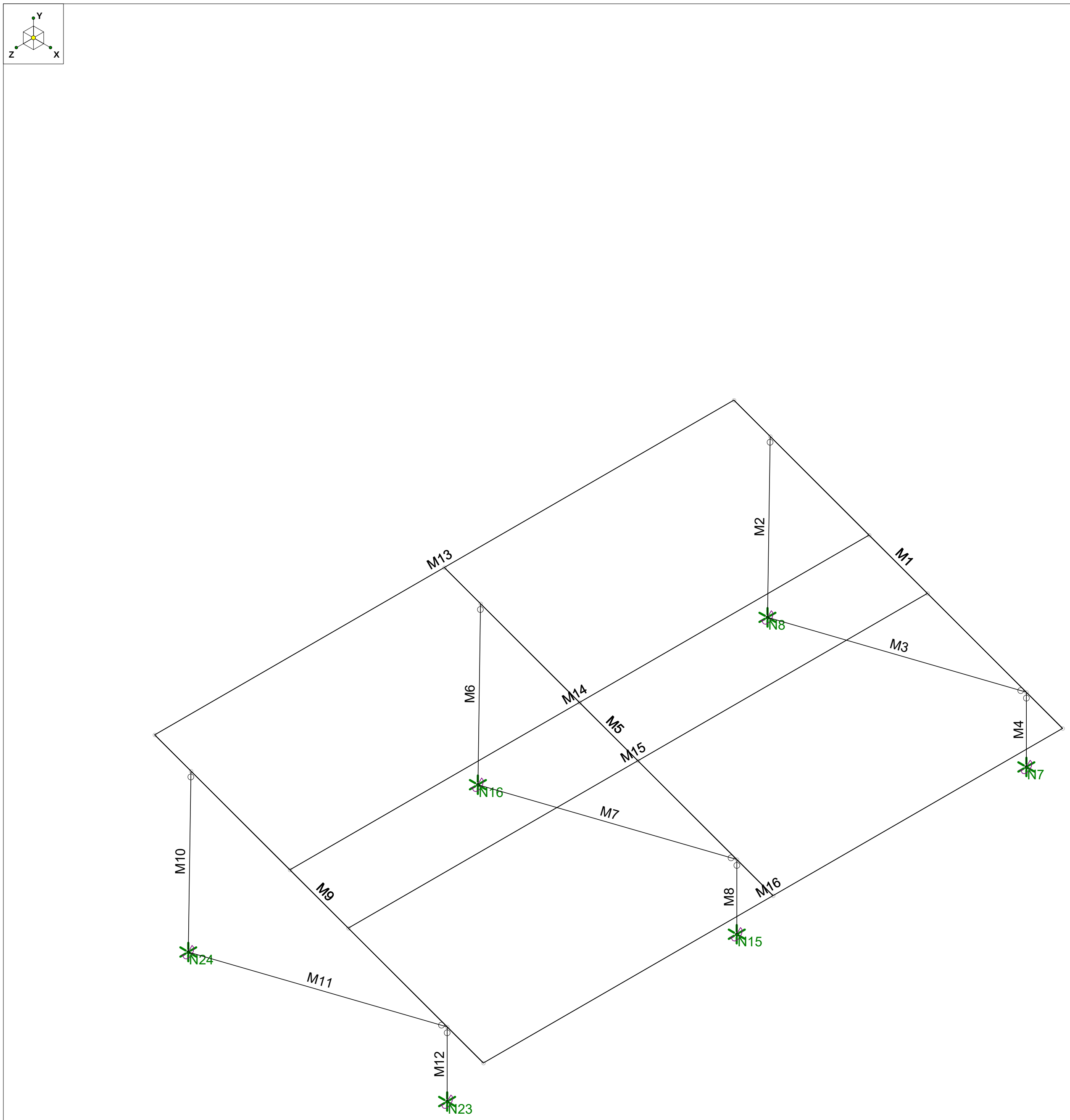


Schletter, Inc.	Standard PVMax Racking System Representative Calculations - ASCE 7-05	20° Tilt w/o Seismic Design
HCV		

1. INTRODUCTION

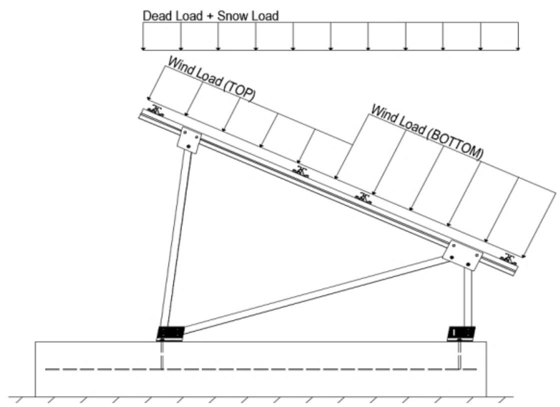
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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 =	20°
Maximum Height Above Grade =	3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	20.62	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	0.91		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	90	mph	Exposure Category = C
Height <	15	ft	Importance Category = II

Peak Velocity Pressure, q_z = 12.72 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.050	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.650	
$Cf-_{TOP,\ OUTER\ PURLIN}$	=	-2.400	
$Cf-_{TOP,\ INNER\ PURLIN}$	=	-1.840	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.000	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

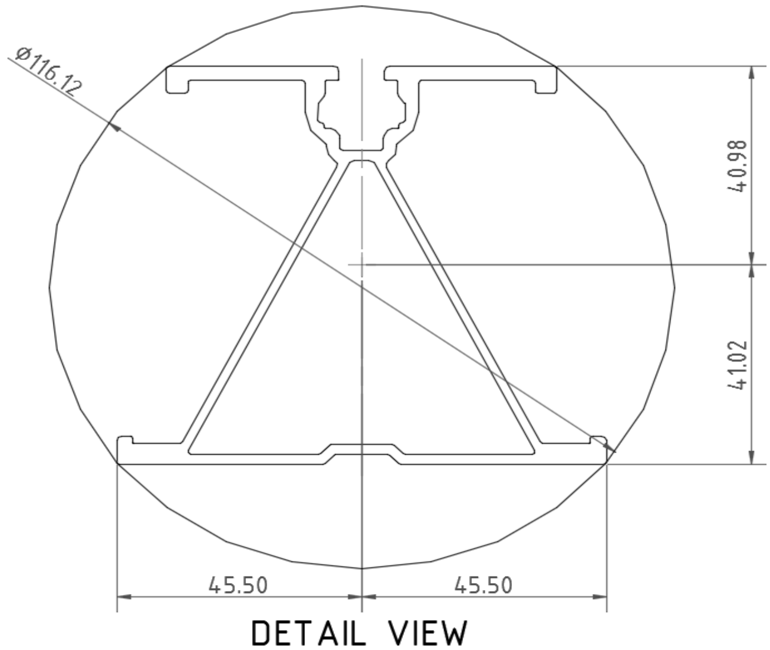
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

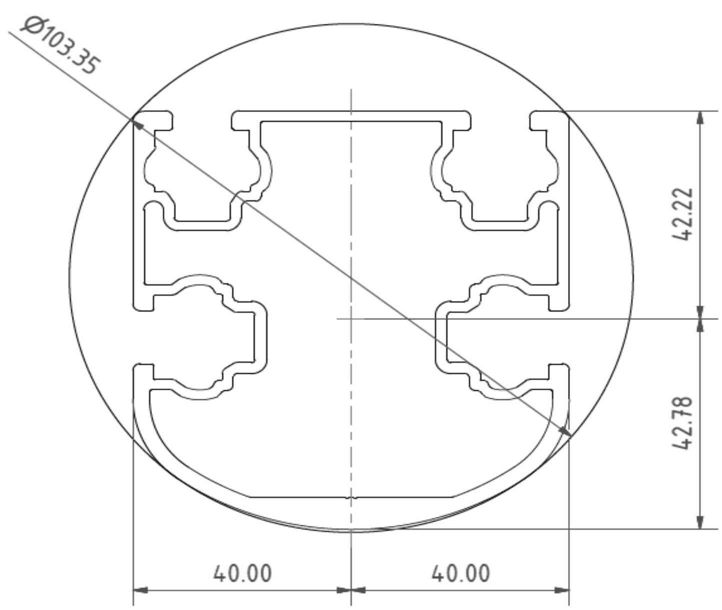
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	108	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.730	k-ft
M_z =	0.292	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	88%	



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).

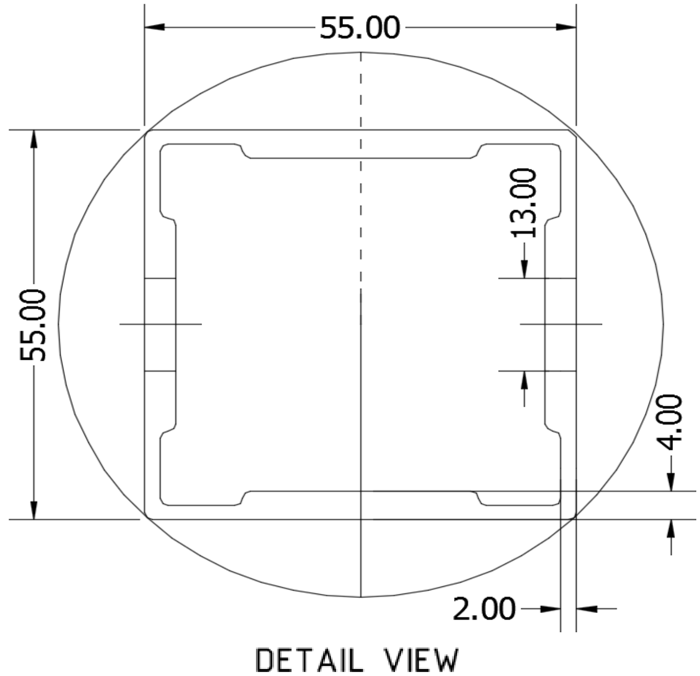
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	104.56	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.00	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-3.330	k-ft
M_z =	0.000	k-ft
P_n =	-0.379	k
$M_{y\ allowable}$ =	3.422	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	98%	



4.3 Front Strut Design

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

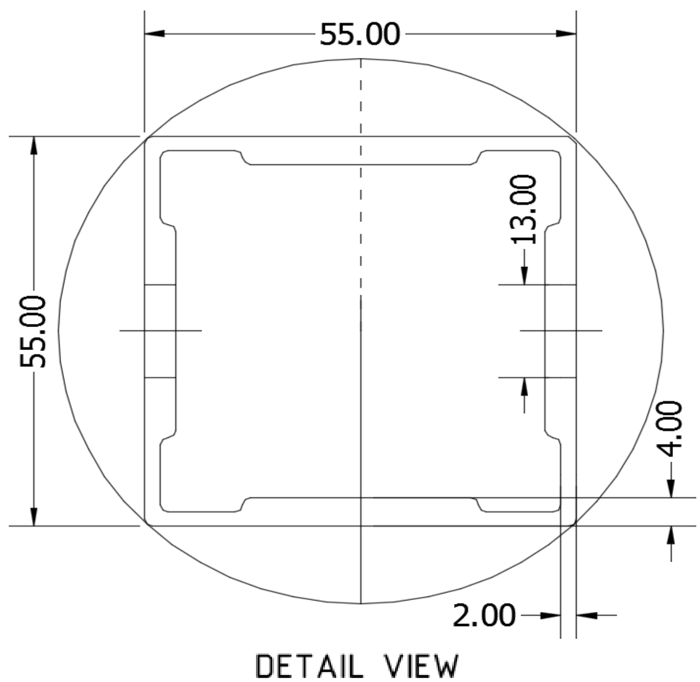
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.255	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	12%	



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).

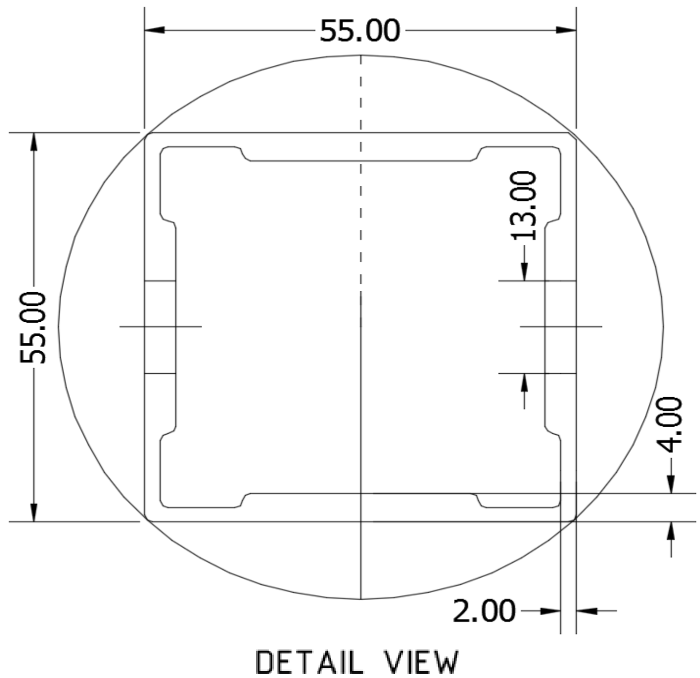
Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	98.03	in
$\Phi F_{ty\ AXIAL}$ =	6.11	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.012	k-ft
M_z =	0.000	k-ft
P_n =	1.457	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	6.000	k
Utilization =	25%	



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 =	61.10	in
$\Phi F_{ty\ AXIAL}$ =	13.63	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	-0.011	k-ft
M_z =	0.000	k-ft
P_n =	3.430	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	13.386	k
Utilization =	26%	



5. FOUNDATION DESIGN CALCULATIONS

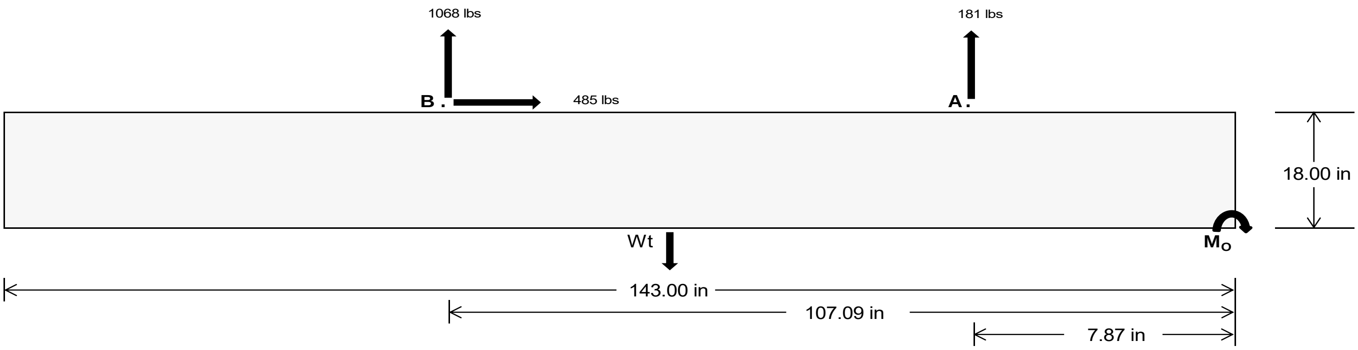
5.1 Helical Pile Foundations

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 =	764.43	4455.60	k
Compressive Load =	4230.95	4754.95	k
Lateral Load =	15.96	2016.29	k
Moment (Weak Axis) =	0.03	0.01	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check

M_O = 124503.7 in-lbs
Resisting Force Required = 1741.31 lbs
S.F. = 1.67
Weight Required = 2902.19 lbs
Minimum Width = 35 in in
Weight Provided = 7559.64 lbs

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

Sliding

Force = 484.52 lbs
Friction = 0.4
Weight Required = 1211.30 lbs
Resisting Weight = 7559.64 lbs
Additional Weight Required = 0 lbs

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

Cohesion

Sliding Force = 484.52 lbs
Cohesion = 130 psf
Area = 34.76 ft^2
Resisting = 3779.82 lbs
Additional Weight Required = 0 lbs

Use a 143in long x 35in wide x 18in tall ballast foundation. Cohesion is OK.

Shear Key

Additional Force = 0 lbs
Lateral Bearing Pressure = 200 psf/ft
Required Depth = 0.00 ft
f'_c = 2500 psi
Length = 8 in

Shear key is not required.

Bearing Pressure

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

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in	35 in	36 in	37 in	38 in
F_A	1582 lbs	1582 lbs	1582 lbs	1582 lbs	1294 lbs	1294 lbs	1294 lbs	1294 lbs	2028 lbs	2028 lbs	2028 lbs	2028 lbs	-361 lbs	-361 lbs	-361 lbs	-361 lbs
F_B	1703 lbs	1703 lbs	1703 lbs	1703 lbs	1577 lbs	1577 lbs	1577 lbs	1577 lbs	2322 lbs	2322 lbs	2322 lbs	2322 lbs	-2136 lbs	-2136 lbs	-2136 lbs	-2136 lbs
F_V	170 lbs	170 lbs	170 lbs	170 lbs	872 lbs	872 lbs	872 lbs	872 lbs	769 lbs	769 lbs	769 lbs	769 lbs	-969 lbs	-969 lbs	-969 lbs	-969 lbs
P_{total}	10845 lbs	11061 lbs	11277 lbs	11493 lbs	10431 lbs	10647 lbs	10863 lbs	11079 lbs	11910 lbs	12126 lbs	12342 lbs	12558 lbs	2039 lbs	2168 lbs	2298 lbs	2427 lbs
M	3593 lbs-ft	3593 lbs-ft	3593 lbs-ft	3593 lbs-ft	3495 lbs-ft	3495 lbs-ft	3495 lbs-ft	3495 lbs-ft	5022 lbs-ft	5022 lbs-ft	5022 lbs-ft	5022 lbs-ft	2964 lbs-ft	2964 lbs-ft	2964 lbs-ft	2964 lbs-ft
e	0.33 ft	0.32 ft	0.32 ft	0.31 ft	0.34 ft	0.33 ft	0.32 ft	0.32 ft	0.42 ft	0.41 ft	0.41 ft	0.40 ft	1.45 ft	1.37 ft	1.29 ft	1.22 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}	260.0 psf	258.8 psf	257.7 psf	256.6 psf	249.5 psf	248.6 psf	247.7 psf	246.9 psf	269.9 psf	268.4 psf	267.1 psf	265.8 psf	15.7 psf	18.9 psf	21.9 psf	24.8 psf
f_{max}	364.1 psf	360.0 psf	356.2 psf	352.5 psf	350.7 psf	347.0 psf	343.5 psf	340.2 psf	415.4 psf	409.9 psf	404.7 psf	399.8 psf	101.6 psf	102.4 psf	103.2 psf	103.9 psf

Maximum Bearing Pressure = 415 psf
Allowable Bearing Pressure = 1500 psf

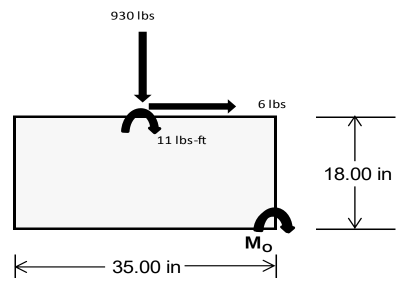
Use a 143in long x 35in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 1335.7 ft-lbs
Resisting Force Required = 915.90 lbs
S.F. = 1.67
Weight Required = 1526.50 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	257 lbs	663 lbs	257 lbs	930 lbs	2694 lbs	930 lbs	75 lbs	194 lbs	75 lbs
F_V	1 lbs	0 lbs	1 lbs	6 lbs	0 lbs	6 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9616 lbs	7560 lbs	9616 lbs	9839 lbs	7560 lbs	9839 lbs	2812 lbs	7560 lbs	2812 lbs
M	5 lbs-ft	0 lbs-ft	5 lbs-ft	20 lbs-ft	0 lbs-ft	20 lbs-ft	1 lbs-ft	0 lbs-ft	1 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft	0.49 ft
f_{min}	276.4 psf	217.5 psf	276.4 psf	281.9 psf	217.5 psf	281.9 psf	80.9 psf	217.5 psf	80.9 psf
f_{max}	277.0 psf	217.5 psf	277.0 psf	284.3 psf	217.5 psf	284.3 psf	80.9 psf	217.5 psf	80.9 psf

Maximum Bearing Pressure = 284 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 24in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

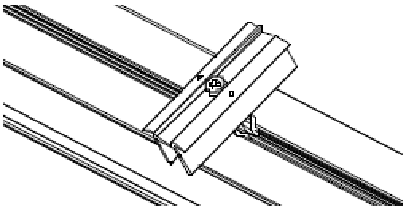
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

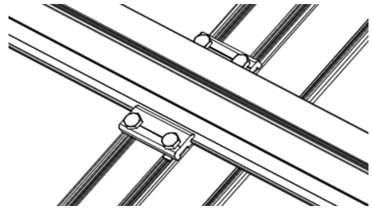
6. DESIGN OF JOINTS AND CONNECTIONS

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		Fastening of Purlins to Girders	
Maximum Uplifting Force =	0.534 k	Maximum Uplifting Force =	1.693 k
Allowable Uplift =	1.214 k	Allowable Uplift =	4.357 k
Utilization =	44%	Utilization =	39%





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		Rear Strut	
Maximum Axial Load =	3.255 k	Maximum Axial Load =	3.430 k
M12 Bolt Capacity =	12.808 k	M12 Bolt Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k	Strut Bearing Capacity =	7.421 k
Utilization =	44%	Utilization =	46%

Diagonal Strut	
Maximum Axial Load =	1.547 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	21%

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

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

7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

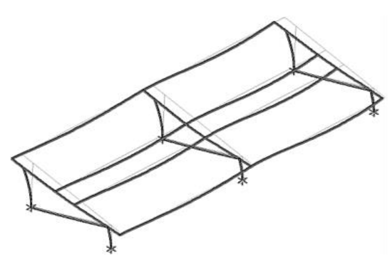
Mean Height, h_{sx} = 51.89 in

Allowable Story Drift for All Other Structures, Δ = { $0.020h_{sx}$; 1.038 in

Max Drift, Δ_{MAX} = 0.034 in

N/A

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 108 in

J = 0.432

298.779

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

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= 27.7 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

$\varphi F_L St$= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

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

Weak Axis:

3.4.14

L_b = 108

J = 0.432

190.005

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

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 = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

$M_{max}Wk$ = 1.152 k-ft

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)
$\varphi F_L = \varphi c[Bp\text{-}1.6Dp^*b/t]$
$\varphi F_L =$ 25.1 ksi

b/t = 37.0588
S1 = 12.21
S2 = 32.70
$\varphi F_L = (\varphi ck2^*\sqrt{(BpE)})/(1.6b/t)$
$\varphi F_L =$ 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
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\sqrt{((LbSc)/(Cb^*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bp\text{-}1.6Dp^*b/t]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi b[Bc\text{-}1.6Dc^*\sqrt{((LbSc)/(Cb^*\sqrt{(IyJ)}/2))}]$
$\varphi F_L =$ 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
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 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

$$S2 = \frac{k_1Bbr}{mDbr}$$

S2 = 73.8

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

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

$$S2 = \frac{k_1Bbr}{mDbr}$$

S2 = 77.3

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L Wk$ = 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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 98.03 in

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4 ksi

Weak Axis:

3.4.14

L_b = 98.03

J = 0.942

152.985

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 2.26776

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.89749

φF_L= (φccFcy)/(λ²)

φF_L= 6.10803 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

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

<u>Strong Axis:</u>

3.4.14

L_b = 61.10 in
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

<u>Weak Axis:</u>

3.4.14

L_b = 61.1
J = 0.942
95.3524

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

<u>Compression</u>

3.4.7

λ = 1.41345

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77788

φF_L= (φccFcy)/(λ²)

φF_L= 13.6277 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 13.63 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 14.03 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-63.565	-63.565	0	0
2	M14	Y	-63.565	-63.565	0	0
3	M15	Y	-63.565	-63.565	0	0
4	M16	Y	-63.565	-63.565	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	-43.811	-43.811	0	0
2	M14	y	-43.811	-43.811	0	0
3	M15	y	-68.846	-68.846	0	0
4	M16	y	-68.846	-68.846	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	100.14	100.14	0	0
2	M14	y	76.774	76.774	0	0
3	M15	y	41.725	41.725	0	0
4	M16	y	41.725	41.725	0	0

Load Combinations

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

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	381.388	2	1124.756	1	.941	1	.005	1	0	1	0	1
2		min	-506.605	3	-1066.538	3	.04	15	0	15	0	1	0	1
3	N7	max	.033	9	1175.376	1	-.454	15	0	15	0	1	0	1
4		min	-.118	2	-163.236	3	-12.277	1	-.025	1	0	1	0	1
5	N15	max	0	15	3254.578	1	0	12	0	12	0	1	0	1
6		min	-1.398	2	-588.023	3	0	1	0	1	0	1	0	1
7	N16	max	1458.243	2	3657.657	1	0	2	0	2	0	1	0	1
8		min	-1550.991	3	-3427.388	3	0	3	0	3	0	1	0	1
9	N23	max	.033	9	1175.376	1	12.277	1	.025	1	0	1	0	1
10		min	-.118	2	-163.236	3	.454	15	0	15	0	1	0	1
11	N24	max	381.388	2	1124.756	1	-.04	15	0	15	0	1	0	1
12		min	-506.605	3	-1066.538	3	-.941	1	-.005	1	0	1	0	1
13	Totals:	max	2219.383	2	11512.498	1	0	12						
14		min	-2564.632	3	-6474.958	3	0	1						

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	76.73	1	475.065	1	-6.023	15	0	15	.214	1	0	1
2			min	2.757	15	-521.796	3	-168.674	1	-.014	1	.008	15	0	3
3		2	max	76.73	1	331.651	1	-4.618	15	0	15	.065	1	.445	3
4			min	2.757	15	-367.456	3	-129.232	1	-.014	1	.002	15	-.403	1
5		3	max	76.73	1	188.236	1	-3.213	15	0	15	0	3	.735	3
6			min	2.757	15	-213.117	3	-89.79	1	-.014	1	-.044	1	-.663	1
7		4	max	76.73	1	44.821	1	-1.809	15	0	15	-.003	12	.871	3
8			min	2.757	15	-58.778	3	-50.348	1	-.014	1	-.114	1	-.78	1
9		5	max	76.73	1	95.562	3	-.404	15	0	15	-.005	12	.852	3
10			min	2.757	15	-98.593	1	-10.906	1	-.014	1	-.145	1	-.753	1
11		6	max	76.73	1	249.901	3	28.536	1	0	15	-.005	15	.68	3
12			min	2.757	15	-242.008	1	.281	12	-.014	1	-.136	1	-.583	1
13		7	max	76.73	1	404.24	3	67.978	1	0	15	-.003	15	.353	3
14			min	2.757	15	-385.423	1	1.709	12	-.014	1	-.088	1	-.269	1
15		8	max	76.73	1	558.58	3	107.42	1	0	15	.002	2	.188	1
16			min	2.757	15	-528.838	1	3.137	12	-.014	1	-.003	3	-.129	3
17		9	max	76.73	1	712.919	3	146.862	1	0	15	.127	1	.789	1
18			min	2.757	15	-672.252	1	4.565	12	-.014	1	.002	12	-.765	3
19		10	max	76.73	1	867.258	3	186.304	1	.014	1	.294	1	1.533	1
20			min	2.757	15	-815.667	1	5.993	12	-.002	3	.007	12	-1.555	3
21		11	max	76.73	1	672.252	1	-4.565	12	.014	1	.127	1	.789	1
22			min	2.757	15	-712.919	3	-146.862	1	0	15	.002	12	-.765	3
23		12	max	76.73	1	528.838	1	-3.137	12	.014	1	.002	2	.188	1
24			min	2.757	15	-558.58	3	-107.42	1	0	15	-.003	3	-.129	3
25		13	max	76.73	1	385.423	1	-1.709	12	.014	1	-.003	15	.353	3
26			min	2.757	15	-404.24	3	-67.978	1	0	15	-.088	1	-.269	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	76.73	1	242.008	1	-.281	12	.014	1	-.005	15	.68	3
28			min	2.757	15	-249.901	3	-28.536	1	0	15	-.136	1	-.583	1
29		15	max	76.73	1	98.593	1	10.906	1	.014	1	-.005	12	.852	3
30			min	2.757	15	-95.562	3	.404	15	0	15	-.145	1	-.753	1
31		16	max	76.73	1	58.778	3	50.348	1	.014	1	-.003	12	.871	3
32			min	2.757	15	-44.821	1	1.809	15	0	15	-.114	1	-.78	1
33		17	max	76.73	1	213.117	3	89.79	1	.014	1	0	3	.735	3
34			min	2.757	15	-188.236	1	3.213	15	0	15	-.044	1	-.663	1
35		18	max	76.73	1	367.456	3	129.232	1	.014	1	.065	1	.445	3
36			min	2.757	15	-331.651	1	4.618	15	0	15	.002	15	-.403	1
37		19	max	76.73	1	521.796	3	168.674	1	.014	1	.214	1	0	1
38			min	2.757	15	-475.065	1	6.023	15	0	15	.008	15	0	3
39	M14	1	max	44.503	1	527.209	1	-6.257	15	.009	3	.254	1	0	1
40			min	1.602	15	-417.061	3	-175.224	1	-.015	1	.009	15	0	3
41		2	max	44.503	1	383.794	1	-4.852	15	.009	3	.098	1	.359	3
42			min	1.602	15	-300.108	3	-135.782	1	-.015	1	.004	15	-.455	1
43		3	max	44.503	1	240.379	1	-3.447	15	.009	3	.002	3	.6	3
44			min	1.602	15	-183.154	3	-96.34	1	-.015	1	-.018	1	-.768	1
45		4	max	44.503	1	96.965	1	-2.042	15	.009	3	-.002	12	.725	3
46			min	1.602	15	-66.2	3	-56.898	1	-.015	1	-.095	1	-.936	1
47		5	max	44.503	1	50.754	3	-.637	15	.009	3	-.004	12	.733	3
48			min	1.602	15	-46.45	1	-17.456	1	-.015	1	-.132	1	-.962	1
49		6	max	44.503	1	167.707	3	21.986	1	.009	3	-.005	15	.623	3
50			min	1.602	15	-189.865	1	-.014	3	-.015	1	-.13	1	-.843	1
51		7	max	44.503	1	284.661	3	61.428	1	.009	3	-.003	15	.397	3
52			min	1.602	15	-333.279	1	1.467	12	-.015	1	-.088	1	-.582	1
53		8	max	44.503	1	401.615	3	100.87	1	.009	3	0	10	.054	3
54			min	1.602	15	-476.694	1	2.895	12	-.015	1	-.007	1	-.177	1
55		9	max	44.503	1	518.569	3	140.312	1	.009	3	.114	1	.372	1
56			min	1.602	15	-620.109	1	4.323	12	-.015	1	.001	12	-.406	3
57		10	max	44.503	1	635.522	3	179.754	1	.015	1	.274	1	1.063	1
58			min	1.602	15	-763.523	1	5.751	12	-.009	3	.006	12	-.983	3
59		11	max	44.503	1	620.109	1	-4.323	12	.015	1	.114	1	.372	1
60			min	1.602	15	-518.569	3	-140.312	1	-.009	3	.001	12	-.406	3
61		12	max	44.503	1	476.694	1	-2.895	12	.015	1	0	10	.054	3
62			min	1.602	15	-401.615	3	-100.87	1	-.009	3	-.007	1	-.177	1
63		13	max	44.503	1	333.279	1	-1.467	12	.015	1	-.003	15	.397	3
64			min	1.602	15	-284.661	3	-61.428	1	-.009	3	-.088	1	-.582	1
65		14	max	44.503	1	189.865	1	.014	3	.015	1	-.005	15	.623	3
66			min	1.602	15	-167.707	3	-21.986	1	-.009	3	-.13	1	-.843	1
67		15	max	44.503	1	46.45	1	17.456	1	.015	1	-.004	12	.733	3
68			min	1.602	15	-50.754	3	.637	15	-.009	3	-.132	1	-.962	1
69		16	max	44.503	1	66.2	3	56.898	1	.015	1	-.002	12	.725	3
70			min	1.602	15	-96.965	1	2.042	15	-.009	3	-.095	1	-.936	1
71		17	max	44.503	1	183.154	3	96.34	1	.015	1	.002	3	.6	3
72			min	1.602	15	-240.379	1	3.447	15	-.009	3	-.018	1	-.768	1
73		18	max	44.503	1	300.108	3	135.782	1	.015	1	.098	1	.359	3
74			min	1.602	15	-383.794	1	4.852	15	-.009	3	.004	15	-.455	1
75		19	max	44.503	1	417.061	3	175.224	1	.015	1	.254	1	0	1
76			min	1.602	15	-527.209	1	6.257	15	-.009	3	.009	15	0	3
77	M15	1	max	-1.708	15	594.767	1	-6.254	15	.015	1	.253	1	0	2
78			min	-47.377	1	-228.28	3	-175.178	1	-.007	3	.009	15	0	3
79		2	max	-1.708	15	431.324	1	-4.849	15	.015	1	.098	1	.198	3
80			min	-47.377	1	-167.405	3	-135.736	1	-.007	3	.004	15	-.513	1
81		3	max	-1.708	15	267.882	1	-3.444	15	.015	1	.002	3	.335	3
82			min	-47.377	1	-106.53	3	-96.294	1	-.007	3	-.018	1	-.863	1
83		4	max	-1.708	15	104.439	1	-2.039	15	.015	1	-.002	12	.411	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
84			min	-47.377	1	-45.654	3	-56.852	1	-.007	3	-.095	1	-1.049	1
85		5	max	-1.708	15	15.221	3	-.635	15	.015	1	-.004	12	.426	3
86			min	-47.377	1	-59.004	1	-17.41	1	-.007	3	-.132	1	-1.072	1
87		6	max	-1.708	15	76.096	3	22.032	1	.015	1	-.005	15	.38	3
88			min	-47.377	1	-222.446	1	.089	3	-.007	3	-.13	1	-.931	1
89		7	max	-1.708	15	136.972	3	61.474	1	.015	1	-.003	15	.274	3
90			min	-47.377	1	-385.889	1	1.532	12	-.007	3	-.088	1	-.627	1
91		8	max	-1.708	15	197.847	3	100.916	1	.015	1	0	10	.107	3
92			min	-47.377	1	-549.332	1	2.959	12	-.007	3	-.007	1	-.159	1
93		9	max	-1.708	15	258.722	3	140.358	1	.015	1	.114	1	.472	1
94			min	-47.377	1	-712.774	1	4.387	12	-.007	3	.002	12	-.122	3
95		10	max	-1.708	15	319.598	3	179.8	1	.007	3	.274	1	1.267	1
96			min	-47.377	1	-876.217	1	5.815	12	-.015	1	.007	12	-.411	3
97		11	max	-1.708	15	712.774	1	-4.387	12	.007	3	.114	1	.472	1
98			min	-47.377	1	-258.722	3	-140.358	1	-.015	1	.002	12	-.122	3
99		12	max	-1.708	15	549.332	1	-2.959	12	.007	3	0	10	.107	3
100			min	-47.377	1	-197.847	3	-100.916	1	-.015	1	-.007	1	-.159	1
101		13	max	-1.708	15	385.889	1	-1.532	12	.007	3	-.003	15	.274	3
102			min	-47.377	1	-136.972	3	-61.474	1	-.015	1	-.088	1	-.627	1
103		14	max	-1.708	15	222.446	1	-.089	3	.007	3	-.005	15	.38	3
104			min	-47.377	1	-76.096	3	-22.032	1	-.015	1	-.13	1	-.931	1
105		15	max	-1.708	15	59.004	1	17.41	1	.007	3	-.004	12	.426	3
106			min	-47.377	1	-15.221	3	.635	15	-.015	1	-.132	1	-1.072	1
107		16	max	-1.708	15	45.654	3	56.852	1	.007	3	-.002	12	.411	3
108			min	-47.377	1	-104.439	1	2.039	15	-.015	1	-.095	1	-1.049	1
109		17	max	-1.708	15	106.53	3	96.294	1	.007	3	.002	3	.335	3
110			min	-47.377	1	-267.882	1	3.444	15	-.015	1	-.018	1	-.863	1
111		18	max	-1.708	15	167.405	3	135.736	1	.007	3	.098	1	.198	3
112			min	-47.377	1	-431.324	1	4.849	15	-.015	1	.004	15	-.513	1
113		19	max	-1.708	15	228.28	3	175.178	1	.007	3	.253	1	0	2
114			min	-47.377	1	-594.767	1	6.254	15	-.015	1	.009	15	0	3
115	M16	1	max	-3.067	15	543.251	1	-6.036	15	.012	1	.217	1	0	1
116			min	-85.192	1	-199.477	3	-169.125	1	-.009	3	.008	15	0	3
117		2	max	-3.067	15	379.808	1	-4.631	15	.012	1	.067	1	.169	3
118			min	-85.192	1	-138.602	3	-129.683	1	-.009	3	.002	15	-.462	1
119		3	max	-3.067	15	216.365	1	-3.226	15	.012	1	0	12	.277	3
120			min	-85.192	1	-77.726	3	-90.241	1	-.009	3	-.043	1	-.76	1
121		4	max	-3.067	15	52.923	1	-1.821	15	.012	1	-.003	12	.324	3
122			min	-85.192	1	-16.851	3	-50.799	1	-.009	3	-.113	1	-.894	1
123		5	max	-3.067	15	44.024	3	-.417	15	.012	1	-.005	12	.311	3
124			min	-85.192	1	-110.52	1	-11.357	1	-.009	3	-.144	1	-.865	1
125		6	max	-3.067	15	104.9	3	28.085	1	.012	1	-.005	15	.236	3
126			min	-85.192	1	-273.963	1	.478	12	-.009	3	-.136	1	-.673	1
127		7	max	-3.067	15	165.775	3	67.527	1	.012	1	-.003	15	.101	3
128			min	-85.192	1	-437.405	1	1.906	12	-.009	3	-.088	1	-.318	1
129		8	max	-3.067	15	226.65	3	106.969	1	.012	1	.001	2	.202	1
130			min	-85.192	1	-600.848	1	3.333	12	-.009	3	-.002	3	-.095	3
131		9	max	-3.067	15	287.526	3	146.411	1	.012	1	.126	1	.884	1
132			min	-85.192	1	-764.291	1	4.761	12	-.009	3	.003	12	-.352	3
133		10	max	-3.067	15	348.401	3	185.853	1	.009	3	.292	1	1.73	1
134			min	-85.192	1	-927.733	1	6.189	12	-.012	1	.008	12	-.67	3
135		11	max	-3.067	15	764.291	1	-4.761	12	.009	3	.126	1	.884	1
136			min	-85.192	1	-287.526	3	-146.411	1	-.012	1	.003	12	-.352	3
137		12	max	-3.067	15	600.848	1	-3.333	12	.009	3	.001	2	.202	1
138			min	-85.192	1	-226.65	3	-106.969	1	-.012	1	-.002	3	-.095	3
139		13	max	-3.067	15	437.405	1	-1.906	12	.009	3	-.003	15	.101	3
140			min	-85.192	1	-165.775	3	-67.527	1	-.012	1	-.088	1	-.318	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
141		14	max	-3.067	15	273.963	1	-.478	12	.009	3	-.005	15	.236	3
142			min	-85.192	1	-104.9	3	-28.085	1	-.012	1	-.136	1	-.673	1
143		15	max	-3.067	15	110.52	1	11.357	1	.009	3	-.005	12	.311	3
144			min	-85.192	1	-44.024	3	.417	15	-.012	1	-.144	1	-.865	1
145		16	max	-3.067	15	16.851	3	50.799	1	.009	3	-.003	12	.324	3
146			min	-85.192	1	-52.923	1	1.821	15	-.012	1	-.113	1	-.894	1
147		17	max	-3.067	15	77.726	3	90.241	1	.009	3	0	12	.277	3
148			min	-85.192	1	-216.365	1	3.226	15	-.012	1	-.043	1	-.76	1
149		18	max	-3.067	15	138.602	3	129.683	1	.009	3	.067	1	.169	3
150			min	-85.192	1	-379.808	1	4.631	15	-.012	1	.002	15	-.462	1
151		19	max	-3.067	15	199.477	3	169.125	1	.009	3	.217	1	0	1
152			min	-85.192	1	-543.251	1	6.036	15	-.012	1	.008	15	0	3
153	M2	1	max	1093.647	1	2.156	4	.906	1	0	3	0	3	0	1
154			min	-954.617	3	.507	15	.032	15	0	1	0	1	0	1
155		2	max	1094.063	1	2.147	4	.906	1	0	3	0	1	0	15
156			min	-954.305	3	.505	15	.032	15	0	1	0	15	0	4
157		3	max	1094.479	1	2.139	4	.906	1	0	3	0	1	0	15
158			min	-953.993	3	.503	15	.032	15	0	1	0	15	-.001	4
159		4	max	1094.895	1	2.13	4	.906	1	0	3	0	1	0	15
160			min	-953.681	3	.501	15	.032	15	0	1	0	15	-.002	4
161		5	max	1095.311	1	2.121	4	.906	1	0	3	.001	1	0	15
162			min	-953.369	3	.499	15	.032	15	0	1	0	15	-.002	4
163		6	max	1095.727	1	2.113	4	.906	1	0	3	.001	1	0	15
164			min	-953.057	3	.497	15	.032	15	0	1	0	15	-.003	4
165		7	max	1096.142	1	2.104	4	.906	1	0	3	.002	1	0	15
166			min	-952.745	3	.495	15	.032	15	0	1	0	15	-.004	4
167		8	max	1096.558	1	2.095	4	.906	1	0	3	.002	1	0	15
168			min	-952.434	3	.493	15	.032	15	0	1	0	15	-.004	4
169		9	max	1096.974	1	2.086	4	.906	1	0	3	.002	1	-.001	15
170			min	-952.122	3	.491	15	.032	15	0	1	0	15	-.005	4
171		10	max	1097.39	1	2.078	4	.906	1	0	3	.002	1	-.001	15
172			min	-951.81	3	.489	15	.032	15	0	1	0	15	-.005	4
173		11	max	1097.806	1	2.069	4	.906	1	0	3	.003	1	-.001	15
174			min	-951.498	3	.486	15	.032	15	0	1	0	15	-.006	4
175		12	max	1098.222	1	2.06	4	.906	1	0	3	.003	1	-.002	15
176			min	-951.186	3	.484	15	.032	15	0	1	0	15	-.007	4
177		13	max	1098.638	1	2.052	4	.906	1	0	3	.003	1	-.002	15
178			min	-950.874	3	.482	15	.032	15	0	1	0	15	-.007	4
179		14	max	1099.054	1	2.043	4	.906	1	0	3	.003	1	-.002	15
180			min	-950.562	3	.48	15	.032	15	0	1	0	15	-.008	4
181		15	max	1099.469	1	2.034	4	.906	1	0	3	.004	1	-.002	15
182			min	-950.25	3	.478	15	.032	15	0	1	0	15	-.008	4
183		16	max	1099.885	1	2.025	4	.906	1	0	3	.004	1	-.002	15
184			min	-949.938	3	.476	15	.032	15	0	1	0	15	-.009	4
185		17	max	1100.301	1	2.017	4	.906	1	0	3	.004	1	-.002	15
186			min	-949.626	3	.474	15	.032	15	0	1	0	15	-.009	4
187		18	max	1100.717	1	2.008	4	.906	1	0	3	.004	1	-.002	15
188			min	-949.314	3	.472	15	.032	15	0	1	0	15	-.01	4
189		19	max	1101.133	1	1.999	4	.906	1	0	3	.005	1	-.002	15
190			min	-949.003	3	.47	15	.032	15	0	1	0	15	-.01	4
191	M3	1	max	378.169	2	9.1	4	.21	1	0	5	0	1	.01	4
192			min	-505.71	3	2.139	15	.008	15	0	1	0	15	.002	15
193		2	max	377.998	2	8.226	4	.21	1	0	5	0	1	.006	4
194			min	-505.837	3	1.934	15	.008	15	0	1	0	15	.002	15
195		3	max	377.828	2	7.352	4	.21	1	0	5	0	1	.003	2
196			min	-505.965	3	1.728	15	.008	15	0	1	0	15	0	12
197		4	max	377.658	2	6.477	4	.21	1	0	5	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-506.093	3	1.523	15	.008	15	0	1	0	15	-.002	3
199		5	max	377.487	2	5.603	4	.21	1	0	5	0	1	0	15
200			min	-506.221	3	1.317	15	.008	15	0	1	0	15	-.003	4
201		6	max	377.317	2	4.728	4	.21	1	0	5	0	1	-.001	15
202			min	-506.348	3	1.112	15	.008	15	0	1	0	15	-.006	4
203		7	max	377.147	2	3.854	4	.21	1	0	5	0	1	-.002	15
204			min	-506.476	3	.906	15	.008	15	0	1	0	15	-.008	4
205		8	max	376.976	2	2.979	4	.21	1	0	5	0	1	-.002	15
206			min	-506.604	3	.7	15	.008	15	0	1	0	15	-.01	4
207		9	max	376.806	2	2.105	4	.21	1	0	5	0	1	-.003	15
208			min	-506.732	3	.495	15	.008	15	0	1	0	15	-.011	4
209		10	max	376.636	2	1.23	4	.21	1	0	5	0	1	-.003	15
210			min	-506.86	3	.289	15	.008	15	0	1	0	15	-.012	4
211		11	max	376.465	2	.397	2	.21	1	0	5	.001	1	-.003	15
212			min	-506.987	3	.035	12	.008	15	0	1	0	15	-.012	4
213		12	max	376.295	2	-.122	15	.21	1	0	5	.001	1	-.003	15
214			min	-507.115	3	-.518	4	.008	15	0	1	0	15	-.012	4
215		13	max	376.125	2	-.327	15	.21	1	0	5	.001	1	-.003	15
216			min	-507.243	3	-1.393	4	.008	15	0	1	0	15	-.011	4
217		14	max	375.954	2	-.533	15	.21	1	0	5	.001	1	-.002	15
218			min	-507.371	3	-2.267	4	.008	15	0	1	0	15	-.011	4
219		15	max	375.784	2	-.738	15	.21	1	0	5	.001	1	-.002	15
220			min	-507.498	3	-3.142	4	.008	15	0	1	0	15	-.009	4
221		16	max	375.614	2	-.944	15	.21	1	0	5	.002	1	-.002	15
222			min	-507.626	3	-4.016	4	.008	15	0	1	0	15	-.008	4
223		17	max	375.443	2	-1.15	15	.21	1	0	5	.002	1	-.001	15
224			min	-507.754	3	-4.891	4	.008	15	0	1	0	15	-.005	4
225		18	max	375.273	2	-1.355	15	.21	1	0	5	.002	1	0	15
226			min	-507.882	3	-5.765	4	.008	15	0	1	0	15	-.003	4
227		19	max	375.103	2	-1.561	15	.21	1	0	5	.002	1	0	1
228			min	-508.009	3	-6.64	4	.008	15	0	1	0	15	0	1
229	M4	1	max	1172.31	1	0	1	-.455	15	0	1	.001	1	0	1
230			min	-165.535	3	0	1	-12.718	1	0	1	0	15	0	1
231		2	max	1172.48	1	0	1	-.455	15	0	1	0	12	0	1
232			min	-165.408	3	0	1	-12.718	1	0	1	0	1	0	1
233		3	max	1172.65	1	0	1	-.455	15	0	1	0	15	0	1
234			min	-165.28	3	0	1	-12.718	1	0	1	-.002	1	0	1
235		4	max	1172.821	1	0	1	-.455	15	0	1	0	15	0	1
236			min	-165.152	3	0	1	-12.718	1	0	1	-.003	1	0	1
237		5	max	1172.991	1	0	1	-.455	15	0	1	0	15	0	1
238			min	-165.024	3	0	1	-12.718	1	0	1	-.005	1	0	1
239		6	max	1173.161	1	0	1	-.455	15	0	1	0	15	0	1
240			min	-164.897	3	0	1	-12.718	1	0	1	-.006	1	0	1
241		7	max	1173.332	1	0	1	-.455	15	0	1	0	15	0	1
242			min	-164.769	3	0	1	-12.718	1	0	1	-.008	1	0	1
243		8	max	1173.502	1	0	1	-.455	15	0	1	0	15	0	1
244			min	-164.641	3	0	1	-12.718	1	0	1	-.009	1	0	1
245		9	max	1173.672	1	0	1	-.455	15	0	1	0	15	0	1
246			min	-164.513	3	0	1	-12.718	1	0	1	-.011	1	0	1
247		10	max	1173.843	1	0	1	-.455	15	0	1	0	15	0	1
248			min	-164.386	3	0	1	-12.718	1	0	1	-.012	1	0	1
249		11	max	1174.013	1	0	1	-.455	15	0	1	0	15	0	1
250			min	-164.258	3	0	1	-12.718	1	0	1	-.014	1	0	1
251		12	max	1174.184	1	0	1	-.455	15	0	1	0	15	0	1
252			min	-164.13	3	0	1	-12.718	1	0	1	-.015	1	0	1
253		13	max	1174.354	1	0	1	-.455	15	0	1	0	15	0	1
254			min	-164.002	3	0	1	-12.718	1	0	1	-.016	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
255		14	max	1174.524	1	0	1	-.455	15	0	1	0	15	0	1
256			min	-163.875	3	0	1	-12.718	1	0	1	-.018	1	0	1
257		15	max	1174.695	1	0	1	-.455	15	0	1	0	15	0	1
258			min	-163.747	3	0	1	-12.718	1	0	1	-.019	1	0	1
259		16	max	1174.865	1	0	1	-.455	15	0	1	0	15	0	1
260			min	-163.619	3	0	1	-12.718	1	0	1	-.021	1	0	1
261		17	max	1175.035	1	0	1	-.455	15	0	1	0	15	0	1
262			min	-163.491	3	0	1	-12.718	1	0	1	-.022	1	0	1
263		18	max	1175.206	1	0	1	-.455	15	0	1	0	15	0	1
264			min	-163.364	3	0	1	-12.718	1	0	1	-.024	1	0	1
265		19	max	1175.376	1	0	1	-.455	15	0	1	0	15	0	1
266			min	-163.236	3	0	1	-12.718	1	0	1	-.025	1	0	1
267	M6	1	max	3422.387	1	2.415	2	0	1	0	1	0	1	0	1
268			min	-3063.415	3	.299	12	0	1	0	1	0	1	0	1
269		2	max	3422.803	1	2.409	2	0	1	0	1	0	1	0	12
270			min	-3063.103	3	.295	12	0	1	0	1	0	1	0	2
271		3	max	3423.219	1	2.402	2	0	1	0	1	0	1	0	12
272			min	-3062.791	3	.292	12	0	1	0	1	0	1	-.001	2
273		4	max	3423.635	1	2.395	2	0	1	0	1	0	1	0	12
274			min	-3062.479	3	.288	12	0	1	0	1	0	1	-.002	2
275		5	max	3424.051	1	2.388	2	0	1	0	1	0	1	0	12
276			min	-3062.168	3	.285	12	0	1	0	1	0	1	-.003	2
277		6	max	3424.467	1	2.381	2	0	1	0	1	0	1	0	12
278			min	-3061.856	3	.282	12	0	1	0	1	0	1	-.003	2
279		7	max	3424.883	1	2.375	2	0	1	0	1	0	1	0	12
280			min	-3061.544	3	.278	12	0	1	0	1	0	1	-.004	2
281		8	max	3425.299	1	2.368	2	0	1	0	1	0	1	0	12
282			min	-3061.232	3	.275	12	0	1	0	1	0	1	-.005	2
283		9	max	3425.715	1	2.361	2	0	1	0	1	0	1	0	12
284			min	-3060.92	3	.271	12	0	1	0	1	0	1	-.005	2
285		10	max	3426.13	1	2.354	2	0	1	0	1	0	1	0	12
286			min	-3060.608	3	.268	12	0	1	0	1	0	1	-.006	2
287		11	max	3426.546	1	2.348	2	0	1	0	1	0	1	0	12
288			min	-3060.296	3	.265	12	0	1	0	1	0	1	-.007	2
289		12	max	3426.962	1	2.341	2	0	1	0	1	0	1	0	12
290			min	-3059.984	3	.261	12	0	1	0	1	0	1	-.007	2
291		13	max	3427.378	1	2.334	2	0	1	0	1	0	1	0	12
292			min	-3059.672	3	.258	12	0	1	0	1	0	1	-.008	2
293		14	max	3427.794	1	2.327	2	0	1	0	1	0	1	-.001	12
294			min	-3059.36	3	.254	12	0	1	0	1	0	1	-.009	2
295		15	max	3428.21	1	2.32	2	0	1	0	1	0	1	-.001	12
296			min	-3059.048	3	.251	12	0	1	0	1	0	1	-.009	2
297		16	max	3428.626	1	2.314	2	0	1	0	1	0	1	-.001	12
298			min	-3058.737	3	.248	12	0	1	0	1	0	1	-.01	2
299		17	max	3429.042	1	2.307	2	0	1	0	1	0	1	-.001	12
300			min	-3058.425	3	.244	12	0	1	0	1	0	1	-.011	2
301		18	max	3429.457	1	2.3	2	0	1	0	1	0	1	-.001	12
302			min	-3058.113	3	.241	12	0	1	0	1	0	1	-.011	2
303		19	max	3429.873	1	2.293	2	0	1	0	1	0	1	-.001	12
304			min	-3057.801	3	.237	12	0	1	0	1	0	1	-.012	2
305	M7	1	max	1457.018	2	9.141	4	0	1	0	1	0	1	.012	2
306			min	-1544.96	3	2.145	15	0	1	0	1	0	1	.001	12
307		2	max	1456.848	2	8.267	4	0	1	0	1	0	1	.008	2
308			min	-1545.088	3	1.939	15	0	1	0	1	0	1	0	3
309		3	max	1456.678	2	7.392	4	0	1	0	1	0	1	.005	2
310			min	-1545.215	3	1.734	15	0	1	0	1	0	1	-.002	3
311		4	max	1456.507	2	6.518	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-1545.343	3	1.528	15	0	1	0	1	0	1	-.004	3
313		5	max	1456.337	2	5.643	4	0	1	0	1	0	1	0	2
314			min	-1545.471	3	1.323	15	0	1	0	1	0	1	-.005	3
315		6	max	1456.167	2	4.769	4	0	1	0	1	0	1	-.001	15
316			min	-1545.599	3	1.117	15	0	1	0	1	0	1	-.007	3
317		7	max	1455.996	2	3.895	4	0	1	0	1	0	1	-.002	15
318			min	-1545.726	3	.912	15	0	1	0	1	0	1	-.008	4
319		8	max	1455.826	2	3.02	4	0	1	0	1	0	1	-.002	15
320			min	-1545.854	3	.706	15	0	1	0	1	0	1	-.009	4
321		9	max	1455.656	2	2.146	4	0	1	0	1	0	1	-.002	15
322			min	-1545.982	3	.499	12	0	1	0	1	0	1	-.011	4
323		10	max	1455.485	2	1.394	2	0	1	0	1	0	1	-.003	15
324			min	-1546.11	3	.159	12	0	1	0	1	0	1	-.011	4
325		11	max	1455.315	2	.713	2	0	1	0	1	0	1	-.003	15
326			min	-1546.238	3	-.305	3	0	1	0	1	0	1	-.012	4
327		12	max	1455.145	2	.031	2	0	1	0	1	0	1	-.003	15
328			min	-1546.365	3	-.816	3	0	1	0	1	0	1	-.012	4
329		13	max	1454.974	2	-.322	15	0	1	0	1	0	1	-.003	15
330			min	-1546.493	3	-1.352	4	0	1	0	1	0	1	-.011	4
331		14	max	1454.804	2	-.527	15	0	1	0	1	0	1	-.002	15
332			min	-1546.621	3	-2.227	4	0	1	0	1	0	1	-.01	4
333		15	max	1454.634	2	-.733	15	0	1	0	1	0	1	-.002	15
334			min	-1546.749	3	-3.101	4	0	1	0	1	0	1	-.009	4
335		16	max	1454.463	2	-.938	15	0	1	0	1	0	1	-.002	15
336			min	-1546.876	3	-3.975	4	0	1	0	1	0	1	-.008	4
337		17	max	1454.293	2	-1.144	15	0	1	0	1	0	1	-.001	15
338			min	-1547.004	3	-4.85	4	0	1	0	1	0	1	-.005	4
339		18	max	1454.123	2	-1.35	15	0	1	0	1	0	1	0	15
340			min	-1547.132	3	-5.724	4	0	1	0	1	0	1	-.003	4
341		19	max	1453.952	2	-1.555	15	0	1	0	1	0	1	0	1
342			min	-1547.26	3	-6.599	4	0	1	0	1	0	1	0	1
343	M8	1	max	3251.511	1	0	1	0	1	0	1	0	1	0	1
344			min	-590.323	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3251.682	1	0	1	0	1	0	1	0	1	0	1
346			min	-590.195	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3251.852	1	0	1	0	1	0	1	0	1	0	1
348			min	-590.067	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3252.022	1	0	1	0	1	0	1	0	1	0	1
350			min	-589.94	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3252.193	1	0	1	0	1	0	1	0	1	0	1
352			min	-589.812	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3252.363	1	0	1	0	1	0	1	0	1	0	1
354			min	-589.684	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3252.533	1	0	1	0	1	0	1	0	1	0	1
356			min	-589.556	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3252.704	1	0	1	0	1	0	1	0	1	0	1
358			min	-589.429	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3252.874	1	0	1	0	1	0	1	0	1	0	1
360			min	-589.301	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3253.045	1	0	1	0	1	0	1	0	1	0	1
362			min	-589.173	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3253.215	1	0	1	0	1	0	1	0	1	0	1
364			min	-589.045	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3253.385	1	0	1	0	1	0	1	0	1	0	1
366			min	-588.918	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3253.556	1	0	1	0	1	0	1	0	1	0	1
368			min	-588.79	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	3253.726	1	0	1	0	1	0	1	0	1	0	1
370			min	-588.662	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3253.896	1	0	1	0	1	0	1	0	1	0	1
372			min	-588.534	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3254.067	1	0	1	0	1	0	1	0	1	0	1
374			min	-588.407	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3254.237	1	0	1	0	1	0	1	0	1	0	1
376			min	-588.279	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3254.407	1	0	1	0	1	0	1	0	1	0	1
378			min	-588.151	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3254.578	1	0	1	0	1	0	1	0	1	0	1
380			min	-588.023	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1093.647	1	2.156	4	-.032	15	0	1	0	1	0	1
382			min	-954.617	3	.507	15	-.906	1	0	3	0	3	0	1
383		2	max	1094.063	1	2.147	4	-.032	15	0	1	0	15	0	15
384			min	-954.305	3	.505	15	-.906	1	0	3	0	1	0	4
385		3	max	1094.479	1	2.139	4	-.032	15	0	1	0	15	0	15
386			min	-953.993	3	.503	15	-.906	1	0	3	0	1	-.001	4
387		4	max	1094.895	1	2.13	4	-.032	15	0	1	0	15	0	15
388			min	-953.681	3	.501	15	-.906	1	0	3	0	1	-.002	4
389		5	max	1095.311	1	2.121	4	-.032	15	0	1	0	15	0	15
390			min	-953.369	3	.499	15	-.906	1	0	3	-.001	1	-.002	4
391		6	max	1095.727	1	2.113	4	-.032	15	0	1	0	15	0	15
392			min	-953.057	3	.497	15	-.906	1	0	3	-.001	1	-.003	4
393		7	max	1096.142	1	2.104	4	-.032	15	0	1	0	15	0	15
394			min	-952.745	3	.495	15	-.906	1	0	3	-.002	1	-.004	4
395		8	max	1096.558	1	2.095	4	-.032	15	0	1	0	15	0	15
396			min	-952.434	3	.493	15	-.906	1	0	3	-.002	1	-.004	4
397		9	max	1096.974	1	2.086	4	-.032	15	0	1	0	15	-.001	15
398			min	-952.122	3	.491	15	-.906	1	0	3	-.002	1	-.005	4
399		10	max	1097.39	1	2.078	4	-.032	15	0	1	0	15	-.001	15
400			min	-951.81	3	.489	15	-.906	1	0	3	-.002	1	-.005	4
401		11	max	1097.806	1	2.069	4	-.032	15	0	1	0	15	-.001	15
402			min	-951.498	3	.486	15	-.906	1	0	3	-.003	1	-.006	4
403		12	max	1098.222	1	2.06	4	-.032	15	0	1	0	15	-.002	15
404			min	-951.186	3	.484	15	-.906	1	0	3	-.003	1	-.007	4
405		13	max	1098.638	1	2.052	4	-.032	15	0	1	0	15	-.002	15
406			min	-950.874	3	.482	15	-.906	1	0	3	-.003	1	-.007	4
407		14	max	1099.054	1	2.043	4	-.032	15	0	1	0	15	-.002	15
408			min	-950.562	3	.48	15	-.906	1	0	3	-.003	1	-.008	4
409		15	max	1099.469	1	2.034	4	-.032	15	0	1	0	15	-.002	15
410			min	-950.25	3	.478	15	-.906	1	0	3	-.004	1	-.008	4
411		16	max	1099.885	1	2.025	4	-.032	15	0	1	0	15	-.002	15
412			min	-949.938	3	.476	15	-.906	1	0	3	-.004	1	-.009	4
413		17	max	1100.301	1	2.017	4	-.032	15	0	1	0	15	-.002	15
414			min	-949.626	3	.474	15	-.906	1	0	3	-.004	1	-.009	4
415		18	max	1100.717	1	2.008	4	-.032	15	0	1	0	15	-.002	15
416			min	-949.314	3	.472	15	-.906	1	0	3	-.004	1	-.01	4
417		19	max	1101.133	1	1.999	4	-.032	15	0	1	0	15	-.002	15
418			min	-949.003	3	.47	15	-.906	1	0	3	-.005	1	-.01	4
419	M11	1	max	378.169	2	9.1	4	-.008	15	0	1	0	15	.01	4
420			min	-505.71	3	2.139	15	-.21	1	0	5	0	1	.002	15
421		2	max	377.998	2	8.226	4	-.008	15	0	1	0	15	.006	4
422			min	-505.837	3	1.934	15	-.21	1	0	5	0	1	.002	15
423		3	max	377.828	2	7.352	4	-.008	15	0	1	0	15	.003	2
424			min	-505.965	3	1.728	15	-.21	1	0	5	0	1	0	12
425		4	max	377.658	2	6.477	4	-.008	15	0	1	0	15	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-506.093	3	1.523	15	-.21	1	0	5	0	1	-.002	3
427		5	max	377.487	2	5.603	4	-.008	15	0	1	0	15	0	15
428			min	-506.221	3	1.317	15	-.21	1	0	5	0	1	-.003	4
429		6	max	377.317	2	4.728	4	-.008	15	0	1	0	15	-.001	15
430			min	-506.348	3	1.112	15	-.21	1	0	5	0	1	-.006	4
431		7	max	377.147	2	3.854	4	-.008	15	0	1	0	15	-.002	15
432			min	-506.476	3	.906	15	-.21	1	0	5	0	1	-.008	4
433		8	max	376.976	2	2.979	4	-.008	15	0	1	0	15	-.002	15
434			min	-506.604	3	.7	15	-.21	1	0	5	0	1	-.01	4
435		9	max	376.806	2	2.105	4	-.008	15	0	1	0	15	-.003	15
436			min	-506.732	3	.495	15	-.21	1	0	5	0	1	-.011	4
437		10	max	376.636	2	1.23	4	-.008	15	0	1	0	15	-.003	15
438			min	-506.86	3	.289	15	-.21	1	0	5	0	1	-.012	4
439		11	max	376.465	2	.397	2	-.008	15	0	1	0	15	-.003	15
440			min	-506.987	3	.035	12	-.21	1	0	5	-.001	1	-.012	4
441		12	max	376.295	2	-.122	15	-.008	15	0	1	0	15	-.003	15
442			min	-507.115	3	-.518	4	-.21	1	0	5	-.001	1	-.012	4
443		13	max	376.125	2	-.327	15	-.008	15	0	1	0	15	-.003	15
444			min	-507.243	3	-1.393	4	-.21	1	0	5	-.001	1	-.011	4
445		14	max	375.954	2	-.533	15	-.008	15	0	1	0	15	-.002	15
446			min	-507.371	3	-2.267	4	-.21	1	0	5	-.001	1	-.011	4
447		15	max	375.784	2	-.738	15	-.008	15	0	1	0	15	-.002	15
448			min	-507.498	3	-3.142	4	-.21	1	0	5	-.001	1	-.009	4
449		16	max	375.614	2	-.944	15	-.008	15	0	1	0	15	-.002	15
450			min	-507.626	3	-4.016	4	-.21	1	0	5	-.002	1	-.008	4
451		17	max	375.443	2	-1.15	15	-.008	15	0	1	0	15	-.001	15
452			min	-507.754	3	-4.891	4	-.21	1	0	5	-.002	1	-.005	4
453		18	max	375.273	2	-1.355	15	-.008	15	0	1	0	15	0	15
454			min	-507.882	3	-5.765	4	-.21	1	0	5	-.002	1	-.003	4
455		19	max	375.103	2	-1.561	15	-.008	15	0	1	0	15	0	1
456			min	-508.009	3	-6.64	4	-.21	1	0	5	-.002	1	0	1
457	M12	1	max	1172.31	1	0	1	12.718	1	0	1	0	15	0	1
458			min	-165.535	3	0	1	.455	15	0	1	-.001	1	0	1
459		2	max	1172.48	1	0	1	12.718	1	0	1	0	1	0	1
460			min	-165.408	3	0	1	.455	15	0	1	0	12	0	1
461		3	max	1172.65	1	0	1	12.718	1	0	1	.002	1	0	1
462			min	-165.28	3	0	1	.455	15	0	1	0	15	0	1
463		4	max	1172.821	1	0	1	12.718	1	0	1	.003	1	0	1
464			min	-165.152	3	0	1	.455	15	0	1	0	15	0	1
465		5	max	1172.991	1	0	1	12.718	1	0	1	.005	1	0	1
466			min	-165.024	3	0	1	.455	15	0	1	0	15	0	1
467		6	max	1173.161	1	0	1	12.718	1	0	1	.006	1	0	1
468			min	-164.897	3	0	1	.455	15	0	1	0	15	0	1
469		7	max	1173.332	1	0	1	12.718	1	0	1	.008	1	0	1
470			min	-164.769	3	0	1	.455	15	0	1	0	15	0	1
471		8	max	1173.502	1	0	1	12.718	1	0	1	.009	1	0	1
472			min	-164.641	3	0	1	.455	15	0	1	0	15	0	1
473		9	max	1173.672	1	0	1	12.718	1	0	1	.011	1	0	1
474			min	-164.513	3	0	1	.455	15	0	1	0	15	0	1
475		10	max	1173.843	1	0	1	12.718	1	0	1	.012	1	0	1
476			min	-164.386	3	0	1	.455	15	0	1	0	15	0	1
477		11	max	1174.013	1	0	1	12.718	1	0	1	.014	1	0	1
478			min	-164.258	3	0	1	.455	15	0	1	0	15	0	1
479		12	max	1174.184	1	0	1	12.718	1	0	1	.015	1	0	1
480			min	-164.13	3	0	1	.455	15	0	1	0	15	0	1
481		13	max	1174.354	1	0	1	12.718	1	0	1	.016	1	0	1
482			min	-164.002	3	0	1	.455	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
483		14	max	1174.524	1	0	1	12.718	1	0	1	.018	1	0	1
484			min	-163.875	3	0	1	.455	15	0	1	0	15	0	1
485		15	max	1174.695	1	0	1	12.718	1	0	1	.019	1	0	1
486			min	-163.747	3	0	1	.455	15	0	1	0	15	0	1
487		16	max	1174.865	1	0	1	12.718	1	0	1	.021	1	0	1
488			min	-163.619	3	0	1	.455	15	0	1	0	15	0	1
489		17	max	1175.035	1	0	1	12.718	1	0	1	.022	1	0	1
490			min	-163.491	3	0	1	.455	15	0	1	0	15	0	1
491		18	max	1175.206	1	0	1	12.718	1	0	1	.024	1	0	1
492			min	-163.364	3	0	1	.455	15	0	1	0	15	0	1
493		19	max	1175.376	1	0	1	12.718	1	0	1	.025	1	0	1
494			min	-163.236	3	0	1	.455	15	0	1	0	15	0	1
495	M1	1	max	168.679	1	521.766	3	-2.757	15	0	1	.214	1	0	15
496			min	6.023	15	-472.92	1	-76.609	1	0	3	.008	15	-.014	1
497		2	max	169.255	1	520.579	3	-2.757	15	0	1	.167	1	.28	1
498			min	6.197	15	-474.503	1	-76.609	1	0	3	.006	15	-.325	3
499		3	max	323.828	3	553.217	1	-2.725	15	0	3	.119	1	.563	1
500			min	-220.522	2	-384.672	3	-75.958	1	0	1	.004	15	-.638	3
501		4	max	324.26	3	551.634	1	-2.725	15	0	3	.072	1	.221	1
502			min	-219.946	2	-385.859	3	-75.958	1	0	1	.003	15	-.399	3
503		5	max	324.693	3	550.051	1	-2.725	15	0	3	.025	1	-.005	15
504			min	-219.37	2	-387.046	3	-75.958	1	0	1	0	15	-.159	3
505		6	max	325.125	3	548.468	1	-2.725	15	0	3	0	15	.082	3
506			min	-218.794	2	-388.234	3	-75.958	1	0	1	-.022	1	-.462	1
507		7	max	325.557	3	546.884	1	-2.725	15	0	3	-.002	15	.323	3
508			min	-218.217	2	-389.421	3	-75.958	1	0	1	-.069	1	-.802	1
509		8	max	325.989	3	545.301	1	-2.725	15	0	3	-.004	15	.565	3
510			min	-217.641	2	-390.609	3	-75.958	1	0	1	-.116	1	-1.141	1
511		9	max	337.144	3	34.617	2	-4.328	15	0	9	.073	1	.661	3
512			min	-148.775	2	.482	15	-120.508	1	0	3	.003	15	-1.299	1
513		10	max	337.576	3	33.034	2	-4.328	15	0	9	0	15	.644	3
514			min	-148.198	2	.004	15	-120.508	1	0	3	-.001	1	-1.31	1
515		11	max	338.008	3	31.451	2	-4.328	15	0	9	-.003	15	.628	3
516			min	-147.622	2	-1.922	4	-120.508	1	0	3	-.076	1	-1.321	1
517		12	max	349.061	3	254.48	3	-2.62	15	0	1	.114	1	.549	3
518			min	-86.73	10	-582.854	1	-73.172	1	0	3	.004	15	-1.167	1
519		13	max	349.494	3	253.293	3	-2.62	15	0	1	.069	1	.391	3
520			min	-86.25	10	-584.437	1	-73.172	1	0	3	.002	15	-.805	1
521		14	max	349.926	3	252.105	3	-2.62	15	0	1	.023	1	.234	3
522			min	-85.77	10	-586.02	1	-73.172	1	0	3	0	15	-.442	1
523		15	max	350.358	3	250.918	3	-2.62	15	0	1	0	15	.078	3
524			min	-85.29	10	-587.604	1	-73.172	1	0	3	-.022	1	-.077	1
525		16	max	350.79	3	249.73	3	-2.62	15	0	1	-.002	15	.288	1
526			min	-84.81	10	-589.187	1	-73.172	1	0	3	-.068	1	-.077	3
527		17	max	351.222	3	248.543	3	-2.62	15	0	1	-.004	15	.654	1
528			min	-84.329	10	-590.77	1	-73.172	1	0	3	-.113	1	-.232	3
529		18	max	-6.21	15	546.868	1	-3.067	15	0	3	-.006	15	.327	1
530			min	-169.697	1	-198.353	3	-85.307	1	0	1	-.164	1	-.114	3
531		19	max	-6.036	15	545.285	1	-3.067	15	0	3	-.008	15	.009	3
532			min	-169.121	1	-199.54	3	-85.307	1	0	1	-.217	1	-.012	1
533	M5	1	max	372.598	1	1734.464	3	0	1	0	1	0	1	.029	1
534			min	11.986	12	-1621.186	1	0	1	0	1	0	1	0	15
535		2	max	373.174	1	1733.277	3	0	1	0	1	0	1	1.035	1
536			min	12.274	12	-1622.769	1	0	1	0	1	0	1	-1.073	3
537		3	max	1018.393	3	1575.269	1	0	1	0	1	0	1	2.008	1
538			min	-750.351	2	-1180.56	3	0	1	0	1	0	1	-2.116	3
539		4	max	1018.825	3	1573.686	1	0	1	0	1	0	1	1.031	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-749.775	2	-1181.747	3	0	1	0	1	0	1	-1.383	3
541		5	max	1019.257	3	1572.103	1	0	1	0	1	0	1	.055	1
542			min	-749.198	2	-1182.935	3	0	1	0	1	0	1	-.649	3
543		6	max	1019.689	3	1570.52	1	0	1	0	1	0	1	.085	3
544			min	-748.622	2	-1184.122	3	0	1	0	1	0	1	-.921	1
545		7	max	1020.121	3	1568.937	1	0	1	0	1	0	1	.82	3
546			min	-748.046	2	-1185.309	3	0	1	0	1	0	1	-1.895	1
547		8	max	1020.554	3	1567.353	1	0	1	0	1	0	1	1.556	3
548			min	-747.47	2	-1186.497	3	0	1	0	1	0	1	-2.868	1
549		9	max	1038.093	3	115.369	2	0	1	0	1	0	1	1.797	3
550			min	-603.981	2	.48	15	0	1	0	1	0	1	-3.252	1
551		10	max	1038.526	3	113.786	2	0	1	0	1	0	1	1.735	3
552			min	-603.405	2	.002	15	0	1	0	1	0	1	-3.291	1
553		11	max	1038.958	3	112.203	2	0	1	0	1	0	1	1.675	3
554			min	-602.829	2	-1.727	4	0	1	0	1	0	1	-3.33	1
555		12	max	1056.701	3	754.578	3	0	1	0	1	0	1	1.466	3
556			min	-459.385	2	-1692.177	1	0	1	0	1	0	1	-2.961	1
557		13	max	1057.133	3	753.39	3	0	1	0	1	0	1	.998	3
558			min	-458.809	2	-1693.76	1	0	1	0	1	0	1	-1.91	1
559		14	max	1057.565	3	752.203	3	0	1	0	1	0	1	.53	3
560			min	-458.233	2	-1695.343	1	0	1	0	1	0	1	-.859	1
561		15	max	1057.998	3	751.016	3	0	1	0	1	0	1	.244	2
562			min	-457.656	2	-1696.927	1	0	1	0	1	0	1	0	15
563		16	max	1058.43	3	749.828	3	0	1	0	1	0	1	1.248	1
564			min	-457.08	2	-1698.51	1	0	1	0	1	0	1	-.402	3
565		17	max	1058.862	3	748.641	3	0	1	0	1	0	1	2.302	1
566			min	-456.504	2	-1700.093	1	0	1	0	1	0	1	-.867	3
567		18	max	-12.666	12	1866.419	1	0	1	0	1	0	1	1.183	1
568			min	-372.289	1	-695.909	3	0	1	0	1	0	1	-.451	3
569		19	max	-12.378	12	1864.836	1	0	1	0	1	0	1	.025	1
570			min	-371.713	1	-697.096	3	0	1	0	1	0	1	-.019	3
571	M9	1	max	168.679	1	521.766	3	76.609	1	0	3	-.008	15	0	15
572			min	6.023	15	-472.92	1	2.757	15	0	1	-.214	1	-.014	1
573		2	max	169.255	1	520.579	3	76.609	1	0	3	-.006	15	.28	1
574			min	6.197	15	-474.503	1	2.757	15	0	1	-.167	1	-.325	3
575		3	max	323.828	3	553.217	1	75.958	1	0	1	-.004	15	.563	1
576			min	-220.522	2	-384.672	3	2.725	15	0	3	-.119	1	-.638	3
577		4	max	324.26	3	551.634	1	75.958	1	0	1	-.003	15	.221	1
578			min	-219.946	2	-385.859	3	2.725	15	0	3	-.072	1	-.399	3
579		5	max	324.693	3	550.051	1	75.958	1	0	1	0	15	-.005	15
580			min	-219.37	2	-387.046	3	2.725	15	0	3	-.025	1	-.159	3
581		6	max	325.125	3	548.468	1	75.958	1	0	1	.022	1	.082	3
582			min	-218.794	2	-388.234	3	2.725	15	0	3	0	15	-.462	1
583		7	max	325.557	3	546.884	1	75.958	1	0	1	.069	1	.323	3
584			min	-218.217	2	-389.421	3	2.725	15	0	3	.002	15	-.802	1
585		8	max	325.989	3	545.301	1	75.958	1	0	1	.116	1	.565	3
586			min	-217.641	2	-390.609	3	2.725	15	0	3	.004	15	-1.141	1
587		9	max	337.144	3	34.617	2	120.508	1	0	3	-.003	15	.661	3
588			min	-148.775	2	.482	15	4.328	15	0	9	-.073	1	-1.299	1
589		10	max	337.576	3	33.034	2	120.508	1	0	3	.001	1	.644	3
590			min	-148.198	2	.004	15	4.328	15	0	9	0	15	-1.31	1
591		11	max	338.008	3	31.451	2	120.508	1	0	3	.076	1	.628	3
592			min	-147.622	2	-1.922	4	4.328	15	0	9	.003	15	-1.321	1
593		12	max	349.061	3	254.48	3	73.172	1	0	3	-.004	15	.549	3
594			min	-86.73	10	-582.854	1	2.62	15	0	1	-.114	1	-1.167	1
595		13	max	349.494	3	253.293	3	73.172	1	0	3	-.002	15	.391	3
596			min	-86.25	10	-584.437	1	2.62	15	0	1	-.069	1	-.805	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
597		14	max	349.926	3	252.105	3	73.172	1	0	3	0	15	.234	3
598			min	-85.77	10	-586.02	1	2.62	15	0	1	-.023	1	-.442	1
599		15	max	350.358	3	250.918	3	73.172	1	0	3	.022	1	.078	3
600			min	-85.29	10	-587.604	1	2.62	15	0	1	0	15	-.077	1
601		16	max	350.79	3	249.73	3	73.172	1	0	3	.068	1	.288	1
602			min	-84.81	10	-589.187	1	2.62	15	0	1	.002	15	-.077	3
603		17	max	351.222	3	248.543	3	73.172	1	0	3	.113	1	.654	1
604			min	-84.329	10	-590.77	1	2.62	15	0	1	.004	15	-.232	3
605		18	max	-6.21	15	546.868	1	85.307	1	0	1	.164	1	.327	1
606			min	-169.697	1	-198.353	3	3.067	15	0	3	.006	15	-.114	3
607		19	max	-6.036	15	545.285	1	85.307	1	0	1	.217	1	.009	3
608			min	-169.121	1	-199.54	3	3.067	15	0	3	.008	15	-.012	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	.192	1	.006	3	1.282e-2	1	NC	1	NC	1
2			min	0	15	-.032	3	-.003	2	-1.963e-3	3	NC	1	NC	1
3		2	max	0	1	.151	3	.031	1	1.408e-2	1	NC	5	NC	2
4			min	0	15	.002	15	0	10	-1.812e-3	3	1186.354	3	7128.016	1
5		3	max	0	1	.298	3	.073	1	1.535e-2	1	NC	5	NC	3
6			min	0	15	-.053	1	.003	15	-1.661e-3	3	654.786	3	3018.19	1
7		4	max	0	1	.389	3	.107	1	1.661e-2	1	NC	5	NC	3
8			min	0	15	-.108	1	.004	15	-1.511e-3	3	513.809	3	2031.451	1
9		5	max	0	1	.411	3	.124	1	1.788e-2	1	NC	5	NC	3
10			min	0	15	-.102	1	.005	15	-1.36e-3	3	487.788	3	1750.177	1
11		6	max	0	1	.367	3	.119	1	1.914e-2	1	NC	5	NC	3
12			min	0	15	-.037	1	.004	15	-1.209e-3	3	541.878	3	1831.328	1
13		7	max	0	1	.27	3	.092	1	2.041e-2	1	NC	5	NC	3
14			min	0	15	.003	15	.002	10	-1.058e-3	3	716.433	3	2365.133	1
15		8	max	0	1	.203	1	.052	1	2.167e-2	1	NC	1	NC	2
16			min	0	15	.006	15	-.002	10	-9.066e-4	3	1217.526	3	4214.684	1
17		9	max	0	1	.317	1	.02	3	2.293e-2	1	NC	5	NC	1
18			min	0	15	.009	15	-.007	10	-7.557e-4	3	1717.945	1	NC	1
19		10	max	0	1	.368	1	.02	3	2.42e-2	1	NC	3	NC	1
20			min	0	1	-.018	3	-.013	2	-6.047e-4	3	1222.666	1	NC	1
21		11	max	0	15	.317	1	.02	3	2.293e-2	1	NC	5	NC	1
22			min	0	1	.009	15	-.007	10	-7.557e-4	3	1717.945	1	NC	1
23		12	max	0	15	.203	1	.052	1	2.167e-2	1	NC	1	NC	2
24			min	0	1	.006	15	-.002	10	-9.066e-4	3	1217.526	3	4214.684	1
25		13	max	0	15	.27	3	.092	1	2.041e-2	1	NC	5	NC	3
26			min	0	1	.003	15	.002	10	-1.058e-3	3	716.433	3	2365.133	1
27		14	max	0	15	.367	3	.119	1	1.914e-2	1	NC	5	NC	3
28			min	0	1	-.037	1	.004	15	-1.209e-3	3	541.878	3	1831.328	1
29		15	max	0	15	.411	3	.124	1	1.788e-2	1	NC	5	NC	3
30			min	0	1	-.102	1	.005	15	-1.36e-3	3	487.788	3	1750.177	1
31		16	max	0	15	.389	3	.107	1	1.661e-2	1	NC	5	NC	3
32			min	0	1	-.108	1	.004	15	-1.511e-3	3	513.809	3	2031.451	1
33		17	max	0	15	.298	3	.073	1	1.535e-2	1	NC	5	NC	3
34			min	0	1	-.053	1	.003	15	-1.661e-3	3	654.786	3	3018.19	1
35		18	max	0	15	.151	3	.031	1	1.408e-2	1	NC	5	NC	2
36			min	0	1	.002	15	0	10	-1.812e-3	3	1186.354	3	7128.016	1
37		19	max	0	15	.192	1	.006	3	1.282e-2	1	NC	1	NC	1
38			min	0	1	-.032	3	-.003	2	-1.963e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.27	3	.006	3	7.702e-3	1	NC	1	NC	1
40			min	0	15	-.59	1	-.003	2	-4.169e-3	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
41		2	max	0	1	.477	3	.021	1	8.992e-3	1	NC	5	NC	1
42			min	0	15	-.894	1	0	10	-4.955e-3	3	708.588	1	NC	1
43		3	max	0	1	.657	3	.056	1	1.028e-2	1	NC	15	NC	2
44			min	0	15	-1.164	1	.002	15	-5.742e-3	3	376.001	1	3935.397	1
45		4	max	0	1	.79	3	.089	1	1.157e-2	1	NC	15	NC	3
46			min	0	15	-1.374	1	.003	15	-6.528e-3	3	275.462	1	2452.745	1
47		5	max	0	1	.866	3	.108	1	1.286e-2	1	8959.162	15	NC	3
48			min	0	15	-1.51	1	.004	15	-7.315e-3	3	234.665	1	2024.736	1
49		6	max	0	1	.885	3	.106	1	1.415e-2	1	8431.834	15	NC	3
50			min	0	15	-1.571	1	.004	15	-8.101e-3	3	220.087	1	2060.937	1
51		7	max	0	1	.855	3	.084	1	1.544e-2	1	8513.583	15	NC	3
52			min	0	15	-1.566	1	.002	10	-8.888e-3	3	221.215	1	2608.569	1
53		8	max	0	1	.794	3	.049	1	1.673e-2	1	9024.625	15	NC	2
54			min	0	15	-1.516	1	-.002	10	-9.674e-3	3	233.211	1	4564.394	1
55		9	max	0	1	.73	3	.018	3	1.802e-2	1	9740.072	15	NC	1
56			min	0	15	-1.452	1	-.006	10	-1.046e-2	3	250.32	1	NC	1
57		10	max	0	1	.698	3	.017	3	1.931e-2	1	NC	15	NC	1
58			min	0	1	-1.42	1	-.012	2	-1.125e-2	3	260.233	1	NC	1
59		11	max	0	15	.73	3	.018	3	1.802e-2	1	9740.072	15	NC	1
60			min	0	1	-1.452	1	-.006	10	-1.046e-2	3	250.32	1	NC	1
61		12	max	0	15	.794	3	.049	1	1.673e-2	1	9024.625	15	NC	2
62			min	0	1	-1.516	1	-.002	10	-9.674e-3	3	233.211	1	4564.394	1
63		13	max	0	15	.855	3	.084	1	1.544e-2	1	8513.583	15	NC	3
64			min	0	1	-1.566	1	.002	10	-8.888e-3	3	221.215	1	2608.569	1
65		14	max	0	15	.885	3	.106	1	1.415e-2	1	8431.834	15	NC	3
66			min	0	1	-1.571	1	.004	15	-8.101e-3	3	220.087	1	2060.937	1
67		15	max	0	15	.866	3	.108	1	1.286e-2	1	8959.162	15	NC	3
68			min	0	1	-1.51	1	.004	15	-7.315e-3	3	234.665	1	2024.736	1
69		16	max	0	15	.79	3	.089	1	1.157e-2	1	NC	15	NC	3
70			min	0	1	-1.374	1	.003	15	-6.528e-3	3	275.462	1	2452.745	1
71		17	max	0	15	.657	3	.056	1	1.028e-2	1	NC	15	NC	2
72			min	0	1	-1.164	1	.002	15	-5.742e-3	3	376.001	1	3935.397	1
73		18	max	0	15	.477	3	.021	1	8.992e-3	1	NC	5	NC	1
74			min	0	1	-.894	1	0	10	-4.955e-3	3	708.588	1	NC	1
75		19	max	0	15	.27	3	.006	3	7.702e-3	1	NC	1	NC	1
76			min	0	1	-.59	1	-.003	2	-4.169e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.277	3	.005	3	3.479e-3	3	NC	1	NC	1
78			min	0	1	-.589	1	-.003	2	-7.841e-3	1	NC	1	NC	1
79		2	max	0	15	.421	3	.021	1	4.131e-3	3	NC	5	NC	1
80			min	0	1	-.917	1	0	10	-9.163e-3	1	658.602	1	NC	1
81		3	max	0	15	.549	3	.057	1	4.783e-3	3	NC	15	NC	2
82			min	0	1	-1.205	1	.002	15	-1.049e-2	1	350.476	1	3913.774	1
83		4	max	0	15	.652	3	.09	1	5.435e-3	3	NC	15	NC	3
84			min	0	1	-1.426	1	.003	15	-1.181e-2	1	257.982	1	2441.923	1
85		5	max	0	15	.722	3	.108	1	6.087e-3	3	8973.006	15	NC	3
86			min	0	1	-1.565	1	.004	15	-1.313e-2	1	221.293	1	2016.343	1
87		6	max	0	15	.758	3	.107	1	6.739e-3	3	8446.558	15	NC	3
88			min	0	1	-1.62	1	.004	15	-1.445e-2	1	209.516	1	2051.704	1
89		7	max	0	15	.765	3	.085	1	7.391e-3	3	8530.692	15	NC	3
90			min	0	1	-1.602	1	.003	10	-1.577e-2	1	213.222	1	2593.519	1
91		8	max	0	15	.751	3	.049	1	8.043e-3	3	9045.654	15	NC	2
92			min	0	1	-1.535	1	-.001	10	-1.71e-2	1	228.217	1	4518.77	1
93		9	max	0	15	.728	3	.017	3	8.695e-3	3	9765.912	15	NC	1
94			min	0	1	-1.457	1	-.005	10	-1.842e-2	1	248.742	1	NC	1
95		10	max	0	1	.716	3	.016	3	9.347e-3	3	NC	15	NC	1
96			min	0	1	-1.418	1	-.011	2	-1.974e-2	1	260.615	1	NC	1
97		11	max	0	1	.728	3	.017	3	8.695e-3	3	9765.912	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.457	1	-.005	10	-1.842e-2	1	248.742	1	NC	1
99		12	max	0	1	.751	3	.049	1	8.043e-3	3	9045.654	15	NC	2
100			min	0	15	-1.535	1	-.001	10	-1.71e-2	1	228.217	1	4518.77	1
101		13	max	0	1	.765	3	.085	1	7.391e-3	3	8530.692	15	NC	3
102			min	0	15	-1.602	1	.003	10	-1.577e-2	1	213.222	1	2593.519	1
103		14	max	0	1	.758	3	.107	1	6.739e-3	3	8446.558	15	NC	3
104			min	0	15	-1.62	1	.004	15	-1.445e-2	1	209.516	1	2051.704	1
105		15	max	0	1	.722	3	.108	1	6.087e-3	3	8973.006	15	NC	3
106			min	0	15	-1.565	1	.004	15	-1.313e-2	1	221.293	1	2016.343	1
107		16	max	0	1	.652	3	.09	1	5.435e-3	3	NC	15	NC	3
108			min	0	15	-1.426	1	.003	15	-1.181e-2	1	257.982	1	2441.923	1
109		17	max	0	1	.549	3	.057	1	4.783e-3	3	NC	15	NC	2
110			min	0	15	-1.205	1	.002	15	-1.049e-2	1	350.476	1	3913.774	1
111		18	max	0	1	.421	3	.021	1	4.131e-3	3	NC	5	NC	1
112			min	0	15	-.917	1	0	10	-9.163e-3	1	658.602	1	NC	1
113		19	max	0	1	.277	3	.005	3	3.479e-3	3	NC	1	NC	1
114			min	0	15	-.589	1	-.003	2	-7.841e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.186	1	.005	3	6.405e-3	3	NC	1	NC	1
116			min	0	1	-.096	3	-.002	2	-1.206e-2	1	NC	1	NC	1
117		2	max	0	15	.023	1	.031	1	7.232e-3	3	NC	5	NC	2
118			min	0	1	-.044	3	0	10	-1.314e-2	1	1325.549	1	7208.657	1
119		3	max	0	15	0	15	.072	1	8.058e-3	3	NC	5	NC	3
120			min	0	1	-.127	2	.003	15	-1.423e-2	1	743.906	1	3033.809	1
121		4	max	0	15	.011	3	.107	1	8.885e-3	3	NC	5	NC	3
122			min	0	1	-.195	2	.004	15	-1.531e-2	1	602.393	1	2034.52	1
123		5	max	0	15	.004	12	.125	1	9.712e-3	3	NC	5	NC	3
124			min	0	1	-.197	2	.005	15	-1.64e-2	1	605.216	1	1747.157	1
125		6	max	0	15	0	13	.12	1	1.054e-2	3	NC	5	NC	3
126			min	0	1	-.136	2	.004	15	-1.749e-2	1	747.727	2	1820.82	1
127		7	max	0	15	.03	9	.094	1	1.137e-2	3	NC	3	NC	3
128			min	0	1	-.081	3	.004	15	-1.857e-2	1	1213.79	2	2335.225	1
129		8	max	0	15	.165	1	.054	1	1.219e-2	3	NC	1	NC	2
130			min	0	1	-.14	3	0	10	-1.966e-2	1	4924.064	3	4086.44	1
131		9	max	0	15	.294	1	.015	1	1.302e-2	3	NC	5	NC	1
132			min	0	1	-.191	3	-.005	10	-2.074e-2	1	1993.327	1	NC	1
133		10	max	0	1	.351	1	.014	3	1.385e-2	3	NC	5	NC	1
134			min	0	1	-.213	3	-.01	2	-2.183e-2	1	1303.03	1	NC	1
135		11	max	0	1	.294	1	.015	1	1.302e-2	3	NC	5	NC	1
136			min	0	15	-.191	3	-.005	10	-2.074e-2	1	1993.327	1	NC	1
137		12	max	0	1	.165	1	.054	1	1.219e-2	3	NC	1	NC	2
138			min	0	15	-.14	3	0	10	-1.966e-2	1	4924.064	3	4086.44	1
139		13	max	0	1	.03	9	.094	1	1.137e-2	3	NC	3	NC	3
140			min	0	15	-.081	3	.004	15	-1.857e-2	1	1213.79	2	2335.225	1
141		14	max	0	1	0	13	.12	1	1.054e-2	3	NC	5	NC	3
142			min	0	15	-.136	2	.004	15	-1.749e-2	1	747.727	2	1820.82	1
143		15	max	0	1	.004	12	.125	1	9.712e-3	3	NC	5	NC	3
144			min	0	15	-.197	2	.005	15	-1.64e-2	1	605.216	1	1747.157	1
145		16	max	0	1	.011	3	.107	1	8.885e-3	3	NC	5	NC	3
146			min	0	15	-.195	2	.004	15	-1.531e-2	1	602.393	1	2034.52	1
147		17	max	0	1	0	15	.072	1	8.058e-3	3	NC	5	NC	3
148			min	0	15	-.127	2	.003	15	-1.423e-2	1	743.906	1	3033.809	1
149		18	max	0	1	.023	1	.031	1	7.232e-3	3	NC	5	NC	2
150			min	0	15	-.044	3	0	10	-1.314e-2	1	1325.549	1	7208.657	1
151		19	max	0	1	.186	1	.005	3	6.405e-3	3	NC	1	NC	1
152			min	0	15	-.096	3	-.002	2	-1.206e-2	1	NC	1	NC	1
153	M2	1	max	.006	1	.005	2	.01	1	-8.051e-6	15	NC	1	NC	2
154			min	-.006	3	-.009	3	0	15	-2.247e-4	1	NC	1	6068.16	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.004	2	.009	1	-7.542e-6	15	NC	1	NC	2
156			min	-.005	3	-.009	3	0	15	-2.104e-4	1	NC	1	6616.374	1
157		3	max	.006	1	.003	2	.008	1	-7.032e-6	15	NC	1	NC	2
158			min	-.005	3	-.008	3	0	15	-1.962e-4	1	NC	1	7269.237	1
159		4	max	.005	1	.003	2	.008	1	-6.523e-6	15	NC	1	NC	2
160			min	-.005	3	-.008	3	0	15	-1.819e-4	1	NC	1	8054.364	1
161		5	max	.005	1	.002	2	.007	1	-6.013e-6	15	NC	1	NC	2
162			min	-.004	3	-.008	3	0	15	-1.677e-4	1	NC	1	9009.396	1
163		6	max	.005	1	.001	2	.006	1	-5.504e-6	15	NC	1	NC	1
164			min	-.004	3	-.008	3	0	15	-1.535e-4	1	NC	1	NC	1
165		7	max	.004	1	0	2	.005	1	-4.995e-6	15	NC	1	NC	1
166			min	-.004	3	-.007	3	0	15	-1.392e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.004	1	-4.485e-6	15	NC	1	NC	1
168			min	-.003	3	-.007	3	0	15	-1.25e-4	1	NC	1	NC	1
169		9	max	.004	1	0	2	.004	1	-3.976e-6	15	NC	1	NC	1
170			min	-.003	3	-.007	3	0	15	-1.108e-4	1	NC	1	NC	1
171		10	max	.003	1	-.001	15	.003	1	-3.466e-6	15	NC	1	NC	1
172			min	-.003	3	-.006	3	0	15	-9.655e-5	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-2.957e-6	15	NC	1	NC	1
174			min	-.002	3	-.006	3	0	15	-8.231e-5	1	NC	1	NC	1
175		12	max	.002	1	-.001	15	.002	1	-2.448e-6	15	NC	1	NC	1
176			min	-.002	3	-.005	3	0	15	-6.808e-5	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.001	1	-1.938e-6	15	NC	1	NC	1
178			min	-.002	3	-.005	3	0	15	-5.384e-5	1	NC	1	NC	1
179		14	max	.002	1	0	15	.001	1	-1.429e-6	15	NC	1	NC	1
180			min	-.002	3	-.004	3	0	15	-3.961e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-9.194e-7	15	NC	1	NC	1
182			min	-.001	3	-.004	4	0	15	-2.538e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-4.1e-7	15	NC	1	NC	1
184			min	0	3	-.003	4	0	15	-1.114e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	3.092e-6	1	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-3.195e-7	3	NC	1	NC	1
187		18	max	0	1	0	15	0	1	1.733e-5	1	NC	1	NC	1
188			min	0	3	-.001	4	0	15	5.459e-7	12	NC	1	NC	1
189		19	max	0	1	0	1	0	1	3.156e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.118e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-3.417e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-9.62e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	1.903e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	15	6.82e-7	15	NC	1	NC	1
195		3	max	0	3	-.001	15	0	1	4.768e-5	1	NC	1	NC	1
196			min	0	2	-.005	4	0	15	1.706e-6	15	NC	1	NC	1
197		4	max	0	3	-.002	15	0	1	7.633e-5	1	NC	1	NC	1
198			min	0	2	-.008	4	0	15	2.729e-6	15	NC	1	NC	1
199		5	max	.001	3	-.003	15	0	1	1.05e-4	1	NC	1	NC	1
200			min	0	2	-.011	4	0	15	3.753e-6	15	9252.221	4	NC	1
201		6	max	.001	3	-.003	15	.001	1	1.336e-4	1	NC	1	NC	1
202			min	-.001	2	-.014	4	0	15	4.777e-6	15	7427.588	4	NC	1
203		7	max	.002	3	-.004	15	.001	1	1.623e-4	1	NC	5	NC	1
204			min	-.001	2	-.016	4	0	15	5.8e-6	15	6332.673	4	NC	1
205		8	max	.002	3	-.004	15	.002	1	1.909e-4	1	NC	5	NC	1
206			min	-.001	2	-.018	4	0	15	6.824e-6	15	5656.78	4	NC	1
207		9	max	.002	3	-.005	15	.002	1	2.196e-4	1	NC	5	NC	1
208			min	-.002	2	-.02	4	0	15	7.848e-6	15	5253.997	4	NC	1
209		10	max	.002	3	-.005	15	.002	1	2.482e-4	1	NC	5	NC	1
210			min	-.002	2	-.021	4	0	15	8.872e-6	15	5053.202	4	NC	1
211		11	max	.003	3	-.005	15	.003	1	2.769e-4	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.002	2	-.021	4	0	15	9.895e-6	15	5024.463	4	NC	1
213		12	max	.003	3	-.005	15	.003	1	3.055e-4	1	NC	5	NC	1
214			min	-.002	2	-.02	4	0	15	1.092e-5	15	5167.51	4	NC	1
215		13	max	.003	3	-.004	15	.004	1	3.342e-4	1	NC	5	NC	1
216			min	-.002	2	-.019	4	0	15	1.194e-5	15	5513.056	4	NC	1
217		14	max	.004	3	-.004	15	.005	1	3.628e-4	1	NC	5	NC	1
218			min	-.003	2	-.017	4	0	15	1.297e-5	15	6139.043	4	NC	1
219		15	max	.004	3	-.003	15	.005	1	3.915e-4	1	NC	3	NC	1
220			min	-.003	2	-.015	4	0	15	1.399e-5	15	7219.459	4	NC	1
221		16	max	.004	3	-.003	15	.006	1	4.201e-4	1	NC	1	NC	1
222			min	-.003	2	-.012	4	0	15	1.501e-5	15	9176.637	4	NC	1
223		17	max	.004	3	-.002	15	.007	1	4.488e-4	1	NC	1	NC	1
224			min	-.003	2	-.008	4	0	15	1.604e-5	15	NC	1	NC	1
225		18	max	.005	3	-.001	15	.008	1	4.774e-4	1	NC	1	NC	1
226			min	-.004	2	-.006	1	0	15	1.706e-5	15	NC	1	NC	1
227		19	max	.005	3	0	15	.009	1	5.061e-4	1	NC	1	NC	1
228			min	-.004	2	-.003	1	0	15	1.808e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.003	2	0	15	7.751e-5	1	NC	1	NC	3
230			min	0	3	-.005	3	-.009	1	2.792e-6	15	NC	1	2661.239	1
231		2	max	.003	1	.003	2	0	15	7.751e-5	1	NC	1	NC	3
232			min	0	3	-.005	3	-.009	1	2.792e-6	15	NC	1	2894.481	1
233		3	max	.002	1	.003	2	0	15	7.751e-5	1	NC	1	NC	3
234			min	0	3	-.004	3	-.008	1	2.792e-6	15	NC	1	3172.04	1
235		4	max	.002	1	.003	2	0	15	7.751e-5	1	NC	1	NC	3
236			min	0	3	-.004	3	-.007	1	2.792e-6	15	NC	1	3505.438	1
237		5	max	.002	1	.003	2	0	15	7.751e-5	1	NC	1	NC	2
238			min	0	3	-.004	3	-.006	1	2.792e-6	15	NC	1	3910.326	1
239		6	max	.002	1	.002	2	0	15	7.751e-5	1	NC	1	NC	2
240			min	0	3	-.004	3	-.006	1	2.792e-6	15	NC	1	4408.414	1
241		7	max	.002	1	.002	2	0	15	7.751e-5	1	NC	1	NC	2
242			min	0	3	-.003	3	-.005	1	2.792e-6	15	NC	1	5030.516	1
243		8	max	.002	1	.002	2	0	15	7.751e-5	1	NC	1	NC	2
244			min	0	3	-.003	3	-.004	1	2.792e-6	15	NC	1	5821.575	1
245		9	max	.002	1	.002	2	0	15	7.751e-5	1	NC	1	NC	2
246			min	0	3	-.003	3	-.004	1	2.792e-6	15	NC	1	6849.25	1
247		10	max	.001	1	.002	2	0	15	7.751e-5	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	2.792e-6	15	NC	1	8219.312	1
249		11	max	.001	1	.001	2	0	15	7.751e-5	1	NC	1	NC	1
250			min	0	3	-.002	3	-.002	1	2.792e-6	15	NC	1	NC	1
251		12	max	.001	1	.001	2	0	15	7.751e-5	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	2.792e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	7.751e-5	1	NC	1	NC	1
254			min	0	3	-.002	3	-.001	1	2.792e-6	15	NC	1	NC	1
255		14	max	0	1	0	2	0	15	7.751e-5	1	NC	1	NC	1
256			min	0	3	-.001	3	-.001	1	2.792e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	7.751e-5	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	2.792e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	7.751e-5	1	NC	1	NC	1
260			min	0	3	0	3	0	1	2.792e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	7.751e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.792e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	7.751e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.792e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	7.751e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.792e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.02	2	0	1	0	1	NC	3	NC	1
268			min	-.018	3	-.027	3	0	1	0	1	3040.197	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.019	1	.018	2	0	1	0	1	NC	3	NC	1
270			min	-.017	3	-.026	3	0	1	0	1	3347.602	2	NC	1
271		3	max	.018	1	.016	2	0	1	0	1	NC	3	NC	1
272			min	-.016	3	-.024	3	0	1	0	1	3721.061	2	NC	1
273		4	max	.017	1	.014	2	0	1	0	1	NC	3	NC	1
274			min	-.015	3	-.023	3	0	1	0	1	4180.472	2	NC	1
275		5	max	.016	1	.013	2	0	1	0	1	NC	3	NC	1
276			min	-.014	3	-.021	3	0	1	0	1	4754.096	2	NC	1
277		6	max	.014	1	.011	2	0	1	0	1	NC	3	NC	1
278			min	-.013	3	-.02	3	0	1	0	1	5483.201	2	NC	1
279		7	max	.013	1	.009	2	0	1	0	1	NC	1	NC	1
280			min	-.012	3	-.019	3	0	1	0	1	6430.043	2	NC	1
281		8	max	.012	1	.008	2	0	1	0	1	NC	1	NC	1
282			min	-.011	3	-.017	3	0	1	0	1	7692.298	2	NC	1
283		9	max	.011	1	.006	2	0	1	0	1	NC	1	NC	1
284			min	-.01	3	-.016	3	0	1	0	1	9430.74	2	NC	1
285		10	max	.01	1	.005	2	0	1	0	1	NC	1	NC	1
286			min	-.009	3	-.014	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	1	.004	2	0	1	0	1	NC	1	NC	1
288			min	-.008	3	-.013	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
290			min	-.007	3	-.011	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.006	3	-.01	3	0	1	0	1	NC	1	NC	1
293		14	max	.006	1	.001	2	0	1	0	1	NC	1	NC	1
294			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.004	3	-.007	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.003	3	-.005	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
312			min	-.002	2	-.009	3	0	1	0	1	NC	1	NC	1
313		5	max	.003	3	-.003	15	0	1	0	1	NC	1	NC	1
314			min	-.003	2	-.011	3	0	1	0	1	9537.57	4	NC	1
315		6	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
316			min	-.004	2	-.014	4	0	1	0	1	7633.753	4	NC	1
317		7	max	.005	3	-.004	15	0	1	0	1	NC	1	NC	1
318			min	-.005	2	-.016	4	0	1	0	1	6492.938	4	NC	1
319		8	max	.006	3	-.004	15	0	1	0	1	NC	2	NC	1
320			min	-.006	2	-.018	4	0	1	0	1	5788.726	4	NC	1
321		9	max	.007	3	-.005	15	0	1	0	1	NC	5	NC	1
322			min	-.006	2	-.02	4	0	1	0	1	5367.997	4	NC	1
323		10	max	.008	3	-.005	15	0	1	0	1	NC	5	NC	1
324			min	-.007	2	-.021	4	0	1	0	1	5156.024	4	NC	1
325		11	max	.008	3	-.005	15	0	1	0	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.008	2	-.021	4	0	1	0	1	5121.038	4	NC	1
327		12	max	.009	3	-.005	15	0	1	0	1	NC	5	NC	1
328			min	-.009	2	-.02	4	0	1	0	1	5261.962	4	NC	1
329		13	max	.01	3	-.004	15	0	1	0	1	NC	5	NC	1
330			min	-.01	2	-.019	4	0	1	0	1	5609.486	4	NC	1
331		14	max	.011	3	-.004	15	0	1	0	1	NC	2	NC	1
332			min	-.01	2	-.017	4	0	1	0	1	6242.426	4	NC	1
333		15	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
334			min	-.011	2	-.015	4	0	1	0	1	7337.22	4	NC	1
335		16	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
336			min	-.012	2	-.012	4	0	1	0	1	9322.52	4	NC	1
337		17	max	.014	3	-.002	15	0	1	0	1	NC	1	NC	1
338			min	-.013	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.014	3	-.001	15	0	1	0	1	NC	1	NC	1
340			min	-.014	2	-.008	1	0	1	0	1	NC	1	NC	1
341		19	max	.015	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.014	2	-.006	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.008	1	.013	2	0	1	0	1	NC	1	NC	1
344			min	-.001	3	-.015	3	0	1	0	1	NC	1	NC	1
345		2	max	.007	1	.012	2	0	1	0	1	NC	1	NC	1
346			min	-.001	3	-.014	3	0	1	0	1	NC	1	NC	1
347		3	max	.007	1	.012	2	0	1	0	1	NC	1	NC	1
348			min	-.001	3	-.014	3	0	1	0	1	NC	1	NC	1
349		4	max	.006	1	.011	2	0	1	0	1	NC	1	NC	1
350			min	-.001	3	-.013	3	0	1	0	1	NC	1	NC	1
351		5	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
352			min	-.001	3	-.012	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.01	2	0	1	0	1	NC	1	NC	1
354			min	-.001	3	-.011	3	0	1	0	1	NC	1	NC	1
355		7	max	.005	1	.009	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.008	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.007	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.006	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.005	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.004	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.004	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.003	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.002	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.001	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.005	2	0	15	2.247e-4	1	NC	1	NC	2
382			min	-.006	3	-.009	3	-.01	1	8.051e-6	15	NC	1	6068.16	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.004	2	0	15	2.104e-4	1	NC	1	NC	2
384			min	-.005	3	-.009	3	-.009	1	7.542e-6	15	NC	1	6616.374	1
385		3	max	.006	1	.003	2	0	15	1.962e-4	1	NC	1	NC	2
386			min	-.005	3	-.008	3	-.008	1	7.032e-6	15	NC	1	7269.237	1
387		4	max	.005	1	.003	2	0	15	1.819e-4	1	NC	1	NC	2
388			min	-.005	3	-.008	3	-.008	1	6.523e-6	15	NC	1	8054.364	1
389		5	max	.005	1	.002	2	0	15	1.677e-4	1	NC	1	NC	2
390			min	-.004	3	-.008	3	-.007	1	6.013e-6	15	NC	1	9009.396	1
391		6	max	.005	1	.001	2	0	15	1.535e-4	1	NC	1	NC	1
392			min	-.004	3	-.008	3	-.006	1	5.504e-6	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	1.392e-4	1	NC	1	NC	1
394			min	-.004	3	-.007	3	-.005	1	4.995e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.25e-4	1	NC	1	NC	1
396			min	-.003	3	-.007	3	-.004	1	4.485e-6	15	NC	1	NC	1
397		9	max	.004	1	0	2	0	15	1.108e-4	1	NC	1	NC	1
398			min	-.003	3	-.007	3	-.004	1	3.976e-6	15	NC	1	NC	1
399		10	max	.003	1	-.001	15	0	15	9.655e-5	1	NC	1	NC	1
400			min	-.003	3	-.006	3	-.003	1	3.466e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	8.231e-5	1	NC	1	NC	1
402			min	-.002	3	-.006	3	-.003	1	2.957e-6	15	NC	1	NC	1
403		12	max	.002	1	-.001	15	0	15	6.808e-5	1	NC	1	NC	1
404			min	-.002	3	-.005	3	-.002	1	2.448e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	5.384e-5	1	NC	1	NC	1
406			min	-.002	3	-.005	3	-.001	1	1.938e-6	15	NC	1	NC	1
407		14	max	.002	1	0	15	0	15	3.961e-5	1	NC	1	NC	1
408			min	-.002	3	-.004	3	-.001	1	1.429e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	2.538e-5	1	NC	1	NC	1
410			min	-.001	3	-.004	4	0	1	9.194e-7	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	1.114e-5	1	NC	1	NC	1
412			min	0	3	-.003	4	0	1	4.1e-7	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	3.195e-7	3	NC	1	NC	1
414			min	0	3	-.002	4	0	1	-3.092e-6	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-5.459e-7	12	NC	1	NC	1
416			min	0	3	-.001	4	0	1	-1.733e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.118e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-3.156e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	9.62e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	3.417e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-6.82e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-1.903e-5	1	NC	1	NC	1
423		3	max	0	3	-.001	15	0	15	-1.706e-6	15	NC	1	NC	1
424			min	0	2	-.005	4	0	1	-4.768e-5	1	NC	1	NC	1
425		4	max	0	3	-.002	15	0	15	-2.729e-6	15	NC	1	NC	1
426			min	0	2	-.008	4	0	1	-7.633e-5	1	NC	1	NC	1
427		5	max	.001	3	-.003	15	0	15	-3.753e-6	15	NC	1	NC	1
428			min	0	2	-.011	4	0	1	-1.05e-4	1	9252.221	4	NC	1
429		6	max	.001	3	-.003	15	0	15	-4.777e-6	15	NC	1	NC	1
430			min	-.001	2	-.014	4	-.001	1	-1.336e-4	1	7427.588	4	NC	1
431		7	max	.002	3	-.004	15	0	15	-5.8e-6	15	NC	5	NC	1
432			min	-.001	2	-.016	4	-.001	1	-1.623e-4	1	6332.673	4	NC	1
433		8	max	.002	3	-.004	15	0	15	-6.824e-6	15	NC	5	NC	1
434			min	-.001	2	-.018	4	-.002	1	-1.909e-4	1	5656.78	4	NC	1
435		9	max	.002	3	-.005	15	0	15	-7.848e-6	15	NC	5	NC	1
436			min	-.002	2	-.02	4	-.002	1	-2.196e-4	1	5253.997	4	NC	1
437		10	max	.002	3	-.005	15	0	15	-8.872e-6	15	NC	5	NC	1
438			min	-.002	2	-.021	4	-.002	1	-2.482e-4	1	5053.202	4	NC	1
439		11	max	.003	3	-.005	15	0	15	-9.895e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.002	2	-.021	4	-.003	1	-2.769e-4	1	5024.463	4	NC	1
441		12	max	.003	3	-.005	15	0	15	-1.092e-5	15	NC	5	NC	1
442			min	-.002	2	-.02	4	-.003	1	-3.055e-4	1	5167.51	4	NC	1
443		13	max	.003	3	-.004	15	0	15	-1.194e-5	15	NC	5	NC	1
444			min	-.002	2	-.019	4	-.004	1	-3.342e-4	1	5513.056	4	NC	1
445		14	max	.004	3	-.004	15	0	15	-1.297e-5	15	NC	5	NC	1
446			min	-.003	2	-.017	4	-.005	1	-3.628e-4	1	6139.043	4	NC	1
447		15	max	.004	3	-.003	15	0	15	-1.399e-5	15	NC	3	NC	1
448			min	-.003	2	-.015	4	-.005	1	-3.915e-4	1	7219.459	4	NC	1
449		16	max	.004	3	-.003	15	0	15	-1.501e-5	15	NC	1	NC	1
450			min	-.003	2	-.012	4	-.006	1	-4.201e-4	1	9176.637	4	NC	1
451		17	max	.004	3	-.002	15	0	15	-1.604e-5	15	NC	1	NC	1
452			min	-.003	2	-.008	4	-.007	1	-4.488e-4	1	NC	1	NC	1
453		18	max	.005	3	-.001	15	0	15	-1.706e-5	15	NC	1	NC	1
454			min	-.004	2	-.006	1	-.008	1	-4.774e-4	1	NC	1	NC	1
455		19	max	.005	3	0	15	0	15	-1.808e-5	15	NC	1	NC	1
456			min	-.004	2	-.003	1	-.009	1	-5.061e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.003	2	.009	1	-2.792e-6	15	NC	1	NC	3
458			min	0	3	-.005	3	0	15	-7.751e-5	1	NC	1	2661.239	1
459		2	max	.003	1	.003	2	.009	1	-2.792e-6	15	NC	1	NC	3
460			min	0	3	-.005	3	0	15	-7.751e-5	1	NC	1	2894.481	1
461		3	max	.002	1	.003	2	.008	1	-2.792e-6	15	NC	1	NC	3
462			min	0	3	-.004	3	0	15	-7.751e-5	1	NC	1	3172.04	1
463		4	max	.002	1	.003	2	.007	1	-2.792e-6	15	NC	1	NC	3
464			min	0	3	-.004	3	0	15	-7.751e-5	1	NC	1	3505.438	1
465		5	max	.002	1	.003	2	.006	1	-2.792e-6	15	NC	1	NC	2
466			min	0	3	-.004	3	0	15	-7.751e-5	1	NC	1	3910.326	1
467		6	max	.002	1	.002	2	.006	1	-2.792e-6	15	NC	1	NC	2
468			min	0	3	-.004	3	0	15	-7.751e-5	1	NC	1	4408.414	1
469		7	max	.002	1	.002	2	.005	1	-2.792e-6	15	NC	1	NC	2
470			min	0	3	-.003	3	0	15	-7.751e-5	1	NC	1	5030.516	1
471		8	max	.002	1	.002	2	.004	1	-2.792e-6	15	NC	1	NC	2
472			min	0	3	-.003	3	0	15	-7.751e-5	1	NC	1	5821.575	1
473		9	max	.002	1	.002	2	.004	1	-2.792e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-7.751e-5	1	NC	1	6849.25	1
475		10	max	.001	1	.002	2	.003	1	-2.792e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-7.751e-5	1	NC	1	8219.312	1
477		11	max	.001	1	.001	2	.002	1	-2.792e-6	15	NC	1	NC	1
478			min	0	3	-.002	3	0	15	-7.751e-5	1	NC	1	NC	1
479		12	max	.001	1	.001	2	.002	1	-2.792e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-7.751e-5	1	NC	1	NC	1
481		13	max	0	1	.001	2	.001	1	-2.792e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-7.751e-5	1	NC	1	NC	1
483		14	max	0	1	0	2	.001	1	-2.792e-6	15	NC	1	NC	1
484			min	0	3	-.001	3	0	15	-7.751e-5	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-2.792e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-7.751e-5	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-2.792e-6	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-7.751e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.792e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-7.751e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.792e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-7.751e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.792e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-7.751e-5	1	NC	1	NC	1
495	M1	1	max	.006	3	.192	1	0	1	1.2e-2	1	NC	1	NC	1
496			min	-.003	2	-.032	3	0	15	-1.574e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.006	3	.095	1	0	15	5.794e-3	1	NC	5	NC	1
498			min	-.003	2	-.016	3	-.007	1	-7.813e-3	3	1399.145	1	NC	1
499		3	max	.006	3	.009	3	0	15	7.478e-6	10	NC	5	NC	1
500			min	-.003	2	-.008	1	-.01	1	-2.202e-4	1	672.371	1	NC	1
501		4	max	.006	3	.049	3	0	15	4.629e-3	1	NC	15	NC	1
502			min	-.003	2	-.126	1	-.009	1	-3.35e-3	3	423.207	1	NC	1
503		5	max	.006	3	.101	3	0	15	9.478e-3	1	9566.769	15	NC	1
504			min	-.003	2	-.25	1	-.006	1	-6.617e-3	3	304.504	1	NC	1
505		6	max	.006	3	.157	3	0	15	1.433e-2	1	7564.703	15	NC	1
506			min	-.003	2	-.37	1	-.003	1	-9.885e-3	3	239.225	1	NC	1
507		7	max	.006	3	.211	3	0	1	1.918e-2	1	6382.264	15	NC	1
508			min	-.003	2	-.478	1	0	3	-1.315e-2	3	200.763	1	NC	1
509		8	max	.006	3	.256	3	0	1	2.403e-2	1	5682.415	15	NC	1
510			min	-.003	2	-.564	1	0	15	-1.642e-2	3	178.046	1	NC	1
511		9	max	.006	3	.285	3	0	15	2.634e-2	1	5316.258	15	NC	1
512			min	-.003	2	-.618	1	0	1	-1.67e-2	3	166.213	1	NC	1
513		10	max	.006	3	.296	3	0	1	2.697e-2	1	5204.358	15	NC	1
514			min	-.003	2	-.635	1	0	15	-1.498e-2	3	162.659	1	NC	1
515		11	max	.005	3	.289	3	0	1	2.76e-2	1	5316.065	15	NC	1
516			min	-.003	2	-.617	1	0	15	-1.326e-2	3	166.413	1	NC	1
517		12	max	.005	3	.265	3	0	15	2.594e-2	1	5682.007	15	NC	1
518			min	-.003	2	-.562	1	-.001	1	-1.132e-2	3	178.657	1	NC	1
519		13	max	.005	3	.226	3	0	15	2.088e-2	1	6381.55	15	NC	1
520			min	-.002	2	-.475	1	0	1	-9.056e-3	3	202.246	1	NC	1
521		14	max	.005	3	.175	3	.002	1	1.581e-2	1	7563.497	15	NC	1
522			min	-.002	2	-.366	1	0	15	-6.793e-3	3	242.378	1	NC	1
523		15	max	.005	3	.119	3	.006	1	1.075e-2	1	9564.689	15	NC	1
524			min	-.002	2	-.244	1	0	15	-4.529e-3	3	310.937	1	NC	1
525		16	max	.005	3	.06	3	.009	1	5.687e-3	1	NC	15	NC	1
526			min	-.002	2	-.12	1	0	15	-2.266e-3	3	436.592	1	NC	1
527		17	max	.005	3	.003	3	.009	1	6.241e-4	1	NC	5	NC	1
528			min	-.002	2	-.005	2	0	15	-2.43e-6	3	702.139	1	NC	1
529		18	max	.005	3	.095	1	.007	1	7.294e-3	1	NC	5	NC	1
530			min	-.002	2	-.048	3	0	15	-2.218e-3	3	1474.173	1	NC	1
531		19	max	.005	3	.186	1	0	15	1.417e-2	1	NC	1	NC	1
532			min	-.002	2	-.096	3	0	1	-4.513e-3	3	NC	1	NC	1
533	M5	1	max	.02	3	.368	1	0	1	0	1	NC	1	NC	1
534			min	-.013	2	-.018	3	0	1	0	1	NC	1	NC	1
535		2	max	.02	3	.185	1	0	1	0	1	NC	5	NC	1
536			min	-.014	2	-.01	3	0	1	0	1	734.047	1	NC	1
537		3	max	.02	3	.027	3	0	1	0	1	NC	15	NC	1
538			min	-.014	2	-.028	1	0	1	0	1	340.297	1	NC	1
539		4	max	.019	3	.118	3	0	1	0	1	7176.111	15	NC	1
540			min	-.013	2	-.29	1	0	1	0	1	204.57	1	NC	1
541		5	max	.019	3	.247	3	0	1	0	1	4996.893	15	NC	1
542			min	-.013	2	-.581	1	0	1	0	1	141.832	1	NC	1
543		6	max	.018	3	.394	3	0	1	0	1	3832.696	15	NC	1
544			min	-.013	2	-.873	1	0	1	0	1	108.411	1	NC	1
545		7	max	.018	3	.538	3	0	1	0	1	3162.848	15	NC	1
546			min	-.012	2	-1.14	1	0	1	0	1	89.223	1	NC	1
547		8	max	.018	3	.66	3	0	1	0	1	2774.575	15	NC	1
548			min	-.012	2	-1.354	1	0	1	0	1	78.118	1	NC	1
549		9	max	.017	3	.739	3	0	1	0	1	2575.675	15	NC	1
550			min	-.012	2	-1.49	1	0	1	0	1	72.44	1	NC	1
551		10	max	.017	3	.769	3	0	1	0	1	2515.722	15	NC	1
552			min	-.012	2	-1.535	1	0	1	0	1	70.75	1	NC	1
553		11	max	.016	3	.75	3	0	1	0	1	2575.766	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
554			min	-.011	2	-1.489	1	0	1	0	1	72.54	1	NC	1
555		12	max	.016	3	.684	3	0	1	0	1	2774.793	15	NC	1
556			min	-.011	2	-1.351	1	0	1	0	1	78.451	1	NC	1
557		13	max	.016	3	.579	3	0	1	0	1	3163.292	15	NC	1
558			min	-.011	2	-1.131	1	0	1	0	1	90.098	1	NC	1
559		14	max	.015	3	.445	3	0	1	0	1	3833.561	15	NC	1
560			min	-.011	2	-.858	1	0	1	0	1	110.406	1	NC	1
561		15	max	.015	3	.297	3	0	1	0	1	4998.604	15	NC	1
562			min	-.011	2	-.562	1	0	1	0	1	146.221	1	NC	1
563		16	max	.014	3	.147	3	0	1	0	1	7179.701	15	NC	1
564			min	-.01	2	-.27	1	0	1	0	1	214.572	1	NC	1
565		17	max	.014	3	.009	3	0	1	0	1	NC	15	NC	1
566			min	-.01	2	-.014	1	0	1	0	1	365.066	1	NC	1
567		18	max	.014	3	.185	1	0	1	0	1	NC	5	NC	1
568			min	-.01	2	-.108	3	0	1	0	1	801.654	1	NC	1
569		19	max	.014	3	.351	1	0	1	0	1	NC	1	NC	1
570			min	-.01	2	-.213	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.006	3	.192	1	0	15	1.574e-2	3	NC	1	NC	1
572			min	-.003	2	-.032	3	0	1	-1.2e-2	1	NC	1	NC	1
573		2	max	.006	3	.095	1	.007	1	7.813e-3	3	NC	5	NC	1
574			min	-.003	2	-.016	3	0	15	-5.794e-3	1	1399.145	1	NC	1
575		3	max	.006	3	.009	3	.01	1	2.202e-4	1	NC	5	NC	1
576			min	-.003	2	-.008	1	0	15	-7.478e-6	10	672.371	1	NC	1
577		4	max	.006	3	.049	3	.009	1	3.35e-3	3	NC	15	NC	1
578			min	-.003	2	-.126	1	0	15	-4.629e-3	1	423.207	1	NC	1
579		5	max	.006	3	.101	3	.006	1	6.617e-3	3	9566.769	15	NC	1
580			min	-.003	2	-.25	1	0	15	-9.478e-3	1	304.504	1	NC	1
581		6	max	.006	3	.157	3	.003	1	9.885e-3	3	7564.703	15	NC	1
582			min	-.003	2	-.37	1	0	15	-1.433e-2	1	239.225	1	NC	1
583		7	max	.006	3	.211	3	0	3	1.315e-2	3	6382.264	15	NC	1
584			min	-.003	2	-.478	1	0	1	-1.918e-2	1	200.763	1	NC	1
585		8	max	.006	3	.256	3	0	15	1.642e-2	3	5682.415	15	NC	1
586			min	-.003	2	-.564	1	0	1	-2.403e-2	1	178.046	1	NC	1
587		9	max	.006	3	.285	3	0	1	1.67e-2	3	5316.258	15	NC	1
588			min	-.003	2	-.618	1	0	15	-2.634e-2	1	166.213	1	NC	1
589		10	max	.006	3	.296	3	0	15	1.498e-2	3	5204.358	15	NC	1
590			min	-.003	2	-.635	1	0	1	-2.697e-2	1	162.659	1	NC	1
591		11	max	.005	3	.289	3	0	15	1.326e-2	3	5316.065	15	NC	1
592			min	-.003	2	-.617	1	0	1	-2.76e-2	1	166.413	1	NC	1
593		12	max	.005	3	.265	3	.001	1	1.132e-2	3	5682.007	15	NC	1
594			min	-.003	2	-.562	1	0	15	-2.594e-2	1	178.657	1	NC	1
595		13	max	.005	3	.226	3	0	1	9.056e-3	3	6381.55	15	NC	1
596			min	-.002	2	-.475	1	0	15	-2.088e-2	1	202.246	1	NC	1
597		14	max	.005	3	.175	3	0	15	6.793e-3	3	7563.497	15	NC	1
598			min	-.002	2	-.366	1	-.002	1	-1.581e-2	1	242.378	1	NC	1
599		15	max	.005	3	.119	3	0	15	4.529e-3	3	9564.689	15	NC	1
600			min	-.002	2	-.244	1	-.006	1	-1.075e-2	1	310.937	1	NC	1
601		16	max	.005	3	.06	3	0	15	2.266e-3	3	NC	15	NC	1
602			min	-.002	2	-.12	1	-.009	1	-5.687e-3	1	436.592	1	NC	1
603		17	max	.005	3	.003	3	0	15	2.43e-6	3	NC	5	NC	1
604			min	-.002	2	-.005	2	-.009	1	-6.241e-4	1	702.139	1	NC	1
605		18	max	.005	3	.095	1	0	15	2.218e-3	3	NC	5	NC	1
606			min	-.002	2	-.048	3	-.007	1	-7.294e-3	1	1474.173	1	NC	1
607		19	max	.005	3	.186	1	0	1	4.513e-3	3	NC	1	NC	1
608			min	-.002	2	-.096	3	0	15	-1.417e-2	1	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

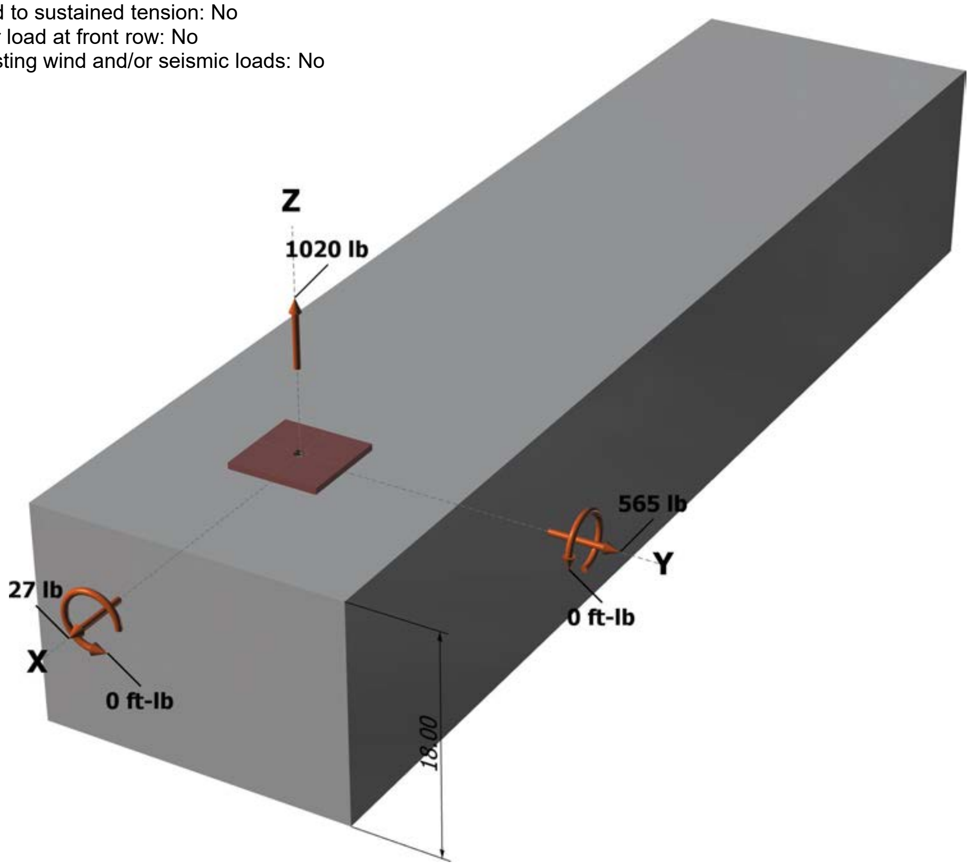
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

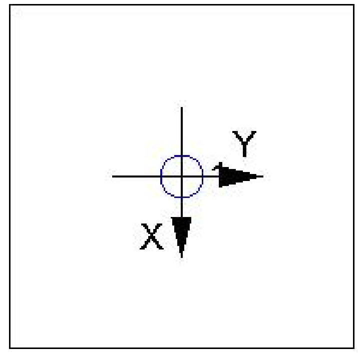
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

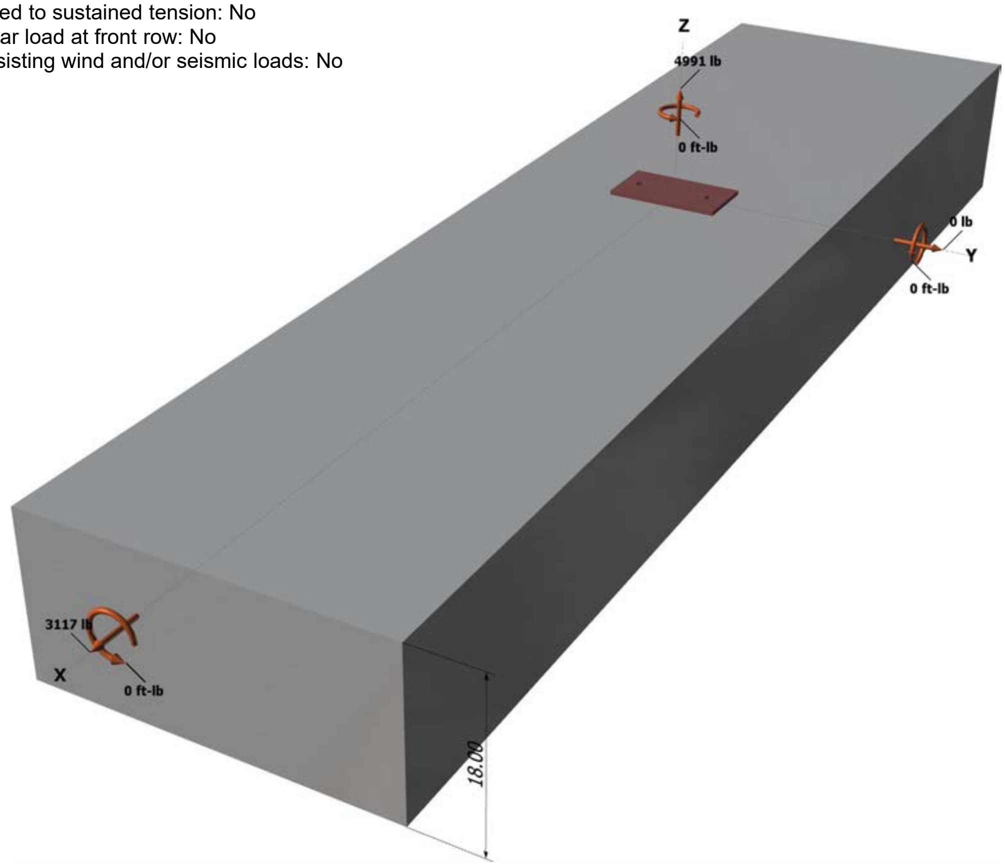
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

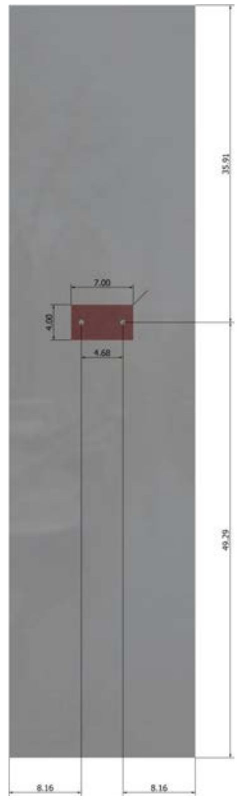
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



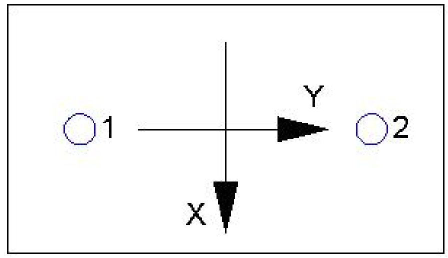
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2495.5	1558.5	0.0	1558.5
2	2495.5	1558.5	0.0	1558.5
Sum	4991.0	3117.0	0.0	3117.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4991
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)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

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	8.16	8744

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

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	2496	6071	0.41	Pass
Concrete breakout	4991	9208	0.54	Pass
Adhesive	**4991**	**8093**	**0.62**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	1559	3156	0.49	Pass
T Concrete breakout x+	**3117**	**5323**	**0.59**	**Pass (Governs)**

|| Concrete breakout y-	**1559**	**12241**	**0.13**	**Pass (Governs)**
Pryout	3117	19833	0.16	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.3	0.62	0.59	120.2 %	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.