-1.114	2	0	1	0	1	92.83	2	2679.59	4
547		8	max	.031	3	.978	3	.55	4	9.415e-4	4	3596.944	15	NC	1
548			min	-.022	2	-1.319	2	0	1	0	1	81.464	2	2395.766	4
549		9	max	.03	3	1.091	3	.523	4	0	1	3337.557	15	NC	1
550			min	-.022	2	-1.45	2	0	1	-8.177e-6	5	75.634	2	2140.137	4
551		10	max	.029	3	1.132	3	.491	4	0	1	3259.452	15	NC	1
552			min	-.022	2	-1.494	2	0	1	-7.892e-6	5	73.937	2	2091.026	4
553		11	max	.029	3	1.104	3	.457	4	0	1	3337.807	15	NC	1
554			min	-.021	2	-1.45	2	0	1	-7.607e-6	5	75.949	2	2123.73	4
555		12	max	.028	3	1.007	3	.422	4	6.791e-4	4	3597.529	15	NC	1
556			min	-.021	2	-1.314	2	0	1	0	1	82.505	2	2158.203	4
557		13	max	.027	3	.851	3	.38	4	2.386e-3	4	4105.086	15	NC	1
558			min	-.02	2	-1.096	2	0	1	0	1	95.564	2	2510.984	4
559		14	max	.027	3	.655	3	.332	4	4.092e-3	4	4982.27	15	NC	1
560			min	-.02	2	-.827	2	0	1	0	1	118.669	2	3519.162	4
561		15	max	.026	3	.438	3	.28	4	5.799e-3	4	6510.612	15	NC	1
562			min	-.02	2	-.537	2	0	1	0	1	160.29	2	6635.901	4
563		16	max	.025	3	.22	3	.231	4	7.505e-3	4	9380.645	15	NC	1
564			min	-.019	2	-.258	2	0	1	0	1	242.099	2	NC	1
565		17	max	.024	3	.018	3	.186	4	9.212e-3	4	NC	5	NC	1
566			min	-.019	2	-.021	2	0	1	0	1	428.576	2	NC	1
567		18	max	.024	3	.15	2	.151	4	4.658e-3	4	NC	5	NC	1
568			min	-.019	2	-.152	3	0	1	0	1	972.875	2	NC	1
569		19	max	.024	3	.284	2	.127	4	0	1	NC	1	NC	1
570			min	-.019	2	-.303	3	0	1	-7.683e-6	4	NC	1	NC	1
571	M9	1	max	.012	3	.211	2	.727	4	1.724e-2	3	NC	1	NC	1
572			min	-.007	2	-.061	3	0	1	-7.238e-3	2	NC	1	NC	1
573		2	max	.012	3	.102	2	.709	4	8.558e-3	3	NC	5	NC	1
574			min	-.007	2	-.028	3	0	12	-3.547e-3	2	1245.976	2	8815.944	4
575		3	max	.012	3	.018	3	.687	4	1.271e-2	4	NC	5	NC	1
576			min	-.007	2	-.014	2	0	12	-1.762e-5	10	603.877	2	5100.813	4
577		4	max	.011	3	.087	3	.662	4	1.004e-2	5	NC	15	NC	1
578			min	-.007	2	-.142	2	0	12	-4.e-3	2	384.713	2	3890.464	4
579		5	max	.011	3	.172	3	.635	4	8.287e-3	3	NC	15	NC	1
580			min	-.007	2	-.274	2	0	12	-8.01e-3	2	279.704	2	3297.486	4
581		6	max	.011	3	.262	3	.606	4	1.238e-2	3	8765.666	15	NC	1
582			min	-.007	2	-.401	2	0	10	-1.202e-2	2	221.534	2	2928.948	4
583		7	max	.011	3	.347	3	.578	4	1.647e-2	3	7412.412	15	NC	1
584			min	-.007	2	-.514	2	0	1	-1.603e-2	2	187.048	2	2642.698	4
585		8	max	.01	3	.418	3	.55	4	2.056e-2	3	6610.169	15	NC	1
586			min	-.006	2	-.603	2	0	1	-2.004e-2	2	166.589	2	2373.588	4
587		9	max	.01	3	.464	3	.523	4	2.114e-2	3	6189.695	15	NC	1
588			min	-.006	2	-.66	2	0	12	-2.25e-2	2	155.907	2	2142.207	4
589		10	max	.01	3	.481	3	.492	4	1.937e-2	3	6060.926	15	NC	1
590			min	-.006	2	-.679	2	0	1	-2.392e-2	2	152.783	2	2073.682	4
591		11	max	.01	3	.469	3	.457	4	1.76e-2	3	6189.232	15	NC	1
592			min	-.006	2	-.659	2	0	1	-2.535e-2	2	156.485	2	2098.738	4
593		12	max	.009	3	.43	3	.422	4	1.531e-2	3	6609.256	15	NC	1
594			min	-.006	2	-.601	2	0	12	-2.427e-2	2	168.285	2	2187.263	4
595		13	max	.009	3	.367	3	.379	4	1.225e-2	3	7410.946	15	NC	1
596			min	-.006	2	-.507	2	0	10	-1.947e-2	2	191.049	2	2577.832	4
597		14	max	.009	3	.286	3	.331	4	9.19e-3	3	8763.377	15	NC	1
598			min	-.006	2	-.39	2	-.002	1	-1.466e-2	2	229.898	2	3543.399	5
599		15	max	.009	3	.194	3	.281	4	6.128e-3	3	NC	15	NC	1
600			min	-.006	2	-.26	2	-.005	1	-9.861e-3	2	296.576	2	6035.973	5
601		16	max	.008	3	.099	3	.233	4	7.509e-3	5	NC	15	NC	1
602			min	-.006	2	-.129	2	-.007	1	-5.057e-3	2	419.512	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
603		17	max	.008	3	.006	3	.189	4	9.401e-3	4	NC	5	NC	1
604			min	-.006	2	-.008	2	-.007	1	-5.013e-4	1	680.748	2	NC	1
605		18	max	.008	3	.095	2	.154	4	4.606e-3	5	NC	5	NC	1
606			min	-.005	2	-.078	3	-.005	1	-6.302e-3	2	1439.156	2	NC	1
607		19	max	.008	3	.187	2	.127	4	4.472e-3	3	NC	1	NC	1
608			min	-.005	2	-.158	3	0	12	-1.254e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

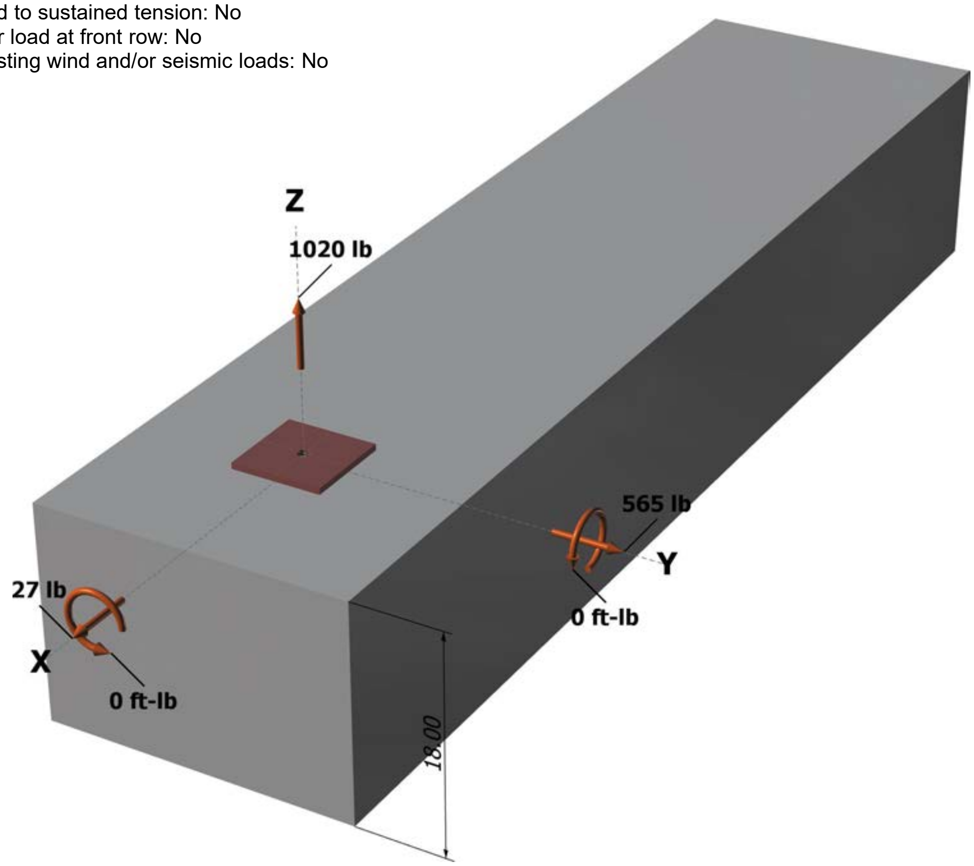
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

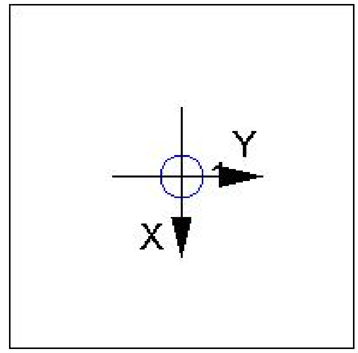
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	1020.0	27.0	565.0	565.6
Sum	1020.0	27.0	565.0	565.6

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	1/5
Project:	Standard PVMax - Worst Case, 32-40 Inch Width		
Address:			
Phone:			
E-mail:			

SIMPSON Strong-Tie®
Anchor Designer™
Software
Version 2.4.6025.0

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

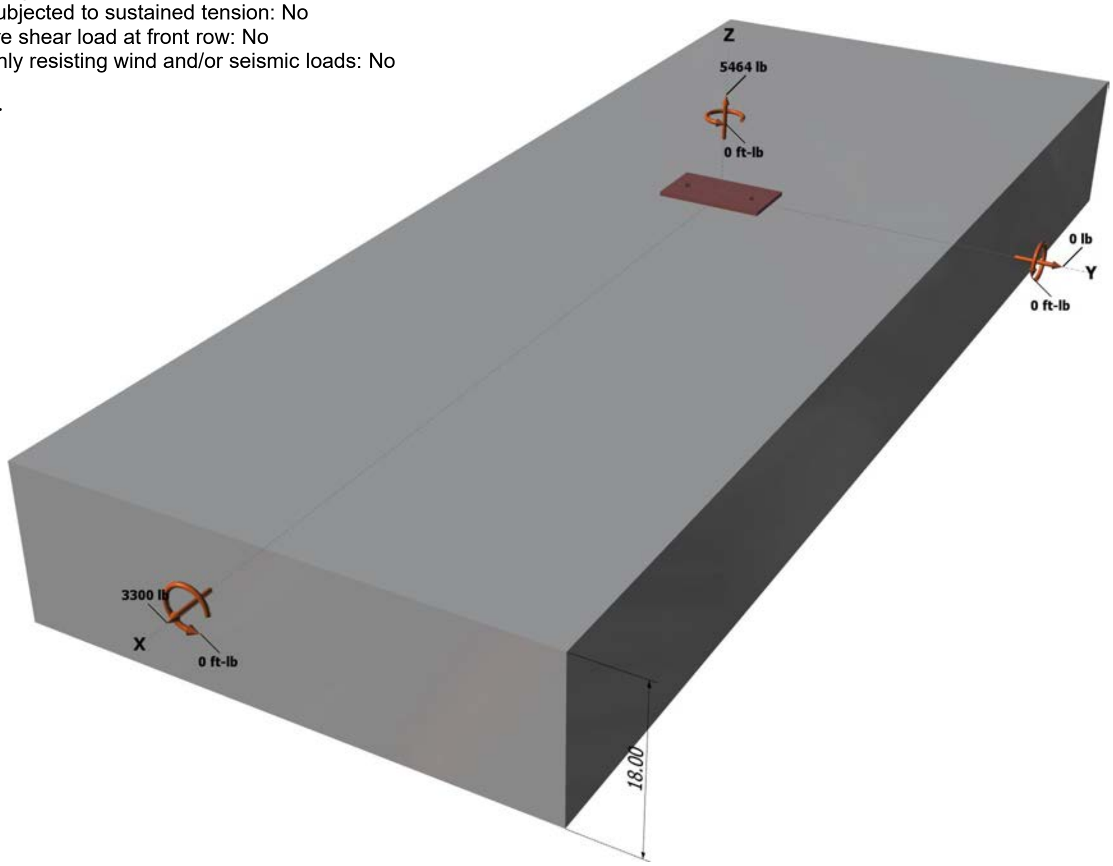
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

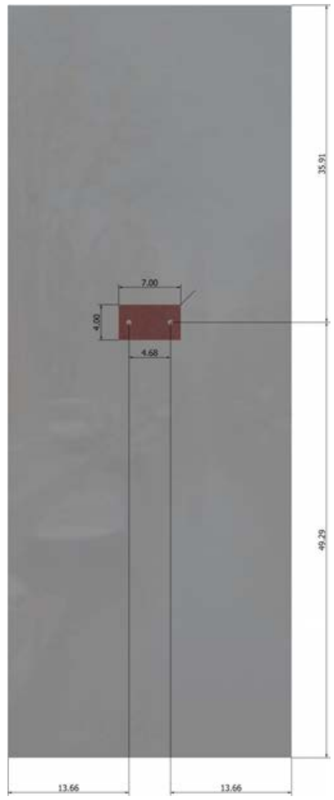
<Figure 1>



Anchor Designer™
Software
Version 2.4.6025.0

Company:	Schletter, Inc.	Date:	8/1/2016
Engineer:	HCV	Page:	2/5
Project:	Standard PVMax - Worst Case, 32-40 Inch Width		
Address:			
Phone:			
E-mail:			

<Figure 2>



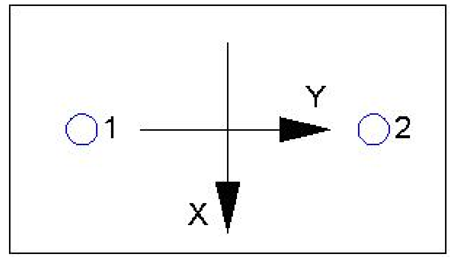
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2732.0	1650.0	0.0	1650.0
2	2732.0	1650.0	0.0	1650.0
Sum	5464.0	3300.0	0.0	3300.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5464
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	6.000	12492

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-5)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
408.24	324.00	1.000	1.000	1.00	1.000	12492	0.65	10231

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

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

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

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

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

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

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

Shear perpendicular to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

$\phi V_{cbgx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
576.00	648.00	1.000	0.928	1.000	1.000	15593	0.70	9001

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.66	18939

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
737.64	839.68	1.000	1.000	1.000	18939	0.70	23292

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

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

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

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

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

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

12. Warnings

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

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

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