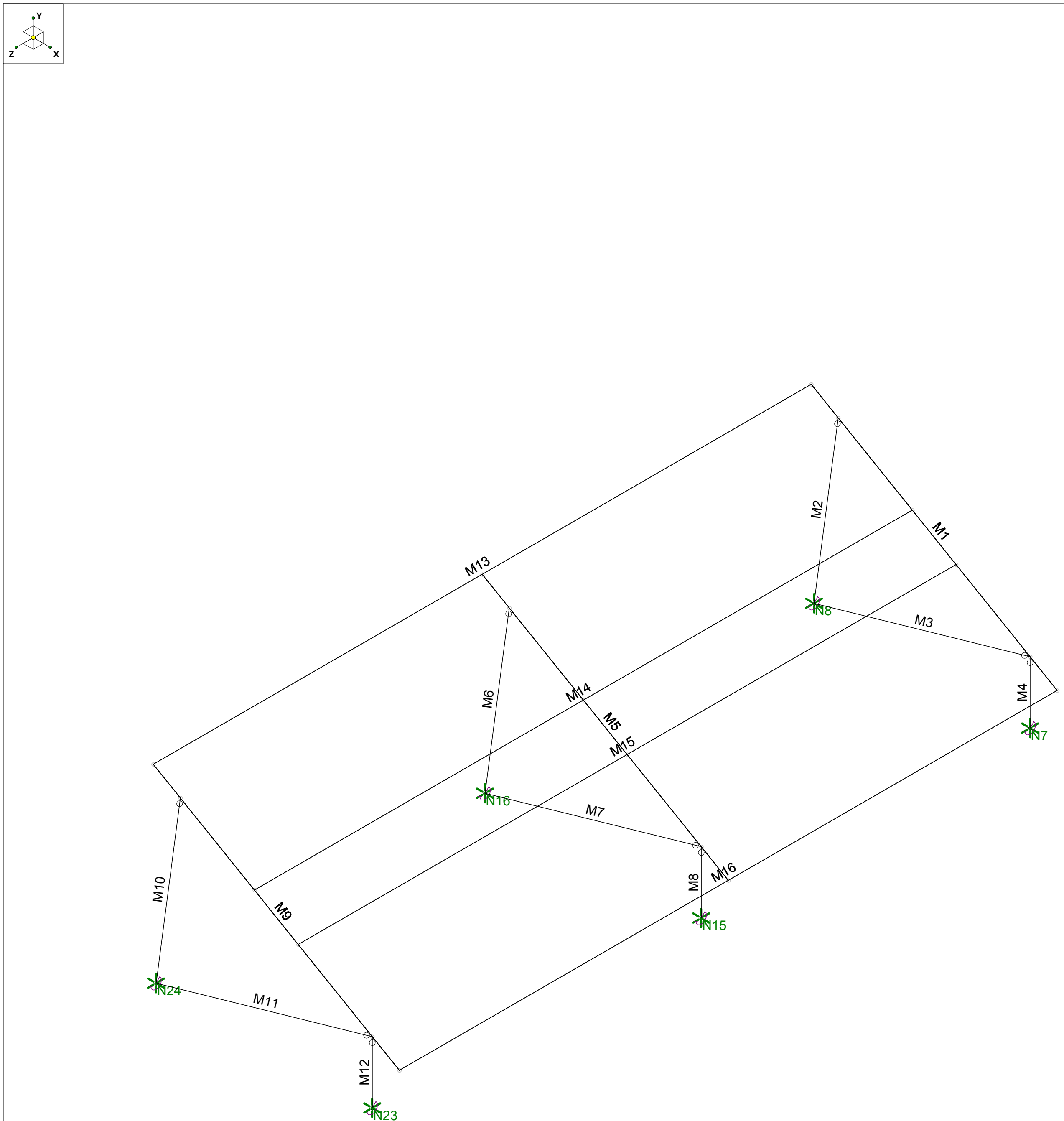


Schletter, Inc.		30° Tilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

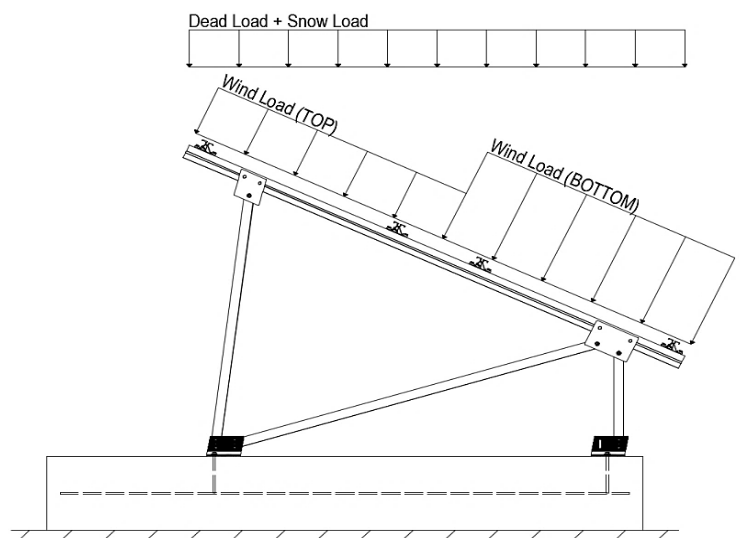
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMax ground mount system.

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

PV modules are required to meet the following specifications:

	Maximum		Minimum
Height =	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 = 30°
Maximum Height Above Grade = 3 ft



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

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

2. LOAD ACTIONS

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

Self-weight of the PV modules.

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

2.3 Wind Loads
Design Wind Speed, V = 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

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

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

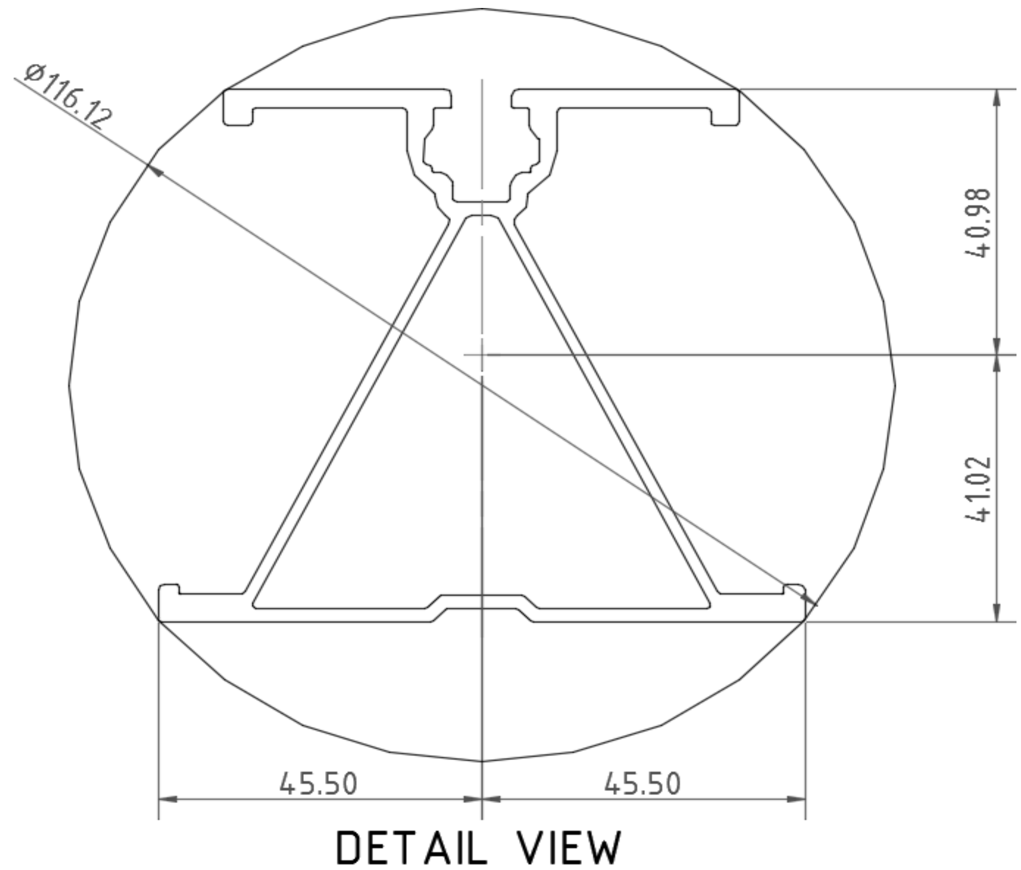
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

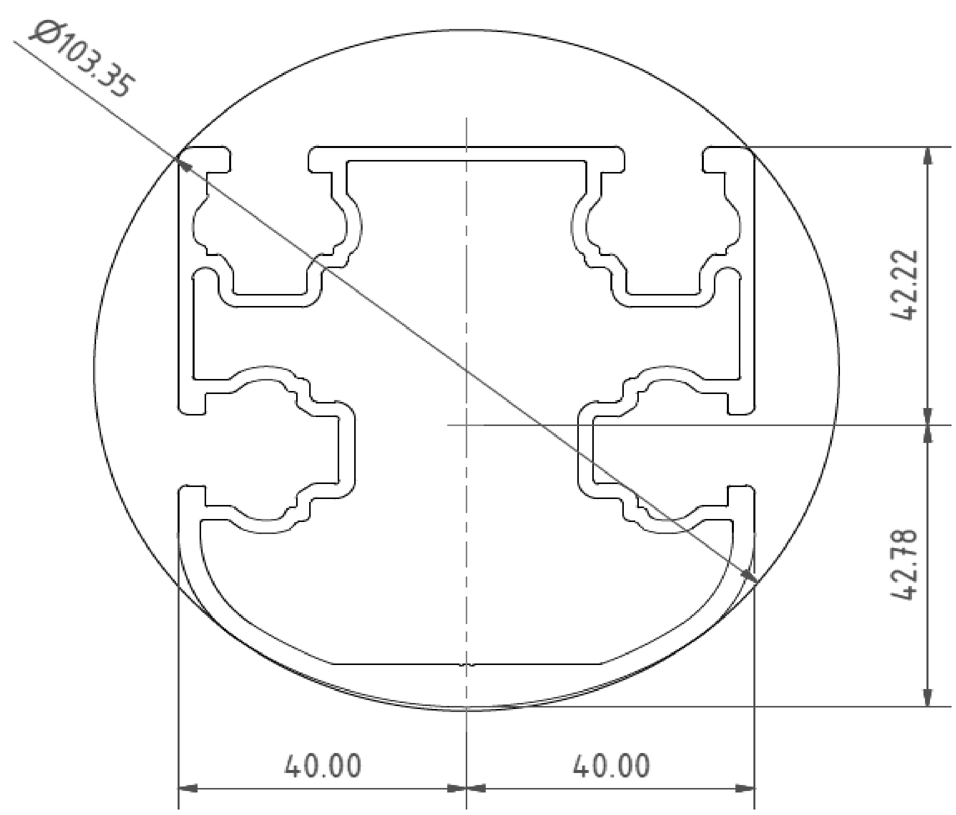
Purlin Type =	**S1.5**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	81	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	-1.694	k-ft
M_z =	-0.003	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	61%	



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).

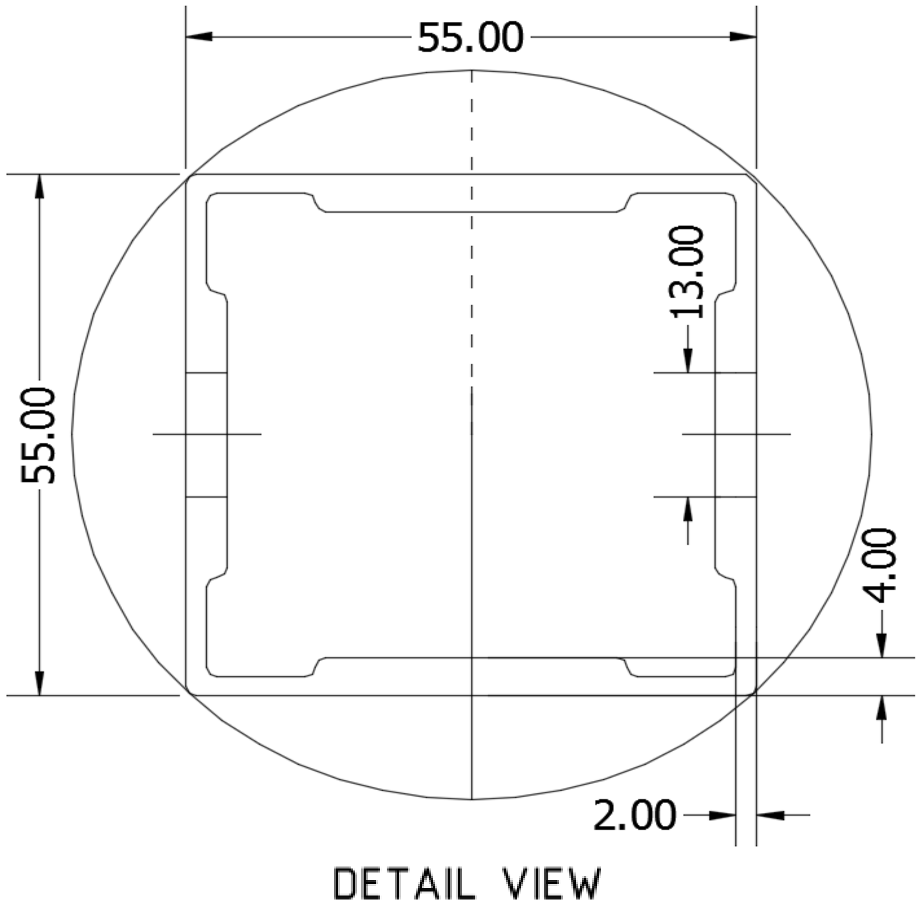
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.792	k-ft
M_z =	0.000	k-ft
P_n =	-0.912	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	82%	



4.3 Front Strut Design

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

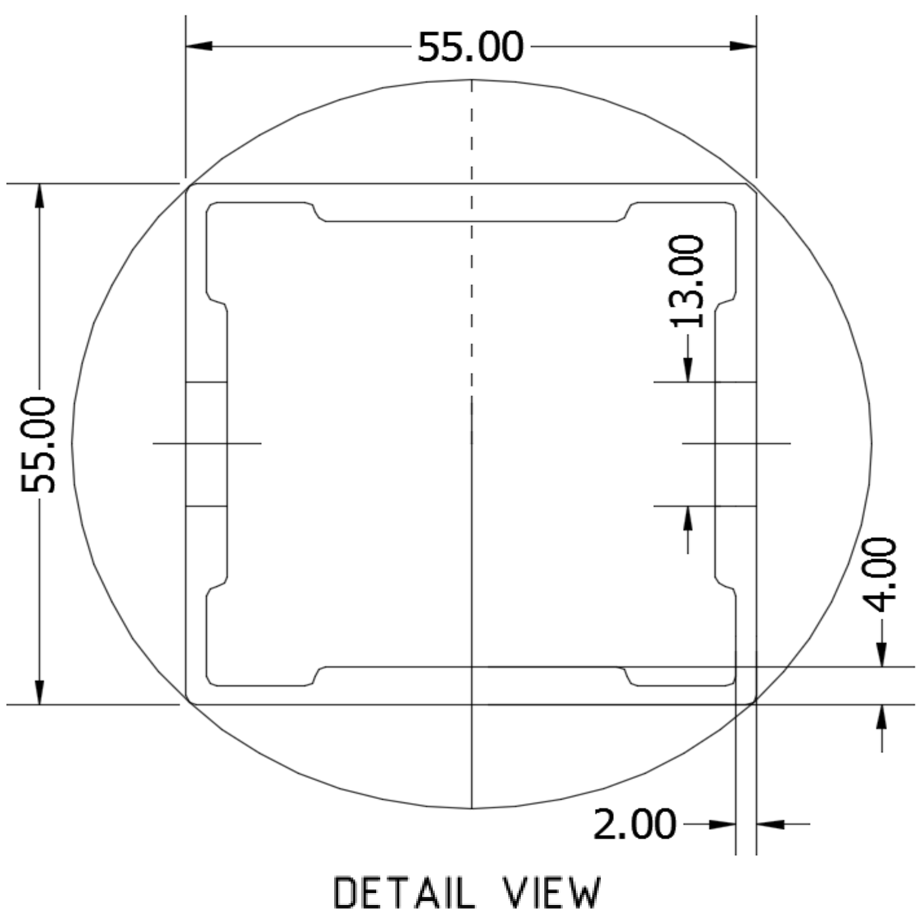
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.317	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	8%	



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).

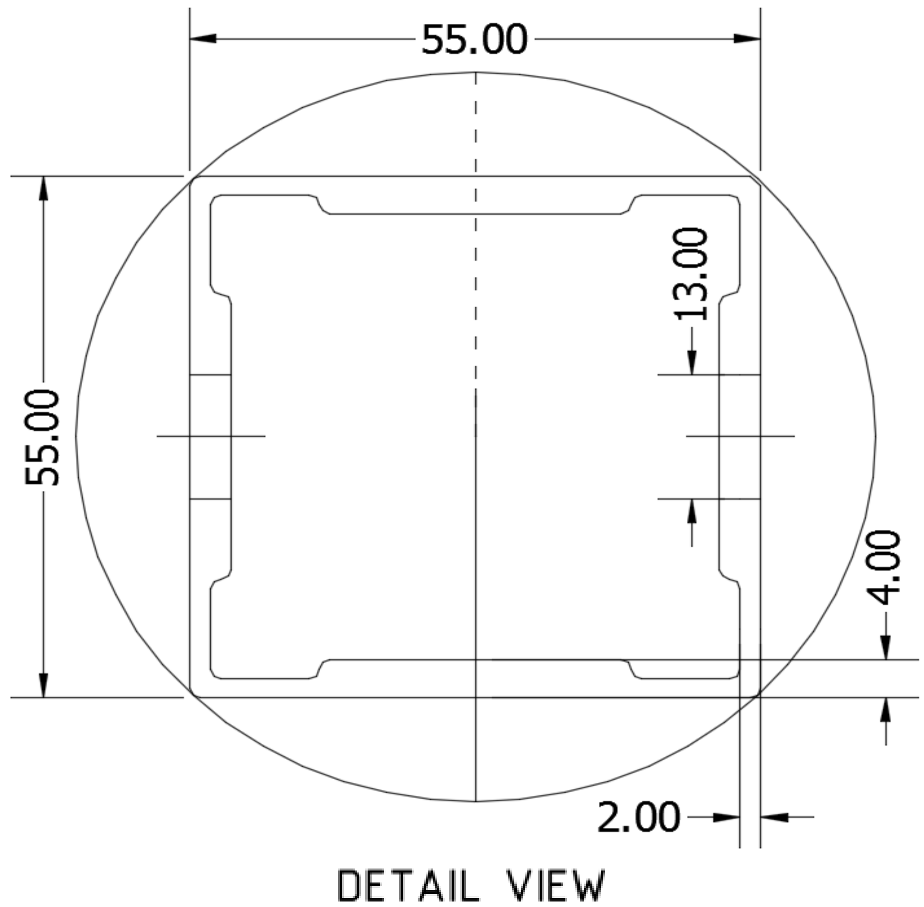
Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	2.637	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	36%	



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 =	70.83	in
$\Phi F_{ty\ AXIAL}$ =	10.55	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 =	-0.010	k-ft
M_z =	0.000	k-ft
P_n =	3.085	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	10.365	k
Utilization =	30%	



5. FOUNDATION DESIGN CALCULATIONS

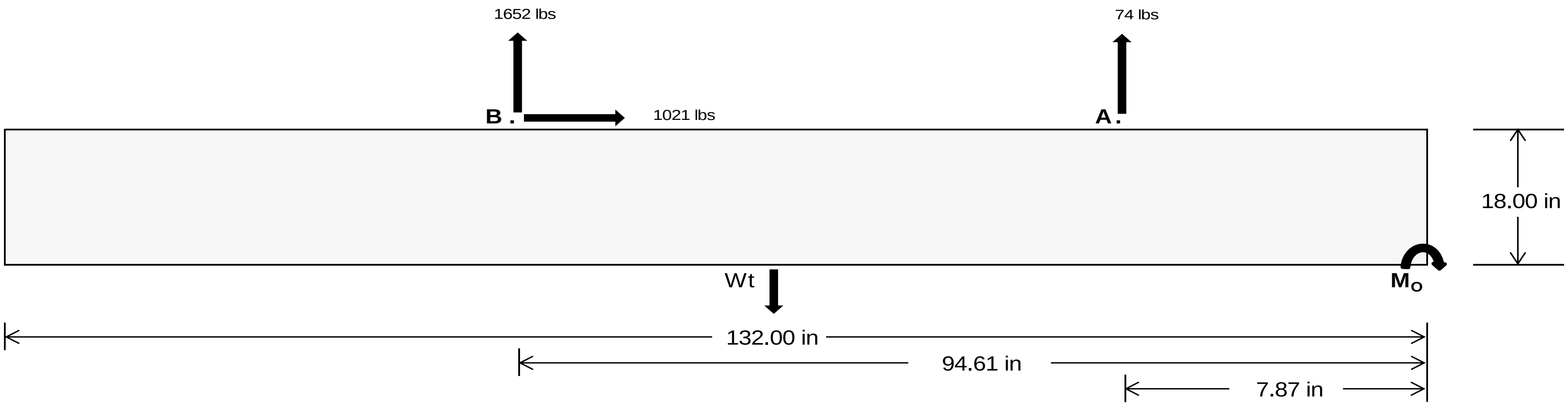
5.1 Helical Pile Foundations

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 =	316.08	6877.52	k
Compressive Load =	3012.60	4923.12	k
Lateral Load =	6.48	4248.22	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 (3) #5 rebar.

Overturning Check

M_O =	175233.7 in-lbs
Resisting Force Required =	2655.06 lbs
S.F. =	1.67
Weight Required =	4425.09 lbs
Minimum Width =	36 in in
Weight Provided =	7177.50 lbs

A minimum 132in long x 36in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	1021.30 lbs
Friction =	0.4
Weight Required =	2553.26 lbs
Resisting Weight =	7177.50 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 36in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	1021.30 lbs
Cohesion =	130 psf
Area =	33.00 ft^2
Resisting =	3588.75 lbs
Additional Weight Required =	0 lbs

Use a 132in long x 36in 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			
	36 in	37 in	38 in	39 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(3 ft) =	7178 lbs	7377 lbs	7576 lbs	7776 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in	36 in	37 in	38 in	39 in
F_A	833 lbs	833 lbs	833 lbs	833 lbs	1291 lbs	1291 lbs	1291 lbs	1291 lbs	1502 lbs	1502 lbs	1502 lbs	1502 lbs	-147 lbs	-147 lbs	-147 lbs	-147 lbs
F_B	775 lbs	775 lbs	775 lbs	775 lbs	2219 lbs	2219 lbs	2219 lbs	2219 lbs	2161 lbs	2161 lbs	2161 lbs	2161 lbs	-3304 lbs	-3304 lbs	-3304 lbs	-3304 lbs
F_V	107 lbs	107 lbs	107 lbs	107 lbs	1828 lbs	1828 lbs	1828 lbs	1828 lbs	1441 lbs	1441 lbs	1441 lbs	1441 lbs	-2043 lbs	-2043 lbs	-2043 lbs	-2043 lbs
P_{total}	8786 lbs	8985 lbs	9185 lbs	9384 lbs	10687 lbs	10887 lbs	11086 lbs	11285 lbs	10840 lbs	11040 lbs	11239 lbs	11438 lbs	855 lbs	975 lbs	1095 lbs	1214 lbs
M	2349 lbs-ft	2349 lbs-ft	2349 lbs-ft	2349 lbs-ft	3704 lbs-ft	3704 lbs-ft	3704 lbs-ft	3704 lbs-ft	4285 lbs-ft	4285 lbs-ft	4285 lbs-ft	4285 lbs-ft	4097 lbs-ft	4097 lbs-ft	4097 lbs-ft	4097 lbs-ft
e	0.27 ft	0.26 ft	0.26 ft	0.25 ft	0.35 ft	0.34 ft	0.33 ft	0.33 ft	0.40 ft	0.39 ft	0.38 ft	0.37 ft	4.79 ft	4.20 ft	3.74 ft	3.37 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}	227.4 psf	227.1 psf	226.9 psf	226.7 psf	262.6 psf	261.4 psf	260.3 psf	259.2 psf	257.7 psf	256.6 psf	255.6 psf	254.6 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	305.1 psf	302.7 psf	300.5 psf	298.3 psf	385.1 psf	380.6 psf	376.3 psf	372.2 psf	399.3 psf	394.4 psf	389.7 psf	385.3 psf	267.5 psf	162.4 psf	131.1 psf	117.2 psf

Maximum Bearing Pressure = 399 psf
Allowable Bearing Pressure = 1500 psf

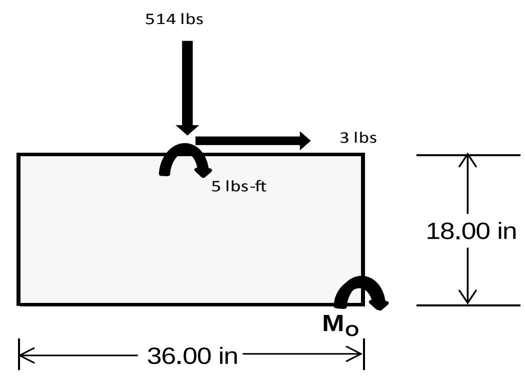
Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 761.9 ft-lbs
Resisting Force Required = 507.91 lbs
S.F. = 1.67
Weight Required = 846.52 lbs
Minimum Width = 36 in in
Weight Provided = 7177.50 lbs

A minimum 132in long x 36in wide x 18in tall ballast foundation is required to resist overturning.



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

Use a 132in long x 36in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	36 in			36 in			36 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	187 lbs	436 lbs	187 lbs	514 lbs	1357 lbs	514 lbs	55 lbs	127 lbs	55 lbs
F_V	1 lbs	0 lbs	1 lbs	3 lbs	0 lbs	3 lbs	0 lbs	0 lbs	0 lbs
P_{total}	9073 lbs	7178 lbs	9073 lbs	8973 lbs	7178 lbs	8973 lbs	2653 lbs	7178 lbs	2653 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	9 lbs-ft	0 lbs-ft	9 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	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft	0.50 ft
f_{min}	274.8 psf	217.5 psf	274.8 psf	271.4 psf	217.5 psf	271.4 psf	80.4 psf	217.5 psf	80.4 psf
f_{max}	275.1 psf	217.5 psf	275.1 psf	272.4 psf	217.5 psf	272.4 psf	80.4 psf	217.5 psf	80.4 psf

Foundation Requirements: 132in long x 36in wide x 18in tall ballast foundation and fiber reinforcing with (3) #5 rebar.

5.3 Foundation Anchors

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

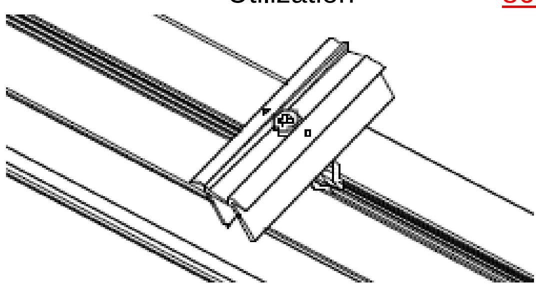
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

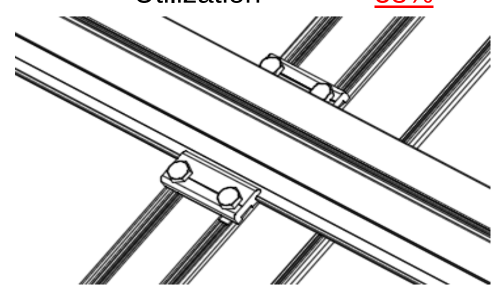
<u>Fastening of Modules to Purlins</u>

Maximum Uplifting Force =	1.045	k
Allowable Uplift =	1.214	k
Utilization =	<u>86%</u>	



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

Maximum Uplifting Force =	2.533	k
Allowable Uplift =	4.357	k
Utilization =	<u>58%</u>	



6.2 Strut Connections

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

<u>Front Strut</u>

Maximum Axial Load =	2.317	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>31%</u>	

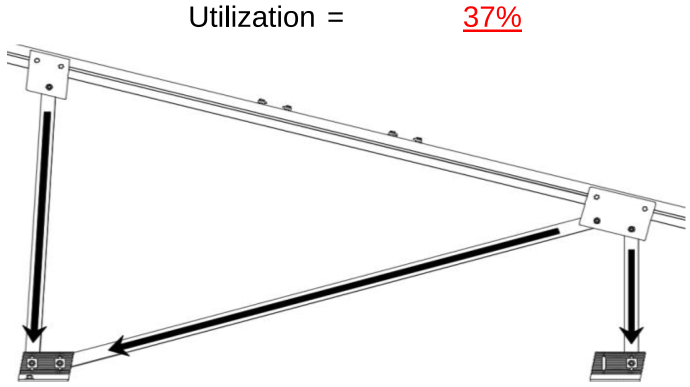
<u>Rear Strut</u>

Maximum Axial Load =	4.595	k
M12 Bolt Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>62%</u>	

<u>Diagonal Strut</u>

Maximum Axial Load =	2.734	k
M12 Bolt Shear Capacity =	12.808	k
Strut Bearing Capacity =	7.421	k
Utilization =	<u>37%</u>	

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



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

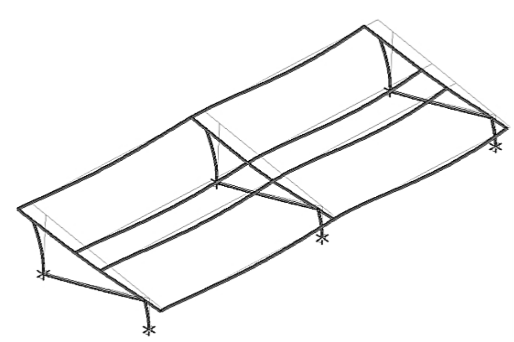
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	48.27	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.965	in
Max Drift, Δ_{MAX} =	0.013	in
<u>N/A</u>		

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 81 in

J = 0.432

224.084

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

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= 28.5 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 = 81

J = 0.432

142.504

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

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= 29.5

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 = **55x55**

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

3.4.16.1 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

3.4.18

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

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

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

$\varphi F_L Wk =$ 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)
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

b/t = 24.5
S1 = 12.21
S2 = 32.70
$\varphi F_L = \varphi c[Bp-1.6Dp*b/t]$
$\varphi F_L =$ 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87
S2 = 131.3
$\varphi F_L = \varphi yFcy$
$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.50 ksi
A = 663.99 mm^2
1.03 in^2
$P_{max} =$ 7.72 kips

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

Strut = **55x55**

Strong Axis:
3.4.14

$L_b =$ 70.83 in
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.0 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

Weak Axis:
3.4.14

$L_b =$ 70.83
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
$\varphi F_L = \varphi b[Bc-1.6Dc*\sqrt{((LbSc)/(Cb*\sqrt{(IyJ)/2}))}]$
$\varphi F_L =$ 30.0

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

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 = 1.63853

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80939

φF_L= (φccFcy)/(λ²)

φF_L= 10.5516 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

$\varphi F_L =$ 10.55 ksi

A = 663.99 mm^2

1.03 in^2

$P_{max} =$ 10.86 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	-39.836	-39.836	0	0
2	M14	Y	-39.836	-39.836	0	0
3	M15	Y	-39.836	-39.836	0	0
4	M16	Y	-39.836	-39.836	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	-85.097	-85.097	0	0
2	M14	y	-85.097	-85.097	0	0
3	M15	y	-136.895	-136.895	0	0
4	M16	y	-136.895	-136.895	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	192.393	192.393	0	0
2	M14	y	147.995	147.995	0	0
3	M15	y	81.397	81.397	0	0
4	M16	y	81.397	81.397	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	918.036	2	1238.258	2	.305	1	.001	1	0	1	0	1
2		min	-1083.115	3	-1696.22	3	.016	15	0	15	0	1	0	1
3	N7	max	.016	9	814.963	1	-.249	15	0	15	0	1	0	1
4		min	-.215	2	-43.892	3	-4.981	1	-.01	1	0	1	0	1
5	N15	max	.019	9	2317.385	2	0	3	0	3	0	1	0	1
6		min	-2.074	2	-243.142	3	0	11	0	11	0	1	0	1
7	N16	max	2961.459	2	3787.017	2	0	11	0	2	0	1	0	1
8		min	-3267.864	3	-5290.4	3	0	3	0	3	0	1	0	1
9	N23	max	.016	9	814.963	1	4.981	1	.01	1	0	1	0	1
10		min	-.215	2	-43.892	3	.249	15	0	15	0	1	0	1
11	N24	max	918.036	2	1238.258	2	-.016	15	0	15	0	1	0	1
12		min	-1083.115	3	-1696.22	3	-.305	1	-.001	1	0	1	0	1
13	Totals:	max	4795.027	2	10166.322	2	0	1						
14		min	-5434.366	3	-9013.765	3	0	11						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	46.212	1	403.795	2	-5.725	15	0	15	.11	1	0	2
2			min	2.278	15	-772.298	3	-119.589	1	-.013	2	.005	15	0	3
3		2	max	46.212	1	281.048	2	-4.385	15	0	15	.031	1	.494	3
4			min	2.278	15	-544.907	3	-91.246	1	-.013	2	0	10	-.257	2
5		3	max	46.212	1	158.302	2	-3.045	15	0	15	.005	3	.817	3
6			min	2.278	15	-317.516	3	-62.903	1	-.013	2	-.027	1	-.422	2
7		4	max	46.212	1	35.556	2	-1.705	15	0	15	0	12	.97	3
8			min	2.278	15	-90.125	3	-34.56	1	-.013	2	-.064	1	-.494	2
9		5	max	46.212	1	137.266	3	.869	10	0	15	-.003	12	.953	3
10			min	2.278	15	-87.191	2	-6.218	1	-.013	2	-.079	1	-.475	2
11		6	max	46.212	1	364.657	3	22.125	1	0	15	-.003	15	.764	3
12			min	2.278	15	-209.937	2	-2.507	3	-.013	2	-.073	1	-.363	2
13		7	max	46.212	1	592.048	3	50.468	1	0	15	-.002	15	.406	3
14			min	2.278	15	-332.683	2	-.497	3	-.013	2	-.046	1	-.16	2
15		8	max	46.212	1	819.439	3	78.811	1	0	15	.006	2	.136	2
16			min	2.278	15	-455.43	2	1.17	12	-.013	2	-.008	3	-.124	3
17		9	max	46.212	1	1046.83	3	107.154	1	0	15	.072	1	.523	2
18			min	2.278	15	-578.176	2	2.51	12	-.013	2	-.006	3	-.824	3
19		10	max	46.212	1	1274.221	3	135.497	1	.013	2	.163	1	1.003	2
20			min	2.278	15	-700.923	2	3.85	12	-.003	3	-.003	3	-1.694	3
21		11	max	46.212	1	578.176	2	-2.51	12	.013	2	.072	1	.523	2
22			min	2.278	15	-1046.83	3	-107.154	1	0	15	-.006	3	-.824	3
23		12	max	46.212	1	455.43	2	-1.17	12	.013	2	.006	2	.136	2
24			min	2.278	15	-819.439	3	-78.811	1	0	15	-.008	3	-.124	3
25		13	max	46.212	1	332.683	2	.497	3	.013	2	-.002	15	.406	3
26			min	2.278	15	-592.048	3	-50.468	1	0	15	-.046	1	-.16	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	46.212	1	209.937	2	2.507	3	.013	2	-.003	15	.764	3
28			min	2.278	15	-364.657	3	-22.125	1	0	15	-.073	1	-.363	2
29		15	max	46.212	1	87.191	2	6.218	1	.013	2	-.003	12	.953	3
30			min	2.278	15	-137.266	3	-.869	10	0	15	-.079	1	-.475	2
31		16	max	46.212	1	90.125	3	34.56	1	.013	2	0	12	.97	3
32			min	2.278	15	-35.556	2	1.705	15	0	15	-.064	1	-.494	2
33		17	max	46.212	1	317.516	3	62.903	1	.013	2	.005	3	.817	3
34			min	2.278	15	-158.302	2	3.045	15	0	15	-.027	1	-.422	2
35		18	max	46.212	1	544.907	3	91.246	1	.013	2	.031	1	.494	3
36			min	2.278	15	-281.048	2	4.385	15	0	15	0	10	-.257	2
37		19	max	46.212	1	772.298	3	119.589	1	.013	2	.11	1	0	2
38			min	2.278	15	-403.795	2	5.725	15	0	15	.005	15	0	3
39	M14	1	max	27.626	1	472.444	2	-5.967	15	.012	3	.132	1	0	2
40			min	1.351	15	-634.944	3	-124.63	1	-.013	2	.006	15	0	3
41		2	max	27.626	1	349.697	2	-4.627	15	.012	3	.049	1	.411	3
42			min	1.351	15	-460.831	3	-96.287	1	-.013	2	.002	10	-.308	2
43		3	max	27.626	1	226.951	2	-3.287	15	.012	3	.007	3	.691	3
44			min	1.351	15	-286.717	3	-67.944	1	-.013	2	-.012	1	-.525	2
45		4	max	27.626	1	104.205	2	-1.947	15	.012	3	0	3	.841	3
46			min	1.351	15	-112.604	3	-39.601	1	-.013	2	-.053	1	-.649	2
47		5	max	27.626	1	61.51	3	.305	10	.012	3	-.003	12	.86	3
48			min	1.351	15	-18.542	2	-11.258	1	-.013	2	-.072	1	-.681	2
49		6	max	27.626	1	235.623	3	17.085	1	.012	3	-.003	15	.749	3
50			min	1.351	15	-141.288	2	-2.96	3	-.013	2	-.07	1	-.621	2
51		7	max	27.626	1	409.736	3	45.428	1	.012	3	-.002	15	.507	3
52			min	1.351	15	-264.035	2	-.95	3	-.013	2	-.046	1	-.469	2
53		8	max	27.626	1	583.85	3	73.77	1	.012	3	.004	2	.134	3
54			min	1.351	15	-386.781	2	.872	12	-.013	2	-.008	3	-.225	2
55		9	max	27.626	1	757.963	3	102.113	1	.012	3	.065	1	.111	2
56			min	1.351	15	-509.527	2	2.211	12	-.013	2	-.007	3	-.369	3
57		10	max	27.626	1	932.077	3	130.456	1	.013	2	.152	1	.539	2
58			min	1.351	15	-632.274	2	3.551	12	-.012	3	-.003	3	-1.003	3
59		11	max	27.626	1	509.527	2	-2.211	12	.013	2	.065	1	.111	2
60			min	1.351	15	-757.963	3	-102.113	1	-.012	3	-.007	3	-.369	3
61		12	max	27.626	1	386.781	2	-.872	12	.013	2	.004	2	.134	3
62			min	1.351	15	-583.85	3	-73.77	1	-.012	3	-.008	3	-.225	2
63		13	max	27.626	1	264.035	2	.95	3	.013	2	-.002	15	.507	3
64			min	1.351	15	-409.736	3	-45.428	1	-.012	3	-.046	1	-.469	2
65		14	max	27.626	1	141.288	2	2.96	3	.013	2	-.003	15	.749	3
66			min	1.351	15	-235.623	3	-17.085	1	-.012	3	-.07	1	-.621	2
67		15	max	27.626	1	18.542	2	11.258	1	.013	2	-.003	12	.86	3
68			min	1.351	15	-61.51	3	-.305	10	-.012	3	-.072	1	-.681	2
69		16	max	27.626	1	112.604	3	39.601	1	.013	2	0	3	.841	3
70			min	1.351	15	-104.205	2	1.947	15	-.012	3	-.053	1	-.649	2
71		17	max	27.626	1	286.717	3	67.944	1	.013	2	.007	3	.691	3
72			min	1.351	15	-226.951	2	3.287	15	-.012	3	-.012	1	-.525	2
73		18	max	27.626	1	460.831	3	96.287	1	.013	2	.049	1	.411	3
74			min	1.351	15	-349.697	2	4.627	15	-.012	3	.002	10	-.308	2
75		19	max	27.626	1	634.944	3	124.63	1	.013	2	.132	1	0	2
76			min	1.351	15	-472.444	2	5.967	15	-.012	3	.006	15	0	3
77	M15	1	max	-1.402	15	682.332	2	-5.965	15	.014	2	.132	1	0	2
78			min	-28.355	1	-365.768	3	-124.677	1	-.01	3	.006	15	0	3
79		2	max	-1.402	15	497.428	2	-4.625	15	.014	2	.049	1	.239	3
80			min	-28.355	1	-271.572	3	-96.334	1	-.01	3	.002	10	-.442	2
81		3	max	-1.402	15	312.524	2	-3.285	15	.014	2	.006	3	.407	3
82			min	-28.355	1	-177.376	3	-67.991	1	-.01	3	-.012	1	-.746	2
83		4	max	-1.402	15	127.62	2	-1.945	15	.014	2	0	3	.505	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	-28.355	1	-83.18	3	-39.648	1	-.01	3	-.053	1	-.911	2
85		5	max	-1.402	15	11.015	3	.199	10	.014	2	-.003	12	.532	3
86			min	-28.355	1	-57.284	2	-11.306	1	-.01	3	-.072	1	-.938	2
87		6	max	-1.402	15	105.211	3	17.037	1	.014	2	-.003	15	.489	3
88			min	-28.355	1	-242.188	2	-2.633	3	-.01	3	-.07	1	-.825	2
89		7	max	-1.402	15	199.407	3	45.38	1	.014	2	-.002	15	.374	3
90			min	-28.355	1	-427.092	2	-.623	3	-.01	3	-.046	1	-.574	2
91		8	max	-1.402	15	293.603	3	73.723	1	.014	2	.004	2	.189	3
92			min	-28.355	1	-611.996	2	1.077	12	-.01	3	-.007	3	-.185	2
93		9	max	-1.402	15	387.799	3	102.066	1	.014	2	.064	1	.344	2
94			min	-28.355	1	-796.9	2	2.416	12	-.01	3	-.006	3	-.066	3
95		10	max	-1.402	15	481.994	3	130.409	1	.01	3	.152	1	1.011	2
96			min	-28.355	1	-981.804	2	3.756	12	-.014	2	-.002	3	-.392	3
97		11	max	-1.402	15	796.9	2	-2.416	12	.01	3	.064	1	.344	2
98			min	-28.355	1	-387.799	3	-102.066	1	-.014	2	-.006	3	-.066	3
99		12	max	-1.402	15	611.996	2	-1.077	12	.01	3	.004	2	.189	3
100			min	-28.355	1	-293.603	3	-73.723	1	-.014	2	-.007	3	-.185	2
101		13	max	-1.402	15	427.092	2	.623	3	.01	3	-.002	15	.374	3
102			min	-28.355	1	-199.407	3	-45.38	1	-.014	2	-.046	1	-.574	2
103		14	max	-1.402	15	242.188	2	2.633	3	.01	3	-.003	15	.489	3
104			min	-28.355	1	-105.211	3	-17.037	1	-.014	2	-.07	1	-.825	2
105		15	max	-1.402	15	57.284	2	11.306	1	.01	3	-.003	12	.532	3
106			min	-28.355	1	-11.015	3	-.199	10	-.014	2	-.072	1	-.938	2
107		16	max	-1.402	15	83.18	3	39.648	1	.01	3	0	3	.505	3
108			min	-28.355	1	-127.62	2	1.945	15	-.014	2	-.053	1	-.911	2
109		17	max	-1.402	15	177.376	3	67.991	1	.01	3	.006	3	.407	3
110			min	-28.355	1	-312.524	2	3.285	15	-.014	2	-.012	1	-.746	2
111		18	max	-1.402	15	271.572	3	96.334	1	.01	3	.049	1	.239	3
112			min	-28.355	1	-497.428	2	4.625	15	-.014	2	.002	10	-.442	2
113		19	max	-1.402	15	365.768	3	124.677	1	.01	3	.132	1	0	2
114			min	-28.355	1	-682.332	2	5.965	15	-.014	2	.006	15	0	3
115	M16	1	max	-2.459	15	617.07	2	-5.732	15	.007	2	.111	1	0	2
116			min	-50.159	1	-307.14	3	-120.034	1	-.012	3	.005	15	0	3
117		2	max	-2.459	15	432.166	2	-4.392	15	.007	2	.032	1	.195	3
118			min	-50.159	1	-212.944	3	-91.691	1	-.012	3	0	10	-.393	2
119		3	max	-2.459	15	247.262	2	-3.052	15	.007	2	.003	3	.319	3
120			min	-50.159	1	-118.748	3	-63.348	1	-.012	3	-.026	1	-.648	2
121		4	max	-2.459	15	62.358	2	-1.712	15	.007	2	-.001	12	.373	3
122			min	-50.159	1	-24.553	3	-35.005	1	-.012	3	-.063	1	-.764	2
123		5	max	-2.459	15	69.643	3	.482	10	.007	2	-.003	12	.356	3
124			min	-50.159	1	-122.546	2	-6.662	1	-.012	3	-.079	1	-.742	2
125		6	max	-2.459	15	163.839	3	21.681	1	.007	2	-.003	15	.269	3
126			min	-50.159	1	-307.45	2	-1.43	3	-.012	3	-.073	1	-.581	2
127		7	max	-2.459	15	258.035	3	50.024	1	.007	2	-.002	15	.11	3
128			min	-50.159	1	-492.354	2	.504	12	-.012	3	-.046	1	-.281	2
129		8	max	-2.459	15	352.231	3	78.366	1	.007	2	.005	2	.158	2
130			min	-50.159	1	-677.258	2	1.844	12	-.012	3	-.006	3	-.118	3
131		9	max	-2.459	15	446.426	3	106.709	1	.007	2	.071	1	.735	2
132			min	-50.159	1	-862.162	2	3.184	12	-.012	3	-.003	3	-.418	3
133		10	max	-2.459	15	540.622	3	135.052	1	.007	12	.162	1	1.451	2
134			min	-50.159	1	-1047.066	2	4.523	12	-.012	3	0	3	-.788	3
135		11	max	-2.459	15	862.162	2	-3.184	12	.012	3	.071	1	.735	2
136			min	-50.159	1	-446.426	3	-106.709	1	-.007	2	-.003	3	-.418	3
137		12	max	-2.459	15	677.258	2	-1.844	12	.012	3	.005	2	.158	2
138			min	-50.159	1	-352.231	3	-78.366	1	-.007	2	-.006	3	-.118	3
139		13	max	-2.459	15	492.354	2	-.504	12	.012	3	-.002	15	.11	3
140			min	-50.159	1	-258.035	3	-50.024	1	-.007	2	-.046	1	-.281	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	-2.459	15	307.45	2	1.43	3	.012	3	-.003	15	.269	3
142			min	-50.159	1	-163.839	3	-21.681	1	-.007	2	-.073	1	-.581	2
143		15	max	-2.459	15	122.546	2	6.662	1	.012	3	-.003	12	.356	3
144			min	-50.159	1	-69.643	3	-.482	10	-.007	2	-.079	1	-.742	2
145		16	max	-2.459	15	24.553	3	35.005	1	.012	3	-.001	12	.373	3
146			min	-50.159	1	-62.358	2	1.712	15	-.007	2	-.063	1	-.764	2
147		17	max	-2.459	15	118.748	3	63.348	1	.012	3	.003	3	.319	3
148			min	-50.159	1	-247.262	2	3.052	15	-.007	2	-.026	1	-.648	2
149		18	max	-2.459	15	212.944	3	91.691	1	.012	3	.032	1	.195	3
150			min	-50.159	1	-432.166	2	4.392	15	-.007	2	0	10	-.393	2
151		19	max	-2.459	15	307.14	3	120.034	1	.012	3	.111	1	0	2
152			min	-50.159	1	-617.07	2	5.732	15	-.007	2	.005	15	0	3
153	M2	1	max	1011.189	2	1.932	4	.212	1	0	3	0	3	0	1
154			min	-1469.824	3	.454	15	.01	15	0	1	0	2	0	1
155		2	max	1011.665	2	1.847	4	.212	1	0	3	0	1	0	15
156			min	-1469.467	3	.434	15	.01	15	0	1	0	10	0	4
157		3	max	1012.14	2	1.761	4	.212	1	0	3	0	1	0	15
158			min	-1469.11	3	.414	15	.01	15	0	1	0	15	-.001	4
159		4	max	1012.616	2	1.675	4	.212	1	0	3	0	1	0	15
160			min	-1468.754	3	.394	15	.01	15	0	1	0	15	-.002	4
161		5	max	1013.092	2	1.59	4	.212	1	0	3	0	1	0	15
162			min	-1468.397	3	.374	15	.01	15	0	1	0	15	-.002	4
163		6	max	1013.568	2	1.504	4	.212	1	0	3	0	1	0	15
164			min	-1468.04	3	.354	15	.01	15	0	1	0	15	-.003	4
165		7	max	1014.043	2	1.419	4	.212	1	0	3	0	1	0	15
166			min	-1467.683	3	.334	15	.01	15	0	1	0	15	-.003	4
167		8	max	1014.519	2	1.333	4	.212	1	0	3	0	1	0	15
168			min	-1467.326	3	.312	12	.01	15	0	1	0	15	-.004	4
169		9	max	1014.995	2	1.247	4	.212	1	0	3	0	1	0	15
170			min	-1466.969	3	.279	12	.01	15	0	1	0	15	-.004	4
171		10	max	1015.471	2	1.162	4	.212	1	0	3	0	1	-.001	15
172			min	-1466.613	3	.246	12	.01	15	0	1	0	15	-.005	4
173		11	max	1015.946	2	1.084	2	.212	1	0	3	0	1	-.001	15
174			min	-1466.256	3	.212	12	.01	15	0	1	0	15	-.005	4
175		12	max	1016.422	2	1.018	2	.212	1	0	3	0	1	-.001	15
176			min	-1465.899	3	.179	12	.01	15	0	1	0	15	-.005	4
177		13	max	1016.898	2	.951	2	.212	1	0	3	0	1	-.001	15
178			min	-1465.542	3	.146	12	.01	15	0	1	0	15	-.006	4
179		14	max	1017.374	2	.884	2	.212	1	0	3	0	1	-.001	15
180			min	-1465.185	3	.112	12	.01	15	0	1	0	15	-.006	4
181		15	max	1017.849	2	.818	2	.212	1	0	3	0	1	-.001	12
182			min	-1464.829	3	.079	12	.01	15	0	1	0	15	-.006	4
183		16	max	1018.325	2	.751	2	.212	1	0	3	.001	1	-.001	12
184			min	-1464.472	3	.045	12	.01	15	0	1	0	15	-.006	4
185		17	max	1018.801	2	.684	2	.212	1	0	3	.001	1	-.001	12
186			min	-1464.115	3	-.003	3	.01	15	0	1	0	15	-.006	4
187		18	max	1019.277	2	.618	2	.212	1	0	3	.001	1	-.001	12
188			min	-1463.758	3	-.053	3	.01	15	0	1	0	15	-.007	4
189		19	max	1019.752	2	.551	2	.212	1	0	3	.001	1	-.001	12
190			min	-1463.401	3	-.103	3	.01	15	0	1	0	15	-.007	4
191	M3	1	max	808.959	2	7.781	4	.123	1	0	3	0	1	.007	4
192			min	-913.582	3	1.829	15	.006	15	0	1	0	15	.001	12
193		2	max	808.789	2	7.016	4	.123	1	0	3	0	1	.004	2
194			min	-913.71	3	1.65	15	.006	15	0	1	0	15	0	12
195		3	max	808.618	2	6.252	4	.123	1	0	3	0	1	.002	2
196			min	-913.838	3	1.47	15	.006	15	0	1	0	15	-.001	3
197		4	max	808.448	2	5.488	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	-913.965	3	1.29	15	.006	15	0	1	0	15	-.003	3
199		5	max	808.278	2	4.723	4	.123	1	0	3	0	1	0	15
200			min	-914.093	3	1.11	15	.006	15	0	1	0	15	-.004	4
201		6	max	808.107	2	3.959	4	.123	1	0	3	0	1	-.001	15
202			min	-914.221	3	.931	15	.006	15	0	1	0	15	-.005	4
203		7	max	807.937	2	3.194	4	.123	1	0	3	0	1	-.002	15
204			min	-914.349	3	.751	15	.006	15	0	1	0	15	-.007	4
205		8	max	807.766	2	2.43	4	.123	1	0	3	0	1	-.002	15
206			min	-914.476	3	.571	15	.006	15	0	1	0	15	-.008	4
207		9	max	807.596	2	1.665	4	.123	1	0	3	0	1	-.002	15
208			min	-914.604	3	.392	15	.006	15	0	1	0	15	-.009	4
209		10	max	807.426	2	.901	4	.123	1	0	3	0	1	-.002	15
210			min	-914.732	3	.19	12	.006	15	0	1	0	15	-.01	4
211		11	max	807.255	2	.297	2	.123	1	0	3	0	1	-.002	15
212			min	-914.86	3	-.177	3	.006	15	0	1	0	15	-.01	4
213		12	max	807.085	2	-.147	15	.123	1	0	3	0	1	-.002	15
214			min	-914.987	3	-.628	4	.006	15	0	1	0	15	-.01	4
215		13	max	806.915	2	-.327	15	.123	1	0	3	0	1	-.002	15
216			min	-915.115	3	-1.392	4	.006	15	0	1	0	15	-.009	4
217		14	max	806.744	2	-.507	15	.123	1	0	3	0	1	-.002	15
218			min	-915.243	3	-2.157	4	.006	15	0	1	0	15	-.008	4
219		15	max	806.574	2	-.686	15	.123	1	0	3	0	1	-.002	15
220			min	-915.371	3	-2.921	4	.006	15	0	1	0	15	-.007	4
221		16	max	806.404	2	-.866	15	.123	1	0	3	0	1	-.001	15
222			min	-915.498	3	-3.686	4	.006	15	0	1	0	15	-.006	4
223		17	max	806.233	2	-1.046	15	.123	1	0	3	.001	1	-.001	15
224			min	-915.626	3	-4.45	4	.006	15	0	1	0	15	-.004	4
225		18	max	806.063	2	-1.226	15	.123	1	0	3	.001	1	0	15
226			min	-915.754	3	-5.215	4	.006	15	0	1	0	15	-.002	4
227		19	max	805.893	2	-1.405	15	.123	1	0	3	.001	1	0	1
228			min	-915.882	3	-5.979	4	.006	15	0	1	0	15	0	1
229	M4	1	max	811.897	1	0	1	-.249	15	0	1	0	1	0	1
230			min	-46.191	3	0	1	-5.095	1	0	1	0	15	0	1
231		2	max	812.067	1	0	1	-.249	15	0	1	0	1	0	1
232			min	-46.064	3	0	1	-5.095	1	0	1	0	15	0	1
233		3	max	812.238	1	0	1	-.249	15	0	1	0	15	0	1
234			min	-45.936	3	0	1	-5.095	1	0	1	0	1	0	1
235		4	max	812.408	1	0	1	-.249	15	0	1	0	15	0	1
236			min	-45.808	3	0	1	-5.095	1	0	1	0	1	0	1
237		5	max	812.578	1	0	1	-.249	15	0	1	0	15	0	1
238			min	-45.68	3	0	1	-5.095	1	0	1	-.001	1	0	1
239		6	max	812.749	1	0	1	-.249	15	0	1	0	15	0	1
240			min	-45.553	3	0	1	-5.095	1	0	1	-.002	1	0	1
241		7	max	812.919	1	0	1	-.249	15	0	1	0	15	0	1
242			min	-45.425	3	0	1	-5.095	1	0	1	-.003	1	0	1
243		8	max	813.089	1	0	1	-.249	15	0	1	0	15	0	1
244			min	-45.297	3	0	1	-5.095	1	0	1	-.003	1	0	1
245		9	max	813.26	1	0	1	-.249	15	0	1	0	15	0	1
246			min	-45.169	3	0	1	-5.095	1	0	1	-.004	1	0	1
247		10	max	813.43	1	0	1	-.249	15	0	1	0	15	0	1
248			min	-45.042	3	0	1	-5.095	1	0	1	-.004	1	0	1
249		11	max	813.6	1	0	1	-.249	15	0	1	0	15	0	1
250			min	-44.914	3	0	1	-5.095	1	0	1	-.005	1	0	1
251		12	max	813.771	1	0	1	-.249	15	0	1	0	15	0	1
252			min	-44.786	3	0	1	-5.095	1	0	1	-.006	1	0	1
253		13	max	813.941	1	0	1	-.249	15	0	1	0	15	0	1
254			min	-44.658	3	0	1	-5.095	1	0	1	-.006	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	814.111	1	0	1	-.249	15	0	1	0	15	0	1
256			min	-44.531	3	0	1	-5.095	1	0	1	-.007	1	0	1
257		15	max	814.282	1	0	1	-.249	15	0	1	0	15	0	1
258			min	-44.403	3	0	1	-5.095	1	0	1	-.007	1	0	1
259		16	max	814.452	1	0	1	-.249	15	0	1	0	15	0	1
260			min	-44.275	3	0	1	-5.095	1	0	1	-.008	1	0	1
261		17	max	814.623	1	0	1	-.249	15	0	1	0	15	0	1
262			min	-44.147	3	0	1	-5.095	1	0	1	-.008	1	0	1
263		18	max	814.793	1	0	1	-.249	15	0	1	0	15	0	1
264			min	-44.019	3	0	1	-5.095	1	0	1	-.009	1	0	1
265		19	max	814.963	1	0	1	-.249	15	0	1	0	15	0	1
266			min	-43.892	3	0	1	-5.095	1	0	1	-.01	1	0	1
267	M6	1	max	3076.846	2	2.288	2	0	1	0	1	0	1	0	1
268			min	-4594.528	3	.119	3	0	1	0	1	0	1	0	1
269		2	max	3077.321	2	2.222	2	0	1	0	1	0	1	0	3
270			min	-4594.171	3	.069	3	0	1	0	1	0	1	0	2
271		3	max	3077.797	2	2.155	2	0	1	0	1	0	1	0	3
272			min	-4593.814	3	.019	3	0	1	0	1	0	1	-.001	2
273		4	max	3078.273	2	2.088	2	0	1	0	1	0	1	0	3
274			min	-4593.458	3	-.031	3	0	1	0	1	0	1	-.002	2
275		5	max	3078.749	2	2.022	2	0	1	0	1	0	1	0	3
276			min	-4593.101	3	-.081	3	0	1	0	1	0	1	-.003	2
277		6	max	3079.225	2	1.955	2	0	1	0	1	0	1	0	3
278			min	-4592.744	3	-.131	3	0	1	0	1	0	1	-.003	2
279		7	max	3079.7	2	1.888	2	0	1	0	1	0	1	0	3
280			min	-4592.387	3	-.181	3	0	1	0	1	0	1	-.004	2
281		8	max	3080.176	2	1.822	2	0	1	0	1	0	1	0	3
282			min	-4592.03	3	-.231	3	0	1	0	1	0	1	-.005	2
283		9	max	3080.652	2	1.755	2	0	1	0	1	0	1	0	3
284			min	-4591.674	3	-.281	3	0	1	0	1	0	1	-.005	2
285		10	max	3081.128	2	1.688	2	0	1	0	1	0	1	0	3
286			min	-4591.317	3	-.331	3	0	1	0	1	0	1	-.006	2
287		11	max	3081.603	2	1.621	2	0	1	0	1	0	1	0	3
288			min	-4590.96	3	-.381	3	0	1	0	1	0	1	-.006	2
289		12	max	3082.079	2	1.555	2	0	1	0	1	0	1	0	3
290			min	-4590.603	3	-.431	3	0	1	0	1	0	1	-.007	2
291		13	max	3082.555	2	1.488	2	0	1	0	1	0	1	0	3
292			min	-4590.246	3	-.481	3	0	1	0	1	0	1	-.007	2
293		14	max	3083.031	2	1.421	2	0	1	0	1	0	1	0	3
294			min	-4589.89	3	-.531	3	0	1	0	1	0	1	-.008	2
295		15	max	3083.506	2	1.355	2	0	1	0	1	0	1	.001	3
296			min	-4589.533	3	-.581	3	0	1	0	1	0	1	-.008	2
297		16	max	3083.982	2	1.288	2	0	1	0	1	0	1	.001	3
298			min	-4589.176	3	-.631	3	0	1	0	1	0	1	-.009	2
299		17	max	3084.458	2	1.221	2	0	1	0	1	0	1	.001	3
300			min	-4588.819	3	-.681	3	0	1	0	1	0	1	-.009	2
301		18	max	3084.934	2	1.155	2	0	1	0	1	0	1	.002	3
302			min	-4588.462	3	-.731	3	0	1	0	1	0	1	-.009	2
303		19	max	3085.409	2	1.088	2	0	1	0	1	0	1	.002	3
304			min	-4588.105	3	-.781	3	0	1	0	1	0	1	-.01	2
305	M7	1	max	2636.866	2	7.8	4	0	1	0	1	0	1	.01	2
306			min	-2731.491	3	1.832	15	0	1	0	1	0	1	-.002	3
307		2	max	2636.695	2	7.036	4	0	1	0	1	0	1	.007	2
308			min	-2731.618	3	1.652	15	0	1	0	1	0	1	-.003	3
309		3	max	2636.525	2	6.271	4	0	1	0	1	0	1	.005	2
310			min	-2731.746	3	1.473	15	0	1	0	1	0	1	-.005	3
311		4	max	2636.355	2	5.507	4	0	1	0	1	0	1	.003	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2731.874	3	1.293	15	0	1	0	1	0	1	-.006	3
313		5	max	2636.184	2	4.742	4	0	1	0	1	0	1	0	2
314			min	-2732.002	3	1.113	15	0	1	0	1	0	1	-.007	3
315		6	max	2636.014	2	3.978	4	0	1	0	1	0	1	0	2
316			min	-2732.129	3	.934	15	0	1	0	1	0	1	-.007	3
317		7	max	2635.844	2	3.213	4	0	1	0	1	0	1	-.002	15
318			min	-2732.257	3	.754	15	0	1	0	1	0	1	-.008	3
319		8	max	2635.673	2	2.5	2	0	1	0	1	0	1	-.002	15
320			min	-2732.385	3	.457	12	0	1	0	1	0	1	-.008	3
321		9	max	2635.503	2	1.905	2	0	1	0	1	0	1	-.002	15
322			min	-2732.513	3	.159	12	0	1	0	1	0	1	-.009	4
323		10	max	2635.333	2	1.309	2	0	1	0	1	0	1	-.002	15
324			min	-2732.64	3	-.257	3	0	1	0	1	0	1	-.009	4
325		11	max	2635.162	2	.713	2	0	1	0	1	0	1	-.002	15
326			min	-2732.768	3	-.703	3	0	1	0	1	0	1	-.01	4
327		12	max	2634.992	2	.118	2	0	1	0	1	0	1	-.002	15
328			min	-2732.896	3	-1.15	3	0	1	0	1	0	1	-.01	4
329		13	max	2634.822	2	-.324	15	0	1	0	1	0	1	-.002	15
330			min	-2733.024	3	-1.597	3	0	1	0	1	0	1	-.009	4
331		14	max	2634.651	2	-.504	15	0	1	0	1	0	1	-.002	15
332			min	-2733.151	3	-2.138	4	0	1	0	1	0	1	-.008	4
333		15	max	2634.481	2	-.684	15	0	1	0	1	0	1	-.002	15
334			min	-2733.279	3	-2.902	4	0	1	0	1	0	1	-.007	4
335		16	max	2634.311	2	-.863	15	0	1	0	1	0	1	-.001	15
336			min	-2733.407	3	-3.667	4	0	1	0	1	0	1	-.006	4
337		17	max	2634.14	2	-1.043	15	0	1	0	1	0	1	-.001	15
338			min	-2733.535	3	-4.431	4	0	1	0	1	0	1	-.004	4
339		18	max	2633.97	2	-1.223	15	0	1	0	1	0	1	0	15
340			min	-2733.662	3	-5.195	4	0	1	0	1	0	1	-.002	4
341		19	max	2633.8	2	-1.402	15	0	1	0	1	0	1	0	1
342			min	-2733.79	3	-5.96	4	0	1	0	1	0	1	0	1
343	M8	1	max	2314.318	2	0	1	0	1	0	1	0	1	0	1
344			min	-245.442	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2314.489	2	0	1	0	1	0	1	0	1	0	1
346			min	-245.314	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2314.659	2	0	1	0	1	0	1	0	1	0	1
348			min	-245.186	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2314.829	2	0	1	0	1	0	1	0	1	0	1
350			min	-245.059	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2315	2	0	1	0	1	0	1	0	1	0	1
352			min	-244.931	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2315.17	2	0	1	0	1	0	1	0	1	0	1
354			min	-244.803	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2315.34	2	0	1	0	1	0	1	0	1	0	1
356			min	-244.675	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2315.511	2	0	1	0	1	0	1	0	1	0	1
358			min	-244.548	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2315.681	2	0	1	0	1	0	1	0	1	0	1
360			min	-244.42	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2315.852	2	0	1	0	1	0	1	0	1	0	1
362			min	-244.292	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2316.022	2	0	1	0	1	0	1	0	1	0	1
364			min	-244.164	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2316.192	2	0	1	0	1	0	1	0	1	0	1
366			min	-244.037	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2316.363	2	0	1	0	1	0	1	0	1	0	1
368			min	-243.909	3	0	1	0	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
369		14	max	2316.533	2	0	1	0	1	0	1	0	1	0	1
370			min	-243.781	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2316.703	2	0	1	0	1	0	1	0	1	0	1
372			min	-243.653	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2316.874	2	0	1	0	1	0	1	0	1	0	1
374			min	-243.526	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2317.044	2	0	1	0	1	0	1	0	1	0	1
376			min	-243.398	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2317.214	2	0	1	0	1	0	1	0	1	0	1
378			min	-243.27	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2317.385	2	0	1	0	1	0	1	0	1	0	1
380			min	-243.142	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1011.189	2	1.932	4	-.01	15	0	1	0	2	0	1
382			min	-1469.824	3	.454	15	-.212	1	0	3	0	3	0	1
383		2	max	1011.665	2	1.847	4	-.01	15	0	1	0	10	0	15
384			min	-1469.467	3	.434	15	-.212	1	0	3	0	1	0	4
385		3	max	1012.14	2	1.761	4	-.01	15	0	1	0	15	0	15
386			min	-1469.11	3	.414	15	-.212	1	0	3	0	1	-.001	4
387		4	max	1012.616	2	1.675	4	-.01	15	0	1	0	15	0	15
388			min	-1468.754	3	.394	15	-.212	1	0	3	0	1	-.002	4
389		5	max	1013.092	2	1.59	4	-.01	15	0	1	0	15	0	15
390			min	-1468.397	3	.374	15	-.212	1	0	3	0	1	-.002	4
391		6	max	1013.568	2	1.504	4	-.01	15	0	1	0	15	0	15
392			min	-1468.04	3	.354	15	-.212	1	0	3	0	1	-.003	4
393		7	max	1014.043	2	1.419	4	-.01	15	0	1	0	15	0	15
394			min	-1467.683	3	.334	15	-.212	1	0	3	0	1	-.003	4
395		8	max	1014.519	2	1.333	4	-.01	15	0	1	0	15	0	15
396			min	-1467.326	3	.312	12	-.212	1	0	3	0	1	-.004	4
397		9	max	1014.995	2	1.247	4	-.01	15	0	1	0	15	0	15
398			min	-1466.969	3	.279	12	-.212	1	0	3	0	1	-.004	4
399		10	max	1015.471	2	1.162	4	-.01	15	0	1	0	15	-.001	15
400			min	-1466.613	3	.246	12	-.212	1	0	3	0	1	-.005	4
401		11	max	1015.946	2	1.084	2	-.01	15	0	1	0	15	-.001	15
402			min	-1466.256	3	.212	12	-.212	1	0	3	0	1	-.005	4
403		12	max	1016.422	2	1.018	2	-.01	15	0	1	0	15	-.001	15
404			min	-1465.899	3	.179	12	-.212	1	0	3	0	1	-.005	4
405		13	max	1016.898	2	.951	2	-.01	15	0	1	0	15	-.001	15
406			min	-1465.542	3	.146	12	-.212	1	0	3	0	1	-.006	4
407		14	max	1017.374	2	.884	2	-.01	15	0	1	0	15	-.001	15
408			min	-1465.185	3	.112	12	-.212	1	0	3	0	1	-.006	4
409		15	max	1017.849	2	.818	2	-.01	15	0	1	0	15	-.001	12
410			min	-1464.829	3	.079	12	-.212	1	0	3	0	1	-.006	4
411		16	max	1018.325	2	.751	2	-.01	15	0	1	0	15	-.001	12
412			min	-1464.472	3	.045	12	-.212	1	0	3	-.001	1	-.006	4
413		17	max	1018.801	2	.684	2	-.01	15	0	1	0	15	-.001	12
414			min	-1464.115	3	-.003	3	-.212	1	0	3	-.001	1	-.006	4
415		18	max	1019.277	2	.618	2	-.01	15	0	1	0	15	-.001	12
416			min	-1463.758	3	-.053	3	-.212	1	0	3	-.001	1	-.007	4
417		19	max	1019.752	2	.551	2	-.01	15	0	1	0	15	-.001	12
418			min	-1463.401	3	-.103	3	-.212	1	0	3	-.001	1	-.007	4
419	M11	1	max	808.959	2	7.781	4	-.006	15	0	1	0	15	.007	4
420			min	-913.582	3	1.829	15	-.123	1	0	3	0	1	.001	12
421		2	max	808.789	2	7.016	4	-.006	15	0	1	0	15	.004	2
422			min	-913.71	3	1.65	15	-.123	1	0	3	0	1	0	12
423		3	max	808.618	2	6.252	4	-.006	15	0	1	0	15	.002	2
424			min	-913.838	3	1.47	15	-.123	1	0	3	0	1	-.001	3
425		4	max	808.448	2	5.488	4	-.006	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	-913.965	3	1.29	15	-.123	1	0	3	0	1	-.003	3
427		5	max	808.278	2	4.723	4	-.006	15	0	1	0	15	0	15
428			min	-914.093	3	1.11	15	-.123	1	0	3	0	1	-.004	4
429		6	max	808.107	2	3.959	4	-.006	15	0	1	0	15	-.001	15
430			min	-914.221	3	.931	15	-.123	1	0	3	0	1	-.005	4
431		7	max	807.937	2	3.194	4	-.006	15	0	1	0	15	-.002	15
432			min	-914.349	3	.751	15	-.123	1	0	3	0	1	-.007	4
433		8	max	807.766	2	2.43	4	-.006	15	0	1	0	15	-.002	15
434			min	-914.476	3	.571	15	-.123	1	0	3	0	1	-.008	4
435		9	max	807.596	2	1.665	4	-.006	15	0	1	0	15	-.002	15
436			min	-914.604	3	.392	15	-.123	1	0	3	0	1	-.009	4
437		10	max	807.426	2	.901	4	-.006	15	0	1	0	15	-.002	15
438			min	-914.732	3	.19	12	-.123	1	0	3	0	1	-.01	4
439		11	max	807.255	2	.297	2	-.006	15	0	1	0	15	-.002	15
440			min	-914.86	3	-.177	3	-.123	1	0	3	0	1	-.01	4
441		12	max	807.085	2	-.147	15	-.006	15	0	1	0	15	-.002	15
442			min	-914.987	3	-.628	4	-.123	1	0	3	0	1	-.01	4
443		13	max	806.915	2	-.327	15	-.006	15	0	1	0	15	-.002	15
444			min	-915.115	3	-1.392	4	-.123	1	0	3	0	1	-.009	4
445		14	max	806.744	2	-.507	15	-.006	15	0	1	0	15	-.002	15
446			min	-915.243	3	-2.157	4	-.123	1	0	3	0	1	-.008	4
447		15	max	806.574	2	-.686	15	-.006	15	0	1	0	15	-.002	15
448			min	-915.371	3	-2.921	4	-.123	1	0	3	0	1	-.007	4
449		16	max	806.404	2	-.866	15	-.006	15	0	1	0	15	-.001	15
450			min	-915.498	3	-3.686	4	-.123	1	0	3	0	1	-.006	4
451		17	max	806.233	2	-1.046	15	-.006	15	0	1	0	15	-.001	15
452			min	-915.626	3	-4.45	4	-.123	1	0	3	-.001	1	-.004	4
453		18	max	806.063	2	-1.226	15	-.006	15	0	1	0	15	0	15
454			min	-915.754	3	-5.215	4	-.123	1	0	3	-.001	1	-.002	4
455		19	max	805.893	2	-1.405	15	-.006	15	0	1	0	15	0	1
456			min	-915.882	3	-5.979	4	-.123	1	0	3	-.001	1	0	1
457	M12	1	max	811.897	1	0	1	5.095	1	0	1	0	15	0	1
458			min	-46.191	3	0	1	.249	15	0	1	0	1	0	1
459		2	max	812.067	1	0	1	5.095	1	0	1	0	15	0	1
460			min	-46.064	3	0	1	.249	15	0	1	0	1	0	1
461		3	max	812.238	1	0	1	5.095	1	0	1	0	1	0	1
462			min	-45.936	3	0	1	.249	15	0	1	0	15	0	1
463		4	max	812.408	1	0	1	5.095	1	0	1	0	1	0	1
464			min	-45.808	3	0	1	.249	15	0	1	0	15	0	1
465		5	max	812.578	1	0	1	5.095	1	0	1	.001	1	0	1
466			min	-45.68	3	0	1	.249	15	0	1	0	15	0	1
467		6	max	812.749	1	0	1	5.095	1	0	1	.002	1	0	1
468			min	-45.553	3	0	1	.249	15	0	1	0	15	0	1
469		7	max	812.919	1	0	1	5.095	1	0	1	.003	1	0	1
470			min	-45.425	3	0	1	.249	15	0	1	0	15	0	1
471		8	max	813.089	1	0	1	5.095	1	0	1	.003	1	0	1
472			min	-45.297	3	0	1	.249	15	0	1	0	15	0	1
473		9	max	813.26	1	0	1	5.095	1	0	1	.004	1	0	1
474			min	-45.169	3	0	1	.249	15	0	1	0	15	0	1
475		10	max	813.43	1	0	1	5.095	1	0	1	.004	1	0	1
476			min	-45.042	3	0	1	.249	15	0	1	0	15	0	1
477		11	max	813.6	1	0	1	5.095	1	0	1	.005	1	0	1
478			min	-44.914	3	0	1	.249	15	0	1	0	15	0	1
479		12	max	813.771	1	0	1	5.095	1	0	1	.006	1	0	1
480			min	-44.786	3	0	1	.249	15	0	1	0	15	0	1
481		13	max	813.941	1	0	1	5.095	1	0	1	.006	1	0	1
482			min	-44.658	3	0	1	.249	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	814.111	1	0	1	5.095	1	0	1	.007	1	0	1
484			min	-44.531	3	0	1	.249	15	0	1	0	15	0	1
485		15	max	814.282	1	0	1	5.095	1	0	1	.007	1	0	1
486			min	-44.403	3	0	1	.249	15	0	1	0	15	0	1
487		16	max	814.452	1	0	1	5.095	1	0	1	.008	1	0	1
488			min	-44.275	3	0	1	.249	15	0	1	0	15	0	1
489		17	max	814.623	1	0	1	5.095	1	0	1	.008	1	0	1
490			min	-44.147	3	0	1	.249	15	0	1	0	15	0	1
491		18	max	814.793	1	0	1	5.095	1	0	1	.009	1	0	1
492			min	-44.019	3	0	1	.249	15	0	1	0	15	0	1
493		19	max	814.963	1	0	1	5.095	1	0	1	.01	1	0	1
494			min	-43.892	3	0	1	.249	15	0	1	0	15	0	1
495	M1	1	max	119.593	1	772.245	3	-2.278	15	0	2	.11	1	0	15
496			min	5.725	15	-403.295	2	-46.175	1	0	3	.005	15	-.013	2
497		2	max	120.309	1	771.314	3	-2.278	15	0	2	.085	1	.2	2
498			min	5.941	15	-404.536	2	-46.175	1	0	3	.004	15	-.411	3
499		3	max	565.17	3	528.207	2	-2.268	15	0	3	.061	1	.403	2
500			min	-328.317	2	-596.353	3	-46.022	1	0	2	.003	15	-.801	3
501		4	max	565.707	3	526.966	2	-2.268	15	0	3	.037	1	.124	2
502			min	-327.601	2	-597.283	3	-46.022	1	0	2	.002	15	-.486	3
503		5	max	566.244	3	525.725	2	-2.268	15	0	3	.012	1	-.003	15
504			min	-326.885	2	-598.213	3	-46.022	1	0	2	0	15	-.171	3
505		6	max	566.781	3	524.485	2	-2.268	15	0	3	0	15	.145	3
506			min	-326.168	2	-599.144	3	-46.022	1	0	2	-.012	1	-.43	2
507		7	max	567.318	3	523.244	2	-2.268	15	0	3	-.002	15	.462	3
508			min	-325.452	2	-600.074	3	-46.022	1	0	2	-.036	1	-.707	2
509		8	max	567.855	3	522.004	2	-2.268	15	0	3	-.003	15	.779	3
510			min	-324.736	2	-601.005	3	-46.022	1	0	2	-.061	1	-.983	2
511		9	max	581.399	3	51.923	2	-3.619	15	0	9	.039	1	.905	3
512			min	-274.154	2	.378	15	-73.669	1	0	3	.002	15	-1.122	2
513		10	max	581.936	3	50.683	2	-3.619	15	0	9	0	10	.886	3
514			min	-273.437	2	.004	15	-73.669	1	0	3	0	1	-1.149	2
515		11	max	582.474	3	49.442	2	-3.619	15	0	9	-.002	15	.867	3
516			min	-272.721	2	-1.538	4	-73.669	1	0	3	-.039	1	-1.175	2
517		12	max	595.692	3	405.231	3	-2.217	15	0	2	.06	1	.76	3
518			min	-221.982	2	-631.796	2	-45.321	1	0	3	.003	15	-1.044	2
519		13	max	596.229	3	404.3	3	-2.217	15	0	2	.036	1	.546	3
520			min	-221.266	2	-633.036	2	-45.321	1	0	3	.002	15	-.711	2
521		14	max	596.767	3	403.37	3	-2.217	15	0	2	.012	1	.333	3
522			min	-220.55	2	-634.277	2	-45.321	1	0	3	0	15	-.376	2
523		15	max	597.304	3	402.439	3	-2.217	15	0	2	0	15	.121	3
524			min	-219.834	2	-635.517	2	-45.321	1	0	3	-.012	1	-.05	1
525		16	max	597.841	3	401.509	3	-2.217	15	0	2	-.002	15	.294	2
526			min	-219.117	2	-636.758	2	-45.321	1	0	3	-.036	1	-.091	3
527		17	max	598.378	3	400.579	3	-2.217	15	0	2	-.003	15	.631	2
528			min	-218.401	2	-637.998	2	-45.321	1	0	3	-.059	1	-.303	3
529		18	max	-5.948	15	618.747	2	-2.459	15	0	3	-.004	15	.319	2
530			min	-120.746	1	-306.298	3	-50.196	1	0	2	-.085	1	-.15	3
531		19	max	-5.732	15	617.507	2	-2.459	15	0	3	-.005	15	.012	3
532			min	-120.03	1	-307.228	3	-50.196	1	0	2	-.111	1	-.007	2
533	M5	1	max	270.986	1	2548.41	3	0	1	0	1	0	1	.026	2
534			min	7.701	12	-1399.506	2	0	1	0	1	0	1	0	15
535		2	max	271.702	1	2547.479	3	0	1	0	1	0	1	.764	2
536			min	8.059	12	-1400.746	2	0	1	0	1	0	1	-1.338	3
537		3	max	1732.225	3	1423.773	2	0	1	0	1	0	1	1.47	2
538			min	-1032.688	2	-1744.942	3	0	1	0	1	0	1	-2.63	3
539		4	max	1732.762	3	1422.533	2	0	1	0	1	0	1	.719	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	-1031.971	2	-1745.872	3	0	1	0	1	0	1	-1.709	3
541		5	max	1733.299	3	1421.292	2	0	1	0	1	0	1	.02	9
542			min	-1031.255	2	-1746.803	3	0	1	0	1	0	1	-.788	3
543		6	max	1733.836	3	1420.052	2	0	1	0	1	0	1	.134	3
544			min	-1030.539	2	-1747.733	3	0	1	0	1	0	1	-.781	2
545		7	max	1734.374	3	1418.811	2	0	1	0	1	0	1	1.057	3
546			min	-1029.823	2	-1748.664	3	0	1	0	1	0	1	-1.53	2
547		8	max	1734.911	3	1417.571	2	0	1	0	1	0	1	1.98	3
548			min	-1029.107	2	-1749.594	3	0	1	0	1	0	1	-2.278	2
549		9	max	1745.606	3	176.408	2	0	1	0	1	0	1	2.279	3
550			min	-913.729	2	.37	15	0	1	0	1	0	1	-2.607	2
551		10	max	1746.143	3	175.167	2	0	1	0	1	0	1	2.203	3
552			min	-913.013	2	-.004	15	0	1	0	1	0	1	-2.7	2
553		11	max	1746.68	3	173.927	2	0	1	0	1	0	1	2.128	3
554			min	-912.297	2	-1.522	4	0	1	0	1	0	1	-2.792	2
555		12	max	1758.026	3	1139.755	3	0	1	0	1	0	1	1.864	3
556			min	-797.234	2	-1771.508	2	0	1	0	1	0	1	-2.501	2
557		13	max	1758.563	3	1138.825	3	0	1	0	1	0	1	1.262	3
558			min	-796.517	2	-1772.748	2	0	1	0	1	0	1	-1.566	2
559		14	max	1759.1	3	1137.895	3	0	1	0	1	0	1	.662	3
560			min	-795.801	2	-1773.989	2	0	1	0	1	0	1	-.63	2
561		15	max	1759.637	3	1136.964	3	0	1	0	1	0	1	.306	2
562			min	-795.085	2	-1775.229	2	0	1	0	1	0	1	0	13
563		16	max	1760.174	3	1136.034	3	0	1	0	1	0	1	1.243	2
564			min	-794.369	2	-1776.47	2	0	1	0	1	0	1	-.538	3
565		17	max	1760.711	3	1135.103	3	0	1	0	1	0	1	2.181	2
566			min	-793.653	2	-1777.71	2	0	1	0	1	0	1	-1.137	3
567		18	max	-9.404	12	2097.153	2	0	1	0	1	0	1	1.121	2
568			min	-270.827	1	-1080.55	3	0	1	0	1	0	1	-.594	3
569		19	max	-9.045	12	2095.913	2	0	1	0	1	0	1	.014	2
570			min	-270.111	1	-1081.481	3	0	1	0	1	0	1	-.024	3
571	M9	1	max	119.593	1	772.245	3	46.175	1	0	3	-.005	15	0	15
572			min	5.725	15	-403.295	2	2.278	15	0	2	-.11	1	-.013	2
573		2	max	120.309	1	771.314	3	46.175	1	0	3	-.004	15	.2	2
574			min	5.941	15	-404.536	2	2.278	15	0	2	-.085	1	-.411	3
575		3	max	565.17	3	528.207	2	46.022	1	0	2	-.003	15	.403	2
576			min	-328.317	2	-596.353	3	2.268	15	0	3	-.061	1	-.801	3
577		4	max	565.707	3	526.966	2	46.022	1	0	2	-.002	15	.124	2
578			min	-327.601	2	-597.283	3	2.268	15	0	3	-.037	1	-.486	3
579		5	max	566.244	3	525.725	2	46.022	1	0	2	0	15	-.003	15
580			min	-326.885	2	-598.213	3	2.268	15	0	3	-.012	1	-.171	3
581		6	max	566.781	3	524.485	2	46.022	1	0	2	.012	1	.145	3
582			min	-326.168	2	-599.144	3	2.268	15	0	3	0	15	-.43	2
583		7	max	567.318	3	523.244	2	46.022	1	0	2	.036	1	.462	3
584			min	-325.452	2	-600.074	3	2.268	15	0	3	.002	15	-.707	2
585		8	max	567.855	3	522.004	2	46.022	1	0	2	.061	1	.779	3
586			min	-324.736	2	-601.005	3	2.268	15	0	3	.003	15	-.983	2
587		9	max	581.399	3	51.923	2	73.669	1	0	3	-.002	15	.905	3
588			min	-274.154	2	.378	15	3.619	15	0	9	-.039	1	-1.122	2
589		10	max	581.936	3	50.683	2	73.669	1	0	3	0	1	.886	3
590			min	-273.437	2	.004	15	3.619	15	0	9	0	10	-1.149	2
591		11	max	582.474	3	49.442	2	73.669	1	0	3	.039	1	.867	3
592			min	-272.721	2	-1.538	4	3.619	15	0	9	.002	15	-1.175	2
593		12	max	595.692	3	405.231	3	45.321	1	0	3	-.003	15	.76	3
594			min	-221.982	2	-631.796	2	2.217	15	0	2	-.06	1	-1.044	2
595		13	max	596.229	3	404.3	3	45.321	1	0	3	-.002	15	.546	3
596			min	-221.266	2	-633.036	2	2.217	15	0	2	-.036	1	-.711	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	596.767	3	403.37	3	45.321	1	0	3	0	15	.333	3
598			min	-220.55	2	-634.277	2	2.217	15	0	2	-.012	1	-.376	2
599		15	max	597.304	3	402.439	3	45.321	1	0	3	.012	1	.121	3
600			min	-219.834	2	-635.517	2	2.217	15	0	2	0	15	-.05	1
601		16	max	597.841	3	401.509	3	45.321	1	0	3	.036	1	.294	2
602			min	-219.117	2	-636.758	2	2.217	15	0	2	.002	15	-.091	3
603		17	max	598.378	3	400.579	3	45.321	1	0	3	.059	1	.631	2
604			min	-218.401	2	-637.998	2	2.217	15	0	2	.003	15	-.303	3
605		18	max	-5.948	15	618.747	2	50.196	1	0	2	.085	1	.319	2
606			min	-120.746	1	-306.298	3	2.459	15	0	3	.004	15	-.15	3
607		19	max	-5.732	15	617.507	2	50.196	1	0	2	.111	1	.012	3
608			min	-120.03	1	-307.228	3	2.459	15	0	3	.005	15	-.007	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	.123	2	.01	3	1.03e-2	2	NC	1	NC	1
2			min	0	15	-.033	3	-.006	2	-3.056e-3	3	NC	1	NC	1
3		2	max	0	1	.085	3	.012	3	1.115e-2	2	NC	4	NC	1
4			min	0	15	.002	15	-.003	10	-2.832e-3	3	1376.09	3	NC	1
5		3	max	0	1	.181	3	.021	1	1.2e-2	2	NC	4	NC	2
6			min	0	15	0	15	-.003	10	-2.607e-3	3	756.883	3	7522.968	1
7		4	max	0	1	.242	3	.03	1	1.284e-2	2	NC	4	NC	2
8			min	0	15	-.002	9	-.003	10	-2.383e-3	3	590.171	3	5148.766	1
9		5	max	0	1	.259	3	.035	1	1.369e-2	2	NC	4	NC	2
10			min	0	15	-.001	9	-.003	10	-2.159e-3	3	554.254	3	4521.452	1
11		6	max	0	1	.235	3	.032	1	1.453e-2	2	NC	4	NC	2
12			min	0	15	0	15	-.005	10	-1.934e-3	3	604.053	3	4870.921	1
13		7	max	0	1	.178	3	.027	3	1.538e-2	2	NC	4	NC	2
14			min	0	15	.002	15	-.007	10	-1.71e-3	3	769.197	3	6670.214	1
15		8	max	0	1	.15	2	.028	3	1.623e-2	2	NC	1	NC	1
16			min	0	15	.003	15	-.012	2	-1.485e-3	3	1195.028	3	8832.86	3
17		9	max	0	1	.192	2	.029	3	1.707e-2	2	NC	4	NC	1
18			min	0	15	.003	15	-.018	2	-1.261e-3	3	2353.643	2	8479.979	3
19		10	max	0	1	.211	2	.029	3	1.792e-2	2	NC	4	NC	1
20			min	0	1	.002	3	-.021	2	-1.036e-3	3	1846.09	2	8392.691	3
21		11	max	0	15	.192	2	.029	3	1.707e-2	2	NC	4	NC	1
22			min	0	1	.003	15	-.018	2	-1.261e-3	3	2353.643	2	8479.979	3
23		12	max	0	15	.15	2	.028	3	1.623e-2	2	NC	1	NC	1
24			min	0	1	.003	15	-.012	2	-1.485e-3	3	1195.028	3	8832.86	3
25		13	max	0	15	.178	3	.027	3	1.538e-2	2	NC	4	NC	2
26			min	0	1	.002	15	-.007	10	-1.71e-3	3	769.197	3	6670.214	1
27		14	max	0	15	.235	3	.032	1	1.453e-2	2	NC	4	NC	2
28			min	0	1	0	15	-.005	10	-1.934e-3	3	604.053	3	4870.921	1
29		15	max	0	15	.259	3	.035	1	1.369e-2	2	NC	4	NC	2
30			min	0	1	-.001	9	-.003	10	-2.159e-3	3	554.254	3	4521.452	1
31		16	max	0	15	.242	3	.03	1	1.284e-2	2	NC	4	NC	2
32			min	0	1	-.002	9	-.003	10	-2.383e-3	3	590.171	3	5148.766	1
33		17	max	0	15	.181	3	.021	1	1.2e-2	2	NC	4	NC	2
34			min	0	1	0	15	-.003	10	-2.607e-3	3	756.883	3	7522.968	1
35		18	max	0	15	.085	3	.012	3	1.115e-2	2	NC	4	NC	1
36			min	0	1	.002	15	-.003	10	-2.832e-3	3	1376.09	3	NC	1
37		19	max	0	15	.123	2	.01	3	1.03e-2	2	NC	1	NC	1
38			min	0	1	-.033	3	-.006	2	-3.056e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.279	3	.009	3	5.669e-3	2	NC	1	NC	1
40			min	0	15	-.381	2	-.006	2	-4.779e-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	.428	3	.01	3	6.516e-3	2	NC	4	NC	1
42			min	0	15	-.52	2	-.004	2	-5.569e-3	3	1086.589	3	NC	1
43		3	max	0	1	.56	3	.016	1	7.362e-3	2	NC	5	NC	2
44			min	0	15	-.645	2	-.003	10	-6.36e-3	3	577.901	3	9953.763	1
45		4	max	0	1	.66	3	.025	1	8.209e-3	2	NC	5	NC	2
46			min	0	15	-.747	2	-.002	10	-7.15e-3	3	424.985	3	6289.982	1
47		5	max	0	1	.724	3	.03	1	9.056e-3	2	NC	5	NC	2
48			min	0	15	-.821	2	-.003	10	-7.941e-3	3	364.044	3	5281.733	1
49		6	max	0	1	.75	3	.029	1	9.903e-3	2	NC	5	NC	2
50			min	0	15	-.864	2	-.004	10	-8.731e-3	3	335.284	2	5526.335	1
51		7	max	0	1	.743	3	.023	3	1.075e-2	2	NC	5	NC	2
52			min	0	15	-.881	2	-.007	10	-9.522e-3	3	324.445	2	7404.524	1
53		8	max	0	1	.714	3	.025	3	1.16e-2	2	NC	5	NC	1
54			min	0	15	-.876	2	-.01	2	-1.031e-2	3	327.362	2	NC	1
55		9	max	0	1	.679	3	.026	3	1.244e-2	2	NC	5	NC	1
56			min	0	15	-.862	2	-.016	2	-1.11e-2	3	336.993	2	9539.137	3
57		10	max	0	1	.662	3	.026	3	1.329e-2	2	NC	5	NC	1
58			min	0	1	-.853	2	-.019	2	-1.189e-2	3	343.301	2	9420.361	3
59		11	max	0	15	.679	3	.026	3	1.244e-2	2	NC	5	NC	1
60			min	0	1	-.862	2	-.016	2	-1.11e-2	3	336.993	2	9539.137	3
61		12	max	0	15	.714	3	.025	3	1.16e-2	2	NC	5	NC	1
62			min	0	1	-.876	2	-.01	2	-1.031e-2	3	327.362	2	NC	1
63		13	max	0	15	.743	3	.023	3	1.075e-2	2	NC	5	NC	2
64			min	0	1	-.881	2	-.007	10	-9.522e-3	3	324.445	2	7404.524	1
65		14	max	0	15	.75	3	.029	1	9.903e-3	2	NC	5	NC	2
66			min	0	1	-.864	2	-.004	10	-8.731e-3	3	335.284	2	5526.335	1
67		15	max	0	15	.724	3	.03	1	9.056e-3	2	NC	5	NC	2
68			min	0	1	-.821	2	-.003	10	-7.941e-3	3	364.044	3	5281.733	1
69		16	max	0	15	.66	3	.025	1	8.209e-3	2	NC	5	NC	2
70			min	0	1	-.747	2	-.002	10	-7.15e-3	3	424.985	3	6289.982	1
71		17	max	0	15	.56	3	.016	1	7.362e-3	2	NC	5	NC	2
72			min	0	1	-.645	2	-.003	10	-6.36e-3	3	577.901	3	9953.763	1
73		18	max	0	15	.428	3	.01	3	6.516e-3	2	NC	4	NC	1
74			min	0	1	-.52	2	-.004	2	-5.569e-3	3	1086.589	3	NC	1
75		19	max	0	15	.279	3	.009	3	5.669e-3	2	NC	1	NC	1
76			min	0	1	-.381	2	-.006	2	-4.779e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.284	3	.008	3	4.17e-3	3	NC	1	NC	1
78			min	0	1	-.38	2	-.005	2	-5.933e-3	2	NC	1	NC	1
79		2	max	0	15	.395	3	.009	3	4.858e-3	3	NC	4	NC	1
80			min	0	1	-.549	2	-.003	2	-6.826e-3	2	957.454	2	NC	1
81		3	max	0	15	.495	3	.016	1	5.546e-3	3	NC	5	NC	2
82			min	0	1	-.699	2	-.002	10	-7.72e-3	2	507.573	2	9900.499	1
83		4	max	0	15	.578	3	.025	1	6.233e-3	3	NC	5	NC	2
84			min	0	1	-.816	2	-.002	10	-8.614e-3	2	371.268	2	6256.226	1
85		5	max	0	15	.638	3	.03	1	6.921e-3	3	NC	5	NC	2
86			min	0	1	-.894	2	-.003	10	-9.508e-3	2	315.566	2	5249.011	1
87		6	max	0	15	.675	3	.029	1	7.609e-3	3	NC	5	NC	2
88			min	0	1	-.929	2	-.004	10	-1.04e-2	2	295.056	2	5481.251	1
89		7	max	0	15	.69	3	.022	3	8.297e-3	3	NC	5	NC	2
90			min	0	1	-.929	2	-.006	10	-1.13e-2	2	295.398	2	7309.151	1
91		8	max	0	15	.688	3	.023	3	8.984e-3	3	NC	5	NC	1
92			min	0	1	-.903	2	-.01	2	-1.219e-2	2	309.954	2	NC	1
93		9	max	0	15	.679	3	.024	3	9.672e-3	3	NC	5	NC	1
94			min	0	1	-.869	2	-.015	2	-1.308e-2	2	331.167	2	NC	1
95		10	max	0	1	.673	3	.024	3	1.036e-2	3	NC	5	NC	1
96			min	0	1	-.852	2	-.018	2	-1.398e-2	2	343.543	2	NC	1
97		11	max	0	1	.679	3	.024	3	9.672e-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	-.869	2	-.015	2	-1.308e-2	2	331.167	2	NC	1
99		12	max	0	1	.688	3	.023	3	8.984e-3	3	NC	5	NC	1
100			min	0	15	-.903	2	-.01	2	-1.219e-2	2	309.954	2	NC	1
101		13	max	0	1	.69	3	.022	3	8.297e-3	3	NC	5	NC	2
102			min	0	15	-.929	2	-.006	10	-1.13e-2	2	295.398	2	7309.151	1
103		14	max	0	1	.675	3	.029	1	7.609e-3	3	NC	5	NC	2
104			min	0	15	-.929	2	-.004	10	-1.04e-2	2	295.056	2	5481.251	1
105		15	max	0	1	.638	3	.03	1	6.921e-3	3	NC	5	NC	2
106			min	0	15	-.894	2	-.003	10	-9.508e-3	2	315.566	2	5249.011	1
107		16	max	0	1	.578	3	.025	1	6.233e-3	3	NC	5	NC	2
108			min	0	15	-.816	2	-.002	10	-8.614e-3	2	371.268	2	6256.226	1
109		17	max	0	1	.495	3	.016	1	5.546e-3	3	NC	5	NC	2
110			min	0	15	-.699	2	-.002	10	-7.72e-3	2	507.573	2	9900.499	1
111		18	max	0	1	.395	3	.009	3	4.858e-3	3	NC	4	NC	1
112			min	0	15	-.549	2	-.003	2	-6.826e-3	2	957.454	2	NC	1
113		19	max	0	1	.284	3	.008	3	4.17e-3	3	NC	1	NC	1
114			min	0	15	-.38	2	-.005	2	-5.933e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.11	2	.007	3	7.823e-3	3	NC	1	NC	1
116			min	0	1	-.097	3	-.005	2	-8.601e-3	2	NC	1	NC	1
117		2	max	0	15	.032	1	.009	3	8.6e-3	3	NC	4	NC	1
118			min	0	1	-.065	3	-.002	10	-9.072e-3	2	2001.176	2	NC	1
119		3	max	0	15	.006	9	.021	1	9.378e-3	3	NC	4	NC	2
120			min	0	1	-.042	3	-.002	10	-9.543e-3	2	1118.338	2	7480.379	1
121		4	max	0	15	.003	4	.031	1	1.016e-2	3	NC	4	NC	2
122			min	0	1	-.071	2	-.001	10	-1.001e-2	2	898.286	2	5096.736	1
123		5	max	0	15	.003	4	.036	1	1.093e-2	3	NC	4	NC	2
124			min	0	1	-.073	2	-.002	10	-1.048e-2	2	889.003	2	4450.47	1
125		6	max	0	15	.008	9	.033	1	1.171e-2	3	NC	4	NC	2
126			min	0	1	-.064	3	-.003	10	-1.096e-2	2	1069.204	2	4750.452	1
127		7	max	0	15	.03	1	.025	1	1.249e-2	3	NC	3	NC	2
128			min	0	1	-.098	3	-.005	10	-1.143e-2	2	1698.02	2	6379.385	1
129		8	max	0	15	.082	2	.021	3	1.327e-2	3	NC	1	NC	1
130			min	0	1	-.138	3	-.008	2	-1.19e-2	2	3964.947	3	NC	1
131		9	max	0	15	.143	2	.021	3	1.404e-2	3	NC	4	NC	1
132			min	0	1	-.172	3	-.014	2	-1.237e-2	2	2168.774	3	NC	1
133		10	max	0	1	.17	2	.021	3	1.482e-2	3	NC	4	NC	1
134			min	0	1	-.187	3	-.016	2	-1.284e-2	2	1807.628	3	NC	1
135		11	max	0	1	.143	2	.021	3	1.404e-2	3	NC	4	NC	1
136			min	0	15	-.172	3	-.014	2	-1.237e-2	2	2168.774	3	NC	1
137		12	max	0	1	.082	2	.021	3	1.327e-2	3	NC	1	NC	1
138			min	0	15	-.138	3	-.008	2	-1.19e-2	2	3964.947	3	NC	1
139		13	max	0	1	.03	1	.025	1	1.249e-2	3	NC	3	NC	2
140			min	0	15	-.098	3	-.005	10	-1.143e-2	2	1698.02	2	6379.385	1
141		14	max	0	1	.008	9	.033	1	1.171e-2	3	NC	4	NC	2
142			min	0	15	-.064	3	-.003	10	-1.096e-2	2	1069.204	2	4750.452	1
143		15	max	0	1	.003	4	.036	1	1.093e-2	3	NC	4	NC	2
144			min	0	15	-.073	2	-.002	10	-1.048e-2	2	889.003	2	4450.47	1
145		16	max	0	1	.003	4	.031	1	1.016e-2	3	NC	4	NC	2
146			min	0	15	-.071	2	-.001	10	-1.001e-2	2	898.286	2	5096.736	1
147		17	max	0	1	.006	9	.021	1	9.378e-3	3	NC	4	NC	2
148			min	0	15	-.042	3	-.002	10	-9.543e-3	2	1118.338	2	7480.379	1
149		18	max	0	1	.032	1	.009	3	8.6e-3	3	NC	4	NC	1
150			min	0	15	-.065	3	-.002	10	-9.072e-3	2	2001.176	2	NC	1
151		19	max	0	1	.11	2	.007	3	7.823e-3	3	NC	1	NC	1
152			min	0	15	-.097	3	-.005	2	-8.601e-3	2	NC	1	NC	1
153	M2	1	max	.007	2	.009	2	.004	1	-4.619e-6	15	NC	1	NC	1
154			min	-.01	3	-.015	3	0	15	-9.326e-5	1	7417.831	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	2	.008	2	.003	1	-4.363e-6	15	NC	1	NC	1
156			min	-.009	3	-.014	3	0	15	-8.809e-5	1	8500.437	2	NC	1
157		3	max	.006	2	.007	2	.003	1	-4.108e-6	15	NC	1	NC	1
158			min	-.009	3	-.013	3	0	15	-8.292e-5	1	9932.061	2	NC	1
159		4	max	.006	2	.006	2	.003	1	-3.852e-6	15	NC	1	NC	1
160			min	-.008	3	-.013	3	0	15	-7.775e-5	1	NC	1	NC	1
161		5	max	.005	2	.005	2	.002	1	-3.597e-6	15	NC	1	NC	1
162			min	-.008	3	-.012	3	0	15	-7.258e-5	1	NC	1	NC	1
163		6	max	.005	2	.004	2	.002	1	-3.341e-6	15	NC	1	NC	1
164			min	-.007	3	-.012	3	0	15	-6.741e-5	1	NC	1	NC	1
165		7	max	.005	2	.003	2	.002	1	-3.086e-6	15	NC	1	NC	1
166			min	-.007	3	-.011	3	0	15	-6.224e-5	1	NC	1	NC	1
167		8	max	.004	2	.002	2	.002	1	-2.83e-6	15	NC	1	NC	1
168			min	-.006	3	-.01	3	0	15	-5.707e-5	1	NC	1	NC	1
169		9	max	.004	2	0	2	.001	1	-2.575e-6	15	NC	1	NC	1
170			min	-.005	3	-.01	3	0	15	-5.19e-5	1	NC	1	NC	1
171		10	max	.003	2	0	2	.001	1	-2.32e-6	15	NC	1	NC	1
172			min	-.005	3	-.009	3	0	15	-4.673e-5	1	NC	1	NC	1
173		11	max	.003	2	0	2	0	1	-2.064e-6	15	NC	1	NC	1
174			min	-.004	3	-.008	3	0	15	-4.156e-5	1	NC	1	NC	1
175		12	max	.003	2	0	2	0	1	-1.809e-6	15	NC	1	NC	1
176			min	-.004	3	-.007	3	0	15	-3.638e-5	1	NC	1	NC	1
177		13	max	.002	2	-.001	15	0	1	-1.553e-6	15	NC	1	NC	1
178			min	-.003	3	-.006	3	0	15	-3.121e-5	1	NC	1	NC	1
179		14	max	.002	2	-.001	15	0	1	-1.298e-6	15	NC	1	NC	1
180			min	-.003	3	-.006	3	0	15	-2.604e-5	1	NC	1	NC	1
181		15	max	.002	2	0	15	0	1	-1.042e-6	15	NC	1	NC	1
182			min	-.002	3	-.005	3	0	15	-2.087e-5	1	NC	1	NC	1
183		16	max	.001	2	0	15	0	1	-7.869e-7	15	NC	1	NC	1
184			min	-.002	3	-.003	3	0	15	-1.57e-5	1	NC	1	NC	1
185		17	max	0	2	0	15	0	1	-5.315e-7	15	NC	1	NC	1
186			min	-.001	3	-.002	3	0	15	-1.053e-5	1	NC	1	NC	1
187		18	max	0	2	0	15	0	1	-2.083e-7	10	NC	1	NC	1
188			min	0	3	-.001	3	0	15	-5.364e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	2.354e-7	2	NC	1	NC	1
190			min	0	1	0	1	0	1	-7.962e-7	3	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	1.305e-7	3	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.301e-7	1	NC	1	NC	1
193		2	max	0	3	0	15	0	2	9.291e-6	1	NC	1	NC	1
194			min	0	2	-.002	4	0	3	4.554e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	1.901e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	3	9.289e-7	15	NC	1	NC	1
197		4	max	.001	3	-.001	15	0	1	2.873e-5	1	NC	1	NC	1
198			min	-.001	2	-.006	4	0	3	1.402e-6	15	NC	1	NC	1
199		5	max	.002	3	-.002	15	0	1	3.845e-5	1	NC	1	NC	1
200			min	-.002	2	-.008	4	0	3	1.876e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	4.817e-5	1	NC	1	NC	1
202			min	-.002	2	-.01	4	0	12	2.349e-6	15	9645.158	4	NC	1
203		7	max	.003	3	-.003	15	0	1	5.79e-5	1	NC	1	NC	1
204			min	-.002	2	-.011	4	0	15	2.823e-6	15	8306.765	4	NC	1
205		8	max	.003	3	-.003	15	0	1	6.762e-5	1	NC	1	NC	1
206			min	-.003	2	-.012	4	0	15	3.296e-6	15	7481.868	4	NC	1
207		9	max	.004	3	-.003	15	0	1	7.734e-5	1	NC	2	NC	1
208			min	-.003	2	-.013	4	0	15	3.77e-6	15	6997.065	4	NC	1
209		10	max	.004	3	-.003	15	0	1	8.706e-5	1	NC	5	NC	1
210			min	-.004	2	-.014	4	0	15	4.243e-6	15	6768.491	4	NC	1
211		11	max	.004	3	-.003	15	0	1	9.678e-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	4.717e-6	15	6762.654	4	NC	1
213		12	max	.005	3	-.003	15	0	1	1.065e-4	1	NC	2	NC	1
214			min	-.004	2	-.013	4	0	15	5.191e-6	15	6983.598	4	NC	1
215		13	max	.005	3	-.003	15	.001	1	1.162e-4	1	NC	1	NC	1
216			min	-.005	2	-.012	4	0	15	5.664e-6	15	7476.117	4	NC	1
217		14	max	.006	3	-.003	15	.001	1	1.259e-4	1	NC	1	NC	1
218			min	-.005	2	-.011	4	0	15	6.138e-6	15	8348.704	4	NC	1
219		15	max	.006	3	-.002	15	.002	1	1.357e-4	1	NC	1	NC	1
220			min	-.005	2	-.01	4	0	15	6.611e-6	15	9840.78	4	NC	1
221		16	max	.007	3	-.002	15	.002	1	1.454e-4	1	NC	1	NC	1
222			min	-.006	2	-.008	4	0	15	7.085e-6	15	NC	1	NC	1
223		17	max	.007	3	-.001	15	.003	1	1.551e-4	1	NC	1	NC	1
224			min	-.006	2	-.005	4	0	15	7.558e-6	15	NC	1	NC	1
225		18	max	.007	3	0	15	.003	1	1.648e-4	1	NC	1	NC	1
226			min	-.007	2	-.004	3	0	15	8.032e-6	15	NC	1	NC	1
227		19	max	.008	3	0	10	.003	1	1.745e-4	1	NC	1	NC	1
228			min	-.007	2	-.002	3	0	15	8.505e-6	15	NC	1	NC	1
229	M4	1	max	.002	1	.007	2	0	15	5.023e-5	1	NC	1	NC	2
230			min	0	3	-.008	3	-.003	1	2.467e-6	15	NC	1	7142.255	1
231		2	max	.002	1	.006	2	0	15	5.023e-5	1	NC	1	NC	2
232			min	0	3	-.008	3	-.003	1	2.467e-6	15	NC	1	7751.524	1
233		3	max	.002	1	.006	2	0	15	5.023e-5	1	NC	1	NC	2
234			min	0	3	-.007	3	-.003	1	2.467e-6	15	NC	1	8477.594	1
235		4	max	.002	1	.006	2	0	15	5.023e-5	1	NC	1	NC	2
236			min	0	3	-.007	3	-.003	1	2.467e-6	15	NC	1	9350.639	1
237		5	max	.002	1	.005	2	0	15	5.023e-5	1	NC	1	NC	1
238			min	0	3	-.006	3	-.002	1	2.467e-6	15	NC	1	NC	1
239		6	max	.001	1	.005	2	0	15	5.023e-5	1	NC	1	NC	1
240			min	0	3	-.006	3	-.002	1	2.467e-6	15	NC	1	NC	1
241		7	max	.001	1	.004	2	0	15	5.023e-5	1	NC	1	NC	1
242			min	0	3	-.005	3	-.002	1	2.467e-6	15	NC	1	NC	1
243		8	max	.001	1	.004	2	0	15	5.023e-5	1	NC	1	NC	1
244			min	0	3	-.005	3	-.002	1	2.467e-6	15	NC	1	NC	1
245		9	max	.001	1	.004	2	0	15	5.023e-5	1	NC	1	NC	1
246			min	0	3	-.005	3	-.001	1	2.467e-6	15	NC	1	NC	1
247		10	max	0	1	.003	2	0	15	5.023e-5	1	NC	1	NC	1
248			min	0	3	-.004	3	-.001	1	2.467e-6	15	NC	1	NC	1
249		11	max	0	1	.003	2	0	15	5.023e-5	1	NC	1	NC	1
250			min	0	3	-.004	3	0	1	2.467e-6	15	NC	1	NC	1
251		12	max	0	1	.003	2	0	15	5.023e-5	1	NC	1	NC	1
252			min	0	3	-.003	3	0	1	2.467e-6	15	NC	1	NC	1
253		13	max	0	1	.002	2	0	15	5.023e-5	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	2.467e-6	15	NC	1	NC	1
255		14	max	0	1	.002	2	0	15	5.023e-5	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	2.467e-6	15	NC	1	NC	1
257		15	max	0	1	.001	2	0	15	5.023e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	2.467e-6	15	NC	1	NC	1
259		16	max	0	1	.001	2	0	15	5.023e-5	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	2.467e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	5.023e-5	1	NC	1	NC	1
262			min	0	3	0	3	0	1	2.467e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	5.023e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	2.467e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	5.023e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	2.467e-6	15	NC	1	NC	1
267	M6	1	max	.021	2	.031	2	0	1	0	1	NC	4	NC	1
268			min	-.031	3	-.044	3	0	1	0	1	1593.993	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	.028	2	0	1	0	1	NC	4	NC	1
270			min	-.029	3	-.041	3	0	1	0	1	1689.787	3	NC	1
271		3	max	.018	2	.026	2	0	1	0	1	NC	4	NC	1
272			min	-.027	3	-.039	3	0	1	0	1	1797.867	3	NC	1
273		4	max	.017	2	.023	2	0	1	0	1	NC	4	NC	1
274			min	-.026	3	-.036	3	0	1	0	1	1920.779	3	NC	1
275		5	max	.016	2	.02	2	0	1	0	1	NC	4	NC	1
276			min	-.024	3	-.034	3	0	1	0	1	2061.798	3	NC	1
277		6	max	.015	2	.018	2	0	1	0	1	NC	4	NC	1
278			min	-.022	3	-.031	3	0	1	0	1	2225.209	3	NC	1
279		7	max	.014	2	.016	2	0	1	0	1	NC	1	NC	1
280			min	-.021	3	-.029	3	0	1	0	1	2416.727	3	NC	1
281		8	max	.013	2	.013	2	0	1	0	1	NC	1	NC	1
282			min	-.019	3	-.026	3	0	1	0	1	2644.151	3	NC	1
283		9	max	.012	2	.011	2	0	1	0	1	NC	1	NC	1
284			min	-.017	3	-.024	3	0	1	0	1	2918.408	3	NC	1
285		10	max	.01	2	.009	2	0	1	0	1	NC	1	NC	1
286			min	-.015	3	-.021	3	0	1	0	1	3255.284	3	NC	1
287		11	max	.009	2	.007	2	0	1	0	1	NC	1	NC	1
288			min	-.014	3	-.019	3	0	1	0	1	3678.474	3	NC	1
289		12	max	.008	2	.006	2	0	1	0	1	NC	1	NC	1
290			min	-.012	3	-.017	3	0	1	0	1	4225.224	3	NC	1
291		13	max	.007	2	.004	2	0	1	0	1	NC	1	NC	1
292			min	-.01	3	-.014	3	0	1	0	1	4957.635	3	NC	1
293		14	max	.006	2	.003	2	0	1	0	1	NC	1	NC	1
294			min	-.009	3	-.012	3	0	1	0	1	5987.518	3	NC	1
295		15	max	.005	2	.002	2	0	1	0	1	NC	1	NC	1
296			min	-.007	3	-.009	3	0	1	0	1	7538.537	3	NC	1
297		16	max	.003	2	.001	2	0	1	0	1	NC	1	NC	1
298			min	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	2	0	2	0	1	0	1	NC	1	NC	1
300			min	-.003	3	-.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	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	.001	3	0	2	0	1	0	1	NC	1	NC	1
308			min	-.001	2	-.003	3	0	1	0	1	NC	1	NC	1
309		3	max	.003	3	0	2	0	1	0	1	NC	1	NC	1
310			min	-.003	2	-.005	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	-.006	2	-.012	3	0	1	0	1	8708.584	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	7782.419	3	NC	1
319		8	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.009	2	-.015	3	0	1	0	1	7235.03	3	NC	1
321		9	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.01	2	-.016	3	0	1	0	1	6953.286	3	NC	1
323		10	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.011	2	-.016	3	0	1	0	1	6835.195	4	NC	1
325		11	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
326			min	-.013	2	-.016	3	0	1	0	1	6825.954	4	NC	1
327		12	max	.014	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.014	2	-.016	3	0	1	0	1	7046.045	4	NC	1
329		13	max	.016	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.015	2	-.015	3	0	1	0	1	7540.336	4	NC	1
331		14	max	.017	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.017	2	-.014	3	0	1	0	1	8417.971	4	NC	1
333		15	max	.018	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.018	2	-.013	3	0	1	0	1	9920.069	4	NC	1
335		16	max	.02	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.019	2	-.012	3	0	1	0	1	NC	1	NC	1
337		17	max	.021	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.02	2	-.01	3	0	1	0	1	NC	1	NC	1
339		18	max	.022	3	0	10	0	1	0	1	NC	1	NC	1
340			min	-.022	2	-.008	3	0	1	0	1	NC	1	NC	1
341		19	max	.024	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.023	2	-.006	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	2	.022	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.025	3	0	1	0	1	NC	1	NC	1
345		2	max	.005	2	.021	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.023	3	0	1	0	1	NC	1	NC	1
347		3	max	.005	2	.02	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.022	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	2	.019	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.02	3	0	1	0	1	NC	1	NC	1
351		5	max	.004	2	.017	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.019	3	0	1	0	1	NC	1	NC	1
353		6	max	.004	2	.016	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	2	.015	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
357		8	max	.003	2	.014	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
359		9	max	.003	2	.012	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	2	.011	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
363		11	max	.002	2	.01	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.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	3	-.01	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	2	.007	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	2	.006	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	2	.005	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
373		16	max	0	2	.004	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
375		17	max	0	2	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
377		18	max	0	2	.001	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.007	2	.009	2	0	15	9.326e-5	1	NC	1	NC	1
382			min	-.01	3	-.015	3	-.004	1	4.619e-6	15	7417.831	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	2	.008	2	0	15	8.809e-5	1	NC	1	NC	1
384			min	-.009	3	-.014	3	-.003	1	4.363e-6	15	8500.437	2	NC	1
385		3	max	.006	2	.007	2	0	15	8.292e-5	1	NC	1	NC	1
386			min	-.009	3	-.013	3	-.003	1	4.108e-6	15	9932.061	2	NC	1
387		4	max	.006	2	.006	2	0	15	7.775e-5	1	NC	1	NC	1
388			min	-.008	3	-.013	3	-.003	1	3.852e-6	15	NC	1	NC	1
389		5	max	.005	2	.005	2	0	15	7.258e-5	1	NC	1	NC	1
390			min	-.008	3	-.012	3	-.002	1	3.597e-6	15	NC	1	NC	1
391		6	max	.005	2	.004	2	0	15	6.741e-5	1	NC	1	NC	1
392			min	-.007	3	-.012	3	-.002	1	3.341e-6	15	NC	1	NC	1
393		7	max	.005	2	.003	2	0	15	6.224e-5	1	NC	1	NC	1
394			min	-.007	3	-.011	3	-.002	1	3.086e-6	15	NC	1	NC	1
395		8	max	.004	2	.002	2	0	15	5.707e-5	1	NC	1	NC	1
396			min	-.006	3	-.01	3	-.002	1	2.83e-6	15	NC	1	NC	1
397		9	max	.004	2	0	2	0	15	5.19e-5	1	NC	1	NC	1
398			min	-.005	3	-.01	3	-.001	1	2.575e-6	15	NC	1	NC	1
399		10	max	.003	2	0	2	0	15	4.673e-5	1	NC	1	NC	1
400			min	-.005	3	-.009	3	-.001	1	2.32e-6	15	NC	1	NC	1
401		11	max	.003	2	0	2	0	15	4.156e-5	1	NC	1	NC	1
402			min	-.004	3	-.008	3	0	1	2.064e-6	15	NC	1	NC	1
403		12	max	.003	2	0	2	0	15	3.638e-5	1	NC	1	NC	1
404			min	-.004	3	-.007	3	0	1	1.809e-6	15	NC	1	NC	1
405		13	max	.002	2	-.001	15	0	15	3.121e-5	1	NC	1	NC	1
406			min	-.003	3	-.006	3	0	1	1.553e-6	15	NC	1	NC	1
407		14	max	.002	2	-.001	15	0	15	2.604e-5	1	NC	1	NC	1
408			min	-.003	3	-.006	3	0	1	1.298e-6	15	NC	1	NC	1
409		15	max	.002	2	0	15	0	15	2.087e-5	1	NC	1	NC	1
410			min	-.002	3	-.005	3	0	1	1.042e-6	15	NC	1	NC	1
411		16	max	.001	2	0	15	0	15	1.57e-5	1	NC	1	NC	1
412			min	-.002	3	-.003	3	0	1	7.869e-7	15	NC	1	NC	1
413		17	max	0	2	0	15	0	15	1.053e-5	1	NC	1	NC	1
414			min	-.001	3	-.002	3	0	1	5.315e-7	15	NC	1	NC	1
415		18	max	0	2	0	15	0	15	5.364e-6	1	NC	1	NC	1
416			min	0	3	-.001	3	0	1	2.083e-7	10	NC	1	NC	1
417		19	max	0	1	0	1	0	1	7.962e-7	3	NC	1	NC	1
418			min	0	1	0	1	0	1	-2.354e-7	2	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	4.301e-7	1	NC	1	NC	1
420			min	0	1	0	1	0	1	-1.305e-7	3	NC	1	NC	1
421		2	max	0	3	0	15	0	3	-4.554e-7	15	NC	1	NC	1
422			min	0	2	-.002	4	0	2	-9.291e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	3	-9.289e-7	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-1.901e-5	1	NC	1	NC	1
425		4	max	.001	3	-.001	15	0	3	-1.402e-6	15	NC	1	NC	1
426			min	-.001	2	-.006	4	0	1	-2.873e-5	1	NC	1	NC	1
427		5	max	.002	3	-.002	15	0	3	-1.876e-6	15	NC	1	NC	1
428			min	-.002	2	-.008	4	0	1	-3.845e-5	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	12	-2.349e-6	15	NC	1	NC	1
430			min	-.002	2	-.01	4	0	1	-4.817e-5	1	9645.158	4	NC	1
431		7	max	.003	3	-.003	15	0	15	-2.823e-6	15	NC	1	NC	1
432			min	-.002	2	-.011	4	0	1	-5.79e-5	1	8306.765	4	NC	1
433		8	max	.003	3	-.003	15	0	15	-3.296e-6	15	NC	1	NC	1
434			min	-.003	2	-.012	4	0	1	-6.762e-5	1	7481.868	4	NC	1
435		9	max	.004	3	-.003	15	0	15	-3.77e-6	15	NC	2	NC	1
436			min	-.003	2	-.013	4	0	1	-7.734e-5	1	6997.065	4	NC	1
437		10	max	.004	3	-.003	15	0	15	-4.243e-6	15	NC	5	NC	1
438			min	-.004	2	-.014	4	0	1	-8.706e-5	1	6768.491	4	NC	1
439		11	max	.004	3	-.003	15	0	15	-4.717e-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	-9.678e-5	1	6762.654	4	NC	1
441		12	max	.005	3	-.003	15	0	15	-5.191e-6	15	NC	2	NC	1
442			min	-.004	2	-.013	4	0	1	-1.065e-4	1	6983.598	4	NC	1
443		13	max	.005	3	-.003	15	0	15	-5.664e-6	15	NC	1	NC	1
444			min	-.005	2	-.012	4	-.001	1	-1.162e-4	1	7476.117	4	NC	1
445		14	max	.006	3	-.003	15	0	15	-6.138e-6	15	NC	1	NC	1
446			min	-.005	2	-.011	4	-.001	1	-1.259e-4	1	8348.704	4	NC	1
447		15	max	.006	3	-.002	15	0	15	-6.611e-6	15	NC	1	NC	1
448			min	-.005	2	-.01	4	-.002	1	-1.357e-4	1	9840.78	4	NC	1
449		16	max	.007	3	-.002	15	0	15	-7.085e-6	15	NC	1	NC	1
450			min	-.006	2	-.008	4	-.002	1	-1.454e-4	1	NC	1	NC	1
451		17	max	.007	3	-.001	15	0	15	-7.558e-6	15	NC	1	NC	1
452			min	-.006	2	-.005	4	-.003	1	-1.551e-4	1	NC	1	NC	1
453		18	max	.007	3	0	15	0	15	-8.032e-6	15	NC	1	NC	1
454			min	-.007	2	-.004	3	-.003	1	-1.648e-4	1	NC	1	NC	1
455		19	max	.008	3	0	10	0	15	-8.505e-6	15	NC	1	NC	1
456			min	-.007	2	-.002	3	-.003	1	-1.745e-4	1	NC	1	NC	1
457	M12	1	max	.002	1	.007	2	.003	1	-2.467e-6	15	NC	1	NC	2
458			min	0	3	-.008	3	0	15	-5.023e-5	1	NC	1	7142.255	1
459		2	max	.002	1	.006	2	.003	1	-2.467e-6	15	NC	1	NC	2
460			min	0	3	-.008	3	0	15	-5.023e-5	1	NC	1	7751.524	1
461		3	max	.002	1	.006	2	.003	1	-2.467e-6	15	NC	1	NC	2
462			min	0	3	-.007	3	0	15	-5.023e-5	1	NC	1	8477.594	1
463		4	max	.002	1	.006	2	.003	1	-2.467e-6	15	NC	1	NC	2
464			min	0	3	-.007	3	0	15	-5.023e-5	1	NC	1	9350.639	1
465		5	max	.002	1	.005	2	.002	1	-2.467e-6	15	NC	1	NC	1
466			min	0	3	-.006	3	0	15	-5.023e-5	1	NC	1	NC	1
467		6	max	.001	1	.005	2	.002	1	-2.467e-6	15	NC	1	NC	1
468			min	0	3	-.006	3	0	15	-5.023e-5	1	NC	1	NC	1
469		7	max	.001	1	.004	2	.002	1	-2.467e-6	15	NC	1	NC	1
470			min	0	3	-.005	3	0	15	-5.023e-5	1	NC	1	NC	1
471		8	max	.001	1	.004	2	.002	1	-2.467e-6	15	NC	1	NC	1
472			min	0	3	-.005	3	0	15	-5.023e-5	1	NC	1	NC	1
473		9	max	.001	1	.004	2	.001	1	-2.467e-6	15	NC	1	NC	1
474			min	0	3	-.005	3	0	15	-5.023e-5	1	NC	1	NC	1
475		10	max	0	1	.003	2	.001	1	-2.467e-6	15	NC	1	NC	1
476			min	0	3	-.004	3	0	15	-5.023e-5	1	NC	1	NC	1
477		11	max	0	1	.003	2	0	1	-2.467e-6	15	NC	1	NC	1
478			min	0	3	-.004	3	0	15	-5.023e-5	1	NC	1	NC	1
479		12	max	0	1	.003	2	0	1	-2.467e-6	15	NC	1	NC	1
480			min	0	3	-.003	3	0	15	-5.023e-5	1	NC	1	NC	1
481		13	max	0	1	.002	2	0	1	-2.467e-6	15	NC	1	NC	1
482			min	0	3	-.003	3	0	15	-5.023e-5	1	NC	1	NC	1
483		14	max	0	1	.002	2	0	1	-2.467e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-5.023e-5	1	NC	1	NC	1
485		15	max	0	1	.001	2	0	1	-2.467e-6	15	NC	1	NC	1
486			min	0	3	-.002	3	0	15	-5.023e-5	1	NC	1	NC	1
487		16	max	0	1	.001	2	0	1	-2.467e-6	15	NC	1	NC	1
488			min	0	3	-.001	3	0	15	-5.023e-5	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-2.467e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-5.023e-5	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-2.467e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-5.023e-5	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-2.467e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-5.023e-5	1	NC	1	NC	1
495	M1	1	max	.01	3	.123	2	0	1	5.356e-3	2	NC	1	NC	1
496			min	-.006	2	-.033	3	0	15	-1.358e-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	.058	2	0	15	2.629e-3	2	NC	4	NC	1
498			min	-.006	2	-.013	3	-.003	1	-6.721e-3	3	1761.595	2	NC	1
499		3	max	.01	3	.015	3	0	15	3.017e-5	10	NC	5	NC	1
500			min	-.006	2	-.012	2	-.004	1	-9.274e-5	3	854.235	2	NC	1
501		4	max	.01	3	.059	3	0	15	2.932e-3	2	NC	5	NC	1
502			min	-.006	2	-.088	2	-.003	1	-3.218e-3	3	544.128	2	NC	1
503		5	max	.009	3	.112	3	0	15	5.834e-3	2	NC	5	NC	1
504			min	-.006	2	-.168	2	-.002	1	-6.342e-3	3	395.756	2	NC	1
505		6	max	.009	3	.168	3	0	15	8.736e-3	2	NC	5	NC	1
506			min	-.006	2	-.244	2	0	1	-9.467e-3	3	313.581	2	NC	1
507		7	max	.009	3	.221	3	0	1	1.164e-2	2	NC	15	NC	1
508			min	-.006	2	-.312	2	0	3	-1.259e-2	3	264.851	2	NC	1
509		8	max	.009	3	.266	3	0	1	1.454e-2	2	NC	15	NC	1
510			min	-.006	2	-.365	2	0	15	-1.572e-2	3	235.927	2	NC	1
511		9	max	.009	3	.294	3	0	15	1.636e-2	2	NC	15	NC	1
512			min	-.006	2	-.399	2	0	1	-1.613e-2	3	220.831	2	NC	1
513		10	max	.008	3	.304	3	0	1	1.746e-2	2	NC	15	NC	1
514			min	-.005	2	-.41	2	0	15	-1.475e-2	3	216.421	2	NC	1
515		11	max	.008	3	.297	3	0	1	1.856e-2	2	NC	15	NC	1
516			min	-.005	2	-.398	2	0	15	-1.336e-2	3	221.653	2	NC	1
517		12	max	.008	3	.272	3	0	15	1.782e-2	2	NC	15	NC	1
518			min	-.005	2	-.363	2	0	1	-1.161e-2	3	238.367	2	NC	1
519		13	max	.008	3	.232	3	0	10	1.428e-2	2	NC	15	NC	1
520			min	-.005	2	-.307	2	0	1	-9.29e-3	3	270.664	2	NC	1
521		14	max	.008	3	.181	3	0	1	1.075e-2	2	NC	5	NC	1
522			min	-.005	2	-.236	2	0	15	-6.973e-3	3	325.789	2	NC	1
523		15	max	.007	3	.124	3	.002	1	7.218e-3	2	NC	5	NC	1
524			min	-.005	2	-.158	2	0	15	-4.657e-3	3	420.454	2	NC	1
525		16	max	.007	3	.064	3	.003	1	3.685e-3	2	NC	5	NC	1
526			min	-.005	2	-.08	2	0	15	-2.34e-3	3	595.217	2	NC	1
527		17	max	.007	3	.005	3	.003	1	2.532e-4	1	NC	5	NC	1
528			min	-.005	2	-.007	2	0	15	-2.33e-5	3	967.698	2	NC	1
529		18	max	.007	3	.055	2	.002	1	4.679e-3	2	NC	4	NC	1
530			min	-.005	2	-.047	3	0	15	-1.813e-3	3	2046.665	2	NC	1
531		19	max	.007	3	.11	2	0	15	9.394e-3	2	NC	1	NC	1
532			min	-.005	2	-.097	3	0	1	-3.699e-3	3	NC	1	NC	1
533	M5	1	max	.029	3	.211	2	0	1	0	1	NC	1	NC	1
534			min	-.021	2	.002	3	0	1	0	1	NC	1	NC	1
535		2	max	.029	3	.096	2	0	1	0	1	NC	5	NC	1
536			min	-.021	2	.002	15	0	1	0	1	1011.633	2	NC	1
537		3	max	.029	3	.047	3	0	1	0	1	NC	5	NC	1
538			min	-.021	2	-.034	2	0	1	0	1	473.582	2	NC	1
539		4	max	.029	3	.131	3	0	1	0	1	NC	5	NC	1
540			min	-.02	2	-.192	2	0	1	0	1	287.947	2	NC	1
541		5	max	.028	3	.25	3	0	1	0	1	NC	15	NC	1
542			min	-.02	2	-.363	2	0	1	0	1	201.602	2	NC	1
543		6	max	.027	3	.385	3	0	1	0	1	8818.694	15	NC	1
544			min	-.02	2	-.534	2	0	1	0	1	155.228	2	NC	1
545		7	max	.027	3	.517	3	0	1	0	1	7277.954	15	NC	1
546			min	-.019	2	-.69	2	0	1	0	1	128.416	2	NC	1
547		8	max	.026	3	.627	3	0	1	0	1	6385.018	15	NC	1
548			min	-.019	2	-.815	2	0	1	0	1	112.815	2	NC	1
549		9	max	.026	3	.698	3	0	1	0	1	5928.206	15	NC	1
550			min	-.019	2	-.895	2	0	1	0	1	104.81	2	NC	1
551		10	max	.025	3	.724	3	0	1	0	1	5790.813	15	NC	1
552			min	-.018	2	-.922	2	0	1	0	1	102.48	2	NC	1
553		11	max	.024	3	.705	3	0	1	0	1	5928.743	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	-.018	2	-.895	2	0	1	0	1	105.243	2	NC	1
555		12	max	.024	3	.643	3	0	1	0	1	6386.246	15	NC	1
556			min	-.018	2	-.811	2	0	1	0	1	114.263	2	NC	1
557		13	max	.023	3	.544	3	0	1	0	1	7280.327	15	NC	1
558			min	-.018	2	-.678	2	0	1	0	1	132.243	2	NC	1
559		14	max	.023	3	.42	3	0	1	0	1	8823.136	15	NC	1
560			min	-.017	2	-.513	2	0	1	0	1	164.003	2	NC	1
561		15	max	.022	3	.282	3	0	1	0	1	NC	15	NC	1
562			min	-.017	2	-.336	2	0	1	0	1	221.112	2	NC	1
563		16	max	.022	3	.143	3	0	1	0	1	NC	5	NC	1
564			min	-.017	2	-.165	2	0	1	0	1	333.187	2	NC	1
565		17	max	.021	3	.015	3	0	1	0	1	NC	5	NC	1
566			min	-.016	2	-.019	2	0	1	0	1	588.902	2	NC	1
567		18	max	.021	3	.087	2	0	1	0	1	NC	5	NC	1
568			min	-.016	2	-.091	3	0	1	0	1	1332.558	2	NC	1
569		19	max	.021	3	.17	2	0	1	0	1	NC	1	NC	1
570			min	-.016	2	-.187	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.01	3	.123	2	0	15	1.358e-2	3	NC	1	NC	1
572			min	-.006	2	-.033	3	0	1	-5.356e-3	2	NC	1	NC	1
573		2	max	.01	3	.058	2	.003	1	6.721e-3	3	NC	4	NC	1
574			min	-.006	2	-.013	3	0	15	-2.629e-3	2	1761.595	2	NC	1
575		3	max	.01	3	.015	3	.004	1	9.274e-5	3	NC	5	NC	1
576			min	-.006	2	-.012	2	0	15	-3.017e-5	10	854.235	2	NC	1
577		4	max	.01	3	.059	3	.003	1	3.218e-3	3	NC	5	NC	1
578			min	-.006	2	-.088	2	0	15	-2.932e-3	2	544.128	2	NC	1
579		5	max	.009	3	.112	3	.002	1	6.342e-3	3	NC	5	NC	1
580			min	-.006	2	-.168	2	0	15	-5.834e-3	2	395.756	2	NC	1
581		6	max	.009	3	.168	3	0	1	9.467e-3	3	NC	5	NC	1
582			min	-.006	2	-.244	2	0	15	-8.736e-3	2	313.581	2	NC	1
583		7	max	.009	3	.221	3	0	3	1.259e-2	3	NC	15	NC	1
584			min	-.006	2	-.312	2	0	1	-1.164e-2	2	264.851	2	NC	1
585		8	max	.009	3	.266	3	0	15	1.572e-2	3	NC	15	NC	1
586			min	-.006	2	-.365	2	0	1	-1.454e-2	2	235.927	2	NC	1
587		9	max	.009	3	.294	3	0	1	1.613e-2	3	NC	15	NC	1
588			min	-.006	2	-.399	2	0	15	-1.636e-2	2	220.831	2	NC	1
589		10	max	.008	3	.304	3	0	15	1.475e-2	3	NC	15	NC	1
590			min	-.005	2	-.41	2	0	1	-1.746e-2	2	216.421	2	NC	1
591		11	max	.008	3	.297	3	0	15	1.336e-2	3	NC	15	NC	1
592			min	-.005	2	-.398	2	0	1	-1.856e-2	2	221.653	2	NC	1
593		12	max	.008	3	.272	3	0	1	1.161e-2	3	NC	15	NC	1
594			min	-.005	2	-.363	2	0	15	-1.782e-2	2	238.367	2	NC	1
595		13	max	.008	3	.232	3	0	1	9.29e-3	3	NC	15	NC	1
596			min	-.005	2	-.307	2	0	10	-1.428e-2	2	270.664	2	NC	1
597		14	max	.008	3	.181	3	0	15	6.973e-3	3	NC	5	NC	1
598			min	-.005	2	-.236	2	0	1	-1.075e-2	2	325.789	2	NC	1
599		15	max	.007	3	.124	3	0	15	4.657e-3	3	NC	5	NC	1
600			min	-.005	2	-.158	2	-.002	1	-7.218e-3	2	420.454	2	NC	1
601		16	max	.007	3	.064	3	0	15	2.34e-3	3	NC	5	NC	1
602			min	-.005	2	-.08	2	-.003	1	-3.685e-3	2	595.217	2	NC	1
603		17	max	.007	3	.005	3	0	15	2.33e-5	3	NC	5	NC	1
604			min	-.005	2	-.007	2	-.003	1	-2.532e-4	1	967.698	2	NC	1
605		18	max	.007	3	.055	2	0	15	1.813e-3	3	NC	4	NC	1
606			min	-.005	2	-.047	3	-.002	1	-4.679e-3	2	2046.665	2	NC	1
607		19	max	.007	3	.11	2	0	1	3.699e-3	3	NC	1	NC	1
608			min	-.005	2	-.097	3	0	15	-9.394e-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

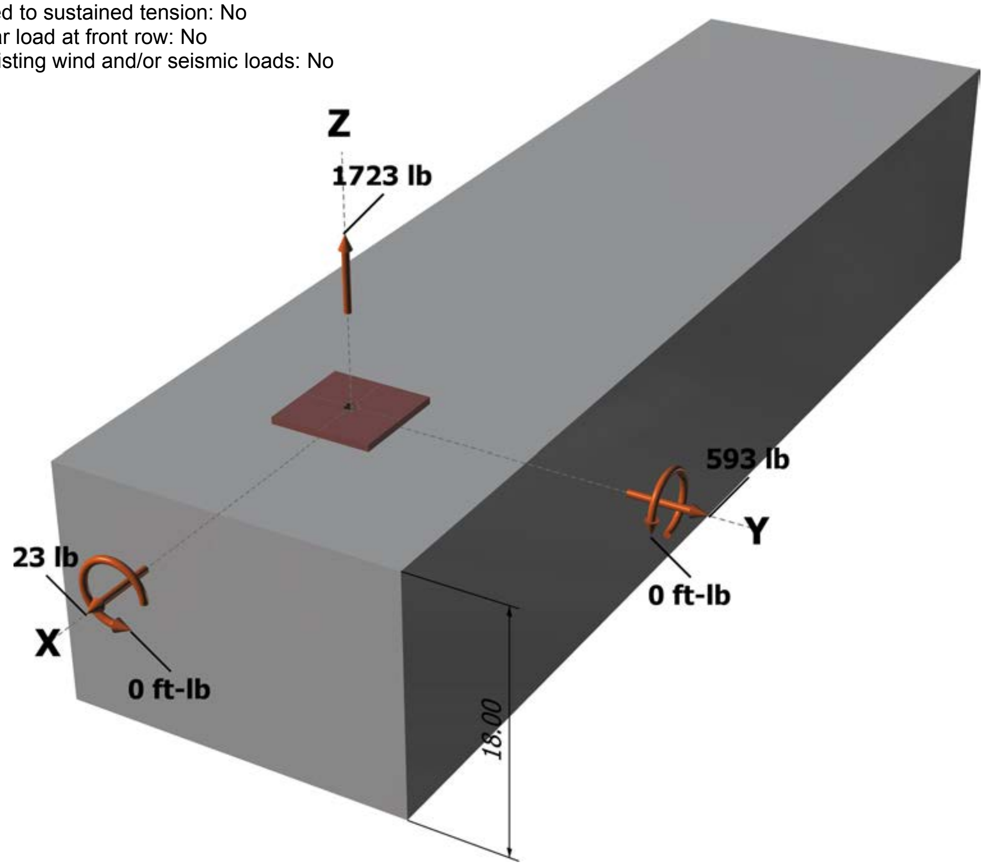
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

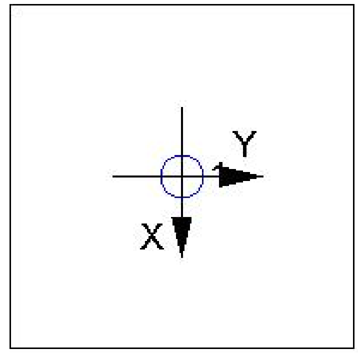
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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)

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	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

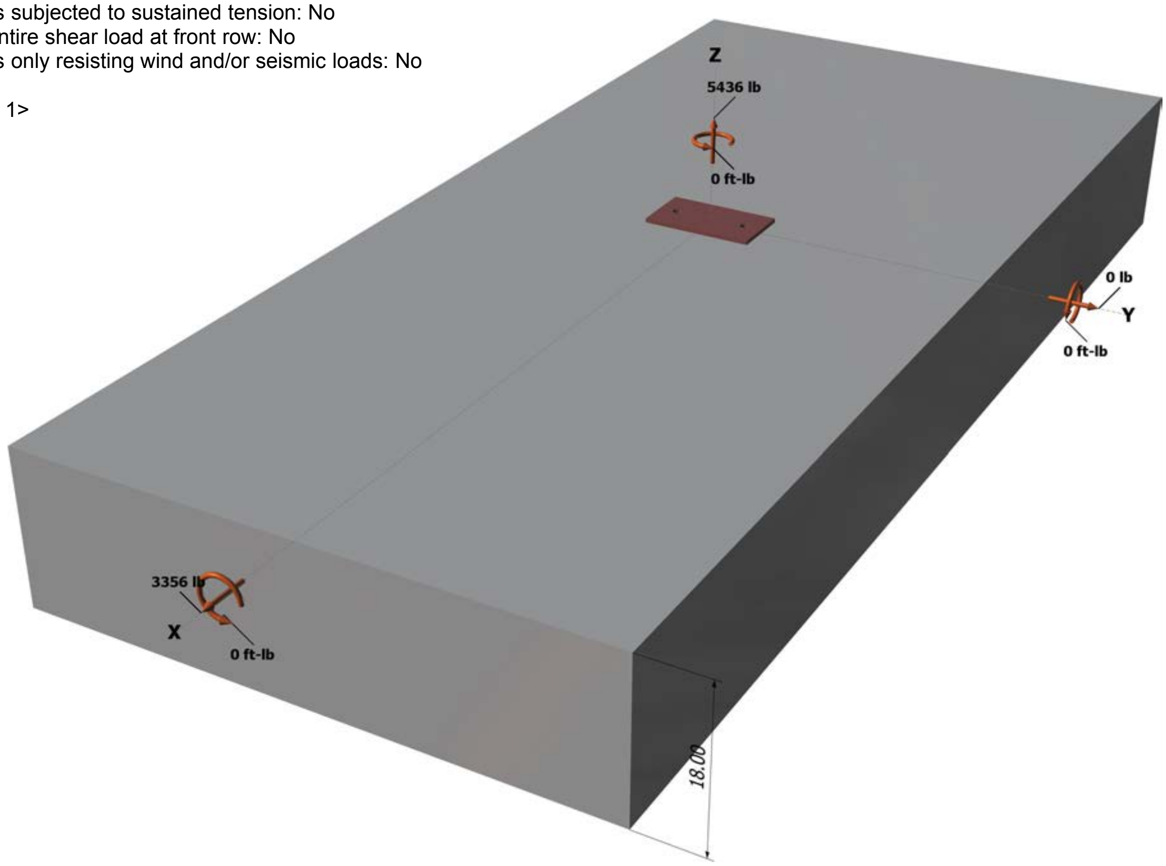
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

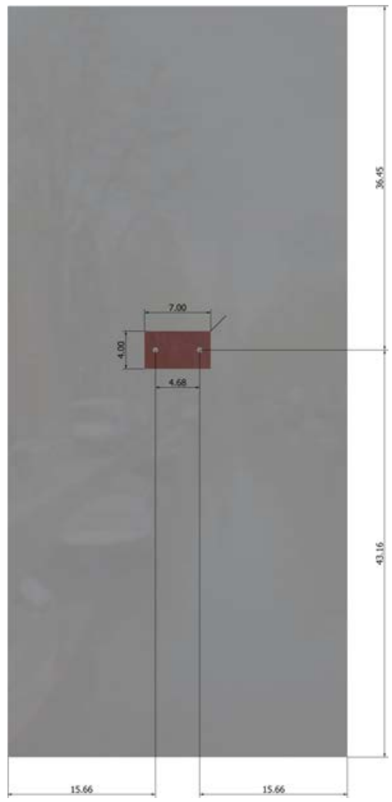
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



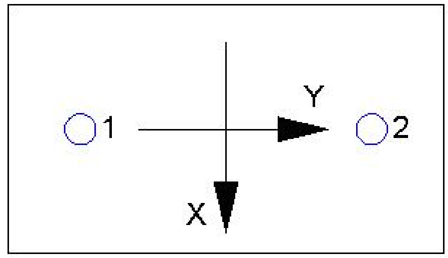
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	2718.0	1678.0	0.0	1678.0
2	2718.0	1678.0	0.0	1678.0
Sum	5436.0	3356.0	0.0	3356.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 5436
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)
648.00	648.00	1.000	0.961	1.000	1.000	15593	0.70	10490

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	15.66	23247

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (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)
845.64	1103.56	1.000	1.000	1.000	23247	0.70	24939

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	2718	6071	0.45	Pass
Concrete breakout	5436	10231	0.53	Pass
Adhesive	**5436**	**8093**	**0.67**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**1678**	**3156**	**0.53**	**Pass (Governs)**
T Concrete breakout x+	3356	10490	0.32	Pass
|| Concrete breakout y-	1678	24939	0.07	Pass
Pryout	3356	20601	0.16	Pass

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

Sec. D.7.3	0.67	0.53	120.3 %	1.2	Pass

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

12. Warnings

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

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

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