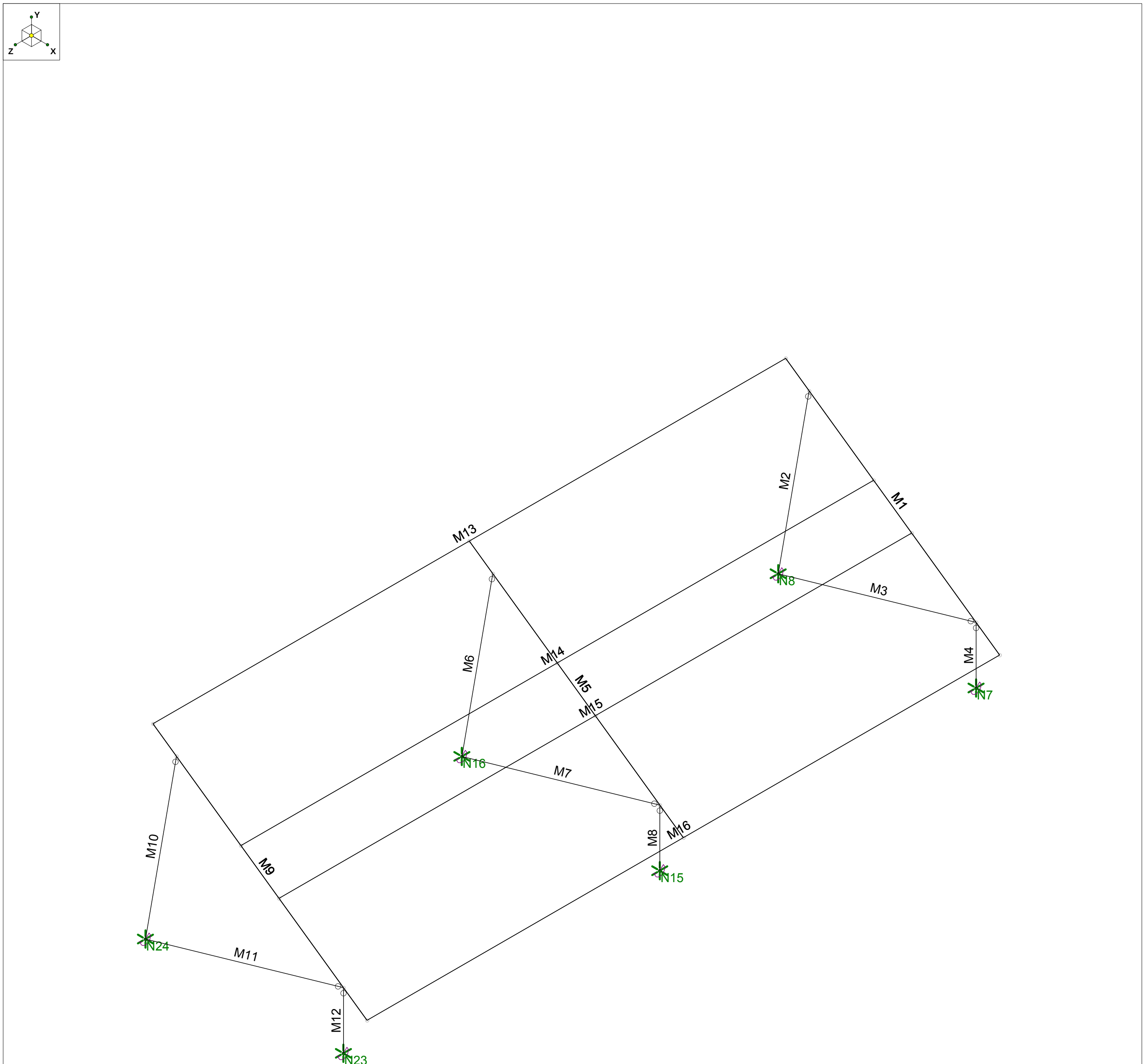


Schletter, Inc.	Standard PVMax Racking System	35° Tilt w/o Seismic Design
HCV	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

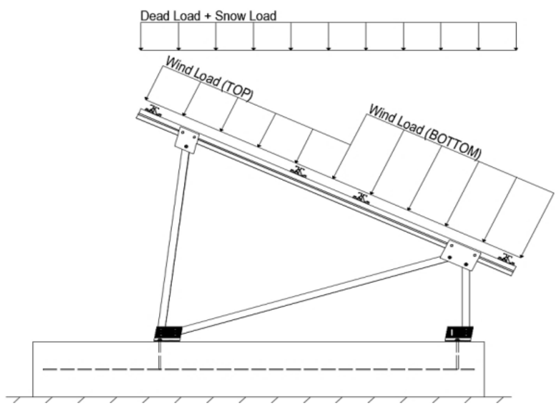
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 2
Module Tilt = 35°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

2.1 Permanent Loads
g_{MAX} = 3.00 psf
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads
Ground Snow Load, P_g = 30.00 psf
Sloped Roof Snow Load, P_s = 14.43 psf *(ASCE 7-05, Eq. 7-2)*
I_s = 1.00
C_s = 0.64
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 130 mph
Height < 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 26.53 psf *Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.200	*(Pressure)*
$Cf+_{BOTTOM}$	=	2.000	
$Cf-_{TOP, OUTER PURLIN}$	=	-2.700	
$Cf-_{TOP, INNER PURLIN}$	=	-2.100	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.200	

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

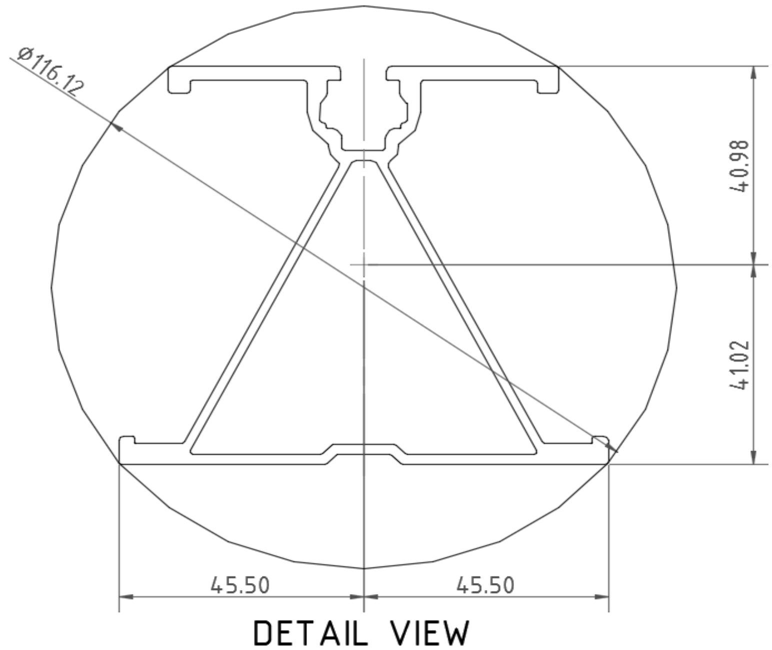
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

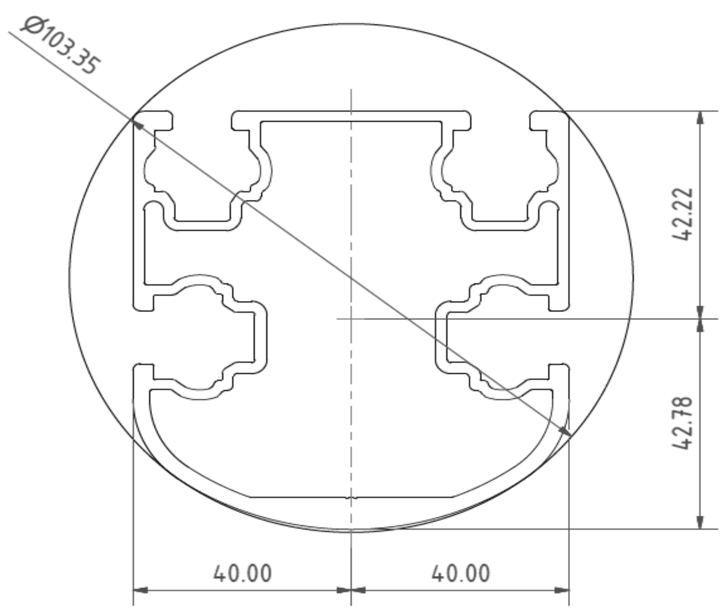
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	72	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.366	k-ft
M_z =	-0.008	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	50%	



4.2 Girder Design

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

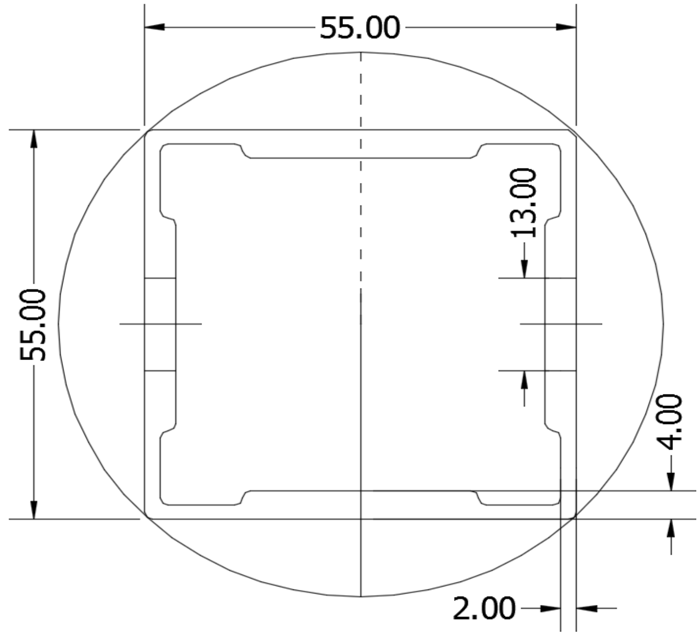
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.499	k-ft
M_z =	0.000	k-ft
P_n =	-0.956	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	74%	



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 =	1.773	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	6%	

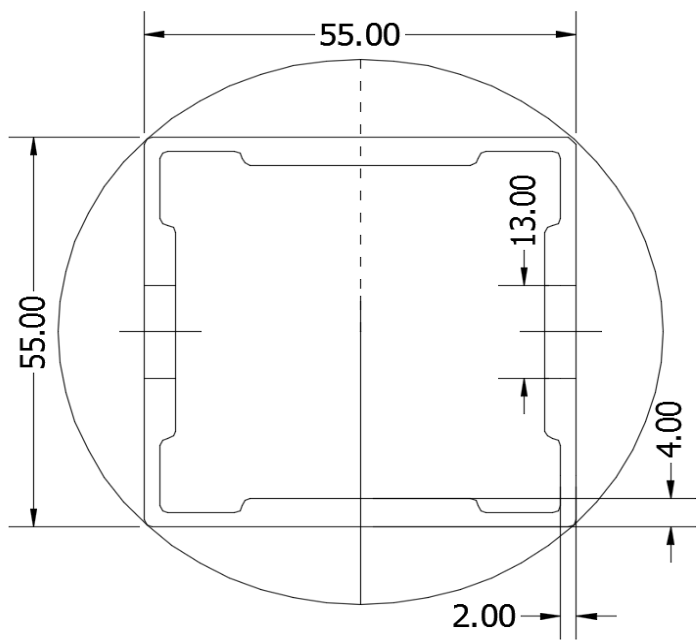


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	55x55	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.780	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	38%	

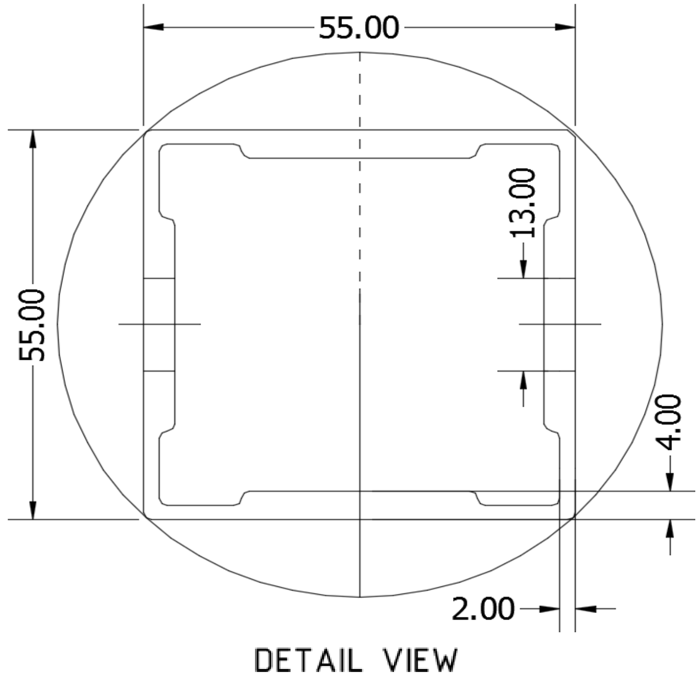


DETAIL VIEW

4.5 Rear Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	78.03	in
$\Phi F_{ty\ AXIAL}$ =	8.94	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 =	-0.009	k-ft
M_z =	0.000	k-ft
P_n =	2.821	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	8.786	k
Utilization =	33%	



5. FOUNDATION DESIGN CALCULATIONS

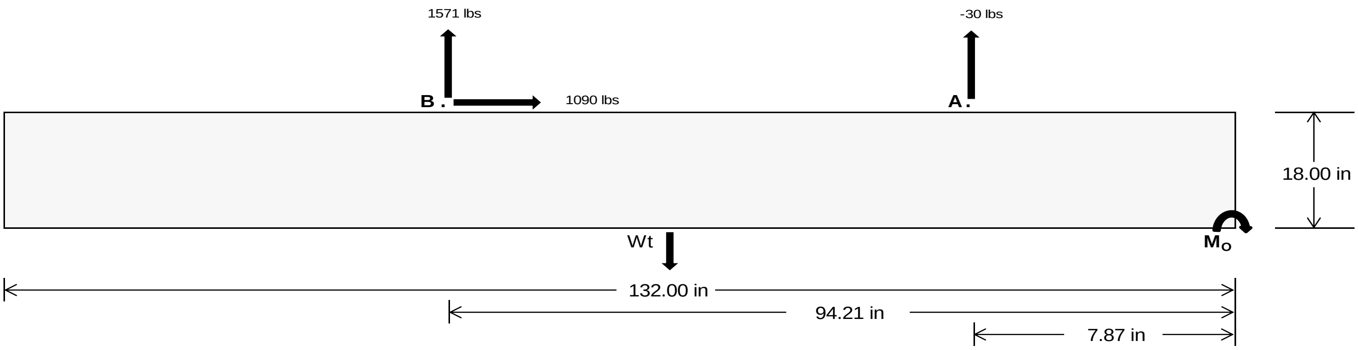
5.1 Helical Pile Foundations

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 =	61.23	6539.97	k
Compressive Load =	2304.82	4616.97	k
Lateral Load =	5.13	4534.70	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement

Use fiber reinforcing with (2) #5 rebar.

Overturning Check	
M_O =	167396.9 in-lbs
Resisting Force Required =	2536.32 lbs
S.F. =	1.67
Weight Required =	4227.19 lbs
Minimum Width =	33 in in
Weight Provided =	6579.38 lbs

A minimum 132in long x 33in wide x 18in tall ballast foundation is required to resist overturning.

Sliding	
Force =	1090.27 lbs
Friction =	0.4
Weight Required =	2725.67 lbs
Resisting Weight =	6579.38 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion	
Sliding Force =	1090.27 lbs
Cohesion =	130 psf
Area =	30.25 ft^2
Resisting =	3289.69 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 33in 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			
	33 in	34 in	35 in	36 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.75 ft) =	6579 lbs	6779 lbs	6978 lbs	7178 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in	33 in	34 in	35 in	36 in
F_A	654 lbs	654 lbs	654 lbs	654 lbs	998 lbs	998 lbs	998 lbs	998 lbs	1155 lbs	1155 lbs	1155 lbs	1155 lbs	60 lbs	60 lbs	60 lbs	60 lbs
F_B	566 lbs	566 lbs	566 lbs	566 lbs	2124 lbs	2124 lbs	2124 lbs	2124 lbs	1944 lbs	1944 lbs	1944 lbs	1944 lbs	-3142 lbs	-3142 lbs	-3142 lbs	-3142 lbs
F_V	82 lbs	82 lbs	82 lbs	82 lbs	1961 lbs	1961 lbs	1961 lbs	1961 lbs	1523 lbs	1523 lbs	1523 lbs	1523 lbs	-2181 lbs	-2181 lbs	-2181 lbs	-2181 lbs
P_{total}	7799 lbs	7999 lbs	8198 lbs	8398 lbs	9701 lbs	9900 lbs	10100 lbs	10299 lbs	9679 lbs	9878 lbs	10078 lbs	10277 lbs	866 lbs	986 lbs	1105 lbs	1225 lbs
M	1961 lbs-ft	1961 lbs-ft	1961 lbs-ft	1961 lbs-ft	2782 lbs-ft	2782 lbs-ft	2782 lbs-ft	2782 lbs-ft	3310 lbs-ft	3310 lbs-ft	3310 lbs-ft	3310 lbs-ft	4409 lbs-ft	4409 lbs-ft	4409 lbs-ft	4409 lbs-ft
e	0.25 ft	0.25 ft	0.24 ft	0.23 ft	0.29 ft	0.28 ft	0.28 ft	0.27 ft	0.34 ft	0.34 ft	0.33 ft	0.32 ft	5.09 ft	4.47 ft	3.99 ft	3.60 ft
L/6	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft	1.83 ft
f_{min}	222.5 psf	222.3 psf	222.2 psf	222.1 psf	270.5 psf	269.0 psf	267.5 psf	266.1 psf	260.3 psf	259.0 psf	257.8 psf	256.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	293.2 psf	291.0 psf	288.9 psf	286.9 psf	370.9 psf	366.4 psf	362.1 psf	358.1 psf	379.7 psf	374.9 psf	370.4 psf	366.1 psf	513.5 psf	225.9 psf	167.2 psf	143.2 psf

Maximum Bearing Pressure = 513 psf
Allowable Bearing Pressure = 1500 psf

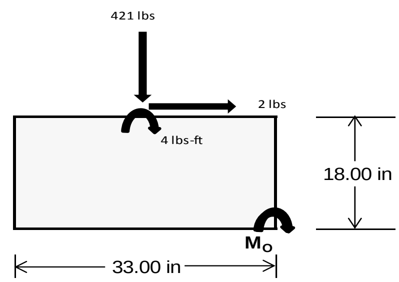
Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 571.6 ft-lbs
Resisting Force Required = 415.69 lbs
S.F. = 1.67
Weight Required = 692.81 lbs
Minimum Width = 33 in in
Weight Provided = 6579.38 lbs

A minimum 132in long x 33in 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	33 in			33 in			33 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	176 lbs	387 lbs	176 lbs	421 lbs	1049 lbs	421 lbs	52 lbs	113 lbs	52 lbs
F_V	1 lbs	0 lbs	1 lbs	2 lbs	0 lbs	2 lbs	0 lbs	0 lbs	0 lbs
P_{total}	8321 lbs	6579 lbs	8321 lbs	8175 lbs	6579 lbs	8175 lbs	2433 lbs	6579 lbs	2433 lbs
M	2 lbs-ft	0 lbs-ft	2 lbs-ft	7 lbs-ft	0 lbs-ft	7 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft	0.46 ft
f_{min}	274.9 psf	217.5 psf	274.9 psf	269.7 psf	217.5 psf	269.7 psf	80.4 psf	217.5 psf	80.4 psf
f_{max}	275.2 psf	217.5 psf	275.2 psf	270.8 psf	217.5 psf	270.8 psf	80.5 psf	217.5 psf	80.5 psf

Maximum Bearing Pressure = 275 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 33in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 33in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

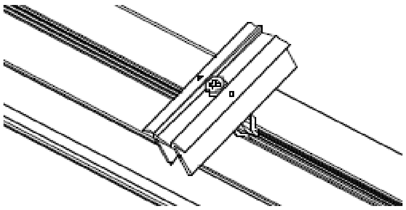
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

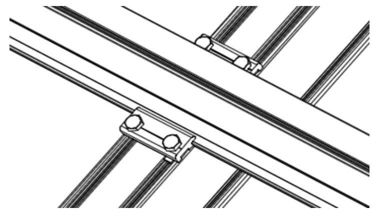
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

Fastening of Modules to Purlins		Fastening of Purlins to Girders	
Maximum Uplifting Force =	1.086 k	Maximum Uplifting Force =	2.344 k
Allowable Uplift =	1.214 k	Allowable Uplift =	4.357 k
Utilization =	89%	Utilization =	54%





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 =	1.773 k	Maximum Axial Load =	4.325 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 =	24%	Utilization =	58%

Diagonal Strut	
Maximum Axial Load =	2.840 k
M12 Bolt Shear Capacity =	12.808 k
Strut Bearing Capacity =	7.421 k
Utilization =	38%

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

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

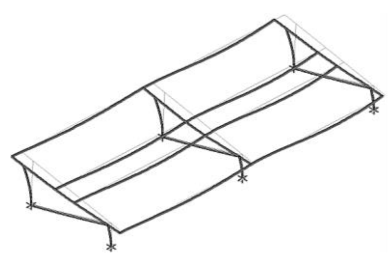
7. SEISMIC DESIGN

7.1 Seismic Drift - 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} =	53.78 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 1.076 in
Max Drift, Δ_{MAX} =	0.009 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 = 72 in

J = 0.432

199.186

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

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= 28.8 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 = 72

J = 0.432

126.67

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

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= 29.7

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)
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 25.1 ksi

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = \varphi b[Bt-Dt^*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 29.4 ksi

Ix = 984962 mm^4

2.366 in^4

y = 43.717 mm

Sx = 1.375 in^3

$M_{max}St =$ 3.363 k-ft

3.4.18

h/t = 16.2

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

S1 = 36.9

m = 0.65

C_0 = 40

Cc = 40

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 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)

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

$\varphi F_L =$ 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi c[Bt-Dt^*\sqrt{(Rb/t)}]$

$\varphi F_L =$ 31.09 ksi

$\varphi F_L =$ 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

$P_{max} =$ 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

Weak Axis:

3.4.14

L_b = 24.8

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 0.57371

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.87952

φF_L= φcc(Bc-Dc*λ)

φF_L= 28.0279 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 28.03 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 28.85 kips

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

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

Strong Axis:

3.4.14

L_b = 86.60 in

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6 ksi

Weak Axis:

3.4.14

L_b = 86.6

J = 0.942

135.148

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

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

$\varphi F_L =$ 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

$\varphi F_L = 1.17\varphi yFcy$

$\varphi F_L =$ 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

$\varphi F_L = 1.3\varphi yFcy$

$\varphi F_L =$ 43.2 ksi

$\varphi F_L St =$ 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

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

$\varphi F_L Wk =$ 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

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

Compression

3.4.7

λ = 2.00335

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.86047

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

$\varphi F_L =$ 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

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

Strong Axis:

3.4.14

L_b = 78.03 in
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 78.03
J = 0.942
121.773

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

S1 = 0.51461

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

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

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 28.2 ksi

Ix = 279836 mm^4

0.672 in^4

y = 27.5 mm

Sx = 0.621 in^3

M_{max}St = 1.460 k-ft

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 28.2 ksi

Iy = 279836 mm^4

0.672 in^4

x = 27.5 mm

Sy = 0.621 in^3

M_{max}Wk = 1.460 k-ft

Compression

3.4.7

λ = 1.80509

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83271

φF_L= (φccFcy)/(λ²)

φF_L= 8.94465 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L= φc[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 8.94 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 9.21 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-8.366	-8.366	0	0
2	M14	Y	-8.366	-8.366	0	0
3	M15	Y	-8.366	-8.366	0	0
4	M16	Y	-8.366	-8.366	0	0

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-32.97	-32.97	0	0
2	M14	Y	-32.97	-32.97	0	0
3	M15	Y	-32.97	-32.97	0	0
4	M16	Y	-32.97	-32.97	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	-88.797	-88.797	0	0
2	M14	y	-88.797	-88.797	0	0
3	M15	y	-147.995	-147.995	0	0
4	M16	y	-147.995	-147.995	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	199.793	199.793	0	0
2	M14	y	155.395	155.395	0	0
3	M15	y	88.797	88.797	0	0
4	M16	y	88.797	88.797	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	1027.105	2	1199.699	2	.223	1	0	1	0	1	0	1
2		min	-1189.667	3	-1656.518	3	.014	15	0	15	0	1	0	1
3	N7	max	.033	3	646.535	1	-.234	15	0	15	0	1	0	1
4		min	-.189	2	30.445	15	-3.945	1	-.007	1	0	1	0	1
5	N15	max	.151	3	1772.935	2	0	11	0	11	0	1	0	1
6		min	-1.698	2	60.213	15	0	1	0	1	0	1	0	1
7	N16	max	3163.289	2	3551.519	2	0	3	0	3	0	1	0	1
8		min	-3488.233	3	-5030.747	3	0	9	0	2	0	1	0	1
9	N23	max	.033	3	646.535	1	3.945	1	.007	1	0	1	0	1
10		min	-.189	2	30.445	15	.234	15	0	15	0	1	0	1
11	N24	max	1027.105	2	1199.699	2	-.014	15	0	15	0	1	0	1
12		min	-1189.667	3	-1656.518	3	-.223	1	0	1	0	1	0	1
13	Totals:	max	5215.423	2	8956.621	2	0	11						
14		min	-5867.351	3	-8010.909	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	34.14	1	361.83	2	-5.814	15	0	15	.081	1	0	2
2			min	2.026	15	-718.117	3	-102.969	1	-.011	2	.005	15	0	3
3		2	max	34.14	1	251.643	2	-4.448	15	0	15	.02	1	.409	3
4			min	2.026	15	-507.931	3	-78.268	1	-.011	2	-.002	10	-.204	2
5		3	max	34.14	1	141.456	2	-3.081	15	0	15	.006	3	.677	3
6			min	2.026	15	-297.745	3	-53.568	1	-.011	2	-.024	1	-.336	2
7		4	max	34.14	1	31.268	2	-1.715	15	0	15	0	3	.806	3
8			min	2.026	15	-87.558	3	-28.867	1	-.011	2	-.051	1	-.393	2
9		5	max	34.14	1	122.628	3	1.707	10	0	15	-.003	12	.794	3
10			min	2.026	15	-78.919	2	-6.105	3	-.011	2	-.062	1	-.377	2
11		6	max	34.14	1	332.814	3	20.534	1	0	15	-.003	15	.642	3
12			min	2.026	15	-189.107	2	-4.056	3	-.011	2	-.057	1	-.288	2
13		7	max	34.14	1	543	3	45.235	1	0	15	-.002	15	.35	3
14			min	2.026	15	-299.294	2	-2.007	3	-.011	2	-.035	1	-.125	2
15		8	max	34.14	1	753.186	3	69.935	1	0	15	.008	2	.111	2
16			min	2.026	15	-409.481	2	.043	3	-.011	2	-.01	3	-.082	3
17		9	max	34.14	1	963.372	3	94.636	1	0	15	.059	1	.421	2
18			min	2.026	15	-519.669	2	1.622	12	-.011	2	-.01	3	-.654	3
19		10	max	34.14	1	629.856	2	-2.988	12	.005	3	.13	1	.804	2
20			min	2.026	15	-1173.558	3	-119.336	1	-.011	2	-.008	3	-1.366	3
21		11	max	34.14	1	519.669	2	-1.622	12	.011	2	.059	1	.421	2
22			min	2.026	15	-963.372	3	-94.636	1	0	15	-.01	3	-.654	3
23		12	max	34.14	1	409.481	2	-.043	3	.011	2	.008	2	.111	2
24			min	2.026	15	-753.186	3	-69.935	1	0	15	-.01	3	-.082	3
25		13	max	34.14	1	299.294	2	2.007	3	.011	2	-.002	15	.35	3
26			min	2.026	15	-543	3	-45.235	1	0	15	-.035	1	-.125	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	34.14	1	189.107	2	4.056	3	.011	2	-.003	15	.642	3
28			min	2.026	15	-332.814	3	-20.534	1	0	15	-.057	1	-.288	2
29		15	max	34.14	1	78.919	2	6.105	3	.011	2	-.003	12	.794	3
30			min	2.026	15	-122.628	3	-1.707	10	0	15	-.062	1	-.377	2
31		16	max	34.14	1	87.558	3	28.867	1	.011	2	0	3	.806	3
32			min	2.026	15	-31.268	2	1.715	15	0	15	-.051	1	-.393	2
33		17	max	34.14	1	297.745	3	53.568	1	.011	2	.006	3	.677	3
34			min	2.026	15	-141.456	2	3.081	15	0	15	-.024	1	-.336	2
35		18	max	34.14	1	507.931	3	78.268	1	.011	2	.02	1	.409	3
36			min	2.026	15	-251.643	2	4.448	15	0	15	-.002	10	-.204	2
37		19	max	34.14	1	718.117	3	102.969	1	.011	2	.081	1	0	2
38			min	2.026	15	-361.83	2	5.814	15	0	15	.005	15	0	3
39	M14	1	max	22.158	1	440.64	2	-6.083	15	.012	3	.099	1	0	2
40			min	1.295	15	-608.184	3	-107.682	1	-.012	2	.006	15	0	3
41		2	max	22.158	1	330.452	2	-4.716	15	.012	3	.036	1	.351	3
42			min	1.295	15	-445.356	3	-82.982	1	-.012	2	0	10	-.257	2
43		3	max	22.158	1	220.265	2	-3.35	15	.012	3	.009	3	.594	3
44			min	1.295	15	-282.528	3	-58.281	1	-.012	2	-.011	1	-.441	2
45		4	max	22.158	1	110.078	2	-1.984	15	.012	3	.002	3	.728	3
46			min	1.295	15	-119.699	3	-33.58	1	-.012	2	-.042	1	-.551	2
47		5	max	22.158	1	43.129	3	1.147	10	.012	3	-.002	12	.753	3
48			min	1.295	15	-3.299	1	-8.88	1	-.012	2	-.056	1	-.587	2
49		6	max	22.158	1	205.957	3	15.821	1	.012	3	-.003	15	.67	3
50			min	1.295	15	-110.297	2	-4.64	3	-.012	2	-.054	1	-.551	2
51		7	max	22.158	1	368.785	3	40.521	1	.012	3	-.002	15	.479	3
52			min	1.295	15	-220.485	2	-2.591	3	-.012	2	-.035	1	-.44	2
53		8	max	22.158	1	531.614	3	65.222	1	.012	3	.006	2	.179	3
54			min	1.295	15	-330.672	2	-.542	3	-.012	2	-.01	3	-.257	2
55		9	max	22.158	1	694.442	3	89.922	1	.012	3	.052	1	.018	1
56			min	1.295	15	-440.859	2	1.24	12	-.012	2	-.01	3	-.23	3
57		10	max	22.158	1	551.047	2	-2.606	12	.012	2	.12	1	.331	2
58			min	1.295	15	-857.27	3	-114.623	1	-.012	3	-.008	3	-.747	3
59		11	max	22.158	1	440.859	2	-1.24	12	.012	2	.052	1	.018	1
60			min	1.295	15	-694.442	3	-89.922	1	-.012	3	-.01	3	-.23	3
61		12	max	22.158	1	330.672	2	.542	3	.012	2	.006	2	.179	3
62			min	1.295	15	-531.614	3	-65.222	1	-.012	3	-.01	3	-.257	2
63		13	max	22.158	1	220.485	2	2.591	3	.012	2	-.002	15	.479	3
64			min	1.295	15	-368.785	3	-40.521	1	-.012	3	-.035	1	-.44	2
65		14	max	22.158	1	110.297	2	4.64	3	.012	2	-.003	15	.67	3
66			min	1.295	15	-205.957	3	-15.821	1	-.012	3	-.054	1	-.551	2
67		15	max	22.158	1	3.299	1	8.88	1	.012	2	-.002	12	.753	3
68			min	1.295	15	-43.129	3	-1.147	10	-.012	3	-.056	1	-.587	2
69		16	max	22.158	1	119.699	3	33.58	1	.012	2	.002	3	.728	3
70			min	1.295	15	-110.078	2	1.984	15	-.012	3	-.042	1	-.551	2
71		17	max	22.158	1	282.528	3	58.281	1	.012	2	.009	3	.594	3
72			min	1.295	15	-220.265	2	3.35	15	-.012	3	-.011	1	-.441	2
73		18	max	22.158	1	445.356	3	82.982	1	.012	2	.036	1	.351	3
74			min	1.295	15	-330.452	2	4.716	15	-.012	3	0	10	-.257	2
75		19	max	22.158	1	608.184	3	107.682	1	.012	2	.099	1	0	2
76			min	1.295	15	-440.64	2	6.083	15	-.012	3	.006	15	0	3
77	M15	1	max	-1.34	15	653.905	2	-6.08	15	.013	2	.1	1	0	2
78			min	-22.5	1	-368.856	3	-107.768	1	-.01	3	.006	15	0	3
79		2	max	-1.34	15	480.573	2	-4.714	15	.013	2	.036	1	.215	3
80			min	-22.5	1	-277.066	3	-83.068	1	-.01	3	0	10	-.378	2
81		3	max	-1.34	15	307.241	2	-3.348	15	.013	2	.008	3	.369	3
82			min	-22.5	1	-185.275	3	-58.367	1	-.01	3	-.011	1	-.641	2
83		4	max	-1.34	15	133.909	2	-1.981	15	.013	2	.002	3	.462	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	-22.5	1	-93.485	3	-33.666	1	-.01	3	-.042	1	-.788	2
85		5	max	-1.34	15	-.261	15	.991	10	.013	2	-.002	12	.494	3
86			min	-22.5	1	-39.423	2	-8.966	1	-.01	3	-.056	1	-.819	2
87		6	max	-1.34	15	90.096	3	15.735	1	.013	2	-.003	15	.465	3
88			min	-22.5	1	-212.755	2	-4.158	3	-.01	3	-.054	1	-.735	2
89		7	max	-1.34	15	181.886	3	40.435	1	.013	2	-.002	15	.374	3
90			min	-22.5	1	-386.087	2	-2.109	3	-.01	3	-.035	1	-.536	2
91		8	max	-1.34	15	273.677	3	65.136	1	.013	2	.006	2	.222	3
92			min	-22.5	1	-559.418	2	-.06	3	-.01	3	-.009	3	-.22	2
93		9	max	-1.34	15	365.467	3	89.836	1	.013	2	.052	1	.21	2
94			min	-22.5	1	-732.75	2	1.542	12	-.01	3	-.009	3	.001	15
95		10	max	-1.34	15	906.082	2	-2.908	12	.013	2	.12	1	.757	2
96			min	-22.5	1	-457.257	3	-114.537	1	-.01	3	-.007	3	-.265	3
97		11	max	-1.34	15	732.75	2	-1.542	12	.01	3	.052	1	.21	2
98			min	-22.5	1	-365.467	3	-89.836	1	-.013	2	-.009	3	.001	15
99		12	max	-1.34	15	559.418	2	.06	3	.01	3	.006	2	.222	3
100			min	-22.5	1	-273.677	3	-65.136	1	-.013	2	-.009	3	-.22	2
101		13	max	-1.34	15	386.087	2	2.109	3	.01	3	-.002	15	.374	3
102			min	-22.5	1	-181.886	3	-40.435	1	-.013	2	-.035	1	-.536	2
103		14	max	-1.34	15	212.755	2	4.158	3	.01	3	-.003	15	.465	3
104			min	-22.5	1	-90.096	3	-15.735	1	-.013	2	-.054	1	-.735	2
105		15	max	-1.34	15	39.423	2	8.966	1	.01	3	-.002	12	.494	3
106			min	-22.5	1	.261	15	-.991	10	-.013	2	-.056	1	-.819	2
107		16	max	-1.34	15	93.485	3	33.666	1	.01	3	.002	3	.462	3
108			min	-22.5	1	-133.909	2	1.981	15	-.013	2	-.042	1	-.788	2
109		17	max	-1.34	15	185.275	3	58.367	1	.01	3	.008	3	.369	3
110			min	-22.5	1	-307.241	2	3.348	15	-.013	2	-.011	1	-.641	2
111		18	max	-1.34	15	277.066	3	83.068	1	.01	3	.036	1	.215	3
112			min	-22.5	1	-480.573	2	4.714	15	-.013	2	0	10	-.378	2
113		19	max	-1.34	15	368.856	3	107.768	1	.01	3	.1	1	0	2
114			min	-22.5	1	-653.905	2	6.08	15	-.013	2	.006	15	0	3
115	M16	1	max	-2.202	15	579.76	2	-5.821	15	.004	2	.082	1	0	2
116			min	-37.521	1	-298.467	3	-103.514	1	-.01	3	.005	15	0	3
117		2	max	-2.202	15	406.428	2	-4.454	15	.004	2	.022	1	.168	3
118			min	-37.521	1	-206.676	3	-78.813	1	-.01	3	0	10	-.329	2
119		3	max	-2.202	15	233.096	2	-3.088	15	.004	2	.004	3	.276	3
120			min	-37.521	1	-114.886	3	-54.113	1	-.01	3	-.023	1	-.542	2
121		4	max	-2.202	15	59.765	2	-1.722	15	.004	2	0	12	.322	3
122			min	-37.521	1	-23.095	3	-29.412	1	-.01	3	-.05	1	-.64	2
123		5	max	-2.202	15	68.695	3	1.161	10	.004	2	-.003	12	.306	3
124			min	-37.521	1	-113.567	2	-4.711	1	-.01	3	-.062	1	-.622	2
125		6	max	-2.202	15	160.485	3	19.989	1	.004	2	-.003	15	.23	3
126			min	-37.521	1	-286.899	2	-2.494	3	-.01	3	-.057	1	-.488	2
127		7	max	-2.202	15	252.276	3	44.69	1	.004	2	-.002	15	.092	3
128			min	-37.521	1	-460.231	2	-.445	3	-.01	3	-.035	1	-.239	2
129		8	max	-2.202	15	344.066	3	69.39	1	.004	2	.006	2	.126	2
130			min	-37.521	1	-633.563	2	1.233	12	-.01	3	-.007	3	-.106	3
131		9	max	-2.202	15	435.857	3	94.091	1	.004	2	.057	1	.606	2
132			min	-37.521	1	-806.895	2	2.599	12	-.01	3	-.006	3	-.366	3
133		10	max	-2.202	15	980.227	2	-3.965	12	.01	3	.128	1	1.201	2
134			min	-37.521	1	-527.647	3	-118.791	1	-.004	2	-.003	3	-.688	3
135		11	max	-2.202	15	806.895	2	-2.599	12	.01	3	.057	1	.606	2
136			min	-37.521	1	-435.857	3	-94.091	1	-.004	2	-.006	3	-.366	3
137		12	max	-2.202	15	633.563	2	-1.233	12	.01	3	.006	2	.126	2
138			min	-37.521	1	-344.066	3	-69.39	1	-.004	2	-.007	3	-.106	3
139		13	max	-2.202	15	460.231	2	.445	3	.01	3	-.002	15	.092	3
140			min	-37.521	1	-252.276	3	-44.69	1	-.004	2	-.035	1	-.239	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-2.202	15	286.899	2	2.494	3	.01	3	-.003	15	.23	3
142			min	-37.521	1	-160.485	3	-19.989	1	-.004	2	-.057	1	-.488	2
143		15	max	-2.202	15	113.567	2	4.711	1	.01	3	-.003	12	.306	3
144			min	-37.521	1	-68.695	3	-1.161	10	-.004	2	-.062	1	-.622	2
145		16	max	-2.202	15	23.095	3	29.412	1	.01	3	0	12	.322	3
146			min	-37.521	1	-59.765	2	1.722	15	-.004	2	-.05	1	-.64	2
147		17	max	-2.202	15	114.886	3	54.113	1	.01	3	.004	3	.276	3
148			min	-37.521	1	-233.096	2	3.088	15	-.004	2	-.023	1	-.542	2
149		18	max	-2.202	15	206.676	3	78.813	1	.01	3	.022	1	.168	3
150			min	-37.521	1	-406.428	2	4.454	15	-.004	2	0	10	-.329	2
151		19	max	-2.202	15	298.467	3	103.514	1	.01	3	.082	1	0	2
152			min	-37.521	1	-579.76	2	5.821	15	-.004	2	.005	15	0	3
153	M2	1	max	952.075	2	2.02	4	.114	1	0	2	0	3	0	1
154			min	-1419.401	3	.475	15	.007	15	0	1	0	2	0	1
155		2	max	952.596	2	1.901	4	.114	1	0	2	0	1	0	15
156			min	-1419.01	3	.447	15	.007	15	0	1	0	10	0	4
157		3	max	953.116	2	1.783	4	.114	1	0	2	0	1	0	15
158			min	-1418.62	3	.419	15	.007	15	0	1	0	10	-.001	4
159		4	max	953.637	2	1.664	4	.114	1	0	2	0	1	0	15
160			min	-1418.229	3	.391	15	.007	15	0	1	0	10	-.002	4
161		5	max	954.158	2	1.545	4	.114	1	0	2	0	1	0	15
162			min	-1417.839	3	.363	15	.007	15	0	1	0	10	-.003	4
163		6	max	954.679	2	1.426	4	.114	1	0	2	0	1	0	15
164			min	-1417.448	3	.335	15	.007	15	0	1	0	15	-.003	4
165		7	max	955.199	2	1.307	4	.114	1	0	2	0	1	0	15
166			min	-1417.058	3	.307	15	.007	15	0	1	0	15	-.004	4
167		8	max	955.72	2	1.188	4	.114	1	0	2	0	1	0	15
168			min	-1416.667	3	.279	15	.007	15	0	1	0	15	-.004	4
169		9	max	956.241	2	1.069	4	.114	1	0	2	0	1	-.001	15
170			min	-1416.277	3	.238	12	.007	15	0	1	0	15	-.004	4
171		10	max	956.761	2	.952	2	.114	1	0	2	0	1	-.001	15
172			min	-1415.886	3	.191	12	.007	15	0	1	0	15	-.005	4
173		11	max	957.282	2	.859	2	.114	1	0	2	0	1	-.001	15
174			min	-1415.496	3	.145	12	.007	15	0	1	0	15	-.005	4
175		12	max	957.803	2	.766	2	.114	1	0	2	0	1	-.001	15
176			min	-1415.105	3	.099	12	.007	15	0	1	0	15	-.005	4
177		13	max	958.323	2	.674	2	.114	1	0	2	0	1	-.001	15
178			min	-1414.714	3	.052	12	.007	15	0	1	0	15	-.006	4
179		14	max	958.844	2	.581	2	.114	1	0	2	0	1	-.001	15
180			min	-1414.324	3	-.009	3	.007	15	0	1	0	15	-.006	4
181		15	max	959.365	2	.488	2	.114	1	0	2	0	1	-.001	15
182			min	-1413.933	3	-.078	3	.007	15	0	1	0	15	-.006	4
183		16	max	959.886	2	.396	2	.114	1	0	2	0	1	-.001	12
184			min	-1413.543	3	-.148	3	.007	15	0	1	0	15	-.006	4
185		17	max	960.406	2	.303	2	.114	1	0	2	0	1	-.001	12
186			min	-1413.152	3	-.217	3	.007	15	0	1	0	15	-.006	4
187		18	max	960.927	2	.211	2	.114	1	0	2	0	1	-.001	12
188			min	-1412.762	3	-.287	3	.007	15	0	1	0	15	-.006	4
189		19	max	961.448	2	.118	2	.114	1	0	2	0	1	-.001	12
190			min	-1412.371	3	-.356	3	.007	15	0	1	0	15	-.006	2
191	M3	1	max	895.249	2	7.664	4	.123	1	0	3	0	1	.006	2
192			min	-978.541	3	1.802	15	.007	15	0	1	0	15	.001	12
193		2	max	895.079	2	6.903	4	.123	1	0	3	0	1	.004	2
194			min	-978.669	3	1.623	15	.007	15	0	1	0	15	0	3
195		3	max	894.908	2	6.142	4	.123	1	0	3	0	1	.001	2
196			min	-978.797	3	1.444	15	.007	15	0	1	0	15	-.001	3
197		4	max	894.738	2	5.381	4	.123	1	0	3	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-978.925	3	1.265	15	.007	15	0	1	0	15	-.003	3
199		5	max	894.568	2	4.62	4	.123	1	0	3	0	1	0	15
200			min	-979.052	3	1.086	15	.007	15	0	1	0	15	-.004	4
201		6	max	894.397	2	3.859	4	.123	1	0	3	0	1	-.001	15
202			min	-979.18	3	.907	15	.007	15	0	1	0	15	-.006	4
203		7	max	894.227	2	3.098	4	.123	1	0	3	0	1	-.002	15
204			min	-979.308	3	.728	15	.007	15	0	1	0	15	-.007	4
205		8	max	894.057	2	2.337	4	.123	1	0	3	0	1	-.002	15
206			min	-979.436	3	.549	15	.007	15	0	1	0	15	-.008	4
207		9	max	893.886	2	1.576	4	.123	1	0	3	0	1	-.002	15
208			min	-979.563	3	.371	15	.007	15	0	1	0	15	-.009	4
209		10	max	893.716	2	.816	2	.123	1	0	3	0	1	-.002	15
210			min	-979.691	3	.164	12	.007	15	0	1	0	15	-.01	4
211		11	max	893.546	2	.223	2	.123	1	0	3	0	1	-.002	15
212			min	-979.819	3	-.214	3	.007	15	0	1	0	15	-.01	4
213		12	max	893.375	2	-.166	15	.123	1	0	3	0	1	-.002	15
214			min	-979.947	3	-.707	4	.007	15	0	1	0	15	-.01	4
215		13	max	893.205	2	-.345	15	.123	1	0	3	0	1	-.002	15
216			min	-980.074	3	-1.468	4	.007	15	0	1	0	15	-.009	4
217		14	max	893.035	2	-.524	15	.123	1	0	3	0	1	-.002	15
218			min	-980.202	3	-2.229	4	.007	15	0	1	0	15	-.009	4
219		15	max	892.864	2	-.703	15	.123	1	0	3	0	1	-.002	15
220			min	-980.33	3	-2.99	4	.007	15	0	1	0	15	-.008	4
221		16	max	892.694	2	-.882	15	.123	1	0	3	0	1	-.001	15
222			min	-980.458	3	-3.751	4	.007	15	0	1	0	15	-.006	4
223		17	max	892.524	2	-1.061	15	.123	1	0	3	0	1	-.001	15
224			min	-980.586	3	-4.512	4	.007	15	0	1	0	15	-.004	4
225		18	max	892.353	2	-1.239	15	.123	1	0	3	.001	1	0	15
226			min	-980.713	3	-5.273	4	.007	15	0	1	0	15	-.002	4
227		19	max	892.183	2	-1.418	15	.123	1	0	3	.001	1	0	1
228			min	-980.841	3	-6.034	4	.007	15	0	1	0	15	0	1
229	M4	1	max	643.468	1	0	1	-.234	15	0	1	0	1	0	1
230			min	29.521	15	0	1	-4.012	1	0	1	0	15	0	1
231		2	max	643.639	1	0	1	-.234	15	0	1	0	1	0	1
232			min	29.572	15	0	1	-4.012	1	0	1	0	15	0	1
233		3	max	643.809	1	0	1	-.234	15	0	1	0	1	0	1
234			min	29.623	15	0	1	-4.012	1	0	1	0	10	0	1
235		4	max	643.979	1	0	1	-.234	15	0	1	0	15	0	1
236			min	29.675	15	0	1	-4.012	1	0	1	0	1	0	1
237		5	max	644.15	1	0	1	-.234	15	0	1	0	15	0	1
238			min	29.726	15	0	1	-4.012	1	0	1	0	1	0	1
239		6	max	644.32	1	0	1	-.234	15	0	1	0	15	0	1
240			min	29.777	15	0	1	-4.012	1	0	1	-.001	1	0	1
241		7	max	644.49	1	0	1	-.234	15	0	1	0	15	0	1
242			min	29.829	15	0	1	-4.012	1	0	1	-.002	1	0	1
243		8	max	644.661	1	0	1	-.234	15	0	1	0	15	0	1
244			min	29.88	15	0	1	-4.012	1	0	1	-.002	1	0	1
245		9	max	644.831	1	0	1	-.234	15	0	1	0	15	0	1
246			min	29.932	15	0	1	-4.012	1	0	1	-.003	1	0	1
247		10	max	645.001	1	0	1	-.234	15	0	1	0	15	0	1
248			min	29.983	15	0	1	-4.012	1	0	1	-.003	1	0	1
249		11	max	645.172	1	0	1	-.234	15	0	1	0	15	0	1
250			min	30.034	15	0	1	-4.012	1	0	1	-.004	1	0	1
251		12	max	645.342	1	0	1	-.234	15	0	1	0	15	0	1
252			min	30.086	15	0	1	-4.012	1	0	1	-.004	1	0	1
253		13	max	645.512	1	0	1	-.234	15	0	1	0	15	0	1
254			min	30.137	15	0	1	-4.012	1	0	1	-.005	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	645.683	1	0	1	-.234	15	0	1	0	15	0	1
256			min	30.189	15	0	1	-4.012	1	0	1	-.005	1	0	1
257		15	max	645.853	1	0	1	-.234	15	0	1	0	15	0	1
258			min	30.24	15	0	1	-4.012	1	0	1	-.005	1	0	1
259		16	max	646.023	1	0	1	-.234	15	0	1	0	15	0	1
260			min	30.291	15	0	1	-4.012	1	0	1	-.006	1	0	1
261		17	max	646.194	1	0	1	-.234	15	0	1	0	15	0	1
262			min	30.343	15	0	1	-4.012	1	0	1	-.006	1	0	1
263		18	max	646.364	1	0	1	-.234	15	0	1	0	15	0	1
264			min	30.394	15	0	1	-4.012	1	0	1	-.007	1	0	1
265		19	max	646.535	1	0	1	-.234	15	0	1	0	15	0	1
266			min	30.445	15	0	1	-4.012	1	0	1	-.007	1	0	1
267	M6	1	max	2811.758	2	2.217	2	0	1	0	1	0	1	0	1
268			min	-4325.477	3	.257	12	0	1	0	1	0	1	0	1
269		2	max	2812.279	2	2.124	2	0	1	0	1	0	1	0	12
270			min	-4325.087	3	.211	12	0	1	0	1	0	1	0	2
271		3	max	2812.8	2	2.031	2	0	1	0	1	0	1	0	12
272			min	-4324.696	3	.164	12	0	1	0	1	0	1	-.002	2
273		4	max	2813.32	2	1.939	2	0	1	0	1	0	1	0	12
274			min	-4324.306	3	.118	12	0	1	0	1	0	1	-.002	2
275		5	max	2813.841	2	1.846	2	0	1	0	1	0	1	0	12
276			min	-4323.915	3	.055	3	0	1	0	1	0	1	-.003	2
277		6	max	2814.362	2	1.754	2	0	1	0	1	0	1	0	12
278			min	-4323.525	3	-.014	3	0	1	0	1	0	1	-.004	2
279		7	max	2814.882	2	1.661	2	0	1	0	1	0	1	0	12
280			min	-4323.134	3	-.084	3	0	1	0	1	0	1	-.004	2
281		8	max	2815.403	2	1.568	2	0	1	0	1	0	1	0	3
282			min	-4322.743	3	-.153	3	0	1	0	1	0	1	-.005	2
283		9	max	2815.924	2	1.476	2	0	1	0	1	0	1	0	3
284			min	-4322.353	3	-.223	3	0	1	0	1	0	1	-.005	2
285		10	max	2816.444	2	1.383	2	0	1	0	1	0	1	0	3
286			min	-4321.962	3	-.292	3	0	1	0	1	0	1	-.006	2
287		11	max	2816.965	2	1.291	2	0	1	0	1	0	1	0	3
288			min	-4321.572	3	-.362	3	0	1	0	1	0	1	-.006	2
289		12	max	2817.486	2	1.198	2	0	1	0	1	0	1	0	3
290			min	-4321.181	3	-.431	3	0	1	0	1	0	1	-.007	2
291		13	max	2818.006	2	1.105	2	0	1	0	1	0	1	0	3
292			min	-4320.791	3	-.501	3	0	1	0	1	0	1	-.007	2
293		14	max	2818.527	2	1.013	2	0	1	0	1	0	1	0	3
294			min	-4320.4	3	-.57	3	0	1	0	1	0	1	-.007	2
295		15	max	2819.048	2	.92	2	0	1	0	1	0	1	0	3
296			min	-4320.01	3	-.64	3	0	1	0	1	0	1	-.008	2
297		16	max	2819.569	2	.827	2	0	1	0	1	0	1	.001	3
298			min	-4319.619	3	-.709	3	0	1	0	1	0	1	-.008	2
299		17	max	2820.089	2	.735	2	0	1	0	1	0	1	.001	3
300			min	-4319.229	3	-.779	3	0	1	0	1	0	1	-.008	2
301		18	max	2820.61	2	.642	2	0	1	0	1	0	1	.002	3
302			min	-4318.838	3	-.848	3	0	1	0	1	0	1	-.009	2
303		19	max	2821.131	2	.55	2	0	1	0	1	0	1	.002	3
304			min	-4318.448	3	-.917	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	2779.781	2	7.678	4	0	1	0	1	0	1	.009	2
306			min	-2837.629	3	1.804	15	0	1	0	1	0	1	-.002	3
307		2	max	2779.611	2	6.917	4	0	1	0	1	0	1	.006	2
308			min	-2837.756	3	1.625	15	0	1	0	1	0	1	-.003	3
309		3	max	2779.44	2	6.156	4	0	1	0	1	0	1	.004	2
310			min	-2837.884	3	1.446	15	0	1	0	1	0	1	-.005	3
311		4	max	2779.27	2	5.395	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2838.012	3	1.267	15	0	1	0	1	0	1	-.006	3
313		5	max	2779.1	2	4.634	4	0	1	0	1	0	1	0	2
314			min	-2838.14	3	1.088	15	0	1	0	1	0	1	-.007	3
315		6	max	2778.929	2	3.873	4	0	1	0	1	0	1	-.001	15
316			min	-2838.267	3	.91	15	0	1	0	1	0	1	-.007	3
317		7	max	2778.759	2	3.112	4	0	1	0	1	0	1	-.002	15
318			min	-2838.395	3	.731	15	0	1	0	1	0	1	-.008	3
319		8	max	2778.589	2	2.372	2	0	1	0	1	0	1	-.002	15
320			min	-2838.523	3	.456	12	0	1	0	1	0	1	-.008	4
321		9	max	2778.418	2	1.779	2	0	1	0	1	0	1	-.002	15
322			min	-2838.651	3	.16	12	0	1	0	1	0	1	-.009	4
323		10	max	2778.248	2	1.186	2	0	1	0	1	0	1	-.002	15
324			min	-2838.778	3	-.251	3	0	1	0	1	0	1	-.01	4
325		11	max	2778.077	2	.593	2	0	1	0	1	0	1	-.002	15
326			min	-2838.906	3	-.695	3	0	1	0	1	0	1	-.01	4
327		12	max	2777.907	2	0	2	0	1	0	1	0	1	-.002	15
328			min	-2839.034	3	-1.14	3	0	1	0	1	0	1	-.01	4
329		13	max	2777.737	2	-.343	15	0	1	0	1	0	1	-.002	15
330			min	-2839.162	3	-1.585	3	0	1	0	1	0	1	-.009	4
331		14	max	2777.566	2	-.521	15	0	1	0	1	0	1	-.002	15
332			min	-2839.289	3	-2.215	4	0	1	0	1	0	1	-.009	4
333		15	max	2777.396	2	-.7	15	0	1	0	1	0	1	-.002	15
334			min	-2839.417	3	-2.976	4	0	1	0	1	0	1	-.007	4
335		16	max	2777.226	2	-.879	15	0	1	0	1	0	1	-.001	15
336			min	-2839.545	3	-3.737	4	0	1	0	1	0	1	-.006	4
337		17	max	2777.055	2	-1.058	15	0	1	0	1	0	1	-.001	15
338			min	-2839.673	3	-4.497	4	0	1	0	1	0	1	-.004	4
339		18	max	2776.885	2	-1.237	15	0	1	0	1	0	1	0	15
340			min	-2839.8	3	-5.258	4	0	1	0	1	0	1	-.002	4
341		19	max	2776.715	2	-1.416	15	0	1	0	1	0	1	0	1
342			min	-2839.928	3	-6.019	4	0	1	0	1	0	1	0	1
343	M8	1	max	1769.869	2	0	1	0	1	0	1	0	1	0	1
344			min	59.288	15	0	1	0	1	0	1	0	1	0	1
345		2	max	1770.039	2	0	1	0	1	0	1	0	1	0	1
346			min	59.339	15	0	1	0	1	0	1	0	1	0	1
347		3	max	1770.21	2	0	1	0	1	0	1	0	1	0	1
348			min	59.391	15	0	1	0	1	0	1	0	1	0	1
349		4	max	1770.38	2	0	1	0	1	0	1	0	1	0	1
350			min	59.442	15	0	1	0	1	0	1	0	1	0	1
351		5	max	1770.55	2	0	1	0	1	0	1	0	1	0	1
352			min	59.494	15	0	1	0	1	0	1	0	1	0	1
353		6	max	1770.721	2	0	1	0	1	0	1	0	1	0	1
354			min	59.545	15	0	1	0	1	0	1	0	1	0	1
355		7	max	1770.891	2	0	1	0	1	0	1	0	1	0	1
356			min	59.596	15	0	1	0	1	0	1	0	1	0	1
357		8	max	1771.061	2	0	1	0	1	0	1	0	1	0	1
358			min	59.648	15	0	1	0	1	0	1	0	1	0	1
359		9	max	1771.232	2	0	1	0	1	0	1	0	1	0	1
360			min	59.699	15	0	1	0	1	0	1	0	1	0	1
361		10	max	1771.402	2	0	1	0	1	0	1	0	1	0	1
362			min	59.751	15	0	1	0	1	0	1	0	1	0	1
363		11	max	1771.572	2	0	1	0	1	0	1	0	1	0	1
364			min	59.802	15	0	1	0	1	0	1	0	1	0	1
365		12	max	1771.743	2	0	1	0	1	0	1	0	1	0	1
366			min	59.853	15	0	1	0	1	0	1	0	1	0	1
367		13	max	1771.913	2	0	1	0	1	0	1	0	1	0	1
368			min	59.905	15	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	1772.083	2	0	1	0	1	0	1	0	1	0	1
370			min	59.956	15	0	1	0	1	0	1	0	1	0	1
371		15	max	1772.254	2	0	1	0	1	0	1	0	1	0	1
372			min	60.008	15	0	1	0	1	0	1	0	1	0	1
373		16	max	1772.424	2	0	1	0	1	0	1	0	1	0	1
374			min	60.059	15	0	1	0	1	0	1	0	1	0	1
375		17	max	1772.594	2	0	1	0	1	0	1	0	1	0	1
376			min	60.11	15	0	1	0	1	0	1	0	1	0	1
377		18	max	1772.765	2	0	1	0	1	0	1	0	1	0	1
378			min	60.162	15	0	1	0	1	0	1	0	1	0	1
379		19	max	1772.935	2	0	1	0	1	0	1	0	1	0	1
380			min	60.213	15	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	952.075	2	2.02	4	-.007	15	0	1	0	2	0	1
382			min	-1419.401	3	.475	15	-.114	1	0	2	0	3	0	1
383		2	max	952.596	2	1.901	4	-.007	15	0	1	0	10	0	15
384			min	-1419.01	3	.447	15	-.114	1	0	2	0	1	0	4
385		3	max	953.116	2	1.783	4	-.007	15	0	1	0	10	0	15
386			min	-1418.62	3	.419	15	-.114	1	0	2	0	1	-.001	4
387		4	max	953.637	2	1.664	4	-.007	15	0	1	0	10	0	15
388			min	-1418.229	3	.391	15	-.114	1	0	2	0	1	-.002	4
389		5	max	954.158	2	1.545	4	-.007	15	0	1	0	10	0	15
390			min	-1417.839	3	.363	15	-.114	1	0	2	0	1	-.003	4
391		6	max	954.679	2	1.426	4	-.007	15	0	1	0	15	0	15
392			min	-1417.448	3	.335	15	-.114	1	0	2	0	1	-.003	4
393		7	max	955.199	2	1.307	4	-.007	15	0	1	0	15	0	15
394			min	-1417.058	3	.307	15	-.114	1	0	2	0	1	-.004	4
395		8	max	955.72	2	1.188	4	-.007	15	0	1	0	15	0	15
396			min	-1416.667	3	.279	15	-.114	1	0	2	0	1	-.004	4
397		9	max	956.241	2	1.069	4	-.007	15	0	1	0	15	-.001	15
398			min	-1416.277	3	.238	12	-.114	1	0	2	0	1	-.004	4
399		10	max	956.761	2	.952	2	-.007	15	0	1	0	15	-.001	15
400			min	-1415.886	3	.191	12	-.114	1	0	2	0	1	-.005	4
401		11	max	957.282	2	.859	2	-.007	15	0	1	0	15	-.001	15
402			min	-1415.496	3	.145	12	-.114	1	0	2	0	1	-.005	4
403		12	max	957.803	2	.766	2	-.007	15	0	1	0	15	-.001	15
404			min	-1415.105	3	.099	12	-.114	1	0	2	0	1	-.005	4
405		13	max	958.323	2	.674	2	-.007	15	0	1	0	15	-.001	15
406			min	-1414.714	3	.052	12	-.114	1	0	2	0	1	-.006	4
407		14	max	958.844	2	.581	2	-.007	15	0	1	0	15	-.001	15
408			min	-1414.324	3	-.009	3	-.114	1	0	2	0	1	-.006	4
409		15	max	959.365	2	.488	2	-.007	15	0	1	0	15	-.001	15
410			min	-1413.933	3	-.078	3	-.114	1	0	2	0	1	-.006	4
411		16	max	959.886	2	.396	2	-.007	15	0	1	0	15	-.001	12
412			min	-1413.543	3	-.148	3	-.114	1	0	2	0	1	-.006	4
413		17	max	960.406	2	.303	2	-.007	15	0	1	0	15	-.001	12
414			min	-1413.152	3	-.217	3	-.114	1	0	2	0	1	-.006	4
415		18	max	960.927	2	.211	2	-.007	15	0	1	0	15	-.001	12
416			min	-1412.762	3	-.287	3	-.114	1	0	2	0	1	-.006	4
417		19	max	961.448	2	.118	2	-.007	15	0	1	0	15	-.001	12
418			min	-1412.371	3	-.356	3	-.114	1	0	2	0	1	-.006	2
419	M11	1	max	895.249	2	7.664	4	-.007	15	0	1	0	15	.006	2
420			min	-978.541	3	1.802	15	-.123	1	0	3	0	1	.001	12
421		2	max	895.079	2	6.903	4	-.007	15	0	1	0	15	.004	2
422			min	-978.669	3	1.623	15	-.123	1	0	3	0	1	0	3
423		3	max	894.908	2	6.142	4	-.007	15	0	1	0	15	.001	2
424			min	-978.797	3	1.444	15	-.123	1	0	3	0	1	-.001	3
425		4	max	894.738	2	5.381	4	-.007	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	-978.925	3	1.265	15	-.123	1	0	3	0	1	-.003	3
427		5	max	894.568	2	4.62	4	-.007	15	0	1	0	15	0	15
428			min	-979.052	3	1.086	15	-.123	1	0	3	0	1	-.004	4
429		6	max	894.397	2	3.859	4	-.007	15	0	1	0	15	-.001	15
430			min	-979.18	3	.907	15	-.123	1	0	3	0	1	-.006	4
431		7	max	894.227	2	3.098	4	-.007	15	0	1	0	15	-.002	15
432			min	-979.308	3	.728	15	-.123	1	0	3	0	1	-.007	4
433		8	max	894.057	2	2.337	4	-.007	15	0	1	0	15	-.002	15
434			min	-979.436	3	.549	15	-.123	1	0	3	0	1	-.008	4
435		9	max	893.886	2	1.576	4	-.007	15	0	1	0	15	-.002	15
436			min	-979.563	3	.371	15	-.123	1	0	3	0	1	-.009	4
437		10	max	893.716	2	.816	2	-.007	15	0	1	0	15	-.002	15
438			min	-979.691	3	.164	12	-.123	1	0	3	0	1	-.01	4
439		11	max	893.546	2	.223	2	-.007	15	0	1	0	15	-.002	15
440			min	-979.819	3	-.214	3	-.123	1	0	3	0	1	-.01	4
441		12	max	893.375	2	-.166	15	-.007	15	0	1	0	15	-.002	15
442			min	-979.947	3	-.707	4	-.123	1	0	3	0	1	-.01	4
443		13	max	893.205	2	-.345	15	-.007	15	0	1	0	15	-.002	15
444			min	-980.074	3	-1.468	4	-.123	1	0	3	0	1	-.009	4
445		14	max	893.035	2	-.524	15	-.007	15	0	1	0	15	-.002	15
446			min	-980.202	3	-2.229	4	-.123	1	0	3	0	1	-.009	4
447		15	max	892.864	2	-.703	15	-.007	15	0	1	0	15	-.002	15
448			min	-980.33	3	-2.99	4	-.123	1	0	3	0	1	-.008	4
449		16	max	892.694	2	-.882	15	-.007	15	0	1	0	15	-.001	15
450			min	-980.458	3	-3.751	4	-.123	1	0	3	0	1	-.006	4
451		17	max	892.524	2	-1.061	15	-.007	15	0	1	0	15	-.001	15
452			min	-980.586	3	-4.512	4	-.123	1	0	3	0	1	-.004	4
453		18	max	892.353	2	-1.239	15	-.007	15	0	1	0	15	0	15
454			min	-980.713	3	-5.273	4	-.123	1	0	3	-.001	1	-.002	4
455		19	max	892.183	2	-1.418	15	-.007	15	0	1	0	15	0	1
456			min	-980.841	3	-6.034	4	-.123	1	0	3	-.001	1	0	1
457	M12	1	max	643.468	1	0	1	4.012	1	0	1	0	15	0	1
458			min	29.521	15	0	1	.234	15	0	1	0	1	0	1
459		2	max	643.639	1	0	1	4.012	1	0	1	0	15	0	1
460			min	29.572	15	0	1	.234	15	0	1	0	1	0	1
461		3	max	643.809	1	0	1	4.012	1	0	1	0	10	0	1
462			min	29.623	15	0	1	.234	15	0	1	0	1	0	1
463		4	max	643.979	1	0	1	4.012	1	0	1	0	1	0	1
464			min	29.675	15	0	1	.234	15	0	1	0	15	0	1
465		5	max	644.15	1	0	1	4.012	1	0	1	0	1	0	1
466			min	29.726	15	0	1	.234	15	0	1	0	15	0	1
467		6	max	644.32	1	0	1	4.012	1	0	1	.001	1	0	1
468			min	29.777	15	0	1	.234	15	0	1	0	15	0	1
469		7	max	644.49	1	0	1	4.012	1	0	1	.002	1	0	1
470			min	29.829	15	0	1	.234	15	0	1	0	15	0	1
471		8	max	644.661	1	0	1	4.012	1	0	1	.002	1	0	1
472			min	29.88	15	0	1	.234	15	0	1	0	15	0	1
473		9	max	644.831	1	0	1	4.012	1	0	1	.003	1	0	1
474			min	29.932	15	0	1	.234	15	0	1	0	15	0	1
475		10	max	645.001	1	0	1	4.012	1	0	1	.003	1	0	1
476			min	29.983	15	0	1	.234	15	0	1	0	15	0	1
477		11	max	645.172	1	0	1	4.012	1	0	1	.004	1	0	1
478			min	30.034	15	0	1	.234	15	0	1	0	15	0	1
479		12	max	645.342	1	0	1	4.012	1	0	1	.004	1	0	1
480			min	30.086	15	0	1	.234	15	0	1	0	15	0	1
481		13	max	645.512	1	0	1	4.012	1	0	1	.005	1	0	1
482			min	30.137	15	0	1	.234	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	645.683	1	0	1	4.012	1	0	1	.005	1	0	1
484			min	30.189	15	0	1	.234	15	0	1	0	15	0	1
485		15	max	645.853	1	0	1	4.012	1	0	1	.005	1	0	1
486			min	30.24	15	0	1	.234	15	0	1	0	15	0	1
487		16	max	646.023	1	0	1	4.012	1	0	1	.006	1	0	1
488			min	30.291	15	0	1	.234	15	0	1	0	15	0	1
489		17	max	646.194	1	0	1	4.012	1	0	1	.006	1	0	1
490			min	30.343	15	0	1	.234	15	0	1	0	15	0	1
491		18	max	646.364	1	0	1	4.012	1	0	1	.007	1	0	1
492			min	30.394	15	0	1	.234	15	0	1	0	15	0	1
493		19	max	646.535	1	0	1	4.012	1	0	1	.007	1	0	1
494			min	30.445	15	0	1	.234	15	0	1	0	15	0	1
495	M1	1	max	102.972	1	718.047	3	-2.026	15	0	2	.081	1	0	15
496			min	5.814	15	-361.396	2	-34.116	1	0	3	.005	15	-.011	2
497		2	max	103.794	1	717.167	3	-2.026	15	0	2	.063	1	.18	2
498			min	6.062	15	-362.57	2	-34.116	1	0	3	.004	15	-.384	3
499		3	max	614.003	3	496.31	2	-2.019	15	0	3	.045	1	.362	2
500			min	-356.11	2	-575.503	3	-34.035	1	0	2	.003	15	-.746	3
501		4	max	614.62	3	495.136	2	-2.019	15	0	3	.027	1	.1	2
502			min	-355.288	2	-576.383	3	-34.035	1	0	2	.002	15	-.442	3
503		5	max	615.236	3	493.963	2	-2.019	15	0	3	.009	1	-.003	15
504			min	-354.466	2	-577.263	3	-34.035	1	0	2	0	15	-.161	2
505		6	max	615.852	3	492.79	2	-2.019	15	0	3	0	15	.167	3
506			min	-353.645	2	-578.143	3	-34.035	1	0	2	-.009	1	-.421	2
507		7	max	616.468	3	491.616	2	-2.019	15	0	3	-.002	15	.472	3
508			min	-352.823	2	-579.023	3	-34.035	1	0	2	-.027	1	-.681	2
509		8	max	617.085	3	490.443	2	-2.019	15	0	3	-.003	15	.778	3
510			min	-352.002	2	-579.903	3	-34.035	1	0	2	-.045	1	-.94	2
511		9	max	632.585	3	52.367	2	-3.314	15	0	9	.029	1	.902	3
512			min	-307.523	2	.359	15	-56.209	1	0	3	.002	15	-1.072	2
513		10	max	633.201	3	51.193	2	-3.314	15	0	9	0	10	.885	3
514			min	-306.702	2	.005	15	-56.209	1	0	3	0	3	-1.099	2
515		11	max	633.817	3	50.02	2	-3.314	15	0	9	-.002	15	.869	3
516			min	-305.88	2	-1.455	4	-56.209	1	0	3	-.03	1	-1.126	2
517		12	max	648.838	3	403.775	3	-1.975	15	0	2	.045	1	.764	3
518			min	-261.163	2	-602.393	2	-33.711	1	0	3	.003	15	-1.002	2
519		13	max	649.454	3	402.895	3	-1.975	15	0	2	.027	1	.551	3
520			min	-260.341	2	-603.567	2	-33.711	1	0	3	.002	15	-.684	2
521		14	max	650.071	3	402.015	3	-1.975	15	0	2	.009	1	.338	3
522			min	-259.52	2	-604.74	2	-33.711	1	0	3	0	15	-.365	2
523		15	max	650.687	3	401.134	3	-1.975	15	0	2	0	15	.127	3
524			min	-258.698	2	-605.913	2	-33.711	1	0	3	-.009	1	-.048	1
525		16	max	651.303	3	400.254	3	-1.975	15	0	2	-.002	15	.274	2
526			min	-257.877	2	-607.087	2	-33.711	1	0	3	-.026	1	-.085	3
527		17	max	651.919	3	399.374	3	-1.975	15	0	2	-.003	15	.595	2
528			min	-257.055	2	-608.26	2	-33.711	1	0	3	-.044	1	-.296	3
529		18	max	-6.068	15	581.315	2	-2.202	15	0	3	-.004	15	.302	2
530			min	-104.333	1	-297.688	3	-37.544	1	0	2	-.063	1	-.147	3
531		19	max	-5.821	15	580.141	2	-2.202	15	0	3	-.005	15	.01	3
532			min	-103.511	1	-298.569	3	-37.544	1	0	2	-.082	1	-.004	2
533	M5	1	max	238.666	1	2347.1	3	0	1	0	1	0	1	.021	2
534			min	5.978	12	-1257.798	2	0	1	0	1	0	1	0	15
535		2	max	239.488	1	2346.22	3	0	1	0	1	0	1	.685	2
536			min	6.389	12	-1258.971	2	0	1	0	1	0	1	-1.228	3
537		3	max	1829.53	3	1265.874	2	0	1	0	1	0	1	1.319	2
538			min	-1070.58	2	-1608.844	3	0	1	0	1	0	1	-2.419	3
539		4	max	1830.147	3	1264.7	2	0	1	0	1	0	1	.652	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-1069.758	2	-1609.724	3	0	1	0	1	0	1	-1.57	3
541		5	max	1830.763	3	1263.527	2	0	1	0	1	0	1	.018	9
542			min	-1068.936	2	-1610.604	3	0	1	0	1	0	1	-.72	3
543		6	max	1831.379	3	1262.354	2	0	1	0	1	0	1	.13	3
544			min	-1068.115	2	-1611.484	3	0	1	0	1	0	1	-.682	2
545		7	max	1831.995	3	1261.18	2	0	1	0	1	0	1	.981	3
546			min	-1067.293	2	-1612.364	3	0	1	0	1	0	1	-1.348	2
547		8	max	1832.611	3	1260.007	2	0	1	0	1	0	1	1.832	3
548			min	-1066.472	2	-1613.244	3	0	1	0	1	0	1	-2.013	2
549		9	max	1840.343	3	179.328	2	0	1	0	1	0	1	2.107	3
550			min	-957.976	2	.349	15	0	1	0	1	0	1	-2.311	2
551		10	max	1840.959	3	178.155	2	0	1	0	1	0	1	2.038	3
552			min	-957.155	2	-.006	5	0	1	0	1	0	1	-2.405	2
553		11	max	1841.575	3	176.981	2	0	1	0	1	0	1	1.971	3
554			min	-956.333	2	-1.468	4	0	1	0	1	0	1	-2.499	2
555		12	max	1850.266	3	1075.454	3	0	1	0	1	0	1	1.724	3
556			min	-848.315	2	-1618.085	2	0	1	0	1	0	1	-2.24	2
557		13	max	1850.882	3	1074.574	3	0	1	0	1	0	1	1.157	3
558			min	-847.493	2	-1619.258	2	0	1	0	1	0	1	-1.386	2
559		14	max	1851.498	3	1073.694	3	0	1	0	1	0	1	.59	3
560			min	-846.672	2	-1620.431	2	0	1	0	1	0	1	-.531	2
561		15	max	1852.115	3	1072.814	3	0	1	0	1	0	1	.324	2
562			min	-845.85	2	-1621.605	2	0	1	0	1	0	1	0	15
563		16	max	1852.731	3	1071.934	3	0	1	0	1	0	1	1.18	2
564			min	-845.028	2	-1622.778	2	0	1	0	1	0	1	-.542	3
565		17	max	1853.347	3	1071.054	3	0	1	0	1	0	1	2.037	2
566			min	-844.207	2	-1623.952	2	0	1	0	1	0	1	-1.107	3
567		18	max	-8.339	12	1963.012	2	0	1	0	1	0	1	1.044	2
568			min	-238.41	1	-1054.601	3	0	1	0	1	0	1	-.577	3
569		19	max	-7.929	12	1961.838	2	0	1	0	1	0	1	.008	2
570			min	-237.588	1	-1055.481	3	0	1	0	1	0	1	-.02	3
571	M9	1	max	102.972	1	718.047	3	34.116	1	0	3	-.005	15	0	15
572			min	5.814	15	-361.396	2	2.026	15	0	2	-.081	1	-.011	2
573		2	max	103.794	1	717.167	3	34.116	1	0	3	-.004	15	.18	2
574			min	6.062	15	-362.57	2	2.026	15	0	2	-.063	1	-.384	3
575		3	max	614.003	3	496.31	2	34.035	1	0	2	-.003	15	.362	2
576			min	-356.11	2	-575.503	3	2.019	15	0	3	-.045	1	-.746	3
577		4	max	614.62	3	495.136	2	34.035	1	0	2	-.002	15	.1	2
578			min	-355.288	2	-576.383	3	2.019	15	0	3	-.027	1	-.442	3
579		5	max	615.236	3	493.963	2	34.035	1	0	2	0	15	-.003	15
580			min	-354.466	2	-577.263	3	2.019	15	0	3	-.009	1	-.161	2
581		6	max	615.852	3	492.79	2	34.035	1	0	2	.009	1	.167	3
582			min	-353.645	2	-578.143	3	2.019	15	0	3	0	15	-.421	2
583		7	max	616.468	3	491.616	2	34.035	1	0	2	.027	1	.472	3
584			min	-352.823	2	-579.023	3	2.019	15	0	3	.002	15	-.681	2
585		8	max	617.085	3	490.443	2	34.035	1	0	2	.045	1	.778	3
586			min	-352.002	2	-579.903	3	2.019	15	0	3	.003	15	-.94	2
587		9	max	632.585	3	52.367	2	56.209	1	0	3	-.002	15	.902	3
588			min	-307.523	2	.359	15	3.314	15	0	9	-.029	1	-1.072	2
589		10	max	633.201	3	51.193	2	56.209	1	0	3	0	3	.885	3
590			min	-306.702	2	.005	15	3.314	15	0	9	0	10	-1.099	2
591		11	max	633.817	3	50.02	2	56.209	1	0	3	.03	1	.869	3
592			min	-305.88	2	-1.455	4	3.314	15	0	9	.002	15	-1.126	2
593		12	max	648.838	3	403.775	3	33.711	1	0	3	-.003	15	.764	3
594			min	-261.163	2	-602.393	2	1.975	15	0	2	-.045	1	-1.002	2
595		13	max	649.454	3	402.895	3	33.711	1	0	3	-.002	15	.551	3
596			min	-260.341	2	-603.567	2	1.975	15	0	2	-.027	1	-.684	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	650.071	3	402.015	3	33.711	1	0	3	0	15	.338	3
598			min	-259.52	2	-604.74	2	1.975	15	0	2	-.009	1	-.365	2
599		15	max	650.687	3	401.134	3	33.711	1	0	3	.009	1	.127	3
600			min	-258.698	2	-605.913	2	1.975	15	0	2	0	15	-.048	1
601		16	max	651.303	3	400.254	3	33.711	1	0	3	.026	1	.274	2
602			min	-257.877	2	-607.087	2	1.975	15	0	2	.002	15	-.085	3
603		17	max	651.919	3	399.374	3	33.711	1	0	3	.044	1	.595	2
604			min	-257.055	2	-608.26	2	1.975	15	0	2	.003	15	-.296	3
605		18	max	-6.068	15	581.315	2	37.544	1	0	2	.063	1	.302	2
606			min	-104.333	1	-297.688	3	2.202	15	0	3	.004	15	-.147	3
607		19	max	-5.821	15	580.141	2	37.544	1	0	2	.082	1	.01	3
608			min	-103.511	1	-298.569	3	2.202	15	0	3	.005	15	-.004	2

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.119	2	.01	3	1.01e-2	2	NC	1	NC	1
2			min	0	15	-.037	3	-.007	2	-3.599e-3	3	NC	1	NC	1
3		2	max	0	1	.091	2	.012	3	1.071e-2	2	NC	4	NC	1
4			min	0	15	.002	15	-.005	2	-3.312e-3	3	1791.4	3	NC	1
5		3	max	0	1	.109	3	.015	3	1.133e-2	2	NC	4	NC	1
6			min	0	15	.001	15	-.004	10	-3.025e-3	3	981.151	3	NC	1
7		4	max	0	1	.152	3	.018	3	1.195e-2	2	NC	4	NC	2
8			min	0	15	.001	15	-.004	10	-2.738e-3	3	759.192	3	7624.355	1
9		5	max	0	1	.167	3	.021	3	1.257e-2	2	NC	4	NC	2
10			min	0	15	.001	15	-.005	10	-2.45e-3	3	703.878	3	6815.723	1
11		6	max	0	1	.155	3	.024	3	1.319e-2	2	NC	4	NC	2
12			min	0	15	.001	15	-.007	10	-2.163e-3	3	750.407	3	7551.928	1
13		7	max	0	1	.12	3	.027	3	1.381e-2	2	NC	1	NC	1
14			min	0	15	.002	15	-.01	2	-1.876e-3	3	917.349	3	8772.133	3
15		8	max	0	1	.14	2	.029	3	1.442e-2	2	NC	1	NC	1
16			min	0	15	.002	15	-.015	2	-1.588e-3	3	1307.759	3	7936.693	3
17		9	max	0	1	.167	2	.03	3	1.504e-2	2	NC	4	NC	1
18			min	0	15	.003	15	-.019	2	-1.301e-3	3	2163.851	3	7524.64	3
19		10	max	0	1	.179	2	.03	3	1.566e-2	2	NC	4	NC	1
20			min	0	1	.003	15	-.021	2	-1.014e-3	3	2421.362	2	7404.859	3
21		11	max	0	15	.167	2	.03	3	1.504e-2	2	NC	4	NC	1
22			min	0	1	.003	15	-.019	2	-1.301e-3	3	2163.851	3	7524.64	3
23		12	max	0	15	.14	2	.029	3	1.442e-2	2	NC	1	NC	1
24			min	0	1	.002	15	-.015	2	-1.588e-3	3	1307.759	3	7936.693	3
25		13	max	0	15	.12	3	.027	3	1.381e-2	2	NC	1	NC	1
26			min	0	1	.002	15	-.01	2	-1.876e-3	3	917.349	3	8772.133	3
27		14	max	0	15	.155	3	.024	3	1.319e-2	2	NC	4	NC	2
28			min	0	1	.001	15	-.007	10	-2.163e-3	3	750.407	3	7551.928	1
29		15	max	0	15	.167	3	.021	3	1.257e-2	2	NC	4	NC	2
30			min	0	1	.001	15	-.005	10	-2.45e-3	3	703.878	3	6815.723	1
31		16	max	0	15	.152	3	.018	3	1.195e-2	2	NC	4	NC	2
32			min	0	1	.001	15	-.004	10	-2.738e-3	3	759.192	3	7624.355	1
33		17	max	0	15	.109	3	.015	3	1.133e-2	2	NC	4	NC	1
34			min	0	1	.001	15	-.004	10	-3.025e-3	3	981.151	3	NC	1
35		18	max	0	15	.091	2	.012	3	1.071e-2	2	NC	4	NC	1
36			min	0	1	.002	15	-.005	2	-3.312e-3	3	1791.4	3	NC	1
37		19	max	0	15	.119	2	.01	3	1.01e-2	2	NC	1	NC	1
38			min	0	1	-.037	3	-.007	2	-3.599e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.284	3	.009	3	5.408e-3	2	NC	1	NC	1
40			min	0	15	-.368	2	-.006	2	-4.727e-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	.395	3	.01	3	6.117e-3	2	NC	4	NC	1
42			min	0	15	-.471	2	-.005	2	-5.411e-3	3	1290.907	3	NC	1
43		3	max	0	1	.495	3	.012	3	6.827e-3	2	NC	5	NC	1
44			min	0	15	-.565	2	-.004	10	-6.096e-3	3	682.36	3	NC	1
45		4	max	0	1	.573	3	.015	3	7.536e-3	2	NC	5	NC	2
46			min	0	15	-.644	2	-.004	10	-6.78e-3	3	496.737	3	9439.399	1
47		5	max	0	1	.627	3	.018	3	8.246e-3	2	NC	5	NC	2
48			min	0	15	-.704	2	-.005	10	-7.464e-3	3	419.338	3	8050.498	1
49		6	max	0	1	.654	3	.021	3	8.955e-3	2	NC	5	NC	2
50			min	0	15	-.743	2	-.006	10	-8.149e-3	3	383.726	2	8649.561	1
51		7	max	0	1	.658	3	.023	3	9.665e-3	2	NC	5	NC	1
52			min	0	15	-.763	2	-.009	2	-8.833e-3	3	364.285	2	NC	1
53		8	max	0	1	.646	3	.025	3	1.037e-2	2	NC	5	NC	1
54			min	0	15	-.768	2	-.014	2	-9.518e-3	3	359.991	2	9038.899	3
55		9	max	0	1	.627	3	.026	3	1.108e-2	2	NC	5	NC	1
56			min	0	15	-.764	2	-.018	2	-1.02e-2	3	363.737	2	8502.472	3
57		10	max	0	1	.617	3	.026	3	1.179e-2	2	NC	5	NC	1
58			min	0	1	-.76	2	-.02	2	-1.089e-2	3	367.339	2	8344.704	3
59		11	max	0	15	.627	3	.026	3	1.108e-2	2	NC	5	NC	1
60			min	0	1	-.764	2	-.018	2	-1.02e-2	3	363.737	2	8502.472	3
61		12	max	0	15	.646	3	.025	3	1.037e-2	2	NC	5	NC	1
62			min	0	1	-.768	2	-.014	2	-9.518e-3	3	359.991	2	9038.899	3
63		13	max	0	15	.658	3	.023	3	9.665e-3	2	NC	5	NC	1
64			min	0	1	-.763	2	-.009	2	-8.833e-3	3	364.285	2	NC	1
65		14	max	0	15	.654	3	.021	3	8.955e-3	2	NC	5	NC	2
66			min	0	1	-.743	2	-.006	10	-8.149e-3	3	383.726	2	8649.561	1
67		15	max	0	15	.627	3	.018	3	8.246e-3	2	NC	5	NC	2
68			min	0	1	-.704	2	-.005	10	-7.464e-3	3	419.338	3	8050.498	1
69		16	max	0	15	.573	3	.015	3	7.536e-3	2	NC	5	NC	2
70			min	0	1	-.644	2	-.004	10	-6.78e-3	3	496.737	3	9439.399	1
71		17	max	0	15	.495	3	.012	3	6.827e-3	2	NC	5	NC	1
72			min	0	1	-.565	2	-.004	10	-6.096e-3	3	682.36	3	NC	1
73		18	max	0	15	.395	3	.01	3	6.117e-3	2	NC	4	NC	1
74			min	0	1	-.471	2	-.005	2	-5.411e-3	3	1290.907	3	NC	1
75		19	max	0	15	.284	3	.009	3	5.408e-3	2	NC	1	NC	1
76			min	0	1	-.368	2	-.006	2	-4.727e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.288	3	.009	3	4.212e-3	3	NC	1	NC	1
78			min	0	1	-.366	2	-.006	2	-5.693e-3	2	NC	1	NC	1
79		2	max	0	15	.375	3	.01	3	4.823e-3	3	NC	4	NC	1
80			min	0	1	-.491	2	-.005	2	-6.449e-3	2	1152.835	2	NC	1
81		3	max	0	15	.456	3	.012	3	5.433e-3	3	NC	5	NC	1
82			min	0	1	-.603	2	-.003	10	-7.205e-3	2	608.053	2	NC	1
83		4	max	0	15	.523	3	.014	3	6.043e-3	3	NC	5	NC	2
84			min	0	1	-.693	2	-.003	10	-7.961e-3	2	441.076	2	9368.285	1
85		5	max	0	15	.574	3	.017	3	6.653e-3	3	NC	5	NC	2
86			min	0	1	-.755	2	-.004	10	-8.717e-3	2	370.483	2	7975.844	1
87		6	max	0	15	.608	3	.02	3	7.264e-3	3	NC	5	NC	2
88			min	0	1	-.789	2	-.006	10	-9.472e-3	2	340.964	2	8537.364	1
89		7	max	0	15	.626	3	.022	3	7.874e-3	3	NC	5	NC	1
90			min	0	1	-.797	2	-.008	2	-1.023e-2	2	334.579	2	NC	1
91		8	max	0	15	.631	3	.023	3	8.484e-3	3	NC	5	NC	1
92			min	0	1	-.786	2	-.013	2	-1.098e-2	2	342.939	2	9720.062	3
93		9	max	0	15	.628	3	.024	3	9.095e-3	3	NC	5	NC	1
94			min	0	1	-.768	2	-.017	2	-1.174e-2	2	358.234	2	9174.517	3
95		10	max	0	1	.625	3	.025	3	9.705e-3	3	NC	5	NC	1
96			min	0	1	-.758	2	-.019	2	-1.25e-2	2	367.536	2	9017.553	3
97		11	max	0	1	.628	3	.024	3	9.095e-3	3	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.768	2	-.017	2	-1.174e-2	2	358.234	2	9174.517	3
99		12	max	0	1	.631	3	.023	3	8.484e-3	3	NC	5	NC	1
100			min	0	15	-.786	2	-.013	2	-1.098e-2	2	342.939	2	9720.062	3
101		13	max	0	1	.626	3	.022	3	7.874e-3	3	NC	5	NC	1
102			min	0	15	-.797	2	-.008	2	-1.023e-2	2	334.579	2	NC	1
103		14	max	0	1	.608	3	.02	3	7.264e-3	3	NC	5	NC	2
104			min	0	15	-.789	2	-.006	10	-9.472e-3	2	340.964	2	8537.364	1
105		15	max	0	1	.574	3	.017	3	6.653e-3	3	NC	5	NC	2
106			min	0	15	-.755	2	-.004	10	-8.717e-3	2	370.483	2	7975.844	1
107		16	max	0	1	.523	3	.014	3	6.043e-3	3	NC	5	NC	2
108			min	0	15	-.693	2	-.003	10	-7.961e-3	2	441.076	2	9368.285	1
109		17	max	0	1	.456	3	.012	3	5.433e-3	3	NC	5	NC	1
110			min	0	15	-.603	2	-.003	10	-7.205e-3	2	608.053	2	NC	1
111		18	max	0	1	.375	3	.01	3	4.823e-3	3	NC	4	NC	1
112			min	0	15	-.491	2	-.005	2	-6.449e-3	2	1152.835	2	NC	1
113		19	max	0	1	.288	3	.009	3	4.212e-3	3	NC	1	NC	1
114			min	0	15	-.366	2	-.006	2	-5.693e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.106	2	.007	3	7.972e-3	3	NC	1	NC	1
116			min	0	1	-.098	3	-.005	2	-8.358e-3	2	NC	1	NC	1
117		2	max	0	15	.051	2	.009	3	8.556e-3	3	NC	4	NC	1
118			min	0	1	-.077	3	-.003	2	-8.603e-3	2	2643.655	2	NC	1
119		3	max	0	15	.017	1	.012	1	9.141e-3	3	NC	4	NC	1
120			min	0	1	-.062	3	-.003	10	-8.849e-3	2	1474.111	2	NC	1
121		4	max	0	15	.009	9	.018	1	9.725e-3	3	NC	4	NC	2
122			min	0	1	-.057	3	-.003	10	-9.094e-3	2	1179.078	2	7480.163	1
123		5	max	0	15	.009	9	.02	1	1.031e-2	3	NC	4	NC	2
124			min	0	1	-.063	3	-.003	10	-9.34e-3	2	1157.955	2	6627.219	1
125		6	max	0	15	.015	1	.019	1	1.089e-2	3	NC	4	NC	2
126			min	0	1	-.079	3	-.005	10	-9.585e-3	2	1371.403	2	7228.681	1
127		7	max	0	15	.04	1	.019	3	1.148e-2	3	NC	3	NC	1
128			min	0	1	-.103	3	-.006	10	-9.83e-3	2	2093.881	2	NC	1
129		8	max	0	15	.081	2	.021	3	1.206e-2	3	NC	1	NC	1
130			min	0	1	-.131	3	-.011	2	-1.008e-2	2	4407.395	3	NC	1
131		9	max	0	15	.121	2	.021	3	1.265e-2	3	NC	4	NC	1
132			min	0	1	-.154	3	-.015	2	-1.032e-2	2	2566.216	3	NC	1
133		10	max	0	1	.139	2	.021	3	1.323e-2	3	NC	4	NC	1
134			min	0	1	-.164	3	-.017	2	-1.057e-2	2	2166.922	3	NC	1
135		11	max	0	1	.121	2	.021	3	1.265e-2	3	NC	4	NC	1
136			min	0	15	-.154	3	-.015	2	-1.032e-2	2	2566.216	3	NC	1
137		12	max	0	1	.081	2	.021	3	1.206e-2	3	NC	1	NC	1
138			min	0	15	-.131	3	-.011	2	-1.008e-2	2	4407.395	3	NC	1
139		13	max	0	1	.04	1	.019	3	1.148e-2	3	NC	3	NC	1
140			min	0	15	-.103	3	-.006	10	-9.83e-3	2	2093.881	2	NC	1
141		14	max	0	1	.015	1	.019	1	1.089e-2	3	NC	4	NC	2
142			min	0	15	-.079	3	-.005	10	-9.585e-3	2	1371.403	2	7228.681	1
143		15	max	0	1	.009	9	.02	1	1.031e-2	3	NC	4	NC	2
144			min	0	15	-.063	3	-.003	10	-9.34e-3	2	1157.955	2	6627.219	1
145		16	max	0	1	.009	9	.018	1	9.725e-3	3	NC	4	NC	2
146			min	0	15	-.057	3	-.003	10	-9.094e-3	2	1179.078	2	7480.163	1
147		17	max	0	1	.017	1	.012	1	9.141e-3	3	NC	4	NC	1
148			min	0	15	-.062	3	-.003	10	-8.849e-3	2	1474.111	2	NC	1
149		18	max	0	1	.051	2	.009	3	8.556e-3	3	NC	4	NC	1
150			min	0	15	-.077	3	-.003	2	-8.603e-3	2	2643.655	2	NC	1
151		19	max	0	1	.106	2	.007	3	7.972e-3	3	NC	1	NC	1
152			min	0	15	-.098	3	-.005	2	-8.358e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.011	2	.003	1	-4.114e-6	15	NC	1	NC	1
154			min	-.01	3	-.016	3	0	15	-6.869e-5	1	7114.189	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.007	2	.009	2	.002	1	-3.907e-6	15	NC	1	NC	1
156			min	-.01	3	-.016	3	0	15	-6.523e-5	1	8217.113	2	NC	1
157		3	max	.006	2	.008	2	.002	1	-3.7e-6	15	NC	1	NC	1
158			min	-.009	3	-.015	3	0	15	-6.176e-5	1	9700.222	2	NC	1
159		4	max	.006	2	.007	2	.002	1	-3.493e-6	15	NC	1	NC	1
160			min	-.009	3	-.015	3	0	15	-5.83e-5	1	NC	1	NC	1
161		5	max	.006	2	.005	2	.002	1	-3.285e-6	15	NC	1	NC	1
162			min	-.008	3	-.014	3	0	15	-5.483e-5	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.002	1	-3.078e-6	15	NC	1	NC	1
164			min	-.008	3	-.013	3	0	15	-5.136e-5	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.001	1	-2.871e-6	15	NC	1	NC	1
166			min	-.007	3	-.013	3	0	15	-4.79e-5	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.001	1	-2.663e-6	15	NC	1	NC	1
168			min	-.006	3	-.012	3	0	15	-4.443e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.001	1	-2.45e-6	10	NC	1	NC	1
170			min	-.006	3	-.011	3	0	15	-4.096e-5	1	NC	1	NC	1
171		10	max	.004	2	0	2	0	1	-2.234e-6	10	NC	1	NC	1
172			min	-.005	3	-.01	3	0	15	-3.75e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	0	1	-2.018e-6	10	NC	1	NC	1
174			min	-.005	3	-.009	3	0	15	-3.403e-5	1	NC	1	NC	1
175		12	max	.003	2	-.001	2	0	1	-1.803e-6	10	NC	1	NC	1
176			min	-.004	3	-.009	3	0	15	-3.057e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-1.587e-6	10	NC	1	NC	1
178			min	-.003	3	-.008	3	0	15	-2.71e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-1.371e-6	10	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-2.363e-5	1	NC	1	NC	1
181		15	max	.002	2	-.001	15	0	1	-1.155e-6	10	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-2.017e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-9.398e-7	10	NC	1	NC	1
184			min	-.002	3	-.004	3	0	15	-1.67e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-7.241e-7	10	NC	1	NC	1
186			min	-.001	3	-.003	3	0	15	-1.323e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-5.084e-7	10	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-9.767e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	-2.927e-7	10	NC	1	NC	1
190			min	0	1	0	1	0	1	-6.301e-6	1	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.49e-6	1	NC	1	NC	1
192			min	0	1	0	1	0	1	6.232e-8	10	NC	1	NC	1
193		2	max	0	3	0	15	0	10	8.2e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	1	4.817e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	10	1.491e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	1	8.722e-7	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	10	2.162e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	1	1.263e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	10	2.833e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	1	1.653e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	10	3.504e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	1	2.044e-6	15	9261.574	4	NC	1
203		7	max	.003	3	-.003	15	0	2	4.175e-5	1	NC	1	NC	1
204			min	-.003	2	-.011	4	0	3	2.435e-6	15	8008.467	4	NC	1
205		8	max	.003	3	-.003	15	0	1	4.846e-5	1	NC	2	NC	1
206			min	-.003	2	-.013	4	0	3	2.825e-6	15	7237.276	4	NC	1
207		9	max	.004	3	-.003	15	0	1	5.517e-5	1	NC	5	NC	1
208			min	-.003	2	-.013	4	0	12	3.216e-6	15	6787.278	4	NC	1
209		10	max	.004	3	-.003	15	0	1	6.188e-5	1	NC	5	NC	1
210			min	-.004	2	-.014	4	0	15	3.606e-6	15	6581.085	4	NC	1
211		11	max	.005	3	-.003	15	0	1	6.859e-5	1	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.004	2	-.014	4	0	15	3.997e-6	15	6588.587	4	NC	1
213		12	max	.005	3	-.003	15	0	1	7.53e-5	1	NC	5	NC	1
214			min	-.005	2	-.014	4	0	15	4.387e-6	15	6815.397	4	NC	1
215		13	max	.006	3	-.003	15	0	1	8.201e-5	1	NC	2	NC	1
216			min	-.005	2	-.013	4	0	15	4.778e-6	15	7306.505	4	NC	1
217		14	max	.006	3	-.003	15	0	1	8.872e-5	1	NC	1	NC	1
218			min	-.006	2	-.011	4	0	15	5.169e-6	15	8169.051	4	NC	1
219		15	max	.007	3	-.002	15	.001	1	9.543e-5	1	NC	1	NC	1
220			min	-.006	2	-.01	4	0	15	5.559e-6	15	9638.438	4	NC	1
221		16	max	.007	3	-.002	15	.001	1	1.021e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	5.95e-6	15	NC	1	NC	1
223		17	max	.008	3	-.001	15	.002	1	1.089e-4	1	NC	1	NC	1
224			min	-.007	2	-.006	3	0	15	6.34e-6	15	NC	1	NC	1
225		18	max	.008	3	0	15	.002	1	1.156e-4	1	NC	1	NC	1
226			min	-.007	2	-.004	3	0	15	6.731e-6	15	NC	1	NC	1
227		19	max	.008	3	0	2	.003	1	1.223e-4	1	NC	1	NC	1
228			min	-.008	2	-.003	3	0	15	7.121e-6	15	NC	1	NC	1
229	M4	1	max	.002	1	.008	2	0	15	5.108e-5	1	NC	1	NC	2
230			min	0	15	-.009	3	-.003	1	3.003e-6	15	NC	1	9614.635	1
231		2	max	.001	1	.007	2	0	15	5.108e-5	1	NC	1	NC	1
232			min	0	15	-.008	3	-.002	1	3.003e-6	15	NC	1	NC	1
233		3	max	.001	1	.007	2	0	15	5.108e-5	1	NC	1	NC	1
234			min	0	15	-.008	3	-.002	1	3.003e-6	15	NC	1	NC	1
235		4	max	.001	1	.006	2	0	15	5.108e-5	1	NC	1	NC	1
236			min	0	15	-.007	3	-.002	1	3.003e-6	15	NC	1	NC	1
237		5	max	.001	1	.006	2	0	15	5.108e-5	1	NC	1	NC	1
238			min	0	15	-.007	3	-.002	1	3.003e-6	15	NC	1	NC	1
239		6	max	.001	1	.006	2	0	15	5.108e-5	1	NC	1	NC	1
240			min	0	15	-.006	3	-.002	1	3.003e-6	15	NC	1	NC	1
241		7	max	.001	1	.005	2	0	15	5.108e-5	1	NC	1	NC	1
242			min	0	15	-.006	3	-.001	1	3.003e-6	15	NC	1	NC	1
243		8	max	0	1	.005	2	0	15	5.108e-5	1	NC	1	NC	1
244			min	0	15	-.005	3	-.001	1	3.003e-6	15	NC	1	NC	1
245		9	max	0	1	.004	2	0	15	5.108e-5	1	NC	1	NC	1
246			min	0	15	-.005	3	-.001	1	3.003e-6	15	NC	1	NC	1
247		10	max	0	1	.004	2	0	15	5.108e-5	1	NC	1	NC	1
248			min	0	15	-.004	3	0	1	3.003e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	5.108e-5	1	NC	1	NC	1
250			min	0	15	-.004	3	0	1	3.003e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	5.108e-5	1	NC	1	NC	1
252			min	0	15	-.003	3	0	1	3.003e-6	15	NC	1	NC	1
253		13	max	0	1	.003	2	0	15	5.108e-5	1	NC	1	NC	1
254			min	0	15	-.003	3	0	1	3.003e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	5.108e-5	1	NC	1	NC	1
256			min	0	15	-.002	3	0	1	3.003e-6	15	NC	1	NC	1
257		15	max	0	1	.002	2	0	15	5.108e-5	1	NC	1	NC	1
258			min	0	15	-.002	3	0	1	3.003e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	5.108e-5	1	NC	1	NC	1
260			min	0	15	-.001	3	0	1	3.003e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	5.108e-5	1	NC	1	NC	1
262			min	0	15	0	3	0	1	3.003e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	5.108e-5	1	NC	1	NC	1
264			min	0	15	0	3	0	1	3.003e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.108e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	3.003e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.033	2	0	1	0	1	NC	4	NC	1
268			min	-.032	3	-.048	3	0	1	0	1	1613.102	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.02	2	.03	2	0	1	0	1	NC	4	NC	1
270			min	-.03	3	-.045	3	0	1	0	1	1707.533	3	NC	1
271		3	max	.019	2	.027	2	0	1	0	1	NC	4	NC	1
272			min	-.028	3	-.042	3	0	1	0	1	1813.852	3	NC	1
273		4	max	.017	2	.025	2	0	1	0	1	NC	4	NC	1
274			min	-.027	3	-.04	3	0	1	0	1	1934.583	3	NC	1
275		5	max	.016	2	.022	2	0	1	0	1	NC	4	NC	1
276			min	-.025	3	-.037	3	0	1	0	1	2072.971	3	NC	1
277		6	max	.015	2	.019	2	0	1	0	1	NC	4	NC	1
278			min	-.023	3	-.034	3	0	1	0	1	2233.26	3	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	1	NC	1
280			min	-.021	3	-.032	3	0	1	0	1	2421.11	3	NC	1
281		8	max	.013	2	.014	2	0	1	0	1	NC	1	NC	1
282			min	-.02	3	-.029	3	0	1	0	1	2644.243	3	NC	1
283		9	max	.012	2	.012	2	0	1	0	1	NC	1	NC	1
284			min	-.018	3	-.026	3	0	1	0	1	2913.475	3	NC	1
285		10	max	.01	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.016	3	-.024	3	0	1	0	1	3244.433	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.021	3	0	1	0	1	3660.573	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.018	3	0	1	0	1	4198.774	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.011	3	-.016	3	0	1	0	1	4920.525	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.013	3	0	1	0	1	5936.546	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.01	3	0	1	0	1	7468.346	3	NC	1
297		16	max	.003	2	0	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.008	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	2	0	2	0	1	0	1	NC	1	NC	1
302			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.006	3	0	1	0	1	NC	1	NC	1
311		4	max	.004	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.004	2	-.008	3	0	1	0	1	NC	1	NC	1
313		5	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.005	2	-.01	3	0	1	0	1	NC	1	NC	1
315		6	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.007	2	-.012	3	0	1	0	1	8848.929	3	NC	1
317		7	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.008	2	-.014	3	0	1	0	1	7906.829	3	NC	1
319		8	max	.01	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7295.4	4	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.011	2	-.016	3	0	1	0	1	6838.535	4	NC	1
323		10	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.012	2	-.017	3	0	1	0	1	6628.115	4	NC	1
325		11	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.013	2	-.017	3	0	1	0	1	6633.403	4	NC	1
327		12	max	.015	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.015	2	-.017	3	0	1	0	1	6859.766	4	NC	1
329		13	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.016	2	-.016	3	0	1	0	1	7352.269	4	NC	1
331		14	max	.018	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.017	2	-.015	3	0	1	0	1	8218.534	4	NC	1
333		15	max	.019	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.019	2	-.014	3	0	1	0	1	9695.195	4	NC	1
335		16	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.02	2	-.013	3	0	1	0	1	NC	1	NC	1
337		17	max	.022	3	0	2	0	1	0	1	NC	1	NC	1
338			min	-.021	2	-.011	3	0	1	0	1	NC	1	NC	1
339		18	max	.023	3	0	2	0	1	0	1	NC	1	NC	1
340			min	-.023	2	-.009	3	0	1	0	1	NC	1	NC	1
341		19	max	.025	3	.003	2	0	1	0	1	NC	1	NC	1
342			min	-.024	2	-.007	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.004	2	.024	2	0	1	0	1	NC	1	NC	1
344			min	0	15	-.026	3	0	1	0	1	NC	1	NC	1
345		2	max	.004	2	.022	2	0	1	0	1	NC	1	NC	1
346			min	0	15	-.024	3	0	1	0	1	NC	1	NC	1
347		3	max	.004	2	.021	2	0	1	0	1	NC	1	NC	1
348			min	0	15	-.023	3	0	1	0	1	NC	1	NC	1
349		4	max	.004	2	.02	2	0	1	0	1	NC	1	NC	1
350			min	0	15	-.021	3	0	1	0	1	NC	1	NC	1
351		5	max	.003	2	.018	2	0	1	0	1	NC	1	NC	1
352			min	0	15	-.02	3	0	1	0	1	NC	1	NC	1
353		6	max	.003	2	.017	2	0	1	0	1	NC	1	NC	1
354			min	0	15	-.019	3	0	1	0	1	NC	1	NC	1
355		7	max	.003	2	.016	2	0	1	0	1	NC	1	NC	1
356			min	0	15	-.017	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.015	2	0	1	0	1	NC	1	NC	1
358			min	0	15	-.016	3	0	1	0	1	NC	1	NC	1
359		9	max	.002	2	.013	2	0	1	0	1	NC	1	NC	1
360			min	0	15	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.002	2	.012	2	0	1	0	1	NC	1	NC	1
362			min	0	15	-.013	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	2	.011	2	0	1	0	1	NC	1	NC	1
364			min	0	15	-.011	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	2	.009	2	0	1	0	1	NC	1	NC	1
366			min	0	15	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.001	2	.008	2	0	1	0	1	NC	1	NC	1
368			min	0	15	-.009	3	0	1	0	1	NC	1	NC	1
369		14	max	.001	2	.007	2	0	1	0	1	NC	1	NC	1
370			min	0	15	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	0	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	15	-.006	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	15	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.003	2	0	1	0	1	NC	1	NC	1
376			min	0	15	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	15	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.011	2	0	15	6.869e-5	1	NC	1	NC	1
382			min	-.01	3	-.016	3	-.003	1	4.114e-6	15	7114.189	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.007	2	.009	2	0	15	6.523e-5	1	NC	1	NC	1
384			min	-.01	3	-.016	3	-.002	1	3.907e-6	15	8217.113	2	NC	1
385		3	max	.006	2	.008	2	0	15	6.176e-5	1	NC	1	NC	1
386			min	-.009	3	-.015	3	-.002	1	3.7e-6	15	9700.222	2	NC	1
387		4	max	.006	2	.007	2	0	15	5.83e-5	1	NC	1	NC	1
388			min	-.009	3	-.015	3	-.002	1	3.493e-6	15	NC	1	NC	1
389		5	max	.006	2	.005	2	0	15	5.483e-5	1	NC	1	NC	1
390			min	-.008	3	-.014	3	-.002	1	3.285e-6	15	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	5.136e-5	1	NC	1	NC	1
392			min	-.008	3	-.013	3	-.002	1	3.078e-6	15	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	4.79e-5	1	NC	1	NC	1
394			min	-.007	3	-.013	3	-.001	1	2.871e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	4.443e-5	1	NC	1	NC	1
396			min	-.006	3	-.012	3	-.001	1	2.663e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	4.096e-5	1	NC	1	NC	1
398			min	-.006	3	-.011	3	-.001	1	2.45e-6	10	NC	1	NC	1
399		10	max	.004	2	0	2	0	15	3.75e-5	1	NC	1	NC	1
400			min	-.005	3	-.01	3	0	1	2.234e-6	10	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	3.403e-5	1	NC	1	NC	1
402			min	-.005	3	-.009	3	0	1	2.018e-6	10	NC	1	NC	1
403		12	max	.003	2	-.001	2	0	15	3.057e-5	1	NC	1	NC	1
404			min	-.004	3	-.009	3	0	1	1.803e-6	10	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	2.71e-5	1	NC	1	NC	1
406			min	-.003	3	-.008	3	0	1	1.587e-6	10	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	2.363e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	1.371e-6	10	NC	1	NC	1
409		15	max	.002	2	-.001	15	0	15	2.017e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.155e-6	10	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.67e-5	1	NC	1	NC	1
412			min	-.002	3	-.004	3	0	1	9.398e-7	10	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.323e-5	1	NC	1	NC	1
414			min	-.001	3	-.003	3	0	1	7.241e-7	10	NC	1	NC	1
415		18	max	0	2	0	15	0	15	9.767e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	5.084e-7	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	6.301e-6	1	NC	1	NC	1
418			min	0	1	0	1	0	1	2.927e-7	10	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	-6.232e-8	10	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.49e-6	1	NC	1	NC	1
421		2	max	0	3	0	15	0	1	-4.817e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	10	-8.2e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	1	-8.722e-7	15	NC	1	NC	1
424			min	0	2	-.004	4	0	10	-1.491e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	1	-1.263e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	10	-2.162e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	1	-1.653e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	10	-2.833e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	1	-2.044e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	10	-3.504e-5	1	9261.574	4	NC	1
431		7	max	.003	3	-.003	15	0	3	-2.435e-6	15	NC	1	NC	1
432			min	-.003	2	-.011	4	0	2	-4.175e-5	1	8008.467	4	NC	1
433		8	max	.003	3	-.003	15	0	3	-2.825e-6	15	NC	2	NC	1
434			min	-.003	2	-.013	4	0	1	-4.846e-5	1	7237.276	4	NC	1
435		9	max	.004	3	-.003	15	0	12	-3.216e-6	15	NC	5	NC	1
436			min	-.003	2	-.013	4	0	1	-5.517e-5	1	6787.278	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-3.606e-6	15	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-6.188e-5	1	6581.085	4	NC	1
439		11	max	.005	3	-.003	15	0	15	-3.997e-6	15	NC	5	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.004	2	-.014	4	0	1	-6.859e-5	1	6588.587	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-4.387e-6	15	NC	5	NC	1
442			min	-.005	2	-.014	4	0	1	-7.53e-5	1	6815.397	4	NC	1
443		13	max	.006	3	-.003	15	0	15	-4.778e-6	15	NC	2	NC	1
444			min	-.005	2	-.013	4	0	1	-8.201e-5	1	7306.505	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-5.169e-6	15	NC	1	NC	1
446			min	-.006	2	-.011	4	0	1	-8.872e-5	1	8169.051	4	NC	1
447		15	max	.007	3	-.002	15	0	15	-5.559e-6	15	NC	1	NC	1
448			min	-.006	2	-.01	4	-.001	1	-9.543e-5	1	9638.438	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-5.95e-6	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.001	1	-1.021e-4	1	NC	1	NC	1
451		17	max	.008	3	-.001	15	0	15	-6.34e-6	15	NC	1	NC	1
452			min	-.007	2	-.006	3	-.002	1	-1.089e-4	1	NC	1	NC	1
453		18	max	.008	3	0	15	0	15	-6.731e-6	15	NC	1	NC	1
454			min	-.007	2	-.004	3	-.002	1	-1.156e-4	1	NC	1	NC	1
455		19	max	.008	3	0	2	0	15	-7.121e-6	15	NC	1	NC	1
456			min	-.008	2	-.003	3	-.003	1	-1.223e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.008	2	.003	1	-3.003e-6	15	NC	1	NC	2
458			min	0	15	-.009	3	0	15	-5.108e-5	1	NC	1	9614.635	1
459		2	max	.001	1	.007	2	.002	1	-3.003e-6	15	NC	1	NC	1
460			min	0	15	-.008	3	0	15	-5.108e-5	1	NC	1	NC	1
461		3	max	.001	1	.007	2	.002	1	-3.003e-6	15	NC	1	NC	1
462			min	0	15	-.008	3	0	15	-5.108e-5	1	NC	1	NC	1
463		4	max	.001	1	.006	2	.002	1	-3.003e-6	15	NC	1	NC	1
464			min	0	15	-.007	3	0	15	-5.108e-5	1	NC	1	NC	1
465		5	max	.001	1	.006	2	.002	1	-3.003e-6	15	NC	1	NC	1
466			min	0	15	-.007	3	0	15	-5.108e-5	1	NC	1	NC	1
467		6	max	.001	1	.006	2	.002	1	-3.003e-6	15	NC	1	NC	1
468			min	0	15	-.006	3	0	15	-5.108e-5	1	NC	1	NC	1
469		7	max	.001	1	.005	2	.001	1	-3.003e-6	15	NC	1	NC	1
470			min	0	15	-.006	3	0	15	-5.108e-5	1	NC	1	NC	1
471		8	max	0	1	.005	2	.001	1	-3.003e-6	15	NC	1	NC	1
472			min	0	15	-.005	3	0	15	-5.108e-5	1	NC	1	NC	1
473		9	max	0	1	.004	2	.001	1	-3.003e-6	15	NC	1	NC	1
474			min	0	15	-.005	3	0	15	-5.108e-5	1	NC	1	NC	1
475		10	max	0	1	.004	2	0	1	-3.003e-6	15	NC	1	NC	1
476			min	0	15	-.004	3	0	15	-5.108e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	0	1	-3.003e-6	15	NC	1	NC	1
478			min	0	15	-.004	3	0	15	-5.108e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-3.003e-6	15	NC	1	NC	1
480			min	0	15	-.003	3	0	15	-5.108e-5	1	NC	1	NC	1
481		13	max	0	1	.003	2	0	1	-3.003e-6	15	NC	1	NC	1
482			min	0	15	-.003	3	0	15	-5.108e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-3.003e-6	15	NC	1	NC	1
484			min	0	15	-.002	3	0	15	-5.108e-5	1	NC	1	NC	1
485		15	max	0	1	.002	2	0	1	-3.003e-6	15	NC	1	NC	1
486			min	0	15	-.002	3	0	15	-5.108e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-3.003e-6	15	NC	1	NC	1
488			min	0	15	-.001	3	0	15	-5.108e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-3.003e-6	15	NC	1	NC	1
490			min	0	15	0	3	0	15	-5.108e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-3.003e-6	15	NC	1	NC	1
492			min	0	15	0	3	0	15	-5.108e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-3.003e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.108e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.119	2	0	1	3.722e-3	2	NC	1	NC	1
496			min	-.007	2	-.037	3	0	15	-1.042e-2	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
497		2	max	.01	3	.055	2	0	15	1.828e-3	2	NC	4	NC	1
498			min	-.007	2	-.014	3	-.002	1	-5.163e-3	3	1798.026	2	NC	1
499		3	max	.01	3	.017	3	0	15	3.177e-5	2	NC	5	NC	1
500			min	-.007	2	-.013	2	-.003	1	-8.284e-5	3	874.018	2	NC	1
501		4	max	.01	3	.062	3	0	15	2.453e-3	2	NC	5	NC	1
502			min	-.007	2	-.087	2	-.002	1	-2.707e-3	3	558.78	2	NC	1
503		5	max	.01	3	.116	3	0	15	4.874e-3	2	NC	5	NC	1
504			min	-.007	2	-.163	2	-.002	1	-5.33e-3	3	407.72	2	NC	1
505		6	max	.01	3	.173	3	0	10	7.295e-3	2	NC	5	NC	1
506			min	-.006	2	-.236	2	0	1	-7.954e-3	3	323.881	2	NC	1
507		7	max	.01	3	.226	3	0	1	9.716e-3	2	NC	15	NC	1
508			min	-.006	2	-.301	2	0	3	-1.058e-2	3	274.075	2	NC	1
509		8	max	.009	3	.27	3	0	1	1.214e-2	2	NC	15	NC	1
510			min	-.006	2	-.352	2	0	15	-1.32e-2	3	244.474	2	NC	1
511		9	max	.009	3	.298	3	0	15	1.364e-2	2	NC	15	NC	1
512			min	-.006	2	-.384	2	0	1	-1.366e-2	3	229.013	2	NC	1
513		10	max	.009	3	.308	3	0	1	1.452e-2	2	NC	15	NC	1
514			min	-.006	2	-.395	2	0	10	-1.269e-2	3	224.514	2	NC	1
515		11	max	.009	3	.301	3	0	1	1.541e-2	2	NC	15	NC	1
516			min	-.006	2	-.384	2	0	15	-1.171e-2	3	229.943	2	NC	1
517		12	max	.008	3	.276	3	0	15	1.477e-2	2	NC	15	NC	1
518			min	-.006	2	-.35	2	0	1	-1.031e-2	3	247.21	2	NC	1
519		13	max	.008	3	.235	3	0	10	1.184e-2	2	NC	15	NC	1
520			min	-.006	2	-.296	2	0	1	-8.248e-3	3	280.536	2	NC	1
521		14	max	.008	3	.184	3	0	1	8.909e-3	2	NC	5	NC	1
522			min	-.006	2	-.228	2	0	15	-6.19e-3	3	337.359	2	NC	1
523		15	max	.008	3	.126	3	.002	1	5.979e-3	2	NC	5	NC	1
524			min	-.006	2	-.153	2	0	15	-4.132e-3	3	434.819	2	NC	1
525		16	max	.008	3	.065	3	.002	1	3.048e-3	2	NC	5	NC	1
526			min	-.005	2	-.077	2	0	15	-2.073e-3	3	614.472	2	NC	1
527		17	max	.007	3	.006	3	.003	1	1.905e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-1.516e-5	3	996.874	2	NC	1
529		18	max	.007	3	.052	2	.002	1	3.542e-3	2	NC	4	NC	1
530			min	-.005	2	-.047	3	0	15	-1.343e-3	3	2105.458	2	NC	1
531		19	max	.007	3	.106	2	0	15	7.114e-3	2	NC	1	NC	1
532			min	-.005	2	-.098	3	0	1	-2.749e-3	3	NC	1	NC	1
533	M5	1	max	.03	3	.179	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	.003	15	0	1	0	1	NC	1	NC	1
535		2	max	.03	3	.078	2	0	1	0	1	NC	4	NC	1
536			min	-.021	2	.001	15	0	1	0	1	1160.161	2	NC	1
537		3	max	.03	3	.05	3	0	1	0	1	NC	5	NC	1
538			min	-.022	2	-.036	2	0	1	0	1	542.154	2	NC	1
539		4	max	.029	3	.129	3	0	1	0	1	NC	5	NC	1
540			min	-.021	2	-.175	2	0	1	0	1	328.846	2	NC	1
541		5	max	.029	3	.238	3	0	1	0	1	NC	15	NC	1
542			min	-.021	2	-.326	2	0	1	0	1	229.797	2	NC	1
543		6	max	.028	3	.362	3	0	1	0	1	NC	15	NC	1
544			min	-.02	2	-.477	2	0	1	0	1	176.688	2	NC	1
545		7	max	.027	3	.484	3	0	1	0	1	8862.134	15	NC	1
546			min	-.02	2	-.615	2	0	1	0	1	146.023	2	NC	1
547		8	max	.027	3	.585	3	0	1	0	1	7770.073	15	NC	1
548			min	-.02	2	-.726	2	0	1	0	1	128.195	2	NC	1
549		9	max	.026	3	.65	3	0	1	0	1	7211.902	15	NC	1
550			min	-.019	2	-.796	2	0	1	0	1	119.051	2	NC	1
551		10	max	.026	3	.673	3	0	1	0	1	7044.193	15	NC	1
552			min	-.019	2	-.82	2	0	1	0	1	116.397	2	NC	1
553		11	max	.025	3	.655	3	0	1	0	1	7212.936	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	-.019	2	-.796	2	0	1	0	1	119.599	2	NC	1
555		12	max	.024	3	.597	3	0	1	0	1	7772.432	15	NC	1
556			min	-.018	2	-.722	2	0	1	0	1	130.056	2	NC	1
557		13	max	.024	3	.504	3	0	1	0	1	8866.661	15	NC	1
558			min	-.018	2	-.603	2	0	1	0	1	150.991	2	NC	1
559		14	max	.023	3	.389	3	0	1	0	1	NC	15	NC	1
560			min	-.018	2	-.456	2	0	1	0	1	188.186	2	NC	1
561		15	max	.022	3	.262	3	0	1	0	1	NC	15	NC	1
562			min	-.018	2	-.298	2	0	1	0	1	255.635	2	NC	1
563		16	max	.022	3	.134	3	0	1	0	1	NC	5	NC	1
564			min	-.017	2	-.147	2	0	1	0	1	389.632	2	NC	1
565		17	max	.021	3	.017	3	0	1	0	1	NC	5	NC	1
566			min	-.017	2	-.02	2	0	1	0	1	700.174	2	NC	1
567		18	max	.021	3	.07	2	0	1	0	1	NC	4	NC	1
568			min	-.017	2	-.08	3	0	1	0	1	1514.564	3	NC	1
569		19	max	.021	3	.139	2	0	1	0	1	NC	1	NC	1
570			min	-.017	2	-.164	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.119	2	0	15	1.042e-2	3	NC	1	NC	1
572			min	-.007	2	-.037	3	0	1	-3.722e-3	2	NC	1	NC	1
573		2	max	.01	3	.055	2	.002	1	5.163e-3	3	NC	4	NC	1
574			min	-.007	2	-.014	3	0	15	-1.828e-3	2	1798.026	2	NC	1
575		3	max	.01	3	.017	3	.003	1	8.284e-5	3	NC	5	NC	1
576			min	-.007	2	-.013	2	0	15	-3.177e-5	2	874.018	2	NC	1
577		4	max	.01	3	.062	3	.002	1	2.707e-3	3	NC	5	NC	1
578			min	-.007	2	-.087	2	0	15	-2.453e-3	2	558.78	2	NC	1
579		5	max	.01	3	.116	3	.002	1	5.33e-3	3	NC	5	NC	1
580			min	-.007	2	-.163	2	0	15	-4.874e-3	2	407.72	2	NC	1
581		6	max	.01	3	.173	3	0	1	7.954e-3	3	NC	5	NC	1
582			min	-.006	2	-.236	2	0	10	-7.295e-3	2	323.881	2	NC	1
583		7	max	.01	3	.226	3	0	3	1.058e-2	3	NC	15	NC	1
584			min	-.006	2	-.301	2	0	1	-9.716e-3	2	274.075	2	NC	1
585		8	max	.009	3	.27	3	0	15	1.32e-2	3	NC	15	NC	1
586			min	-.006	2	-.352	2	0	1	-1.214e-2	2	244.474	2	NC	1
587		9	max	.009	3	.298	3	0	1	1.366e-2	3	NC	15	NC	1
588			min	-.006	2	-.384	2	0	15	-1.364e-2	2	229.013	2	NC	1
589		10	max	.009	3	.308	3	0	10	1.269e-2	3	NC	15	NC	1
590			min	-.006	2	-.395	2	0	1	-1.452e-2	2	224.514	2	NC	1
591		11	max	.009	3	.301	3	0	15	1.171e-2	3	NC	15	NC	1
592			min	-.006	2	-.384	2	0	1	-1.541e-2	2	229.943	2	NC	1
593		12	max	.008	3	.276	3	0	1	1.031e-2	3	NC	15	NC	1
594			min	-.006	2	-.35	2	0	15	-1.477e-2	2	247.21	2	NC	1
595		13	max	.008	3	.235	3	0	1	8.248e-3	3	NC	15	NC	1
596			min	-.006	2	-.296	2	0	10	-1.184e-2	2	280.536	2	NC	1
597		14	max	.008	3	.184	3	0	15	6.19e-3	3	NC	5	NC	1
598			min	-.006	2	-.228	2	0	1	-8.909e-3	2	337.359	2	NC	1
599		15	max	.008	3	.126	3	0	15	4.132e-3	3	NC	5	NC	1
600			min	-.006	2	-.153	2	-.002	1	-5.979e-3	2	434.819	2	NC	1
601		16	max	.008	3	.065	3	0	15	2.073e-3	3	NC	5	NC	1
602			min	-.005	2	-.077	2	-.002	1	-3.048e-3	2	614.472	2	NC	1
603		17	max	.007	3	.006	3	0	15	1.516e-5	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.003	1	-1.905e-4	1	996.874	2	NC	1
605		18	max	.007	3	.052	2	0	15	1.343e-3	3	NC	4	NC	1
606			min	-.005	2	-.047	3	-.002	1	-3.542e-3	2	2105.458	2	NC	1
607		19	max	.007	3	.106	2	0	1	2.749e-3	3	NC	1	NC	1
608			min	-.005	2	-.098	3	0	15	-7.114e-3	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

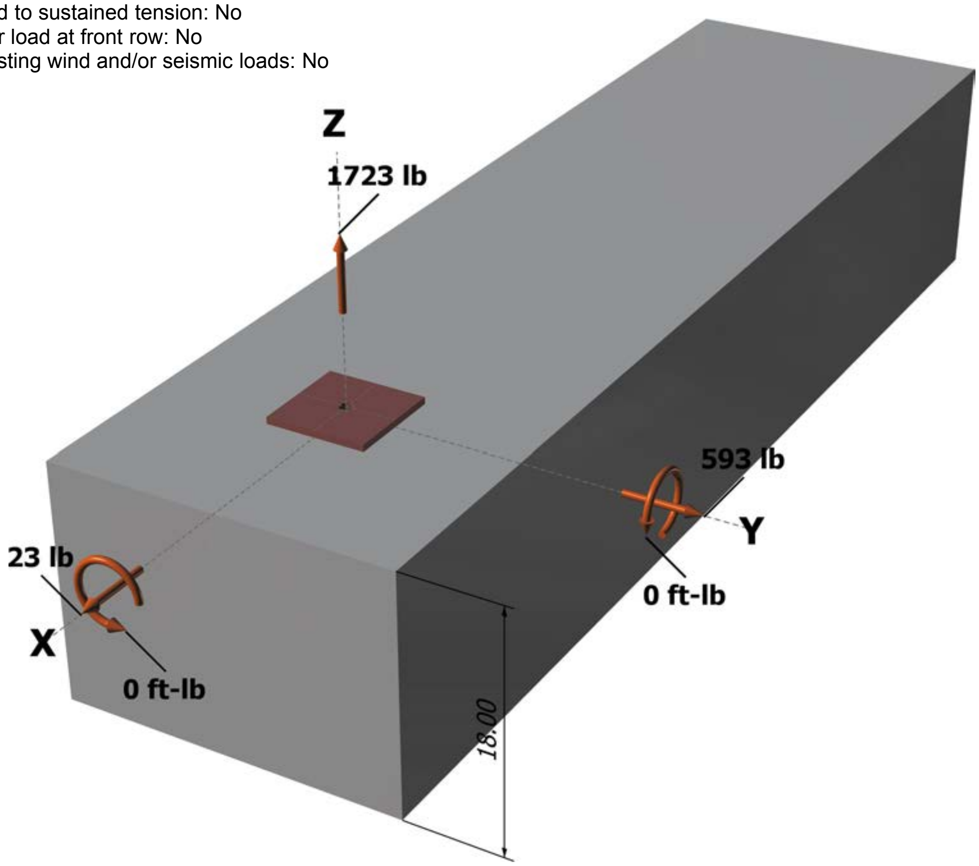
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

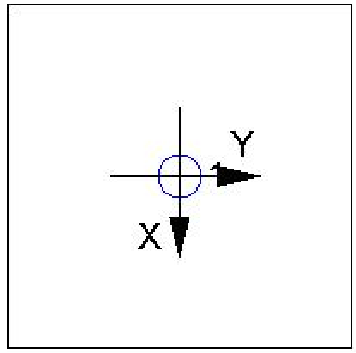
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

$\tau_{k,cr}$ (psi)	$f_{short-term}$	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	1723	6071	0.28	Pass
Concrete breakout	1723	5710	0.30	Pass
Adhesive	**1723**	**5365**	**0.32**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

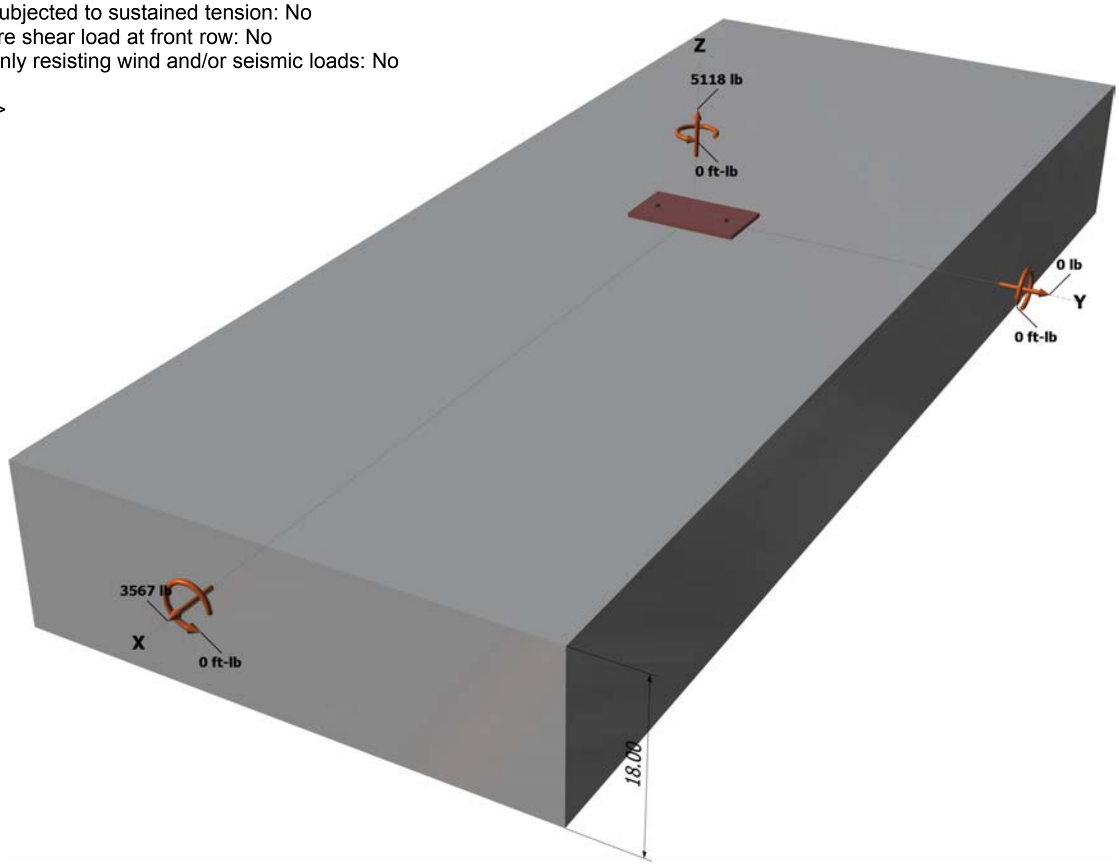
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

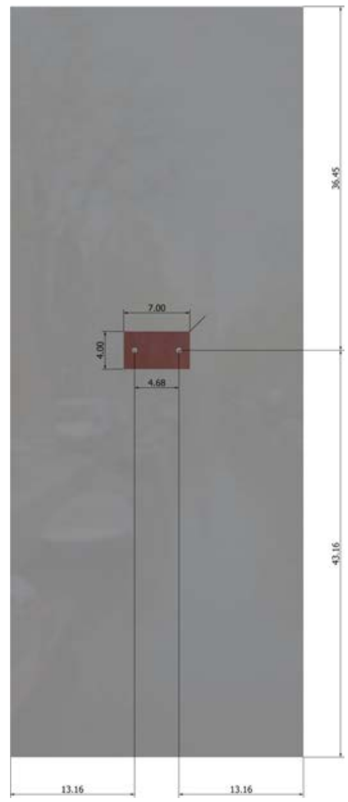
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

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

<Figure 1>



<Figure 2>



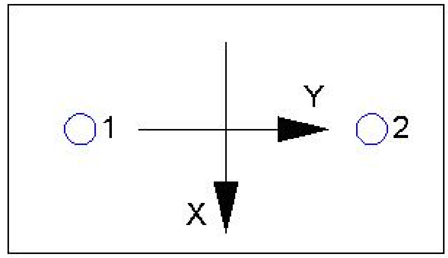
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2559.0	1783.5	0.0	1783.5
2	2559.0	1783.5	0.0	1783.5
Sum	5118.0	3567.0	0.0	3567.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5118
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
558.00	648.00	1.000	0.919	1.000	1.000	15593	0.70	8641

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	13.16	17908

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
710.64	779.34	1.000	1.000	1.000	17908	0.70	22862

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

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

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

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

ϕV_{cpg} (lb)
20601

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	2559	6071	0.42	Pass
Concrete breakout	5118	10231	0.50	Pass
Adhesive	**5118**	**8093**	**0.63**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, $øV_n$ (lb)	Ratio	Status
Steel	**1784**	**3156**	**0.57**	**Pass (Governs)**
T Concrete breakout x+	3567	8641	0.41	Pass
|| Concrete breakout y-	1784	22862	0.08	Pass
Pryout	3567	20601	0.17	Pass

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

Sec. D.7.3	0.63	0.57	119.8 %	1.2	Pass

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

12. Warnings

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

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

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