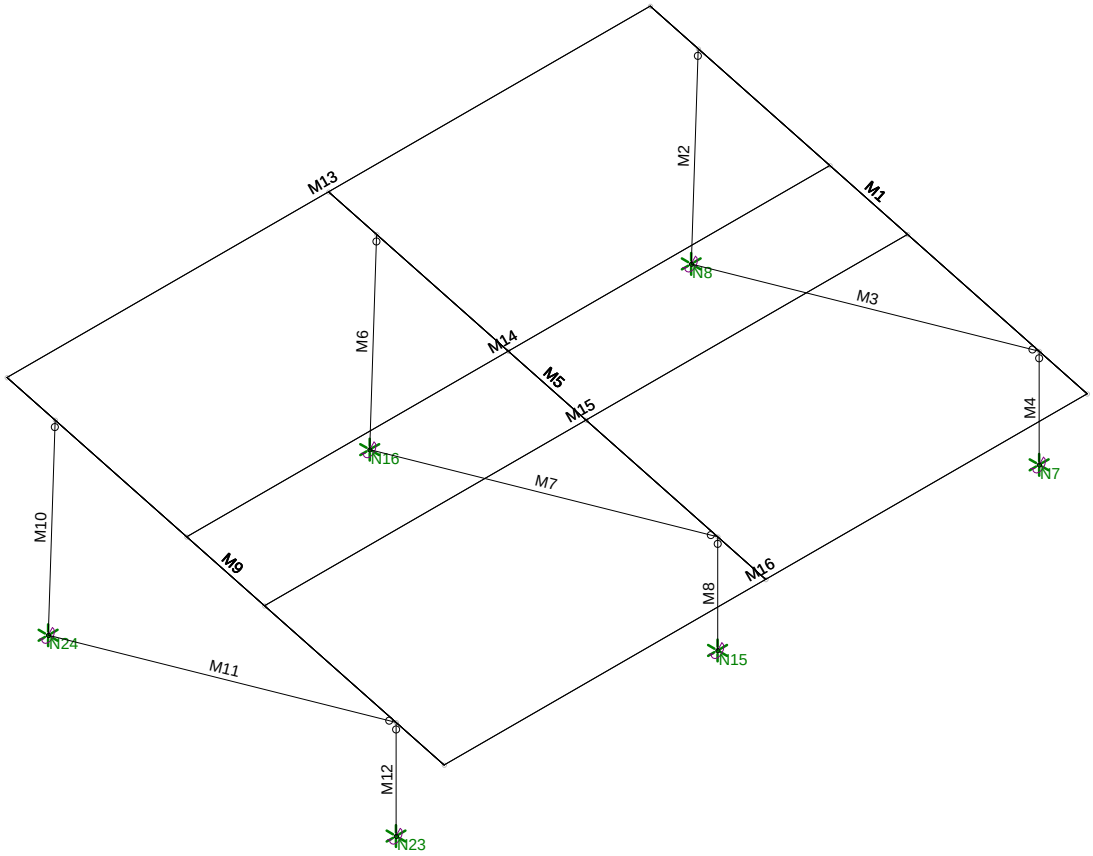


Schletter, Inc.		15ÁTilt w/o Seismic Design
HCV	Standard PVMax Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

1.2 Construction

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

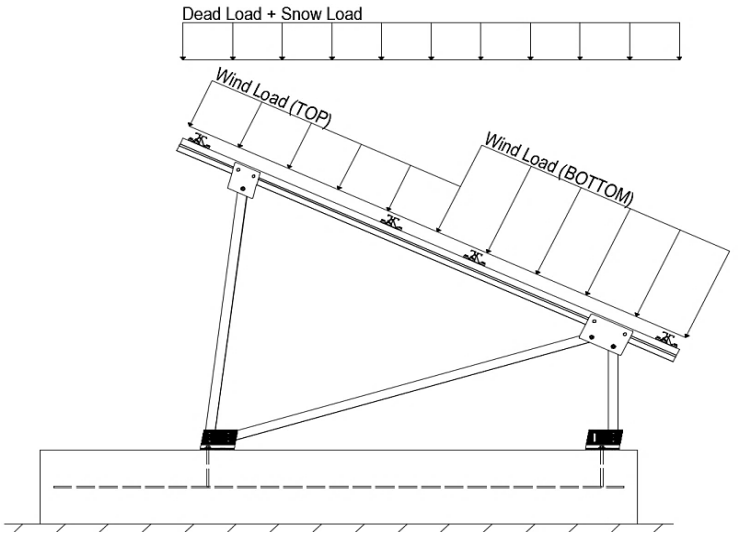
PV modules are required to meet the following specifications:

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

Modules Per Row =	2
Module Tilt =	15°
Maximum Height Above Grade =	3 ft

1.3 Technical Codes

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



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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	22.68	psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00		
C_s =	1.00		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	115	mph	Exposure Category = C
Height <	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	20.76	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$ =	1.000		*(Pressure)*
$Cf+_{BOTTOM}$ =	1.600		
$Cf-_{TOP, OUTER PURLIN}$ =	-2.300		
$Cf-_{TOP, INNER PURLIN}$ =	-1.780	*(Suction)*	
$Cf-_{BOTTOM}$ =	-1.000		

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W	
1.2D + 1.0W + 0.5S	
0.9D + 1.0W [M]	
1.54D + 1.3E + 0.2S [R]	*(ASCE 7, Eq 2.3.2-1 through 2.3.2-7) & (ASCE 7, Section 12.4.3.2)*
0.56D + 1.3E [R]	
1.54D + 1.25E + 0.2S [O]	
0.56D + 1.25E [O]	

Allowable Stress Design, ASD

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

1.0D + 1.0S	
1.0D + 0.6W	
1.0D + 0.75L + 0.45W + 0.75S	
0.6D + 0.6W [M]	*(ASCE 7, Eq 2.4.1-1 through 2.4.1-8) & (ASCE 7, Section 12.4.3.2)*
1.238D + 0.875E [O]	
1.1785D + 0.65625E + 0.75S [O]	
0.362D + 0.875E [O]	

[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
M13	Top
M14	Mid-Top
M15	Mid-Bottom
M16	Bottom

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

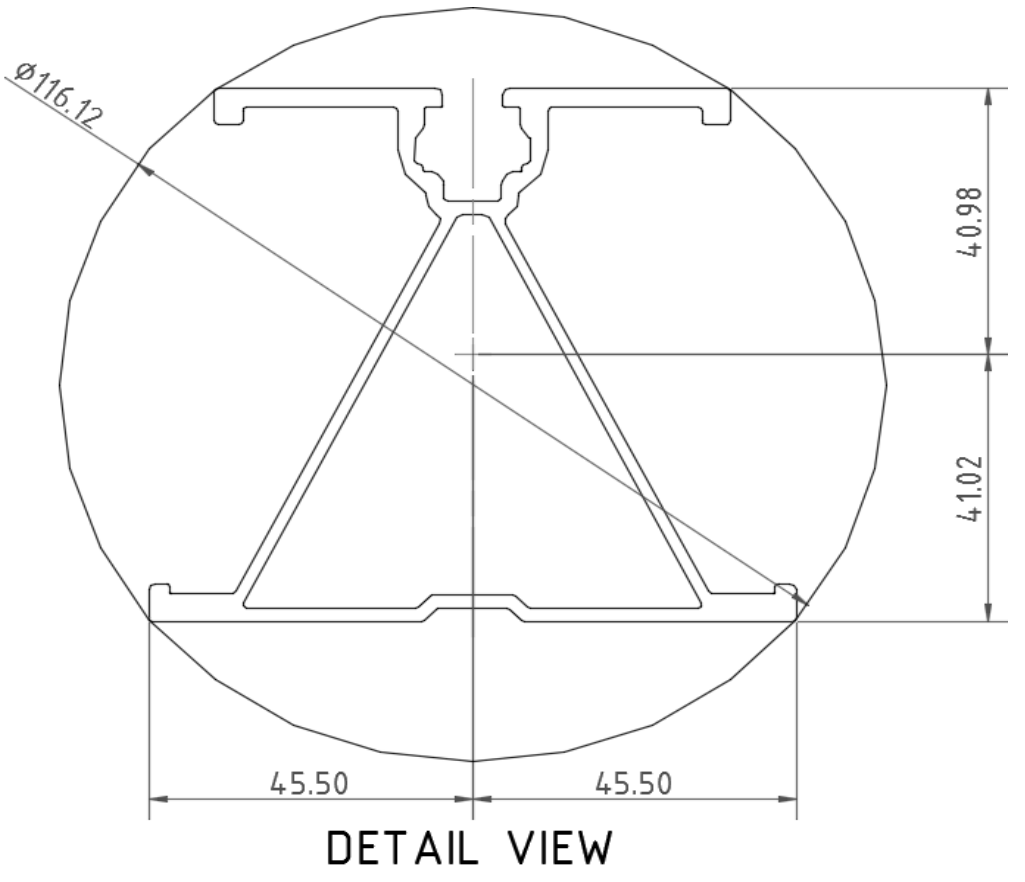
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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).

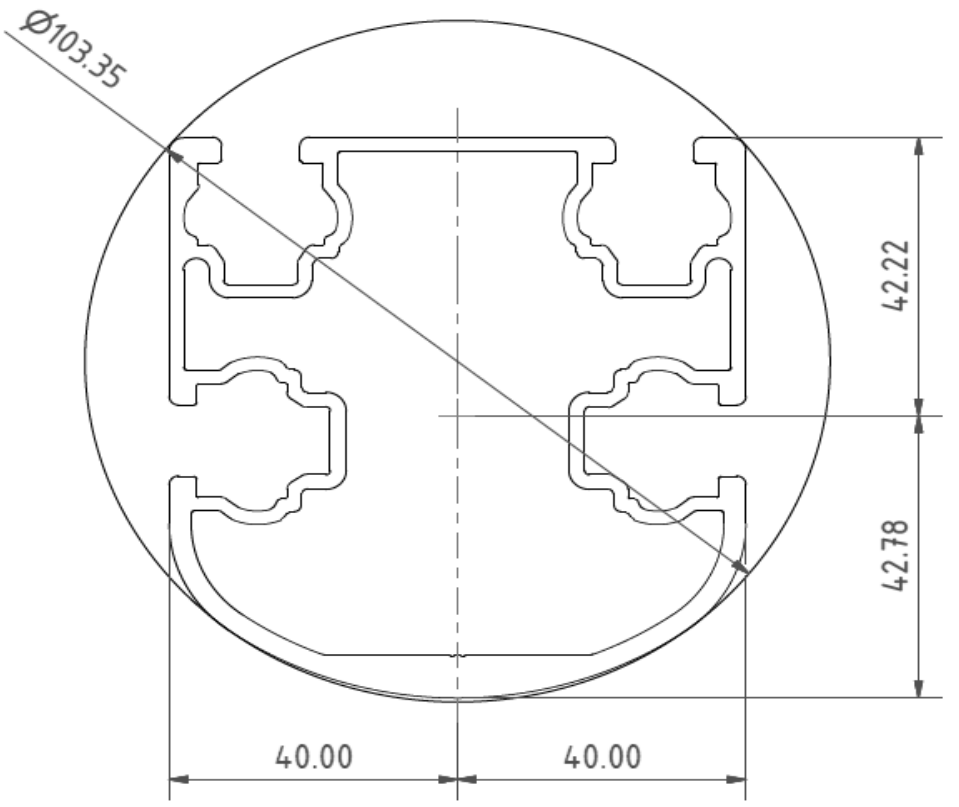
Purlin Type	=	**S1.5**	
Aluminum Type	=	6105-T5	
F_{ty}	=	35	ksi
L_b	=	123	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$	=	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$	=	23.08	ksi
S_y	=	1.33	in^3
S_x	=	0.60	in^3
E	=	10100	ksi
I_y	=	2.16	in^4
I_x	=	1.07	in^4
A	=	1.25	in^2
g	=	1.50	lbs/ft
M_y	=	2.050	k-ft
M_z	=	0.267	k-ft
$M_{y\ allowable}$	=	2.779	k-ft
$M_{z\ allowable}$	=	1.154	k-ft
Utilization	=	97%	



4.2 Girder Design

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

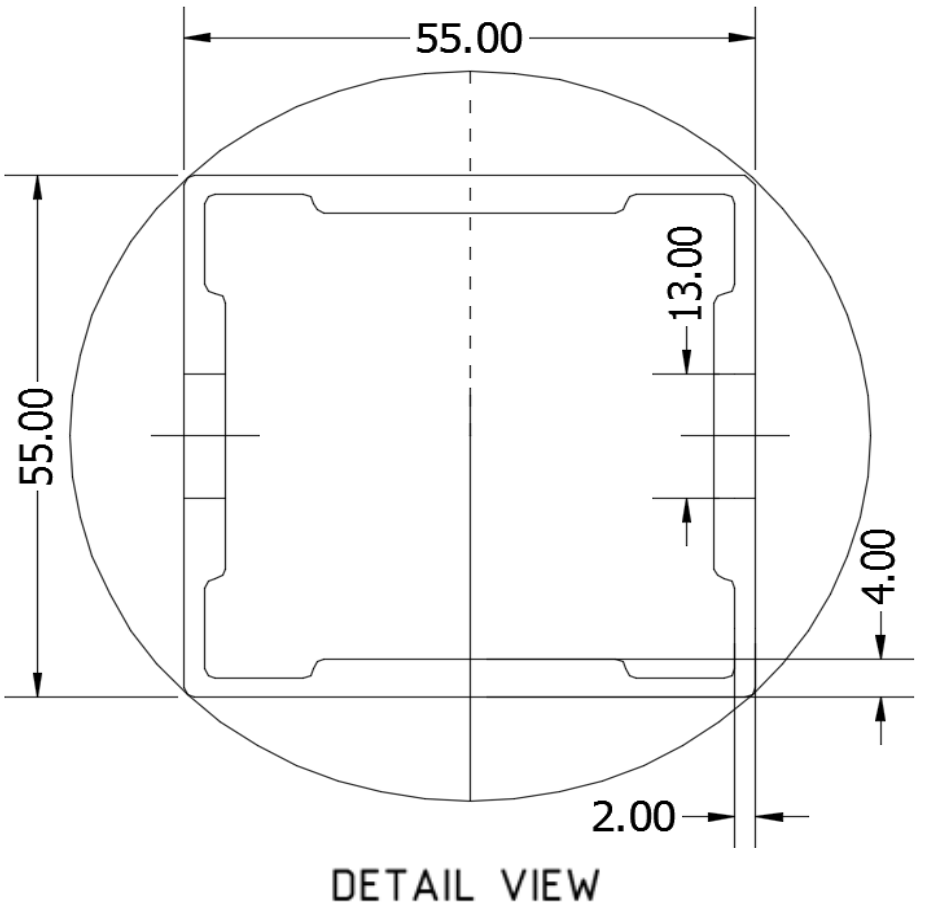
Girder Type	=	**BF0**	
Aluminum Type	=	6105-T5	
F_{ty}	=	35	ksi
L_b	=	88.90	in
$\Phi F_{ty\ AXIAL}$	=	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$	=	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$	=	33.25	ksi
S_y	=	1.42	in^3
S_x	=	1.41	in^3
E	=	10100	ksi
I_y	=	2.39	in^4
I_x	=	2.22	in^4
A	=	1.88	in^2
g	=	2.26	lbs/ft
M_y	=	-3.185	k-ft
M_z	=	0.000	k-ft
P_n	=	-0.201	k
$M_{y\ allowable}$	=	3.464	k-ft
$M_{z\ allowable}$	=	3.907	k-ft
$P_{n\ allowable}$	=	58.535	k
Utilization	=	92%	



4.3 Front Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	3.627	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	13%	

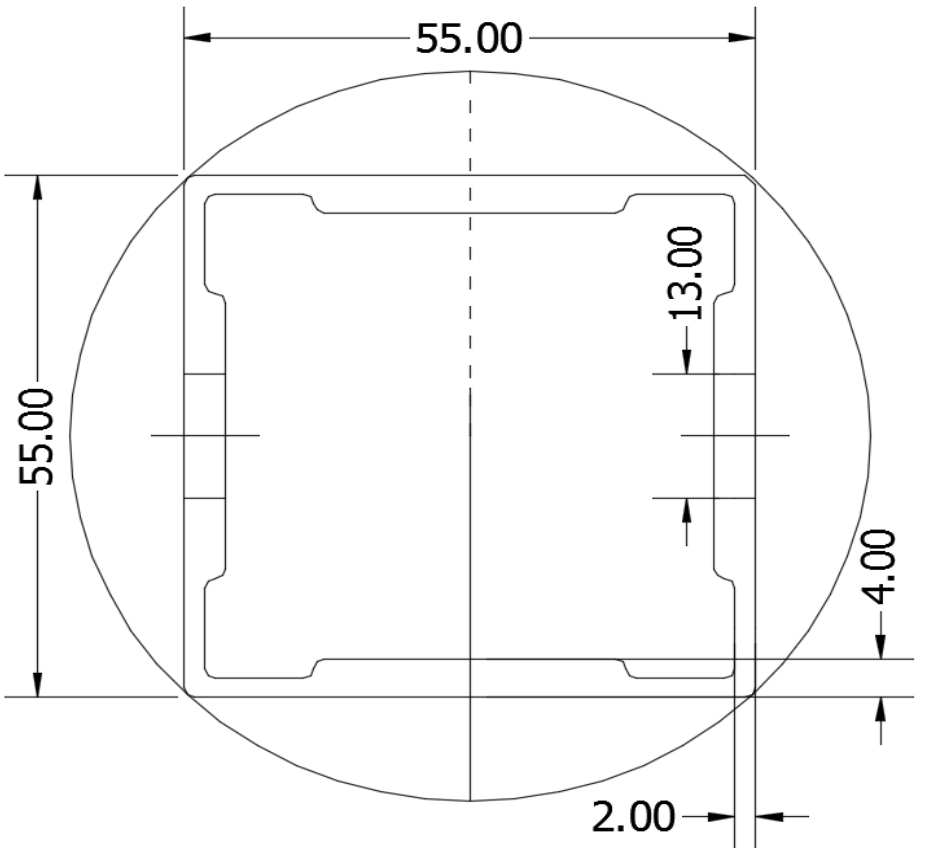


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.010	k-ft
M_z =	0.000	k-ft
P_n =	1.022	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	15%	

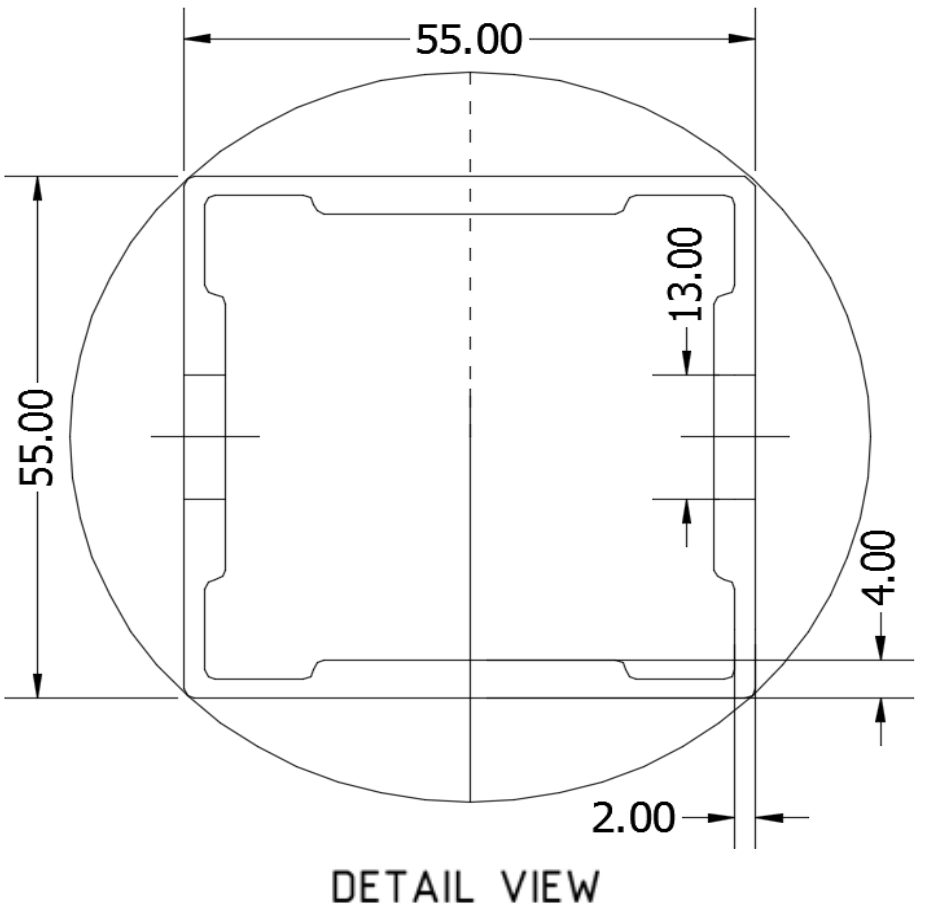


DETAIL VIEW

4.5 Rear Strut Design

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

Strut Type	=	**55x55**	
Aluminum Type	=	6105-T5	
F_{ty}	=	35	ksi
L_b	=	48.30	in
$\Phi F_{ty\ AXIAL}$	=	18.93	ksi
$\Phi F_{ty\ BENDING}$	=	28.22	ksi
S_y	=	0.60	in^3
S_x	=	0.60	in^3
E	=	10100	ksi
I_y	=	0.67	in^4
I_x	=	0.67	in^4
A	=	0.98	in^2
g	=	1.18	lbs/ft
M_y	=	-0.009	k-ft
M_z	=	0.000	k-ft
P_n	=	3.588	k
$M_{y\ allowable}$	=	1.408	k-ft
$M_{z\ allowable}$	=	1.408	k-ft
$P_{n\ allowable}$	=	18.592	k
Utilization	=	20%	



5. FOUNDATION DESIGN CALCULATIONS

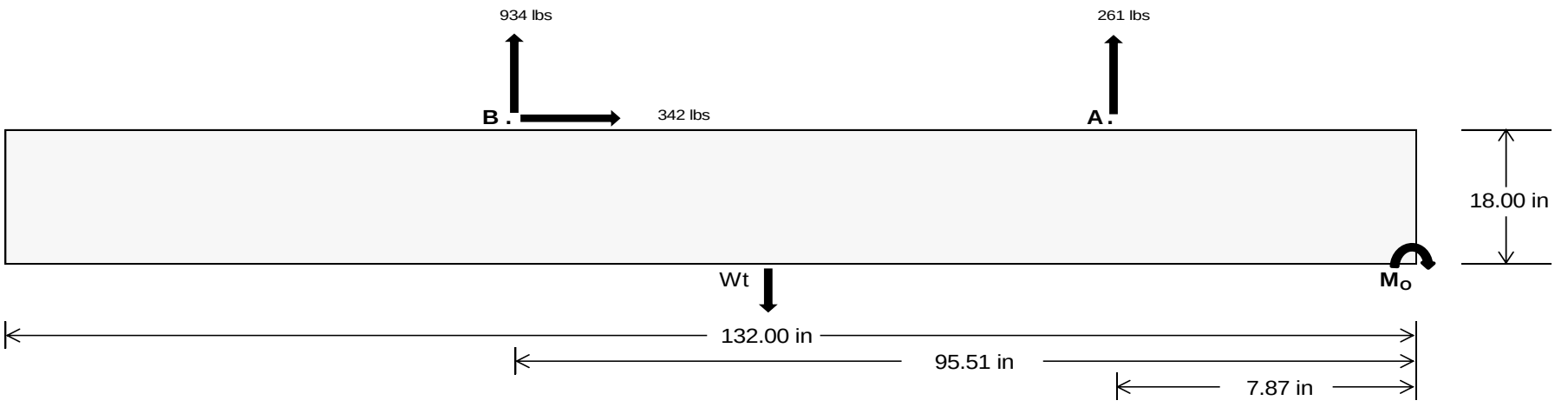
5.1 Helical Pile Foundations

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	=	1154.32	4069.21	k
Compressive Load	=	4714.78	4892.98	k
Lateral Load	=	10.52	1484.72	k
Moment (Weak Axis)	=	0.02	0.01	k

5.2 Design of Ballast Foundations

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



Concrete Properties		
Weight of Concrete =	145	pcf
Compressive Strength =	2500	psi
Yield Strength =	60000	psi
Overturning Check		
M_O =	97425.0	in-lbs
Resisting Force Required =	1476.14	lbs
S.F. =	1.67	
Weight Required =	2460.23	lbs
Minimum Width =	22 in	in
Weight Provided =	4386.25	lbs
Sliding		
Force =	342.29	lbs
Friction =	0.4	
Weight Required =	855.72	lbs
Resisting Weight =	4386.25	lbs
Additional Weight Required =	0	lbs
Cohesion		
Sliding Force =	342.29	lbs
Cohesion =	130	psf
Area =	20.17	ft^2
Resisting =	2193.13	lbs
Additional Weight Required =	0	lbs
Shear Key		
Additional Force =	0	lbs
Lateral Bearing Pressure =	200	psf/ft
Required Depth =	0.00	ft
f'_c =	2500	psi
Length =	8	in

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

A minimum 132in long x 22in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 22in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 22in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	22 in	23 in	24 in	25 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(1.83 ft) =	4386 lbs	4586 lbs	4785 lbs	4984 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in	22 in	23 in	24 in	25 in
F_A	1767 lbs	1767 lbs	1767 lbs	1767 lbs	1349 lbs	1349 lbs	1349 lbs	1349 lbs	2206 lbs	2206 lbs	2206 lbs	2206 lbs	-523 lbs	-523 lbs	-523 lbs	-523 lbs
F_B	1831 lbs	1831 lbs	1831 lbs	1831 lbs	1400 lbs	1400 lbs	1400 lbs	1400 lbs	2288 lbs	2288 lbs	2288 lbs	2288 lbs	-1868 lbs	-1868 lbs	-1868 lbs	-1868 lbs
F_V	157 lbs	157 lbs	157 lbs	157 lbs	614 lbs	614 lbs	614 lbs	614 lbs	568 lbs	568 lbs	568 lbs	568 lbs	-685 lbs	-685 lbs	-685 lbs	-685 lbs
P_{total}	7985 lbs	8184 lbs	8384 lbs	8583 lbs	7135 lbs	7334 lbs	7534 lbs	7733 lbs	8880 lbs	9079 lbs	9279 lbs	9478 lbs	241 lbs	361 lbs	480 lbs	600 lbs
M	4292 lbs-ft	4292 lbs-ft	4292 lbs-ft	4292 lbs-ft	4014 lbs-ft	4014 lbs-ft	4014 lbs-ft	4014 lbs-ft	5911 lbs-ft	5911 lbs-ft	5911 lbs-ft	5911 lbs-ft	1035 lbs-ft	1035 lbs-ft	1035 lbs-ft	1035 lbs-ft
e	0.54 ft	0.52 ft	0.51 ft	0.50 ft	0.56 ft	0.55 ft	0.53 ft	0.52 ft	0.67 ft	0.65 ft	0.64 ft	0.62 ft	4.29 ft	2.87 ft	2.15 ft	1.72 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}	279.9 psf	277.2 psf	274.7 psf	272.4 psf	245.2 psf	244.0 psf	242.9 psf	241.9 psf	280.4 psf	277.7 psf	275.2 psf	272.9 psf	0.0 psf	0.0 psf	0.0 psf	1.6 psf
f_{max}	512.0 psf	499.2 psf	487.5 psf	476.7 psf	462.4 psf	451.7 psf	442.0 psf	433.0 psf	600.2 psf	583.6 psf	568.3 psf	554.3 psf	72.6 psf	47.7 psf	47.8 psf	50.8 psf

Maximum Bearing Pressure = 600 psf
Allowable Bearing Pressure = 1500 psf

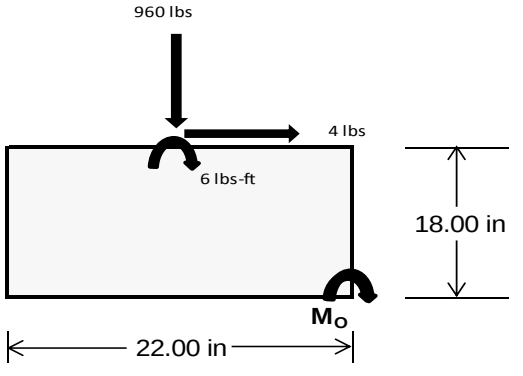
Use a 132in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	868.1	ft-lbs
Resisting Force Required =	947.00	lbs
S.F. =	1.67	
Weight Required =	1578.34	lbs
Minimum Width =	22 in	in
Weight Provided =	4386.25	lbs

A minimum 132in long x 22in wide x 18in tall ballast foundation is required to resist overturning.



Bearing Pressure

ASD LC	1.238D + 0.875E			1.1785D + 0.65625E + 0.75S			0.362D + 0.875E		
Width	22 in			22 in			22 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	242 lbs	661 lbs	242 lbs	960 lbs	2928 lbs	960 lbs	71 lbs	193 lbs	71 lbs
F_V	1 lbs	0 lbs	1 lbs	4 lbs	0 lbs	4 lbs	0 lbs	0 lbs	0 lbs
P_{total}	5672 lbs	4386 lbs	5672 lbs	6129 lbs	4386 lbs	6129 lbs	1659 lbs	4386 lbs	1659 lbs
M	3 lbs-ft	0 lbs-ft	3 lbs-ft	12 lbs-ft	0 lbs-ft	12 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	0.31 ft	0.31 ft	0.31 ft	0.31 ft	0.31 ft	0.31 ft	0.31 ft	0.31 ft	0.31 ft
f_{min}	280.7 psf	217.5 psf	280.7 psf	302.0 psf	217.5 psf	302.0 psf	82.2 psf	217.5 psf	82.2 psf
f_{max}	281.8 psf	217.5 psf	281.8 psf	305.8 psf	217.5 psf	305.8 psf	82.3 psf	217.5 psf	82.3 psf

Maximum Bearing Pressure = 306 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 22in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 22in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

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

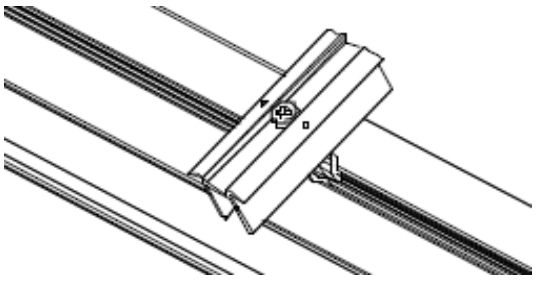
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

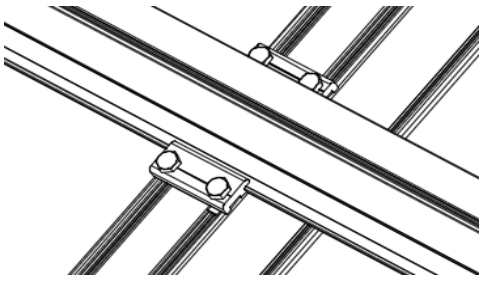
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.444 k
Allowable Uplift	=	1.214 k
Utilization	=	37%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	1.598 k
Allowable Uplift	=	4.357 k
Utilization	=	37%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	3.627 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	49%

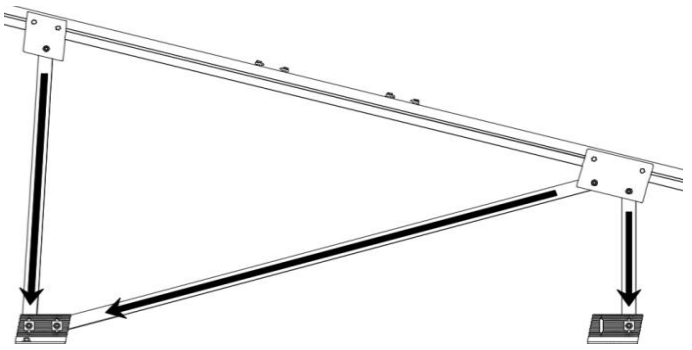
Rear Strut

Maximum Axial Load	=	3.588 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	48%

Diagonal Strut

Maximum Axial Load	=	1.081 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	15%

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

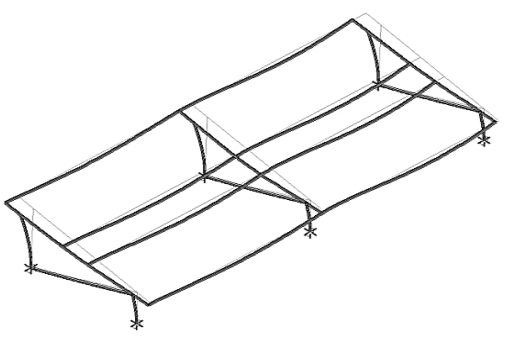
7.1 Seismic Drift - N/A

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}	=	36.30 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.726 in
Max Drift, Δ_{MAX}	=	0.038 in

N/A

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



APPENDIX A

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

Purlin = **S1.5**

Strong Axis:

3.4.14

L_b = 123 in

J = 0.432

340.276

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 27.3 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 123

J = 0.432

216.395

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

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= 28.6

3.4.16

b/t = 37.0588

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 23.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 32.195

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

S1 = 36.9

m = 0.65

C_0 = 45.5

Cc = 45.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 23.1 ksi

Iy = 446476 mm^4

1.073 in^4

x = 45.5 mm

Sy = 0.599 in^3

M_{max}Wk = 1.152 k-ft

Compression

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Girder = **BF0**

Strong Axis:

3.4.14

L_b = 88.9 in
J = 1.08
152.913

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

S1 = 0.51461

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

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

3.4.16

b/t = 16.2

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 88.9
J = 1.08
161.829

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

S1 = 0.51461

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

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

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7
φF_L = φyFcy
φF_L = 33.3 ksi

3.4.16.1 Used

Rb/t = 18.1

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L = φb[Bt-Dt*√(Rb/t)]

φF_L = 31.1 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.4

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

S1 = 35.2

m = 0.68

C_0 = 41.067

Cc = 43.717

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

S2 = 73.8

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L St$ = 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

φF_L = 1.3φyFcy

φF_L = 43.2 ksi

$\varphi F_L Wk$ = 33.3 ksi

Iy = 923544 mm^4

2.219 in^4

x = 40 mm

Sy = 1.409 in^3

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

Compression

3.4.9

b/t = 16.2

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 31.6 ksi

b/t = 7.4

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 ksi

3.4.10

Rb/t = 18.1

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

S1 = 6.87

S2 = 131.3

φF_L = φc[Bt-Dt*√(Rb/t)]

φF_L = 31.09 ksi

φF_L = 31.09 ksi

A = 1215.13 mm^2

1.88 in^2

P_{max} = 58.55 kips

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 24.8 in

J = 0.942

38.7028

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.4 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 24.5

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

S1 = 36.9

m = 0.65

C_0 = 27.5

Cc = 27.5

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 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

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

$\varphi F_L Wk$= 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 = 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

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

$\varphi F_L St$= 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

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

$\varphi F_L Wk$= 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

φF_L= (φccFcy)/(λ²)

φF_L= 7.50396 ksi

3.4.9

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

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **55x55**

Strong Axis:

3.4.14

L_b = 48.30 in
J = 0.942
75.3767

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.6 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 48.3
J = 0.942
75.3767

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.6

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

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

$\varphi F_L St$= 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

3.4.18

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

$\varphi F_L Wk$= 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 = 1.11734

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.76536

φF_L= φcc(Bc-Dc*λ)

φF_L= 18.9268 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

$\varphi F_L = \varphi y Fcy$

φF_L = 33.25 ksi

φF_L = 18.93 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 19.48 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	-61.093	-61.093	0	0
2	M14	Y	-61.093	-61.093	0	0
3	M15	Y	-61.093	-61.093	0	0
4	M16	Y	-61.093	-61.093	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	-57.906	-57.906	0	0
2	M14	y	-57.906	-57.906	0	0
3	M15	y	-92.65	-92.65	0	0
4	M16	y	-92.65	-92.65	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	133.185	133.185	0	0
2	M14	y	103.073	103.073	0	0
3	M15	y	57.906	57.906	0	0
4	M16	y	57.906	57.906	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...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5																
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1																
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1														
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3														
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3														
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25														
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25														

Load Combinations (Continued)

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	258.579	2	1119.571	1	1.114	1	.005	1	0	1	0	1
2		min	-362.764	3	-950.644	3	.041	15	0	15	0	1	0	1
3	N7	max	.047	1	1238.132	1	-.274	15	0	15	0	1	0	1
4		min	-.057	2	-254.573	3	-8.089	1	-.017	1	0	1	0	1
5	N15	max	.024	9	3626.757	1	0	1	0	1	0	1	0	1
6		min	-.853	2	-887.942	3	0	12	0	12	0	1	0	1
7	N16	max	1081.446	2	3763.834	1	0	3	0	3	0	1	0	1
8		min	-1142.09	3	-3130.158	3	0	1	0	1	0	1	0	1
9	N23	max	.047	1	1238.132	1	8.089	1	.017	1	0	1	0	1
10		min	-.057	2	-254.573	3	.274	15	0	15	0	1	0	1
11	N24	max	258.579	2	1119.571	1	-.041	15	0	15	0	1	0	1
12		min	-362.764	3	-950.644	3	-1.114	1	-.005	1	0	1	0	1
13	Totals:	max	1597.637	2	12105.997	1	0	1						
14		min	-1868.01	3	-6428.534	3	0	9						

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	88.769	1	512.877	1	-4.565	15	0	3	.211	1	0	1
2			min	2.907	15	-491.901	3	-139.849	1	-.013	1	.007	15	0	3
3		2	max	88.769	1	359.34	1	-3.512	15	0	3	.07	1	.477	3
4			min	2.907	15	-346.113	3	-107.544	1	-.013	1	.002	15	-.497	1
5		3	max	88.769	1	205.804	1	-2.459	15	0	3	0	12	.788	3
6			min	2.907	15	-200.325	3	-75.24	1	-.013	1	-.034	1	-.818	1
7		4	max	88.769	1	52.268	1	-1.405	15	0	3	-.003	12	.933	3
8			min	2.907	15	-54.538	3	-42.935	1	-.013	1	-.101	1	-.965	1
9		5	max	88.769	1	91.25	3	-.352	15	0	3	-.004	12	.913	3
10			min	2.907	15	-101.269	1	-10.631	1	-.013	1	-.132	1	-.938	1
11		6	max	88.769	1	237.038	3	21.674	1	0	3	-.004	15	.726	3
12			min	2.907	15	-254.805	1	.41	12	-.013	1	-.125	1	-.735	1
13		7	max	88.769	1	382.826	3	53.978	1	0	3	-.003	15	.373	3
14			min	2.907	15	-408.342	1	1.463	12	-.013	1	-.082	1	-.357	1
15		8	max	88.769	1	528.614	3	86.283	1	0	3	0	10	.195	1
16			min	2.907	15	-561.878	1	2.516	12	-.013	1	-.002	1	-.146	3
17		9	max	88.769	1	674.402	3	118.587	1	0	3	.114	1	.923	1
18			min	2.907	15	-715.414	1	3.569	12	-.013	1	.002	12	-.831	3
19		10	max	88.769	1	868.951	1	-4.622	12	0	3	.268	1	1.825	1
20			min	2.907	15	-820.19	3	-150.892	1	-.013	1	.007	12	-1.682	3
21		11	max	88.769	1	715.414	1	-3.569	12	.013	1	.114	1	.923	1
22			min	2.907	15	-674.402	3	-118.587	1	0	3	.002	12	-.831	3
23		12	max	88.769	1	561.878	1	-2.516	12	.013	1	0	10	.195	1
24			min	2.907	15	-528.614	3	-86.283	1	0	3	-.002	1	-.146	3
25		13	max	88.769	1	408.342	1	-1.463	12	.013	1	-.003	15	.373	3
26			min	2.907	15	-382.826	3	-53.978	1	0	3	-.082	1	-.357	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
27		14	max	88.769	1	254.805	1	-.41	12	.013	1	-.004	15	.726	3
28			min	2.907	15	-237.038	3	-21.674	1	0	3	-.125	1	-.735	1
29		15	max	88.769	1	101.269	1	10.631	1	.013	1	-.004	12	.913	3
30			min	2.907	15	-91.25	3	.352	15	0	3	-.132	1	-.938	1
31		16	max	88.769	1	54.538	3	42.935	1	.013	1	-.003	12	.933	3
32			min	2.907	15	-52.268	1	1.405	15	0	3	-.101	1	-.965	1
33		17	max	88.769	1	200.325	3	75.24	1	.013	1	0	12	.788	3
34			min	2.907	15	-205.804	1	2.459	15	0	3	-.034	1	-.818	1
35		18	max	88.769	1	346.113	3	107.544	1	.013	1	.07	1	.477	3
36			min	2.907	15	-359.34	1	3.512	15	0	3	.002	15	-.497	1
37		19	max	88.769	1	491.901	3	139.849	1	.013	1	.211	1	0	1
38			min	2.907	15	-512.877	1	4.565	15	0	3	.007	15	0	3
39	M14	1	max	40.774	1	540.735	1	-4.703	15	.006	3	.24	1	0	1
40			min	1.338	15	-386.579	3	-144.087	1	-.011	1	.008	15	0	3
41		2	max	40.774	1	387.199	1	-3.65	15	.006	3	.094	1	.377	3
42			min	1.338	15	-275.085	3	-111.783	1	-.011	1	.003	15	-.528	1
43		3	max	40.774	1	233.662	1	-2.597	15	.006	3	0	3	.627	3
44			min	1.338	15	-163.592	3	-79.478	1	-.011	1	-.015	1	-.882	1
45		4	max	40.774	1	80.126	1	-1.543	15	.006	3	-.002	12	.749	3
46			min	1.338	15	-52.098	3	-47.173	1	-.011	1	-.087	1	-1.061	1
47		5	max	40.774	1	59.396	3	-.49	15	.006	3	-.004	12	.745	3
48			min	1.338	15	-73.411	1	-14.869	1	-.011	1	-.122	1	-1.064	1
49		6	max	40.774	1	170.889	3	17.436	1	.006	3	-.004	15	.614	3
50			min	1.338	15	-226.947	1	.276	12	-.011	1	-.121	1	-.893	1
51		7	max	40.774	1	282.383	3	49.74	1	.006	3	-.003	15	.356	3
52			min	1.338	15	-380.483	1	1.329	12	-.011	1	-.082	1	-.548	1
53		8	max	40.774	1	393.876	3	82.045	1	.006	3	0	10	0	15
54			min	1.338	15	-534.02	1	2.382	12	-.011	1	-.007	1	-.033	2
55		9	max	40.774	1	505.37	3	114.349	1	.006	3	.104	1	.669	1
56			min	1.338	15	-687.556	1	3.435	12	-.011	1	.002	12	-.541	3
57		10	max	40.774	1	841.093	1	-4.488	12	.006	3	.253	1	1.539	1
58			min	1.338	15	-616.864	3	-146.654	1	-.011	1	.007	12	-1.18	3
59		11	max	40.774	1	687.556	1	-3.435	12	.011	1	.104	1	.669	1
60			min	1.338	15	-505.37	3	-114.349	1	-.006	3	.002	12	-.541	3
61		12	max	40.774	1	534.02	1	-2.382	12	.011	1	0	10	0	15
62			min	1.338	15	-393.876	3	-82.045	1	-.006	3	-.007	1	-.033	2
63		13	max	40.774	1	380.483	1	-1.329	12	.011	1	-.003	15	.356	3
64			min	1.338	15	-282.383	3	-49.74	1	-.006	3	-.082	1	-.548	1
65		14	max	40.774	1	226.947	1	-.276	12	.011	1	-.004	15	.614	3
66			min	1.338	15	-170.889	3	-17.436	1	-.006	3	-.121	1	-.893	1
67		15	max	40.774	1	73.411	1	14.869	1	.011	1	-.004	12	.745	3
68			min	1.338	15	-59.396	3	.49	15	-.006	3	-.122	1	-1.064	1
69		16	max	40.774	1	52.098	3	47.173	1	.011	1	-.002	12	.749	3
70			min	1.338	15	-80.126	1	1.543	15	-.006	3	-.087	1	-1.061	1
71		17	max	40.774	1	163.592	3	79.478	1	.011	1	0	3	.627	3
72			min	1.338	15	-233.662	1	2.597	15	-.006	3	-.015	1	-.882	1
73		18	max	40.774	1	275.085	3	111.783	1	.011	1	.094	1	.377	3
74			min	1.338	15	-387.199	1	3.65	15	-.006	3	.003	15	-.528	1
75		19	max	40.774	1	386.579	3	144.087	1	.011	1	.24	1	0	1
76			min	1.338	15	-540.735	1	4.703	15	-.006	3	.008	15	0	3
77	M15	1	max	-1.407	15	607.5	1	-4.702	15	.012	1	.24	1	0	2
78			min	-42.852	1	-213.138	3	-144.067	1	-.005	3	.008	15	0	3
79		2	max	-1.407	15	434.179	1	-3.649	15	.012	1	.094	1	.209	3
80			min	-42.852	1	-153.084	3	-111.762	1	-.005	3	.003	15	-.593	1
81		3	max	-1.407	15	260.858	1	-2.596	15	.012	1	0	3	.349	3
82			min	-42.852	1	-93.031	3	-79.458	1	-.005	3	-.015	1	-.989	1
83		4	max	-1.407	15	87.537	1	-1.543	15	.012	1	-.002	12	.42	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	-42.852	1	-32.977	3	-47.153	1	-.005	3	-.087	1	-1.187	1
85		5	max	-1.407	15	27.076	3	-.489	15	.012	1	-.004	12	.424	3
86			min	-42.852	1	-85.784	1	-14.849	1	-.005	3	-.122	1	-1.188	1
87		6	max	-1.407	15	87.129	3	17.456	1	.012	1	-.004	15	.359	3
88			min	-42.852	1	-259.106	1	.298	12	-.005	3	-.121	1	-.992	1
89		7	max	-1.407	15	147.183	3	49.76	1	.012	1	-.003	15	.225	3
90			min	-42.852	1	-432.427	1	1.351	12	-.005	3	-.082	1	-.598	1
91		8	max	-1.407	15	207.236	3	82.065	1	.012	1	0	10	.024	3
92			min	-42.852	1	-605.748	1	2.404	12	-.005	3	-.007	1	-.009	9
93		9	max	-1.407	15	267.29	3	114.369	1	.012	1	.104	1	.782	1
94			min	-42.852	1	-779.069	1	3.458	12	-.005	3	.002	12	-.247	3
95		10	max	-1.407	15	952.39	1	-4.511	12	.012	1	.253	1	1.768	1
96			min	-42.852	1	-327.343	3	-146.674	1	-.005	3	.007	12	-.585	3
97		11	max	-1.407	15	779.069	1	-3.458	12	.005	3	.104	1	.782	1
98			min	-42.852	1	-267.29	3	-114.369	1	-.012	1	.002	12	-.247	3
99		12	max	-1.407	15	605.748	1	-2.404	12	.005	3	0	10	.024	3
100			min	-42.852	1	-207.236	3	-82.065	1	-.012	1	-.007	1	-.009	9
101		13	max	-1.407	15	432.427	1	-1.351	12	.005	3	-.003	15	.225	3
102			min	-42.852	1	-147.183	3	-49.76	1	-.012	1	-.082	1	-.598	1
103		14	max	-1.407	15	259.106	1	-.298	12	.005	3	-.004	15	.359	3
104			min	-42.852	1	-87.129	3	-17.456	1	-.012	1	-.121	1	-.992	1
105		15	max	-1.407	15	85.784	1	14.849	1	.005	3	-.004	12	.424	3
106			min	-42.852	1	-27.076	3	.489	15	-.012	1	-.122	1	-1.188	1
107		16	max	-1.407	15	32.977	3	47.153	1	.005	3	-.002	12	.42	3
108			min	-42.852	1	-87.537	1	1.543	15	-.012	1	-.087	1	-1.187	1
109		17	max	-1.407	15	93.031	3	79.458	1	.005	3	0	3	.349	3
110			min	-42.852	1	-260.858	1	2.596	15	-.012	1	-.015	1	-.989	1
111		18	max	-1.407	15	153.084	3	111.762	1	.005	3	.094	1	.209	3
112			min	-42.852	1	-434.179	1	3.649	15	-.012	1	.003	15	-.593	1
113		19	max	-1.407	15	213.138	3	144.067	1	.005	3	.24	1	0	2
114			min	-42.852	1	-607.5	1	4.702	15	-.012	1	.008	15	0	3
115	M16	1	max	-3.072	15	579.902	1	-4.569	15	.012	1	.212	1	0	1
116			min	-93.666	1	-199.775	3	-140.021	1	-.007	3	.007	15	0	3
117		2	max	-3.072	15	406.581	1	-3.516	15	.012	1	.071	1	.193	3
118			min	-93.666	1	-139.722	3	-107.716	1	-.007	3	.002	15	-.562	1
119		3	max	-3.072	15	233.259	1	-2.463	15	.012	1	0	12	.318	3
120			min	-93.666	1	-79.668	3	-75.412	1	-.007	3	-.033	1	-.926	1
121		4	max	-3.072	15	59.938	1	-1.41	15	.012	1	-.003	12	.375	3
122			min	-93.666	1	-19.615	3	-43.107	1	-.007	3	-.101	1	-1.093	1
123		5	max	-3.072	15	40.439	3	-.357	15	.012	1	-.004	12	.363	3
124			min	-93.666	1	-113.383	1	-10.803	1	-.007	3	-.131	1	-1.063	1
125		6	max	-3.072	15	100.492	3	21.502	1	.012	1	-.004	15	.283	3
126			min	-93.666	1	-286.704	1	.483	12	-.007	3	-.125	1	-.835	1
127		7	max	-3.072	15	160.546	3	53.807	1	.012	1	-.003	15	.134	3
128			min	-93.666	1	-460.025	1	1.536	12	-.007	3	-.082	1	-.41	1
129		8	max	-3.072	15	220.599	3	86.111	1	.012	1	0	10	.213	1
130			min	-93.666	1	-633.346	1	2.59	12	-.007	3	-.003	1	-.083	3
131		9	max	-3.072	15	280.652	3	118.416	1	.012	1	.114	1	1.033	1
132			min	-93.666	1	-806.668	1	3.643	12	-.007	3	.003	12	-.368	3
133		10	max	-3.072	15	979.989	1	-4.696	12	.012	1	.267	1	2.05	1
134			min	-93.666	1	-340.706	3	-150.72	1	-.007	3	.008	12	-.722	3
135		11	max	-3.072	15	806.668	1	-3.643	12	.007	3	.114	1	1.033	1
136			min	-93.666	1	-280.652	3	-118.416	1	-.012	1	.003	12	-.368	3
137		12	max	-3.072	15	633.346	1	-2.59	12	.007	3	0	10	.213	1
138			min	-93.666	1	-220.599	3	-86.111	1	-.012	1	-.003	1	-.083	3
139		13	max	-3.072	15	460.025	1	-1.536	12	.007	3	-.003	15	.134	3
140			min	-93.666	1	-160.546	3	-53.807	1	-.012	1	-.082	1	-.41	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-3.072	15	286.704	1	-.483	12	.007	3	-.004	15	.283	3
142			min	-93.666	1	-100.492	3	-21.502	1	-.012	1	-.125	1	-.835	1
143		15	max	-3.072	15	113.383	1	10.803	1	.007	3	-.004	12	.363	3
144			min	-93.666	1	-40.439	3	.357	15	-.012	1	-.131	1	-1.063	1
145		16	max	-3.072	15	19.615	3	43.107	1	.007	3	-.003	12	.375	3
146			min	-93.666	1	-59.938	1	1.41	15	-.012	1	-.101	1	-1.093	1
147		17	max	-3.072	15	79.668	3	75.412	1	.007	3	0	12	.318	3
148			min	-93.666	1	-233.259	1	2.463	15	-.012	1	-.033	1	-.926	1
149		18	max	-3.072	15	139.722	3	107.716	1	.007	3	.071	1	.193	3
150			min	-93.666	1	-406.581	1	3.516	15	-.012	1	.002	15	-.562	1
151		19	max	-3.072	15	199.775	3	140.021	1	.007	3	.212	1	0	1
152			min	-93.666	1	-579.902	1	4.569	15	-.012	1	.007	15	0	3
153	M2	1	max	1110.913	1	2.28	4	1.261	1	0	3	0	3	0	1
154			min	-866.293	3	.537	15	.041	15	0	1	0	1	0	1
155		2	max	1111.242	1	2.264	4	1.261	1	0	3	0	1	0	15
156			min	-866.047	3	.534	15	.041	15	0	1	0	15	0	4
157		3	max	1111.57	1	2.249	4	1.261	1	0	3	0	1	0	15
158			min	-865.8	3	.53	15	.041	15	0	1	0	15	-.001	4
159		4	max	1111.898	1	2.234	4	1.261	1	0	3	0	1	0	15
160			min	-865.554	3	.526	15	.041	15	0	1	0	15	-.001	4
161		5	max	1112.227	1	2.219	4	1.261	1	0	3	.001	1	0	15
162			min	-865.308	3	.523	15	.041	15	0	1	0	15	-.002	4
163		6	max	1112.555	1	2.203	4	1.261	1	0	3	.001	1	0	15
164			min	-865.061	3	.519	15	.041	15	0	1	0	15	-.002	4
165		7	max	1112.884	1	2.188	4	1.261	1	0	3	.002	1	0	15
166			min	-864.815	3	.516	15	.041	15	0	1	0	15	-.003	4
167		8	max	1113.212	1	2.173	4	1.261	1	0	3	.002	1	0	15
168			min	-864.569	3	.512	15	.041	15	0	1	0	15	-.003	4
169		9	max	1113.541	1	2.157	4	1.261	1	0	3	.002	1	0	15
170			min	-864.322	3	.508	15	.041	15	0	1	0	15	-.004	4
171		10	max	1113.869	1	2.142	4	1.261	1	0	3	.002	1	-.001	15
172			min	-864.076	3	.505	15	.041	15	0	1	0	15	-.004	4
173		11	max	1114.198	1	2.127	4	1.261	1	0	3	.003	1	-.001	15
174			min	-863.83	3	.501	15	.041	15	0	1	0	15	-.005	4
175		12	max	1114.526	1	2.112	4	1.261	1	0	3	.003	1	-.001	15
176			min	-863.583	3	.498	15	.041	15	0	1	0	15	-.005	4
177		13	max	1114.854	1	2.096	4	1.261	1	0	3	.003	1	-.001	15
178			min	-863.337	3	.494	15	.041	15	0	1	0	15	-.006	4
179		14	max	1115.183	1	2.081	4	1.261	1	0	3	.004	1	-.001	15
180			min	-863.091	3	.491	15	.041	15	0	1	0	15	-.006	4
181		15	max	1115.511	1	2.066	4	1.261	1	0	3	.004	1	-.002	15
182			min	-862.844	3	.487	15	.041	15	0	1	0	15	-.007	4
183		16	max	1115.84	1	2.051	4	1.261	1	0	3	.004	1	-.002	15
184			min	-862.598	3	.483	15	.041	15	0	1	0	15	-.007	4
185		17	max	1116.168	1	2.035	4	1.261	1	0	3	.004	1	-.002	15
186			min	-862.352	3	.48	15	.041	15	0	1	0	15	-.008	4
187		18	max	1116.497	1	2.02	4	1.261	1	0	3	.005	1	-.002	15
188			min	-862.105	3	.476	15	.041	15	0	1	0	15	-.008	4
189		19	max	1116.825	1	2.005	4	1.261	1	0	3	.005	1	-.002	15
190			min	-861.859	3	.473	15	.041	15	0	1	0	15	-.009	4
191	M3	1	max	236.964	2	8.077	4	.012	1	0	3	0	1	.009	4
192			min	-344.146	3	1.899	15	0	15	0	1	0	15	.002	15
193		2	max	236.793	2	7.305	4	.012	1	0	3	0	1	.005	4
194			min	-344.274	3	1.718	15	0	15	0	1	0	15	.001	15
195		3	max	236.623	2	6.532	4	.012	1	0	3	0	1	.003	2
196			min	-344.401	3	1.536	15	0	15	0	1	0	15	0	12
197		4	max	236.453	2	5.76	4	.012	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	-344.529	3	1.355	15	0	15	0	1	0	15	-.001	3
199		5	max	236.282	2	4.988	4	.012	1	0	3	0	1	0	15
200			min	-344.657	3	1.173	15	0	15	0	1	0	15	-.002	4
201		6	max	236.112	2	4.215	4	.012	1	0	3	0	1	-.001	15
202			min	-344.785	3	.992	15	0	15	0	1	0	15	-.004	4
203		7	max	235.941	2	3.443	4	.012	1	0	3	0	1	-.001	15
204			min	-344.912	3	.81	15	0	15	0	1	0	15	-.006	4
205		8	max	235.771	2	2.67	4	.012	1	0	3	0	1	-.002	15
206			min	-345.04	3	.628	15	0	15	0	1	0	15	-.007	4
207		9	max	235.601	2	1.898	4	.012	1	0	3	0	1	-.002	15
208			min	-345.168	3	.447	15	0	15	0	1	0	15	-.008	4
209		10	max	235.43	2	1.126	4	.012	1	0	3	0	1	-.002	15
210			min	-345.296	3	.265	15	0	15	0	1	0	15	-.009	4
211		11	max	235.26	2	.383	2	.012	1	0	3	0	1	-.002	15
212			min	-345.423	3	.048	12	0	15	0	1	0	15	-.009	4
213		12	max	235.09	2	-.098	15	.012	1	0	3	0	1	-.002	15
214			min	-345.551	3	-.419	4	0	15	0	1	0	15	-.009	4
215		13	max	234.919	2	-.279	15	.012	1	0	3	0	1	-.002	15
216			min	-345.679	3	-1.192	4	0	15	0	1	0	15	-.009	4
217		14	max	234.749	2	-.461	15	.012	1	0	3	0	1	-.002	15
218			min	-345.807	3	-1.964	4	0	15	0	1	0	15	-.008	4
219		15	max	234.579	2	-.643	15	.012	1	0	3	0	1	-.002	15
220			min	-345.934	3	-2.737	4	0	15	0	1	0	15	-.007	4
221		16	max	234.408	2	-.824	15	.012	1	0	3	0	1	-.001	15
222			min	-346.062	3	-3.509	4	0	15	0	1	0	15	-.006	4
223		17	max	234.238	2	-1.006	15	.012	1	0	3	0	1	-.001	15
224			min	-346.19	3	-4.281	4	0	15	0	1	0	15	-.004	4
225		18	max	234.068	2	-1.187	15	.012	1	0	3	0	1	0	15
226			min	-346.318	3	-5.054	4	0	15	0	1	0	15	-.002	4
227		19	max	233.897	2	-1.369	15	.012	1	0	3	0	1	0	1
228			min	-346.445	3	-5.826	4	0	15	0	1	0	15	0	1
229	M4	1	max	1235.065	1	0	1	-.275	15	0	1	0	1	0	1
230			min	-256.873	3	0	1	-8.413	1	0	1	0	10	0	1
231		2	max	1235.236	1	0	1	-.275	15	0	1	0	12	0	1
232			min	-256.745	3	0	1	-8.413	1	0	1	0	1	0	1
233		3	max	1235.406	1	0	1	-.275	15	0	1	0	15	0	1
234			min	-256.617	3	0	1	-8.413	1	0	1	-.002	1	0	1
235		4	max	1235.576	1	0	1	-.275	15	0	1	0	15	0	1
236			min	-256.49	3	0	1	-8.413	1	0	1	-.003	1	0	1
237		5	max	1235.747	1	0	1	-.275	15	0	1	0	15	0	1
238			min	-256.362	3	0	1	-8.413	1	0	1	-.004	1	0	1
239		6	max	1235.917	1	0	1	-.275	15	0	1	0	15	0	1
240			min	-256.234	3	0	1	-8.413	1	0	1	-.005	1	0	1
241		7	max	1236.087	1	0	1	-.275	15	0	1	0	15	0	1
242			min	-256.106	3	0	1	-8.413	1	0	1	-.006	1	0	1
243		8	max	1236.258	1	0	1	-.275	15	0	1	0	15	0	1
244			min	-255.979	3	0	1	-8.413	1	0	1	-.007	1	0	1
245		9	max	1236.428	1	0	1	-.275	15	0	1	0	15	0	1
246			min	-255.851	3	0	1	-8.413	1	0	1	-.008	1	0	1
247		10	max	1236.599	1	0	1	-.275	15	0	1	0	15	0	1
248			min	-255.723	3	0	1	-8.413	1	0	1	-.009	1	0	1
249		11	max	1236.769	1	0	1	-.275	15	0	1	0	15	0	1
250			min	-255.595	3	0	1	-8.413	1	0	1	-.01	1	0	1
251		12	max	1236.939	1	0	1	-.275	15	0	1	0	15	0	1
252			min	-255.467	3	0	1	-8.413	1	0	1	-.01	1	0	1
253		13	max	1237.11	1	0	1	-.275	15	0	1	0	15	0	1
254			min	-255.34	3	0	1	-8.413	1	0	1	-.011	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	1237.28	1	0	1	-.275	15	0	1	0	15	0	1
256			min	-255.212	3	0	1	-8.413	1	0	1	-.012	1	0	1
257		15	max	1237.45	1	0	1	-.275	15	0	1	0	15	0	1
258			min	-255.084	3	0	1	-8.413	1	0	1	-.013	1	0	1
259		16	max	1237.621	1	0	1	-.275	15	0	1	0	15	0	1
260			min	-254.956	3	0	1	-8.413	1	0	1	-.014	1	0	1
261		17	max	1237.791	1	0	1	-.275	15	0	1	0	15	0	1
262			min	-254.829	3	0	1	-8.413	1	0	1	-.015	1	0	1
263		18	max	1237.961	1	0	1	-.275	15	0	1	0	15	0	1
264			min	-254.701	3	0	1	-8.413	1	0	1	-.016	1	0	1
265		19	max	1238.132	1	0	1	-.275	15	0	1	0	15	0	1
266			min	-254.573	3	0	1	-8.413	1	0	1	-.017	1	0	1
267	M6	1	max	3582.273	1	2.583	2	0	1	0	1	0	1	0	1
268			min	-2846.935	3	.338	12	0	1	0	1	0	1	0	1
269		2	max	3582.601	1	2.571	2	0	1	0	1	0	1	0	12
270			min	-2846.688	3	.332	12	0	1	0	1	0	1	0	2
271		3	max	3582.93	1	2.559	2	0	1	0	1	0	1	0	12
272			min	-2846.442	3	.326	12	0	1	0	1	0	1	-.001	2
273		4	max	3583.258	1	2.547	2	0	1	0	1	0	1	0	12
274			min	-2846.196	3	.32	12	0	1	0	1	0	1	-.002	2
275		5	max	3583.586	1	2.536	2	0	1	0	1	0	1	0	12
276			min	-2845.949	3	.314	12	0	1	0	1	0	1	-.002	2
277		6	max	3583.915	1	2.524	2	0	1	0	1	0	1	0	12
278			min	-2845.703	3	.308	12	0	1	0	1	0	1	-.003	2
279		7	max	3584.243	1	2.512	2	0	1	0	1	0	1	0	12
280			min	-2845.457	3	.302	12	0	1	0	1	0	1	-.003	2
281		8	max	3584.572	1	2.5	2	0	1	0	1	0	1	0	12
282			min	-2845.21	3	.296	12	0	1	0	1	0	1	-.004	2
283		9	max	3584.9	1	2.488	2	0	1	0	1	0	1	0	12
284			min	-2844.964	3	.29	12	0	1	0	1	0	1	-.004	2
285		10	max	3585.229	1	2.476	2	0	1	0	1	0	1	0	12
286			min	-2844.718	3	.284	12	0	1	0	1	0	1	-.005	2
287		11	max	3585.557	1	2.464	2	0	1	0	1	0	1	0	12
288			min	-2844.471	3	.278	12	0	1	0	1	0	1	-.006	2
289		12	max	3585.885	1	2.452	2	0	1	0	1	0	1	0	12
290			min	-2844.225	3	.273	12	0	1	0	1	0	1	-.006	2
291		13	max	3586.214	1	2.44	2	0	1	0	1	0	1	0	12
292			min	-2843.979	3	.267	12	0	1	0	1	0	1	-.007	2
293		14	max	3586.542	1	2.429	2	0	1	0	1	0	1	0	12
294			min	-2843.732	3	.261	12	0	1	0	1	0	1	-.007	2
295		15	max	3586.871	1	2.417	2	0	1	0	1	0	1	0	12
296			min	-2843.486	3	.255	12	0	1	0	1	0	1	-.008	2
297		16	max	3587.199	1	2.405	2	0	1	0	1	0	1	0	12
298			min	-2843.24	3	.249	12	0	1	0	1	0	1	-.008	2
299		17	max	3587.528	1	2.393	2	0	1	0	1	0	1	-.001	12
300			min	-2842.993	3	.243	12	0	1	0	1	0	1	-.009	2
301		18	max	3587.856	1	2.381	2	0	1	0	1	0	1	-.001	12
302			min	-2842.747	3	.237	12	0	1	0	1	0	1	-.009	2
303		19	max	3588.185	1	2.369	2	0	1	0	1	0	1	-.001	12
304			min	-2842.501	3	.231	12	0	1	0	1	0	1	-.01	2
305	M7	1	max	1022.291	2	8.119	4	0	1	0	1	0	1	.01	2
306			min	-1078.222	3	1.905	15	0	1	0	1	0	1	.001	12
307		2	max	1022.12	2	7.346	4	0	1	0	1	0	1	.007	2
308			min	-1078.35	3	1.723	15	0	1	0	1	0	1	0	3
309		3	max	1021.95	2	6.574	4	0	1	0	1	0	1	.005	2
310			min	-1078.477	3	1.542	15	0	1	0	1	0	1	-.002	3
311		4	max	1021.78	2	5.801	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	-1078.605	3	1.36	15	0	1	0	1	0	1	-.003	3
313		5	max	1021.609	2	5.029	4	0	1	0	1	0	1	0	2
314			min	-1078.733	3	1.178	15	0	1	0	1	0	1	-.004	3
315		6	max	1021.439	2	4.257	4	0	1	0	1	0	1	-.001	15
316			min	-1078.861	3	.997	15	0	1	0	1	0	1	-.005	3
317		7	max	1021.268	2	3.484	4	0	1	0	1	0	1	-.001	15
318			min	-1078.988	3	.815	15	0	1	0	1	0	1	-.006	3
319		8	max	1021.098	2	2.712	4	0	1	0	1	0	1	-.002	15
320			min	-1079.116	3	.634	15	0	1	0	1	0	1	-.007	4
321		9	max	1020.928	2	1.939	4	0	1	0	1	0	1	-.002	15
322			min	-1079.244	3	.45	12	0	1	0	1	0	1	-.008	4
323		10	max	1020.757	2	1.301	2	0	1	0	1	0	1	-.002	15
324			min	-1079.372	3	.149	12	0	1	0	1	0	1	-.009	4
325		11	max	1020.587	2	.699	2	0	1	0	1	0	1	-.002	15
326			min	-1079.499	3	-.276	3	0	1	0	1	0	1	-.009	4
327		12	max	1020.417	2	.097	2	0	1	0	1	0	1	-.002	15
328			min	-1079.627	3	-.728	3	0	1	0	1	0	1	-.009	4
329		13	max	1020.246	2	-.274	15	0	1	0	1	0	1	-.002	15
330			min	-1079.755	3	-1.179	3	0	1	0	1	0	1	-.009	4
331		14	max	1020.076	2	-.456	15	0	1	0	1	0	1	-.002	15
332			min	-1079.883	3	-1.923	4	0	1	0	1	0	1	-.008	4
333		15	max	1019.906	2	-.637	15	0	1	0	1	0	1	-.002	15
334			min	-1080.01	3	-2.695	4	0	1	0	1	0	1	-.007	4
335		16	max	1019.735	2	-.819	15	0	1	0	1	0	1	-.001	15
336			min	-1080.138	3	-3.468	4	0	1	0	1	0	1	-.006	4
337		17	max	1019.565	2	-1	15	0	1	0	1	0	1	0	15
338			min	-1080.266	3	-4.24	4	0	1	0	1	0	1	-.004	4
339		18	max	1019.395	2	-1.182	15	0	1	0	1	0	1	0	15
340			min	-1080.394	3	-5.012	4	0	1	0	1	0	1	-.002	4
341		19	max	1019.224	2	-1.363	15	0	1	0	1	0	1	0	1
342			min	-1080.522	3	-5.785	4	0	1	0	1	0	1	0	1
343	M8	1	max	3623.69	1	0	1	0	1	0	1	0	1	0	1
344			min	-890.242	3	0	1	0	1	0	1	0	1	0	1
345		2	max	3623.861	1	0	1	0	1	0	1	0	1	0	1
346			min	-890.114	3	0	1	0	1	0	1	0	1	0	1
347		3	max	3624.031	1	0	1	0	1	0	1	0	1	0	1
348			min	-889.987	3	0	1	0	1	0	1	0	1	0	1
349		4	max	3624.201	1	0	1	0	1	0	1	0	1	0	1
350			min	-889.859	3	0	1	0	1	0	1	0	1	0	1
351		5	max	3624.372	1	0	1	0	1	0	1	0	1	0	1
352			min	-889.731	3	0	1	0	1	0	1	0	1	0	1
353		6	max	3624.542	1	0	1	0	1	0	1	0	1	0	1
354			min	-889.603	3	0	1	0	1	0	1	0	1	0	1
355		7	max	3624.712	1	0	1	0	1	0	1	0	1	0	1
356			min	-889.476	3	0	1	0	1	0	1	0	1	0	1
357		8	max	3624.883	1	0	1	0	1	0	1	0	1	0	1
358			min	-889.348	3	0	1	0	1	0	1	0	1	0	1
359		9	max	3625.053	1	0	1	0	1	0	1	0	1	0	1
360			min	-889.22	3	0	1	0	1	0	1	0	1	0	1
361		10	max	3625.224	1	0	1	0	1	0	1	0	1	0	1
362			min	-889.092	3	0	1	0	1	0	1	0	1	0	1
363		11	max	3625.394	1	0	1	0	1	0	1	0	1	0	1
364			min	-888.964	3	0	1	0	1	0	1	0	1	0	1
365		12	max	3625.564	1	0	1	0	1	0	1	0	1	0	1
366			min	-888.837	3	0	1	0	1	0	1	0	1	0	1
367		13	max	3625.735	1	0	1	0	1	0	1	0	1	0	1
368			min	-888.709	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	3625.905	1	0	1	0	1	0	1	0	1	0	1
370			min	-888.581	3	0	1	0	1	0	1	0	1	0	1
371		15	max	3626.075	1	0	1	0	1	0	1	0	1	0	1
372			min	-888.453	3	0	1	0	1	0	1	0	1	0	1
373		16	max	3626.246	1	0	1	0	1	0	1	0	1	0	1
374			min	-888.326	3	0	1	0	1	0	1	0	1	0	1
375		17	max	3626.416	1	0	1	0	1	0	1	0	1	0	1
376			min	-888.198	3	0	1	0	1	0	1	0	1	0	1
377		18	max	3626.586	1	0	1	0	1	0	1	0	1	0	1
378			min	-888.07	3	0	1	0	1	0	1	0	1	0	1
379		19	max	3626.757	1	0	1	0	1	0	1	0	1	0	1
380			min	-887.942	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	1110.913	1	2.28	4	-.041	15	0	1	0	1	0	1
382			min	-866.293	3	.537	15	-1.261	1	0	3	0	3	0	1
383		2	max	1111.242	1	2.264	4	-.041	15	0	1	0	15	0	15
384			min	-866.047	3	.534	15	-1.261	1	0	3	0	1	0	4
385		3	max	1111.57	1	2.249	4	-.041	15	0	1	0	15	0	15
386			min	-865.8	3	.53	15	-1.261	1	0	3	0	1	-.001	4
387		4	max	1111.898	1	2.234	4	-.041	15	0	1	0	15	0	15
388			min	-865.554	3	.526	15	-1.261	1	0	3	0	1	-.001	4
389		5	max	1112.227	1	2.219	4	-.041	15	0	1	0	15	0	15
390			min	-865.308	3	.523	15	-1.261	1	0	3	-.001	1	-.002	4
391		6	max	1112.555	1	2.203	4	-.041	15	0	1	0	15	0	15
392			min	-865.061	3	.519	15	-1.261	1	0	3	-.001	1	-.002	4
393		7	max	1112.884	1	2.188	4	-.041	15	0	1	0	15	0	15
394			min	-864.815	3	.516	15	-1.261	1	0	3	-.002	1	-.003	4
395		8	max	1113.212	1	2.173	4	-.041	15	0	1	0	15	0	15
396			min	-864.569	3	.512	15	-1.261	1	0	3	-.002	1	-.003	4
397		9	max	1113.541	1	2.157	4	-.041	15	0	1	0	15	0	15
398			min	-864.322	3	.508	15	-1.261	1	0	3	-.002	1	-.004	4
399		10	max	1113.869	1	2.142	4	-.041	15	0	1	0	15	-.001	15
400			min	-864.076	3	.505	15	-1.261	1	0	3	-.002	1	-.004	4
401		11	max	1114.198	1	2.127	4	-.041	15	0	1	0	15	-.001	15
402			min	-863.83	3	.501	15	-1.261	1	0	3	-.003	1	-.005	4
403		12	max	1114.526	1	2.112	4	-.041	15	0	1	0	15	-.001	15
404			min	-863.583	3	.498	15	-1.261	1	0	3	-.003	1	-.005	4
405		13	max	1114.854	1	2.096	4	-.041	15	0	1	0	15	-.001	15
406			min	-863.337	3	.494	15	-1.261	1	0	3	-.003	1	-.006	4
407		14	max	1115.183	1	2.081	4	-.041	15	0	1	0	15	-.001	15
408			min	-863.091	3	.491	15	-1.261	1	0	3	-.004	1	-.006	4
409		15	max	1115.511	1	2.066	4	-.041	15	0	1	0	15	-.002	15
410			min	-862.844	3	.487	15	-1.261	1	0	3	-.004	1	-.007	4
411		16	max	1115.84	1	2.051	4	-.041	15	0	1	0	15	-.002	15
412			min	-862.598	3	.483	15	-1.261	1	0	3	-.004	1	-.007	4
413		17	max	1116.168	1	2.035	4	-.041	15	0	1	0	15	-.002	15
414			min	-862.352	3	.48	15	-1.261	1	0	3	-.004	1	-.008	4
415		18	max	1116.497	1	2.02	4	-.041	15	0	1	0	15	-.002	15
416			min	-862.105	3	.476	15	-1.261	1	0	3	-.005	1	-.008	4
417		19	max	1116.825	1	2.005	4	-.041	15	0	1	0	15	-.002	15
418			min	-861.859	3	.473	15	-1.261	1	0	3	-.005	1	-.009	4
419	M11	1	max	236.964	2	8.077	4	0	15	0	1	0	15	.009	4
420			min	-344.146	3	1.899	15	-.012	1	0	3	0	1	.002	15
421		2	max	236.793	2	7.305	4	0	15	0	1	0	15	.005	4
422			min	-344.274	3	1.718	15	-.012	1	0	3	0	1	.001	15
423		3	max	236.623	2	6.532	4	0	15	0	1	0	15	.003	2
424			min	-344.401	3	1.536	15	-.012	1	0	3	0	1	0	12
425		4	max	236.453	2	5.76	4	0	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	-344.529	3	1.355	15	-.012	1	0	3	0	1	-.001	3
427		5	max	236.282	2	4.988	4	0	15	0	1	0	15	0	15
428			min	-344.657	3	1.173	15	-.012	1	0	3	0	1	-.002	4
429		6	max	236.112	2	4.215	4	0	15	0	1	0	15	-.001	15
430			min	-344.785	3	.992	15	-.012	1	0	3	0	1	-.004	4
431		7	max	235.941	2	3.443	4	0	15	0	1	0	15	-.001	15
432			min	-344.912	3	.81	15	-.012	1	0	3	0	1	-.006	4
433		8	max	235.771	2	2.67	4	0	15	0	1	0	15	-.002	15
434			min	-345.04	3	.628	15	-.012	1	0	3	0	1	-.007	4
435		9	max	235.601	2	1.898	4	0	15	0	1	0	15	-.002	15
436			min	-345.168	3	.447	15	-.012	1	0	3	0	1	-.008	4
437		10	max	235.43	2	1.126	4	0	15	0	1	0	15	-.002	15
438			min	-345.296	3	.265	15	-.012	1	0	3	0	1	-.009	4
439		11	max	235.26	2	.383	2	0	15	0	1	0	15	-.002	15
440			min	-345.423	3	.048	12	-.012	1	0	3	0	1	-.009	4
441		12	max	235.09	2	-.098	15	0	15	0	1	0	15	-.002	15
442			min	-345.551	3	-.419	4	-.012	1	0	3	0	1	-.009	4
443		13	max	234.919	2	-.279	15	0	15	0	1	0	15	-.002	15
444			min	-345.679	3	-1.192	4	-.012	1	0	3	0	1	-.009	4
445		14	max	234.749	2	-.461	15	0	15	0	1	0	15	-.002	15
446			min	-345.807	3	-1.964	4	-.012	1	0	3	0	1	-.008	4
447		15	max	234.579	2	-.643	15	0	15	0	1	0	15	-.002	15
448			min	-345.934	3	-2.737	4	-.012	1	0	3	0	1	-.007	4
449		16	max	234.408	2	-.824	15	0	15	0	1	0	15	-.001	15
450			min	-346.062	3	-3.509	4	-.012	1	0	3	0	1	-.006	4
451		17	max	234.238	2	-1.006	15	0	15	0	1	0	15	-.001	15
452			min	-346.19	3	-4.281	4	-.012	1	0	3	0	1	-.004	4
453		18	max	234.068	2	-1.187	15	0	15	0	1	0	15	0	15
454			min	-346.318	3	-5.054	4	-.012	1	0	3	0	1	-.002	4
455		19	max	233.897	2	-1.369	15	0	15	0	1	0	15	0	1
456			min	-346.445	3	-5.826	4	-.012	1	0	3	0	1	0	1
457	M12	1	max	1235.065	1	0	1	8.413	1	0	1	0	10	0	1
458			min	-256.873	3	0	1	.275	15	0	1	0	1	0	1
459		2	max	1235.236	1	0	1	8.413	1	0	1	0	1	0	1
460			min	-256.745	3	0	1	.275	15	0	1	0	12	0	1
461		3	max	1235.406	1	0	1	8.413	1	0	1	.002	1	0	1
462			min	-256.617	3	0	1	.275	15	0	1	0	15	0	1
463		4	max	1235.576	1	0	1	8.413	1	0	1	.003	1	0	1
464			min	-256.49	3	0	1	.275	15	0	1	0	15	0	1
465		5	max	1235.747	1	0	1	8.413	1	0	1	.004	1	0	1
466			min	-256.362	3	0	1	.275	15	0	1	0	15	0	1
467		6	max	1235.917	1	0	1	8.413	1	0	1	.005	1	0	1
468			min	-256.234	3	0	1	.275	15	0	1	0	15	0	1
469		7	max	1236.087	1	0	1	8.413	1	0	1	.006	1	0	1
470			min	-256.106	3	0	1	.275	15	0	1	0	15	0	1
471		8	max	1236.258	1	0	1	8.413	1	0	1	.007	1	0	1
472			min	-255.979	3	0	1	.275	15	0	1	0	15	0	1
473		9	max	1236.428	1	0	1	8.413	1	0	1	.008	1	0	1
474			min	-255.851	3	0	1	.275	15	0	1	0	15	0	1
475		10	max	1236.599	1	0	1	8.413	1	0	1	.009	1	0	1
476			min	-255.723	3	0	1	.275	15	0	1	0	15	0	1
477		11	max	1236.769	1	0	1	8.413	1	0	1	.01	1	0	1
478			min	-255.595	3	0	1	.275	15	0	1	0	15	0	1
479		12	max	1236.939	1	0	1	8.413	1	0	1	.01	1	0	1
480			min	-255.467	3	0	1	.275	15	0	1	0	15	0	1
481		13	max	1237.11	1	0	1	8.413	1	0	1	.011	1	0	1
482			min	-255.34	3	0	1	.275	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	1237.28	1	0	1	8.413	1	0	1	.012	1	0	1
484			min	-255.212	3	0	1	.275	15	0	1	0	15	0	1
485		15	max	1237.45	1	0	1	8.413	1	0	1	.013	1	0	1
486			min	-255.084	3	0	1	.275	15	0	1	0	15	0	1
487		16	max	1237.621	1	0	1	8.413	1	0	1	.014	1	0	1
488			min	-254.956	3	0	1	.275	15	0	1	0	15	0	1
489		17	max	1237.791	1	0	1	8.413	1	0	1	.015	1	0	1
490			min	-254.829	3	0	1	.275	15	0	1	0	15	0	1
491		18	max	1237.961	1	0	1	8.413	1	0	1	.016	1	0	1
492			min	-254.701	3	0	1	.275	15	0	1	0	15	0	1
493		19	max	1238.132	1	0	1	8.413	1	0	1	.017	1	0	1
494			min	-254.573	3	0	1	.275	15	0	1	0	15	0	1
495	M1	1	max	139.851	1	491.89	3	-2.907	15	0	1	.211	1	0	3
496			min	4.565	15	-511.684	1	-88.683	1	0	3	.007	15	-.013	1
497		2	max	140.222	1	490.852	3	-2.907	15	0	1	.164	1	.257	1
498			min	4.677	15	-513.068	1	-88.683	1	0	3	.005	15	-.259	3
499		3	max	202.618	3	566.327	1	-2.866	15	0	3	.117	1	.515	1
500			min	-131.334	2	-355.156	3	-87.644	1	0	1	.004	15	-.507	3
501		4	max	202.896	3	564.944	1	-2.866	15	0	3	.071	1	.216	1
502			min	-130.963	2	-356.194	3	-87.644	1	0	1	.002	15	-.32	3
503		5	max	203.174	3	563.56	1	-2.866	15	0	3	.025	1	-.004	15
504			min	-130.593	2	-357.232	3	-87.644	1	0	1	0	15	-.131	3
505		6	max	203.452	3	562.176	1	-2.866	15	0	3	0	15	.057	3
506			min	-130.222	2	-358.27	3	-87.644	1	0	1	-.021	1	-.378	1
507		7	max	203.73	3	560.793	1	-2.866	15	0	3	-.002	15	.247	3
508			min	-129.851	2	-359.307	3	-87.644	1	0	1	-.068	1	-.675	1
509		8	max	204.008	3	559.409	1	-2.866	15	0	3	-.004	15	.437	3
510			min	-129.48	2	-360.345	3	-87.644	1	0	1	-.114	1	-.97	1
511		9	max	211.818	3	34.051	2	-4.205	15	0	9	.067	1	.51	3
512			min	-73.651	2	.42	15	-128.438	1	0	3	.002	15	-1.105	1
513		10	max	212.096	3	32.668	2	-4.205	15	0	9	0	15	.497	3
514			min	-73.28	2	.002	15	-128.438	1	0	3	0	1	-1.115	1
515		11	max	212.374	3	31.284	2	-4.205	15	0	9	-.002	15	.484	3
516			min	-72.909	2	-1.712	4	-128.438	1	0	3	-.069	1	-1.123	1
517		12	max	220.146	3	237.06	3	-2.798	15	0	1	.112	1	.421	3
518			min	-43.397	10	-595.224	1	-85.626	1	0	3	.004	15	-.991	1
519		13	max	220.425	3	236.022	3	-2.798	15	0	1	.067	1	.296	3
520			min	-43.088	10	-596.608	1	-85.626	1	0	3	.002	15	-.677	1
521		14	max	220.703	3	234.984	3	-2.798	15	0	1	.022	1	.172	3
522			min	-42.779	10	-597.991	1	-85.626	1	0	3	0	15	-.362	1
523		15	max	220.981	3	233.947	3	-2.798	15	0	1	0	15	.048	3
524			min	-42.47	10	-599.375	1	-85.626	1	0	3	-.023	1	-.046	1
525		16	max	221.259	3	232.909	3	-2.798	15	0	1	-.002	15	.271	1
526			min	-42.161	10	-600.758	1	-85.626	1	0	3	-.068	1	-.075	3
527		17	max	221.537	3	231.871	3	-2.798	15	0	1	-.004	15	.588	1
528			min	-41.852	10	-602.142	1	-85.626	1	0	3	-.114	1	-.197	3
529		18	max	-4.681	15	582.415	1	-3.072	15	0	3	-.005	15	.295	1
530			min	-140.39	1	-198.765	3	-93.749	1	0	1	-.163	1	-.098	3
531		19	max	-4.569	15	581.031	1	-3.072	15	0	3	-.007	15	.007	3
532			min	-140.019	1	-199.803	3	-93.749	1	0	1	-.212	1	-.012	1
533	M5	1	max	301.779	1	1640.335	3	0	1	0	1	0	1	.027	1
534			min	9.244	12	-1730.799	1	0	1	0	1	0	1	0	3
535		2	max	302.15	1	1639.297	3	0	1	0	1	0	1	.941	1
536			min	9.429	12	-1732.183	1	0	1	0	1	0	1	-.866	3
537		3	max	650.743	3	1737.291	1	0	1	0	1	0	1	1.813	1
538			min	-496.927	1	-1144.631	3	0	1	0	1	0	1	-1.698	3
539		4	max	651.021	3	1735.907	1	0	1	0	1	0	1	.897	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
540			min	-496.556	1	-1145.669	3	0	1	0	1	0	1	-1.093	3
541		5	max	651.299	3	1734.524	1	0	1	0	1	0	1	.013	9
542			min	-496.186	1	-1146.706	3	0	1	0	1	0	1	-.488	3
543		6	max	651.577	3	1733.14	1	0	1	0	1	0	1	.117	3
544			min	-495.815	1	-1147.744	3	0	1	0	1	0	1	-.934	1
545		7	max	651.855	3	1731.757	1	0	1	0	1	0	1	.723	3
546			min	-495.444	1	-1148.782	3	0	1	0	1	0	1	-1.848	1
547		8	max	652.133	3	1730.373	1	0	1	0	1	0	1	1.329	3
548			min	-495.073	1	-1149.82	3	0	1	0	1	0	1	-2.761	1
549		9	max	665.78	3	112.702	2	0	1	0	1	0	1	1.531	3
550			min	-367.266	2	.418	15	0	1	0	1	0	1	-3.122	1
551		10	max	666.058	3	111.318	2	0	1	0	1	0	1	1.483	3
552			min	-366.895	2	0	15	0	1	0	1	0	1	-3.154	1
553		11	max	666.336	3	109.934	2	0	1	0	1	0	1	1.436	3
554			min	-366.524	2	-1.587	4	0	1	0	1	0	1	-3.185	1
555		12	max	680.058	3	751.32	3	0	1	0	1	0	1	1.26	3
556			min	-252.168	2	-1850.62	1	0	1	0	1	0	1	-2.836	1
557		13	max	680.336	3	750.282	3	0	1	0	1	0	1	.864	3
558			min	-251.797	2	-1852.003	1	0	1	0	1	0	1	-1.859	1
559		14	max	680.614	3	749.244	3	0	1	0	1	0	1	.468	3
560			min	-251.426	2	-1853.387	1	0	1	0	1	0	1	-.882	1
561		15	max	680.892	3	748.206	3	0	1	0	1	0	1	.143	2
562			min	-251.056	2	-1854.771	1	0	1	0	1	0	1	-.004	13
563		16	max	681.17	3	747.169	3	0	1	0	1	0	1	1.076	1
564			min	-250.685	2	-1856.154	1	0	1	0	1	0	1	-.321	3
565		17	max	681.448	3	746.131	3	0	1	0	1	0	1	2.055	1
566			min	-250.314	2	-1857.538	1	0	1	0	1	0	1	-.715	3
567		18	max	-9.576	12	1968.019	1	0	1	0	1	0	1	1.063	1
568			min	-301.815	1	-680.541	3	0	1	0	1	0	1	-.374	3
569		19	max	-9.391	12	1966.636	1	0	1	0	1	0	1	.024	1
570			min	-301.444	1	-681.579	3	0	1	0	1	0	1	-.014	3
571	M9	1	max	139.851	1	491.89	3	88.683	1	0	3	-.007	15	0	3
572			min	4.565	15	-511.684	1	2.907	15	0	1	-.211	1	-.013	1
573		2	max	140.222	1	490.852	3	88.683	1	0	3	-.005	15	.257	1
574			min	4.677	15	-513.068	1	2.907	15	0	1	-.164	1	-.259	3
575		3	max	202.618	3	566.327	1	87.644	1	0	1	-.004	15	.515	1
576			min	-131.334	2	-355.156	3	2.866	15	0	3	-.117	1	-.507	3
577		4	max	202.896	3	564.944	1	87.644	1	0	1	-.002	15	.216	1
578			min	-130.963	2	-356.194	3	2.866	15	0	3	-.071	1	-.32	3
579		5	max	203.174	3	563.56	1	87.644	1	0	1	0	15	-.004	15
580			min	-130.593	2	-357.232	3	2.866	15	0	3	-.025	1	-.131	3
581		6	max	203.452	3	562.176	1	87.644	1	0	1	.021	1	.057	3
582			min	-130.222	2	-358.27	3	2.866	15	0	3	0	15	-.378	1
583		7	max	203.73	3	560.793	1	87.644	1	0	1	.068	1	.247	3
584			min	-129.851	2	-359.307	3	2.866	15	0	3	.002	15	-.675	1
585		8	max	204.008	3	559.409	1	87.644	1	0	1	.114	1	.437	3
586			min	-129.48	2	-360.345	3	2.866	15	0	3	.004	15	-.97	1
587		9	max	211.818	3	34.051	2	128.438	1	0	3	-.002	15	.51	3
588			min	-73.651	2	.42	15	4.205	15	0	9	-.067	1	-1.105	1
589		10	max	212.096	3	32.668	2	128.438	1	0	3	0	1	.497	3
590			min	-73.28	2	.002	15	4.205	15	0	9	0	15	-1.115	1
591		11	max	212.374	3	31.284	2	128.438	1	0	3	.069	1	.484	3
592			min	-72.909	2	-1.712	4	4.205	15	0	9	.002	15	-1.123	1
593		12	max	220.146	3	237.06	3	85.626	1	0	3	-.004	15	.421	3
594			min	-43.397	10	-595.224	1	2.798	15	0	1	-.112	1	-.991	1
595		13	max	220.425	3	236.022	3	85.626	1	0	3	-.002	15	.296	3
596			min	-43.088	10	-596.608	1	2.798	15	0	1	-.067	1	-.677	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	220.703	3	234.984	3	85.626	1	0	3	0	15	.172	3
598			min	-42.779	10	-597.991	1	2.798	15	0	1	-.022	1	-.362	1
599		15	max	220.981	3	233.947	3	85.626	1	0	3	.023	1	.048	3
600			min	-42.47	10	-599.375	1	2.798	15	0	1	0	15	-.046	1
601		16	max	221.259	3	232.909	3	85.626	1	0	3	.068	1	.271	1
602			min	-42.161	10	-600.758	1	2.798	15	0	1	.002	15	-.075	3
603		17	max	221.537	3	231.871	3	85.626	1	0	3	.114	1	.588	1
604			min	-41.852	10	-602.142	1	2.798	15	0	1	.004	15	-.197	3
605		18	max	-4.681	15	582.415	1	93.749	1	0	1	.163	1	.295	1
606			min	-140.39	1	-198.765	3	3.072	15	0	3	.005	15	-.098	3
607		19	max	-4.569	15	581.031	1	93.749	1	0	1	.212	1	.007	3
608			min	-140.019	1	-199.803	3	3.072	15	0	3	.007	15	-.012	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M13	1	max	0	1	.112	1	.004	3	8.868e-3	1	NC	1	NC	1
2			min	0	15	-.015	3	-.001	2	-1.112e-3	3	NC	1	NC	1
3		2	max	0	1	.235	3	.035	1	1.022e-2	1	NC	5	NC	2
4			min	0	15	-.127	1	.001	15	-1.161e-3	3	985.812	3	7361.326	1
5		3	max	0	1	.437	3	.084	1	1.157e-2	1	NC	5	NC	3
6			min	0	15	-.315	1	.003	15	-1.211e-3	3	544.985	3	3000.814	1
7		4	max	0	1	.559	3	.126	1	1.293e-2	1	NC	5	NC	3
8			min	0	15	-.421	1	.004	15	-1.261e-3	3	428.933	3	1981.426	1
9		5	max	0	1	.586	3	.148	1	1.428e-2	1	NC	5	NC	3
10			min	0	15	-.429	1	.005	15	-1.31e-3	3	409.328	3	1684.629	1
11		6	max	0	1	.521	3	.143	1	1.563e-2	1	NC	5	NC	3
12			min	0	15	-.343	1	.005	15	-1.36e-3	3	459.001	3	1741.115	1
13		7	max	0	1	.383	3	.113	1	1.698e-2	1	NC	5	NC	3
14			min	0	15	-.182	1	.004	15	-1.41e-3	3	618.644	3	2211.409	1
15		8	max	0	1	.208	3	.067	1	1.834e-2	1	NC	4	NC	2
16			min	0	15	-.003	9	.002	10	-1.459e-3	3	1106.078	3	3796.684	1
17		9	max	0	1	.189	1	.02	1	1.969e-2	1	NC	4	NC	1
18			min	0	15	.005	15	-.002	10	-1.509e-3	3	3166.82	1	NC	1
19		10	max	0	1	.268	1	.011	3	2.104e-2	1	NC	3	NC	1
20			min	0	1	-.023	3	-.007	2	-1.559e-3	3	1578.104	1	NC	1
21		11	max	0	15	.189	1	.02	1	1.969e-2	1	NC	4	NC	1
22			min	0	1	.005	15	-.002	10	-1.509e-3	3	3166.82	1	NC	1
23		12	max	0	15	.208	3	.067	1	1.834e-2	1	NC	4	NC	2
24			min	0	1	-.003	9	.002	10	-1.459e-3	3	1106.078	3	3796.684	1
25		13	max	0	15	.383	3	.113	1	1.698e-2	1	NC	5	NC	3
26			min	0	1	-.182	1	.004	15	-1.41e-3	3	618.644	3	2211.409	1
27		14	max	0	15	.521	3	.143	1	1.563e-2	1	NC	5	NC	3
28			min	0	1	-.343	1	.005	15	-1.36e-3	3	459.001	3	1741.115	1
29		15	max	0	15	.586	3	.148	1	1.428e-2	1	NC	5	NC	3
30			min	0	1	-.429	1	.005	15	-1.31e-3	3	409.328	3	1684.629	1
31		16	max	0	15	.559	3	.126	1	1.293e-2	1	NC	5	NC	3
32			min	0	1	-.421	1	.004	15	-1.261e-3	3	428.933	3	1981.426	1
33		17	max	0	15	.437	3	.084	1	1.157e-2	1	NC	5	NC	3
34			min	0	1	-.315	1	.003	15	-1.211e-3	3	544.985	3	3000.814	1
35		18	max	0	15	.235	3	.035	1	1.022e-2	1	NC	5	NC	2
36			min	0	1	-.127	1	.001	15	-1.161e-3	3	985.812	3	7361.326	1
37		19	max	0	15	.112	1	.004	3	8.868e-3	1	NC	1	NC	1
38			min	0	1	-.015	3	-.001	2	-1.112e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.15	3	.003	3	5.58e-3	1	NC	1	NC	1
40			min	0	15	-.361	1	-.001	10	-2.723e-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	.39	3	.025	1	6.713e-3	1	NC	5	NC	1
42			min	0	15	-.732	1	0	15	-3.323e-3	3	664.592	1	NC	1
43		3	max	0	1	.592	3	.068	1	7.845e-3	1	NC	15	NC	3
44			min	0	15	-1.049	1	.002	15	-3.922e-3	3	357.862	1	3733.497	1
45		4	max	0	1	.731	3	.109	1	8.978e-3	1	NC	15	NC	3
46			min	0	15	-1.277	1	.004	15	-4.522e-3	3	268.734	1	2310.03	1
47		5	max	0	1	.794	3	.132	1	1.011e-2	1	9468.661	15	NC	3
48			min	0	15	-1.397	1	.004	15	-5.121e-3	3	237.516	1	1895.589	1
49		6	max	0	1	.781	3	.13	1	1.124e-2	1	9393.964	15	NC	3
50			min	0	15	-1.409	1	.004	15	-5.721e-3	3	234.739	1	1915.415	1
51		7	max	0	1	.706	3	.105	1	1.238e-2	1	NC	15	NC	3
52			min	0	15	-1.331	1	.004	15	-6.32e-3	3	253.669	1	2393.821	1
53		8	max	0	1	.596	3	.063	1	1.351e-2	1	NC	15	NC	2
54			min	0	15	-1.198	1	.002	10	-6.92e-3	3	294.009	1	4053.719	1
55		9	max	0	1	.49	3	.02	1	1.464e-2	1	NC	15	NC	1
56			min	0	15	-1.064	1	-.002	10	-7.52e-3	3	350.232	1	NC	1
57		10	max	0	1	.44	3	.01	3	1.577e-2	1	NC	5	NC	1
58			min	0	1	-1	1	-.006	2	-8.119e-3	3	385.325	1	NC	1
59		11	max	0	15	.49	3	.02	1	1.464e-2	1	NC	15	NC	1
60			min	0	1	-1.064	1	-.002	10	-7.52e-3	3	350.232	1	NC	1
61		12	max	0	15	.596	3	.063	1	1.351e-2	1	NC	15	NC	2
62			min	0	1	-1.198	1	.002	10	-6.92e-3	3	294.009	1	4053.719	1
63		13	max	0	15	.706	3	.105	1	1.238e-2	1	NC	15	NC	3
64			min	0	1	-1.331	1	.004	15	-6.32e-3	3	253.669	1	2393.821	1
65		14	max	0	15	.781	3	.13	1	1.124e-2	1	9393.964	15	NC	3
66			min	0	1	-1.409	1	.004	15	-5.721e-3	3	234.739	1	1915.415	1
67		15	max	0	15	.794	3	.132	1	1.011e-2	1	9468.661	15	NC	3
68			min	0	1	-1.397	1	.004	15	-5.121e-3	3	237.516	1	1895.589	1
69		16	max	0	15	.731	3	.109	1	8.978e-3	1	NC	15	NC	3
70			min	0	1	-1.277	1	.004	15	-4.522e-3	3	268.734	1	2310.03	1
71		17	max	0	15	.592	3	.068	1	7.845e-3	1	NC	15	NC	3
72			min	0	1	-1.049	1	.002	15	-3.922e-3	3	357.862	1	3733.497	1
73		18	max	0	15	.39	3	.025	1	6.713e-3	1	NC	5	NC	1
74			min	0	1	-.732	1	0	15	-3.323e-3	3	664.592	1	NC	1
75		19	max	0	15	.15	3	.003	3	5.58e-3	1	NC	1	NC	1
76			min	0	1	-.361	1	-.001	10	-2.723e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.154	3	.003	3	2.295e-3	3	NC	1	NC	1
78			min	0	1	-.361	1	0	10	-5.674e-3	1	NC	1	NC	1
79		2	max	0	15	.306	3	.025	1	2.803e-3	3	NC	5	NC	1
80			min	0	1	-.765	1	0	15	-6.83e-3	1	608.817	1	NC	1
81		3	max	0	15	.438	3	.068	1	3.31e-3	3	NC	15	NC	3
82			min	0	1	-1.11	1	.002	15	-7.986e-3	1	328.542	1	3723.356	1
83		4	max	0	15	.534	3	.109	1	3.818e-3	3	NC	15	NC	3
84			min	0	1	-1.354	1	.004	15	-9.142e-3	1	247.643	1	2305.079	1
85		5	max	0	15	.588	3	.132	1	4.325e-3	3	9476.827	15	NC	3
86			min	0	1	-1.479	1	.004	15	-1.03e-2	1	220.144	1	1891.837	1
87		6	max	0	15	.598	3	.131	1	4.833e-3	3	9403.615	15	NC	3
88			min	0	1	-1.482	1	.004	15	-1.145e-2	1	219.465	1	1911.394	1
89		7	max	0	15	.573	3	.105	1	5.34e-3	3	NC	15	NC	3
90			min	0	1	-1.385	1	.004	15	-1.261e-2	1	240.243	1	2387.505	1
91		8	max	0	15	.524	3	.063	1	5.848e-3	3	NC	15	NC	2
92			min	0	1	-1.228	1	.002	15	-1.377e-2	1	283.69	1	4035.954	1
93		9	max	0	15	.474	3	.02	1	6.355e-3	3	NC	15	NC	1
94			min	0	1	-1.072	1	-.002	10	-1.492e-2	1	345.846	1	NC	1
95		10	max	0	1	.45	3	.01	3	6.863e-3	3	NC	5	NC	1
96			min	0	1	-.999	1	-.006	2	-1.608e-2	1	385.824	1	NC	1
97		11	max	0	1	.474	3	.02	1	6.355e-3	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-1.072	1	-.002	10	-1.492e-2	1	345.846	1	NC	1
99		12	max	0	1	.524	3	.063	1	5.848e-3	3	NC	15	NC	2
100			min	0	15	-1.228	1	.002	15	-1.377e-2	1	283.69	1	4035.954	1
101		13	max	0	1	.573	3	.105	1	5.34e-3	3	NC	15	NC	3
102			min	0	15	-1.385	1	.004	15	-1.261e-2	1	240.243	1	2387.505	1
103		14	max	0	1	.598	3	.131	1	4.833e-3	3	9403.615	15	NC	3
104			min	0	15	-1.482	1	.004	15	-1.145e-2	1	219.465	1	1911.394	1
105		15	max	0	1	.588	3	.132	1	4.325e-3	3	9476.827	15	NC	3
106			min	0	15	-1.479	1	.004	15	-1.03e-2	1	220.144	1	1891.837	1
107		16	max	0	1	.534	3	.109	1	3.818e-3	3	NC	15	NC	3
108			min	0	15	-1.354	1	.004	15	-9.142e-3	1	247.643	1	2305.079	1
109		17	max	0	1	.438	3	.068	1	3.31e-3	3	NC	15	NC	3
110			min	0	15	-1.11	1	.002	15	-7.986e-3	1	328.542	1	3723.356	1
111		18	max	0	1	.306	3	.025	1	2.803e-3	3	NC	5	NC	1
112			min	0	15	-.765	1	0	15	-6.83e-3	1	608.817	1	NC	1
113		19	max	0	1	.154	3	.003	3	2.295e-3	3	NC	1	NC	1
114			min	0	15	-.361	1	0	10	-5.674e-3	1	NC	1	NC	1
115	M16	1	max	0	15	.108	1	.003	3	3.986e-3	3	NC	1	NC	1
116			min	0	1	-.051	3	0	10	-8.345e-3	1	NC	1	NC	1
117		2	max	0	15	.039	3	.035	1	4.706e-3	3	NC	5	NC	2
118			min	0	1	-.165	1	.001	15	-9.57e-3	1	899.48	1	7404.597	1
119		3	max	0	15	.109	3	.084	1	5.426e-3	3	NC	5	NC	3
120			min	0	1	-.383	1	.003	15	-1.08e-2	1	501.164	1	3008.738	1
121		4	max	0	15	.147	3	.126	1	6.147e-3	3	NC	5	NC	3
122			min	0	1	-.506	1	.004	15	-1.202e-2	1	400.264	1	1983.06	1
123		5	max	0	15	.146	3	.148	1	6.867e-3	3	NC	5	NC	3
124			min	0	1	-.519	1	.005	15	-1.325e-2	1	392.019	1	1683.42	1
125		6	max	0	15	.109	3	.143	1	7.587e-3	3	NC	5	NC	3
126			min	0	1	-.425	1	.005	15	-1.447e-2	1	461.742	1	1736.625	1
127		7	max	0	15	.044	3	.114	1	8.307e-3	3	NC	5	NC	3
128			min	0	1	-.246	1	.004	15	-1.57e-2	1	695.349	1	2198.789	1
129		8	max	0	15	.004	4	.067	1	9.027e-3	3	NC	3	NC	2
130			min	0	1	-.053	2	.002	15	-1.692e-2	1	1806.671	2	3745.588	1
131		9	max	0	15	.17	1	.021	1	9.747e-3	3	NC	4	NC	1
132			min	0	1	-.104	3	-.001	10	-1.815e-2	1	4000.287	1	NC	1
133		10	max	0	1	.258	1	.008	3	1.047e-2	3	NC	5	NC	1
134			min	0	1	-.135	3	-.005	2	-1.937e-2	1	1647.714	1	NC	1
135		11	max	0	1	.17	1	.021	1	9.747e-3	3	NC	4	NC	1
136			min	0	15	-.104	3	-.001	10	-1.815e-2	1	4000.287	1	NC	1
137		12	max	0	1	.004	4	.067	1	9.027e-3	3	NC	3	NC	2
138			min	0	15	-.053	2	.002	15	-1.692e-2	1	1806.671	2	3745.588	1
139		13	max	0	1	.044	3	.114	1	8.307e-3	3	NC	5	NC	3
140			min	0	15	-.246	1	.004	15	-1.57e-2	1	695.349	1	2198.789	1
141		14	max	0	1	.109	3	.143	1	7.587e-3	3	NC	5	NC	3
142			min	0	15	-.425	1	.005	15	-1.447e-2	1	461.742	1	1736.625	1
143		15	max	0	1	.146	3	.148	1	6.867e-3	3	NC	5	NC	3
144			min	0	15	-.519	1	.005	15	-1.325e-2	1	392.019	1	1683.42	1
145		16	max	0	1	.147	3	.126	1	6.147e-3	3	NC	5	NC	3
146			min	0	15	-.506	1	.004	15	-1.202e-2	1	400.264	1	1983.06	1
147		17	max	0	1	.109	3	.084	1	5.426e-3	3	NC	5	NC	3
148			min	0	15	-.383	1	.003	15	-1.08e-2	1	501.164	1	3008.738	1
149		18	max	0	1	.039	3	.035	1	4.706e-3	3	NC	5	NC	2
150			min	0	15	-.165	1	.001	15	-9.57e-3	1	899.48	1	7404.597	1
151		19	max	0	1	.108	1	.003	3	3.986e-3	3	NC	1	NC	1
152			min	0	15	-.051	3	0	10	-8.345e-3	1	NC	1	NC	1
153	M2	1	max	.005	1	.002	2	.007	1	-5.735e-6	15	NC	1	NC	2
154			min	-.004	3	-.005	3	0	15	-1.756e-4	1	NC	1	7041.065	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	.005	1	.002	2	.006	1	-5.315e-6	15	NC	1	NC	2
156			min	-.004	3	-.005	3	0	15	-1.627e-4	1	NC	1	7678.52	1
157		3	max	.005	1	.001	2	.006	1	-4.894e-6	15	NC	1	NC	2
158			min	-.004	3	-.004	3	0	15	-1.498e-4	1	NC	1	8438.006	1
159		4	max	.004	1	0	2	.005	1	-4.473e-6	15	NC	1	NC	2
160			min	-.003	3	-.004	3	0	15	-1.369e-4	1	NC	1	9351.816	1
161		5	max	.004	1	0	2	.005	1	-4.052e-6	15	NC	1	NC	1
162			min	-.003	3	-.004	3	0	15	-1.24e-4	1	NC	1	NC	1
163		6	max	.004	1	0	2	.004	1	-3.632e-6	15	NC	1	NC	1
164			min	-.003	3	-.004	3	0	15	-1.111e-4	1	NC	1	NC	1
165		7	max	.003	1	0	2	.004	1	-3.211e-6	15	NC	1	NC	1
166			min	-.003	3	-.004	3	0	15	-9.825e-5	1	NC	1	NC	1
167		8	max	.003	1	0	2	.003	1	-2.79e-6	15	NC	1	NC	1
168			min	-.002	3	-.004	3	0	15	-8.536e-5	1	NC	1	NC	1
169		9	max	.003	1	0	15	.003	1	-2.369e-6	15	NC	1	NC	1
170			min	-.002	3	-.004	3	0	15	-7.247e-5	1	NC	1	NC	1
171		10	max	.003	1	0	15	.002	1	-1.949e-6	15	NC	1	NC	1
172			min	-.002	3	-.003	3	0	15	-5.958e-5	1	NC	1	NC	1
173		11	max	.002	1	0	15	.002	1	-1.528e-6	15	NC	1	NC	1
174			min	-.002	3	-.003	3	0	15	-4.669e-5	1	NC	1	NC	1
175		12	max	.002	1	0	15	.001	1	-1.107e-6	15	NC	1	NC	1
176			min	-.002	3	-.003	3	0	15	-3.38e-5	1	NC	1	NC	1
177		13	max	.002	1	0	15	.001	1	-6.864e-7	15	NC	1	NC	1
178			min	-.001	3	-.003	3	0	15	-2.091e-5	1	NC	1	NC	1
179		14	max	.001	1	0	15	0	1	-2.656e-7	15	NC	1	NC	1
180			min	-.001	3	-.002	3	0	15	-8.02e-6	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	4.871e-6	1	NC	1	NC	1
182			min	0	3	-.002	4	0	15	-3.208e-8	3	NC	1	NC	1
183		16	max	0	1	0	15	0	1	1.776e-5	1	NC	1	NC	1
184			min	0	3	-.002	4	0	15	5.074e-7	12	NC	1	NC	1
185		17	max	0	1	0	15	0	1	3.065e-5	1	NC	1	NC	1
186			min	0	3	-.001	4	0	15	9.966e-7	15	NC	1	NC	1
187		18	max	0	1	0	15	0	1	4.354e-5	1	NC	1	NC	1
188			min	0	3	0	4	0	15	1.417e-6	15	NC	1	NC	1
189		19	max	0	1	0	1	0	1	5.643e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	1.838e-6	15	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-5.7e-7	15	NC	1	NC	1
192			min	0	1	0	1	0	1	-1.749e-5	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	4.239e-6	1	NC	1	NC	1
194			min	0	2	-.001	4	0	15	1.39e-7	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	2.597e-5	1	NC	1	NC	1
196			min	0	2	-.003	4	0	15	8.479e-7	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	4.77e-5	1	NC	1	NC	1
198			min	0	2	-.005	4	0	15	1.557e-6	15	NC	1	NC	1
199		5	max	0	3	-.002	15	.001	1	6.943e-5	1	NC	1	NC	1
200			min	0	2	-.007	4	0	15	2.266e-6	15	NC	1	NC	1
201		6	max	0	3	-.002	15	.001	1	9.116e-5	1	NC	1	NC	1
202			min	0	2	-.009	4	0	15	2.975e-6	15	NC	1	NC	1
203		7	max	.001	3	-.002	15	.002	1	1.129e-4	1	NC	1	NC	1
204			min	0	2	-.01	4	0	15	3.684e-6	15	9283.464	4	NC	1
205		8	max	.001	3	-.003	15	.002	1	1.346e-4	1	NC	1	NC	1
206			min	0	2	-.011	4	0	15	4.393e-6	15	8275.435	4	NC	1
207		9	max	.001	3	-.003	15	.002	1	1.564e-4	1	NC	1	NC	1
208			min	0	2	-.012	4	0	15	5.101e-6	15	7673.087	4	NC	1
209		10	max	.002	3	-.003	15	.003	1	1.781e-4	1	NC	2	NC	1
210			min	-.001	2	-.013	4	0	15	5.81e-6	15	7369.385	4	NC	1
211		11	max	.002	3	-.003	15	.003	1	1.998e-4	1	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.001	2	-.013	4	0	15	6.519e-6	15	7318.797	4	NC	1
213		12	max	.002	3	-.003	15	.004	1	2.216e-4	1	NC	2	NC	1
214			min	-.001	2	-.013	4	0	15	7.228e-6	15	7519.698	4	NC	1
215		13	max	.002	3	-.003	15	.004	1	2.433e-4	1	NC	1	NC	1
216			min	-.001	2	-.012	4	0	15	7.937e-6	15	8015.888	4	NC	1
217		14	max	.002	3	-.002	15	.004	1	2.65e-4	1	NC	1	NC	1
218			min	-.001	2	-.011	4	0	15	8.646e-6	15	8919.94	4	NC	1
219		15	max	.002	3	-.002	15	.005	1	2.867e-4	1	NC	1	NC	1
220			min	-.002	2	-.009	4	0	15	9.355e-6	15	NC	1	NC	1
221		16	max	.003	3	-.002	15	.005	1	3.085e-4	1	NC	1	NC	1
222			min	-.002	2	-.008	1	0	15	1.006e-5	15	NC	1	NC	1
223		17	max	.003	3	-.001	15	.006	1	3.302e-4	1	NC	1	NC	1
224			min	-.002	2	-.006	1	0	15	1.077e-5	15	NC	1	NC	1
225		18	max	.003	3	0	15	.006	1	3.519e-4	1	NC	1	NC	1
226			min	-.002	2	-.005	1	0	15	1.148e-5	15	NC	1	NC	1
227		19	max	.003	3	0	15	.006	1	3.737e-4	1	NC	1	NC	1
228			min	-.002	2	-.003	1	0	15	1.219e-5	15	NC	1	NC	1
229	M4	1	max	.003	1	.002	2	0	15	-3.995e-7	12	NC	1	NC	3
230			min	0	3	-.003	3	-.006	1	-1.369e-5	1	NC	1	3816.86	1
231		2	max	.003	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
232			min	0	3	-.003	3	-.006	1	-1.369e-5	1	NC	1	4157.501	1
233		3	max	.003	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
234			min	0	3	-.003	3	-.005	1	-1.369e-5	1	NC	1	4562.535	1
235		4	max	.002	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
236			min	0	3	-.002	3	-.005	1	-1.369e-5	1	NC	1	5048.76	1
237		5	max	.002	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
238			min	0	3	-.002	3	-.004	1	-1.369e-5	1	NC	1	5639.001	1
239		6	max	.002	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
240			min	0	3	-.002	3	-.004	1	-1.369e-5	1	NC	1	6364.91	1
241		7	max	.002	1	.001	2	0	15	-3.995e-7	12	NC	1	NC	2
242			min	0	3	-.002	3	-.003	1	-1.369e-5	1	NC	1	7271.425	1
243		8	max	.002	1	0	2	0	15	-3.995e-7	12	NC	1	NC	2
244			min	0	3	-.002	3	-.003	1	-1.369e-5	1	NC	1	8424.089	1
245		9	max	.002	1	0	2	0	15	-3.995e-7	12	NC	1	NC	2
246			min	0	3	-.002	3	-.002	1	-1.369e-5	1	NC	1	9921.592	1
247		10	max	.001	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
248			min	0	3	-.001	3	-.002	1	-1.369e-5	1	NC	1	NC	1
249		11	max	.001	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
250			min	0	3	-.001	3	-.002	1	-1.369e-5	1	NC	1	NC	1
251		12	max	.001	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
252			min	0	3	-.001	3	-.001	1	-1.369e-5	1	NC	1	NC	1
253		13	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
254			min	0	3	0	3	-.001	1	-1.369e-5	1	NC	1	NC	1
255		14	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
256			min	0	3	0	3	0	1	-1.369e-5	1	NC	1	NC	1
257		15	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
258			min	0	3	0	3	0	1	-1.369e-5	1	NC	1	NC	1
259		16	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
260			min	0	3	0	3	0	1	-1.369e-5	1	NC	1	NC	1
261		17	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
262			min	0	3	0	3	0	1	-1.369e-5	1	NC	1	NC	1
263		18	max	0	1	0	2	0	15	-3.995e-7	12	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.369e-5	1	NC	1	NC	1
265		19	max	0	1	0	1	0	1	-3.995e-7	12	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.369e-5	1	NC	1	NC	1
267	M6	1	max	.017	1	.01	2	0	1	0	1	NC	3	NC	1
268			min	-.013	3	-.015	3	0	1	0	1	4747.821	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
269		2	max	.016	1	.009	2	0	1	0	1	NC	3	NC	1
270			min	-.012	3	-.014	3	0	1	0	1	5235.039	2	NC	1
271		3	max	.015	1	.008	2	0	1	0	1	NC	1	NC	1
272			min	-.012	3	-.013	3	0	1	0	1	5828.606	2	NC	1
273		4	max	.014	1	.007	2	0	1	0	1	NC	1	NC	1
274			min	-.011	3	-.012	3	0	1	0	1	6561.119	2	NC	1
275		5	max	.013	1	.006	2	0	1	0	1	NC	1	NC	1
276			min	-.01	3	-.012	3	0	1	0	1	7479.156	2	NC	1
277		6	max	.012	1	.006	2	0	1	0	1	NC	1	NC	1
278			min	-.009	3	-.011	3	0	1	0	1	8651.209	2	NC	1
279		7	max	.011	1	.005	2	0	1	0	1	NC	1	NC	1
280			min	-.009	3	-.01	3	0	1	0	1	NC	1	NC	1
281		8	max	.01	1	.004	2	0	1	0	1	NC	1	NC	1
282			min	-.008	3	-.009	3	0	1	0	1	NC	1	NC	1
283		9	max	.009	1	.003	2	0	1	0	1	NC	1	NC	1
284			min	-.007	3	-.009	3	0	1	0	1	NC	1	NC	1
285		10	max	.008	1	.002	2	0	1	0	1	NC	1	NC	1
286			min	-.007	3	-.008	3	0	1	0	1	NC	1	NC	1
287		11	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
288			min	-.006	3	-.007	3	0	1	0	1	NC	1	NC	1
289		12	max	.006	1	.001	2	0	1	0	1	NC	1	NC	1
290			min	-.005	3	-.006	3	0	1	0	1	NC	1	NC	1
291		13	max	.006	1	0	2	0	1	0	1	NC	1	NC	1
292			min	-.004	3	-.005	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	0	2	0	1	0	1	NC	1	NC	1
294			min	-.004	3	-.004	3	0	1	0	1	NC	1	NC	1
295		15	max	.004	1	0	2	0	1	0	1	NC	1	NC	1
296			min	-.003	3	-.004	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.002	3	-.003	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
301		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
302			min	0	3	0	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.001	3	0	15	0	1	0	1	NC	1	NC	1
310			min	0	2	-.004	3	0	1	0	1	NC	1	NC	1
311		4	max	.002	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.001	2	-.005	3	0	1	0	1	NC	1	NC	1
313		5	max	.002	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.002	2	-.007	4	0	1	0	1	NC	1	NC	1
315		6	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.002	2	-.009	4	0	1	0	1	NC	1	NC	1
317		7	max	.003	3	-.002	15	0	1	0	1	NC	1	NC	1
318			min	-.003	2	-.01	4	0	1	0	1	9561.603	4	NC	1
319		8	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.003	2	-.011	4	0	1	0	1	8503.386	4	NC	1
321		9	max	.004	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.004	2	-.012	4	0	1	0	1	7869.298	4	NC	1
323		10	max	.005	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.004	2	-.013	4	0	1	0	1	7545.808	4	NC	1
325		11	max	.005	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	-.005	2	-.013	4	0	1	0	1	7484.073	4	NC	1
327		12	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.005	2	-.013	4	0	1	0	1	7680.992	4	NC	1
329		13	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.006	2	-.012	4	0	1	0	1	8180.261	4	NC	1
331		14	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.006	2	-.012	1	0	1	0	1	9095.901	4	NC	1
333		15	max	.007	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.007	2	-.011	1	0	1	0	1	NC	1	NC	1
335		16	max	.008	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.007	2	-.011	1	0	1	0	1	NC	1	NC	1
337		17	max	.008	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.008	2	-.01	1	0	1	0	1	NC	1	NC	1
339		18	max	.009	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.008	2	-.009	1	0	1	0	1	NC	1	NC	1
341		19	max	.009	3	0	15	0	1	0	1	NC	1	NC	1
342			min	-.009	2	-.007	1	0	1	0	1	NC	1	NC	1
343	M8	1	max	.009	1	.007	2	0	1	0	1	NC	1	NC	1
344			min	-.002	3	-.009	3	0	1	0	1	NC	1	NC	1
345		2	max	.008	1	.007	2	0	1	0	1	NC	1	NC	1
346			min	-.002	3	-.009	3	0	1	0	1	NC	1	NC	1
347		3	max	.008	1	.007	2	0	1	0	1	NC	1	NC	1
348			min	-.002	3	-.008	3	0	1	0	1	NC	1	NC	1
349		4	max	.007	1	.006	2	0	1	0	1	NC	1	NC	1
350			min	-.002	3	-.008	3	0	1	0	1	NC	1	NC	1
351		5	max	.007	1	.006	2	0	1	0	1	NC	1	NC	1
352			min	-.002	3	-.007	3	0	1	0	1	NC	1	NC	1
353		6	max	.006	1	.005	2	0	1	0	1	NC	1	NC	1
354			min	-.002	3	-.007	3	0	1	0	1	NC	1	NC	1
355		7	max	.006	1	.005	2	0	1	0	1	NC	1	NC	1
356			min	-.001	3	-.006	3	0	1	0	1	NC	1	NC	1
357		8	max	.005	1	.004	2	0	1	0	1	NC	1	NC	1
358			min	-.001	3	-.006	3	0	1	0	1	NC	1	NC	1
359		9	max	.005	1	.004	2	0	1	0	1	NC	1	NC	1
360			min	-.001	3	-.005	3	0	1	0	1	NC	1	NC	1
361		10	max	.004	1	.004	2	0	1	0	1	NC	1	NC	1
362			min	-.001	3	-.005	3	0	1	0	1	NC	1	NC	1
363		11	max	.004	1	.003	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
365		12	max	.003	1	.003	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
367		13	max	.003	1	.002	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
371		15	max	.002	1	.002	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.001	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	0	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	0	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.005	1	.002	2	0	15	1.756e-4	1	NC	1	NC	2
382			min	-.004	3	-.005	3	-.007	1	5.735e-6	15	NC	1	7041.065	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	.005	1	.002	2	0	15	1.627e-4	1	NC	1	NC	2
384			min	-.004	3	-.005	3	-.006	1	5.315e-6	15	NC	1	7678.52	1
385		3	max	.005	1	.001	2	0	15	1.498e-4	1	NC	1	NC	2
386			min	-.004	3	-.004	3	-.006	1	4.894e-6	15	NC	1	8438.006	1
387		4	max	.004	1	0	2	0	15	1.369e-4	1	NC	1	NC	2
388			min	-.003	3	-.004	3	-.005	1	4.473e-6	15	NC	1	9351.816	1
389		5	max	.004	1	0	2	0	15	1.24e-4	1	NC	1	NC	1
390			min	-.003	3	-.004	3	-.005	1	4.052e-6	15	NC	1	NC	1
391		6	max	.004	1	0	2	0	15	1.111e-4	1	NC	1	NC	1
392			min	-.003	3	-.004	3	-.004	1	3.632e-6	15	NC	1	NC	1
393		7	max	.003	1	0	2	0	15	9.825e-5	1	NC	1	NC	1
394			min	-.003	3	-.004	3	-.004	1	3.211e-6	15	NC	1	NC	1
395		8	max	.003	1	0	2	0	15	8.536e-5	1	NC	1	NC	1
396			min	-.002	3	-.004	3	-.003	1	2.79e-6	15	NC	1	NC	1
397		9	max	.003	1	0	15	0	15	7.247e-5	1	NC	1	NC	1
398			min	-.002	3	-.004	3	-.003	1	2.369e-6	15	NC	1	NC	1
399		10	max	.003	1	0	15	0	15	5.958e-5	1	NC	1	NC	1
400			min	-.002	3	-.003	3	-.002	1	1.949e-6	15	NC	1	NC	1
401		11	max	.002	1	0	15	0	15	4.669e-5	1	NC	1	NC	1
402			min	-.002	3	-.003	3	-.002	1	1.528e-6	15	NC	1	NC	1
403		12	max	.002	1	0	15	0	15	3.38e-5	1	NC	1	NC	1
404			min	-.002	3	-.003	3	-.001	1	1.107e-6	15	NC	1	NC	1
405		13	max	.002	1	0	15	0	15	2.091e-5	1	NC	1	NC	1
406			min	-.001	3	-.003	3	-.001	1	6.864e-7	15	NC	1	NC	1
407		14	max	.001	1	0	15	0	15	8.02e-6	1	NC	1	NC	1
408			min	-.001	3	-.002	3	0	1	2.656e-7	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	3.208e-8	3	NC	1	NC	1
410			min	0	3	-.002	4	0	1	-4.871e-6	1	NC	1	NC	1
411		16	max	0	1	0	15	0	15	-5.074e-7	12	NC	1	NC	1
412			min	0	3	-.002	4	0	1	-1.776e-5	1	NC	1	NC	1
413		17	max	0	1	0	15	0	15	-9.966e-7	15	NC	1	NC	1
414			min	0	3	-.001	4	0	1	-3.065e-5	1	NC	1	NC	1
415		18	max	0	1	0	15	0	15	-1.417e-6	15	NC	1	NC	1
416			min	0	3	0	4	0	1	-4.354e-5	1	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-1.838e-6	15	NC	1	NC	1
418			min	0	1	0	1	0	1	-5.643e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	1.749e-5	1	NC	1	NC	1
420			min	0	1	0	1	0	1	5.7e-7	15	NC	1	NC	1
421		2	max	0	3	0	15	0	15	-1.39e-7	15	NC	1	NC	1
422			min	0	2	-.001	4	0	1	-4.239e-6	1	NC	1	NC	1
423		3	max	0	3	0	15	0	15	-8.479e-7	15	NC	1	NC	1
424			min	0	2	-.003	4	0	1	-2.597e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-1.557e-6	15	NC	1	NC	1
426			min	0	2	-.005	4	0	1	-4.77e-5	1	NC	1	NC	1
427		5	max	0	3	-.002	15	0	15	-2.266e-6	15	NC	1	NC	1
428			min	0	2	-.007	4	-.001	1	-6.943e-5	1	NC	1	NC	1
429		6	max	0	3	-.002	15	0	15	-2.975e-6	15	NC	1	NC	1
430			min	0	2	-.009	4	-.001	1	-9.116e-5	1	NC	1	NC	1
431		7	max	.001	3	-.002	15	0	15	-3.684e-6	15	NC	1	NC	1
432			min	0	2	-.01	4	-.002	1	-1.129e-4	1	9283.464	4	NC	1
433		8	max	.001	3	-.003	15	0	15	-4.393e-6	15	NC	1	NC	1
434			min	0	2	-.011	4	-.002	1	-1.346e-4	1	8275.435	4	NC	1
435		9	max	.001	3	-.003	15	0	15	-5.101e-6	15	NC	1	NC	1
436			min	0	2	-.012	4	-.002	1	-1.564e-4	1	7673.087	4	NC	1
437		10	max	.002	3	-.003	15	0	15	-5.81e-6	15	NC	2	NC	1
438			min	-.001	2	-.013	4	-.003	1	-1.781e-4	1	7369.385	4	NC	1
439		11	max	.002	3	-.003	15	0	15	-6.519e-6	15	NC	2	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.001	2	-.013	4	-.003	1	-1.998e-4	1	7318.797	4	NC	1
441		12	max	.002	3	-.003	15	0	15	-7.228e-6	15	NC	2	NC	1
442			min	-.001	2	-.013	4	-.004	1	-2.216e-4	1	7519.698	4	NC	1
443		13	max	.002	3	-.003	15	0	15	-7.937e-6	15	NC	1	NC	1
444			min	-.001	2	-.012	4	-.004	1	-2.433e-4	1	8015.888	4	NC	1
445		14	max	.002	3	-.002	15	0	15	-8.646e-6	15	NC	1	NC	1
446			min	-.001	2	-.011	4	-.004	1	-2.65e-4	1	8919.94	4	NC	1
447		15	max	.002	3	-.002	15	0	15	-9.355e-6	15	NC	1	NC	1
448			min	-.002	2	-.009	4	-.005	1	-2.867e-4	1	NC	1	NC	1
449		16	max	.003	3	-.002	15	0	15	-1.006e-5	15	NC	1	NC	1
450			min	-.002	2	-.008	1	-.005	1	-3.085e-4	1	NC	1	NC	1
451		17	max	.003	3	-.001	15	0	15	-1.077e-5	15	NC	1	NC	1
452			min	-.002	2	-.006	1	-.006	1	-3.302e-4	1	NC	1	NC	1
453		18	max	.003	3	0	15	0	15	-1.148e-5	15	NC	1	NC	1
454			min	-.002	2	-.005	1	-.006	1	-3.519e-4	1	NC	1	NC	1
455		19	max	.003	3	0	15	0	15	-1.219e-5	15	NC	1	NC	1
456			min	-.002	2	-.003	1	-.006	1	-3.737e-4	1	NC	1	NC	1
457	M12	1	max	.003	1	.002	2	.006	1	1.369e-5	1	NC	1	NC	3
458			min	0	3	-.003	3	0	15	3.995e-7	12	NC	1	3816.86	1
459		2	max	.003	1	.001	2	.006	1	1.369e-5	1	NC	1	NC	2
460			min	0	3	-.003	3	0	15	3.995e-7	12	NC	1	4157.501	1
461		3	max	.003	1	.001	2	.005	1	1.369e-5	1	NC	1	NC	2
462			min	0	3	-.003	3	0	15	3.995e-7	12	NC	1	4562.535	1
463		4	max	.002	1	.001	2	.005	1	1.369e-5	1	NC	1	NC	2
464			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	5048.76	1
465		5	max	.002	1	.001	2	.004	1	1.369e-5	1	NC	1	NC	2
466			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	5639.001	1
467		6	max	.002	1	.001	2	.004	1	1.369e-5	1	NC	1	NC	2
468			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	6364.91	1
469		7	max	.002	1	.001	2	.003	1	1.369e-5	1	NC	1	NC	2
470			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	7271.425	1
471		8	max	.002	1	0	2	.003	1	1.369e-5	1	NC	1	NC	2
472			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	8424.089	1
473		9	max	.002	1	0	2	.002	1	1.369e-5	1	NC	1	NC	2
474			min	0	3	-.002	3	0	15	3.995e-7	12	NC	1	9921.592	1
475		10	max	.001	1	0	2	.002	1	1.369e-5	1	NC	1	NC	1
476			min	0	3	-.001	3	0	15	3.995e-7	12	NC	1	NC	1
477		11	max	.001	1	0	2	.002	1	1.369e-5	1	NC	1	NC	1
478			min	0	3	-.001	3	0	15	3.995e-7	12	NC	1	NC	1
479		12	max	.001	1	0	2	.001	1	1.369e-5	1	NC	1	NC	1
480			min	0	3	-.001	3	0	15	3.995e-7	12	NC	1	NC	1
481		13	max	0	1	0	2	.001	1	1.369e-5	1	NC	1	NC	1
482			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
483		14	max	0	1	0	2	0	1	1.369e-5	1	NC	1	NC	1
484			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
485		15	max	0	1	0	2	0	1	1.369e-5	1	NC	1	NC	1
486			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
487		16	max	0	1	0	2	0	1	1.369e-5	1	NC	1	NC	1
488			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
489		17	max	0	1	0	2	0	1	1.369e-5	1	NC	1	NC	1
490			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
491		18	max	0	1	0	2	0	1	1.369e-5	1	NC	1	NC	1
492			min	0	3	0	3	0	15	3.995e-7	12	NC	1	NC	1
493		19	max	0	1	0	1	0	1	1.369e-5	1	NC	1	NC	1
494			min	0	1	0	1	0	1	3.995e-7	12	NC	1	NC	1
495	M1	1	max	.004	3	.112	1	0	1	1.816e-2	1	NC	1	NC	1
496			min	-.001	2	-.015	3	0	15	-1.894e-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	.004	3	.055	1	0	15	8.849e-3	1	NC	3	NC	1
498			min	-.001	2	-.007	3	-.005	1	-9.371e-3	3	2025.627	1	NC	1
499		3	max	.004	3	.005	3	0	15	1.935e-5	10	NC	5	NC	1
500			min	-.001	2	-.006	1	-.007	1	-1.279e-4	1	968.432	1	NC	1
501		4	max	.004	3	.027	3	0	15	5.051e-3	1	NC	5	NC	1
502			min	-.001	2	-.077	1	-.006	1	-3.427e-3	3	604.468	1	NC	1
503		5	max	.004	3	.056	3	0	15	1.023e-2	1	NC	15	NC	1
504			min	-.001	2	-.153	1	-.004	1	-6.762e-3	3	432.138	1	NC	1
505		6	max	.004	3	.087	3	0	15	1.541e-2	1	NC	15	NC	1
506			min	-.001	2	-.227	1	-.002	1	-1.01e-2	3	337.887	1	NC	1
507		7	max	.003	3	.117	3	0	1	2.059e-2	1	9551.488	15	NC	1
508			min	-.001	10	-.293	1	0	12	-1.343e-2	3	282.583	1	NC	1
509		8	max	.003	3	.142	3	0	1	2.577e-2	1	8484.832	15	NC	1
510			min	-.001	10	-.346	1	0	15	-1.677e-2	3	250.013	1	NC	1
511		9	max	.003	3	.158	3	0	15	2.832e-2	1	7928.851	15	NC	1
512			min	-.001	10	-.379	1	0	1	-1.685e-2	3	233.111	1	NC	1
513		10	max	.003	3	.164	3	0	1	2.912e-2	1	7759.571	15	NC	1
514			min	0	10	-.39	1	0	12	-1.478e-2	3	228.046	1	NC	1
515		11	max	.003	3	.161	3	0	1	2.993e-2	1	7928.701	15	NC	1
516			min	0	10	-.379	1	0	15	-1.27e-2	3	233.369	1	NC	1
517		12	max	.003	3	.147	3	0	15	2.82e-2	1	8484.519	15	NC	1
518			min	0	10	-.345	1	0	1	-1.061e-2	3	250.817	1	NC	1
519		13	max	.003	3	.125	3	0	15	2.266e-2	1	9550.935	15	NC	1
520			min	0	10	-.291	1	0	1	-8.495e-3	3	284.571	1	NC	1
521		14	max	.003	3	.097	3	.002	1	1.712e-2	1	NC	15	NC	1
522			min	0	10	-.224	1	0	15	-6.378e-3	3	342.17	1	NC	1
523		15	max	.003	3	.065	3	.004	1	1.158e-2	1	NC	15	NC	1
524			min	0	10	-.149	1	0	15	-4.261e-3	3	440.996	1	NC	1
525		16	max	.003	3	.033	3	.006	1	6.035e-3	1	NC	5	NC	1
526			min	0	10	-.074	1	0	15	-2.144e-3	3	623.198	1	NC	1
527		17	max	.003	3	.002	3	.007	1	4.941e-4	1	NC	5	NC	1
528			min	0	10	-.004	1	0	15	-2.752e-5	3	1010.956	1	NC	1
529		18	max	.003	3	.055	1	.005	1	1.048e-2	1	NC	5	NC	1
530			min	0	10	-.025	3	0	15	-3.357e-3	3	2133.891	1	NC	1
531		19	max	.003	3	.108	1	0	15	2.082e-2	1	NC	1	NC	1
532			min	0	10	-.051	3	0	1	-6.814e-3	3	NC	1	NC	1
533	M5	1	max	.011	3	.268	1	0	1	0	1	NC	1	NC	1
534			min	-.007	2	-.023	3	0	1	0	1	NC	1	NC	1
535		2	max	.011	3	.133	1	0	1	0	1	NC	5	NC	1
536			min	-.007	2	-.012	3	0	1	0	1	847.693	1	NC	1
537		3	max	.011	3	.017	3	0	1	0	1	NC	15	NC	1
538			min	-.007	2	-.021	1	0	1	0	1	396.051	1	NC	1
539		4	max	.011	3	.078	3	0	1	0	1	9110.917	15	NC	1
540			min	-.007	2	-.209	1	0	1	0	1	240.144	1	NC	1
541		5	max	.011	3	.16	3	0	1	0	1	6377.321	15	NC	1
542			min	-.007	2	-.414	1	0	1	0	1	167.765	1	NC	1
543		6	max	.011	3	.252	3	0	1	0	1	4910.761	15	NC	1
544			min	-.007	2	-.619	1	0	1	0	1	128.966	1	NC	1
545		7	max	.011	3	.341	3	0	1	0	1	4063.649	15	NC	1
546			min	-.006	2	-.805	1	0	1	0	1	106.569	1	NC	1
547		8	max	.01	3	.417	3	0	1	0	1	3571.019	15	NC	1
548			min	-.006	2	-.955	1	0	1	0	1	93.55	1	NC	1
549		9	max	.01	3	.465	3	0	1	0	1	3318.354	15	NC	1
550			min	-.006	2	-1.049	1	0	1	0	1	86.88	1	NC	1
551		10	max	.01	3	.483	3	0	1	0	1	3242.218	15	NC	1
552			min	-.006	2	-1.08	1	0	1	0	1	84.892	1	NC	1
553		11	max	.01	3	.471	3	0	1	0	1	3318.407	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	-.006	2	-1.048	1	0	1	0	1	86.984	1	NC	1
555		12	max	.01	3	.43	3	0	1	0	1	3571.145	15	NC	1
556			min	-.006	2	-.952	1	0	1	0	1	93.891	1	NC	1
557		13	max	.009	3	.364	3	0	1	0	1	4063.91	15	NC	1
558			min	-.006	2	-.8	1	0	1	0	1	107.455	1	NC	1
559		14	max	.009	3	.281	3	0	1	0	1	4911.279	15	NC	1
560			min	-.006	2	-.61	1	0	1	0	1	130.96	1	NC	1
561		15	max	.009	3	.188	3	0	1	0	1	6378.352	15	NC	1
562			min	-.005	2	-.403	1	0	1	0	1	172.086	1	NC	1
563		16	max	.009	3	.094	3	0	1	0	1	9113.086	15	NC	1
564			min	-.005	2	-.197	1	0	1	0	1	249.808	1	NC	1
565		17	max	.008	3	.006	3	0	1	0	1	NC	15	NC	1
566			min	-.005	2	-.013	1	0	1	0	1	419.509	1	NC	1
567		18	max	.008	3	.133	1	0	1	0	1	NC	5	NC	1
568			min	-.005	2	-.068	3	0	1	0	1	910.45	1	NC	1
569		19	max	.008	3	.258	1	0	1	0	1	NC	1	NC	1
570			min	-.005	2	-.135	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.004	3	.112	1	0	15	1.894e-2	3	NC	1	NC	1
572			min	-.001	2	-.015	3	0	1	-1.816e-2	1	NC	1	NC	1
573		2	max	.004	3	.055	1	.005	1	9.371e-3	3	NC	3	NC	1
574			min	-.001	2	-.007	3	0	15	-8.849e-3	1	2025.627	1	NC	1
575		3	max	.004	3	.005	3	.007	1	1.279e-4	1	NC	5	NC	1
576			min	-.001	2	-.006	1	0	15	-1.935e-5	10	968.432	1	NC	1
577		4	max	.004	3	.027	3	.006	1	3.427e-3	3	NC	5	NC	1
578			min	-.001	2	-.077	1	0	15	-5.051e-3	1	604.468	1	NC	1
579		5	max	.004	3	.056	3	.004	1	6.762e-3	3	NC	15	NC	1
580			min	-.001	2	-.153	1	0	15	-1.023e-2	1	432.138	1	NC	1
581		6	max	.004	3	.087	3	.002	1	1.01e-2	3	NC	15	NC	1
582			min	-.001	2	-.227	1	0	15	-1.541e-2	1	337.887	1	NC	1
583		7	max	.003	3	.117	3	0	12	1.343e-2	3	9551.488	15	NC	1
584			min	-.001	10	-.293	1	0	1	-2.059e-2	1	282.583	1	NC	1
585		8	max	.003	3	.142	3	0	15	1.677e-2	3	8484.832	15	NC	1
586			min	-.001	10	-.346	1	0	1	-2.577e-2	1	250.013	1	NC	1
587		9	max	.003	3	.158	3	0	1	1.685e-2	3	7928.851	15	NC	1
588			min	-.001	10	-.379	1	0	15	-2.832e-2	1	233.111	1	NC	1
589		10	max	.003	3	.164	3	0	12	1.478e-2	3	7759.571	15	NC	1
590			min	0	10	-.39	1	0	1	-2.912e-2	1	228.046	1	NC	1
591		11	max	.003	3	.161	3	0	15	1.27e-2	3	7928.701	15	NC	1
592			min	0	10	-.379	1	0	1	-2.993e-2	1	233.369	1	NC	1
593		12	max	.003	3	.147	3	0	1	1.061e-2	3	8484.519	15	NC	1
594			min	0	10	-.345	1	0	15	-2.82e-2	1	250.817	1	NC	1
595		13	max	.003	3	.125	3	0	1	8.495e-3	3	9550.935	15	NC	1
596			min	0	10	-.291	1	0	15	-2.266e-2	1	284.571	1	NC	1
597		14	max	.003	3	.097	3	0	15	6.378e-3	3	NC	15	NC	1
598			min	0	10	-.224	1	-.002	1	-1.712e-2	1	342.17	1	NC	1
599		15	max	.003	3	.065	3	0	15	4.261e-3	3	NC	15	NC	1
600			min	0	10	-.149	1	-.004	1	-1.158e-2	1	440.996	1	NC	1
601		16	max	.003	3	.033	3	0	15	2.144e-3	3	NC	5	NC	1
602			min	0	10	-.074	1	-.006	1	-6.035e-3	1	623.198	1	NC	1
603		17	max	.003	3	.002	3	0	15	2.752e-5	3	NC	5	NC	1
604			min	0	10	-.004	1	-.007	1	-4.941e-4	1	1010.956	1	NC	1
605		18	max	.003	3	.055	1	0	15	3.357e-3	3	NC	5	NC	1
606			min	0	10	-.025	3	-.005	1	-1.048e-2	1	2133.891	1	NC	1
607		19	max	.003	3	.108	1	0	1	6.814e-3	3	NC	1	NC	1
608			min	0	10	-.051	3	0	15	-2.082e-2	1	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

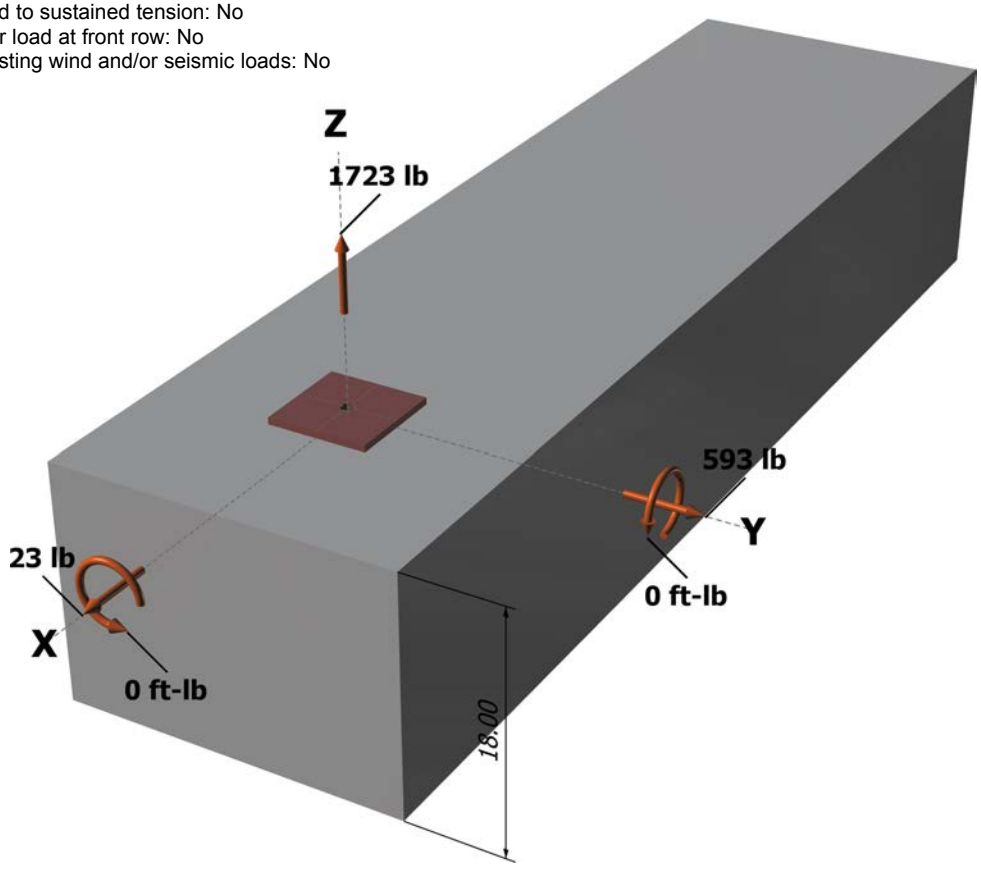
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

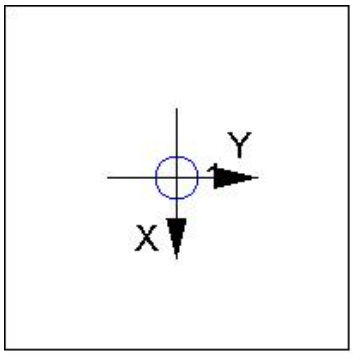
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	ϕ	ϕN_a (lb)
109.66	109.66	1.000	1.000	9755	0.55	5365

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

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

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

Shear perpendicular to edge in y-direction:

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

Shear parallel to edge in y-direction:

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

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

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

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

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

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

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

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

11. Results

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

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

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

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

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

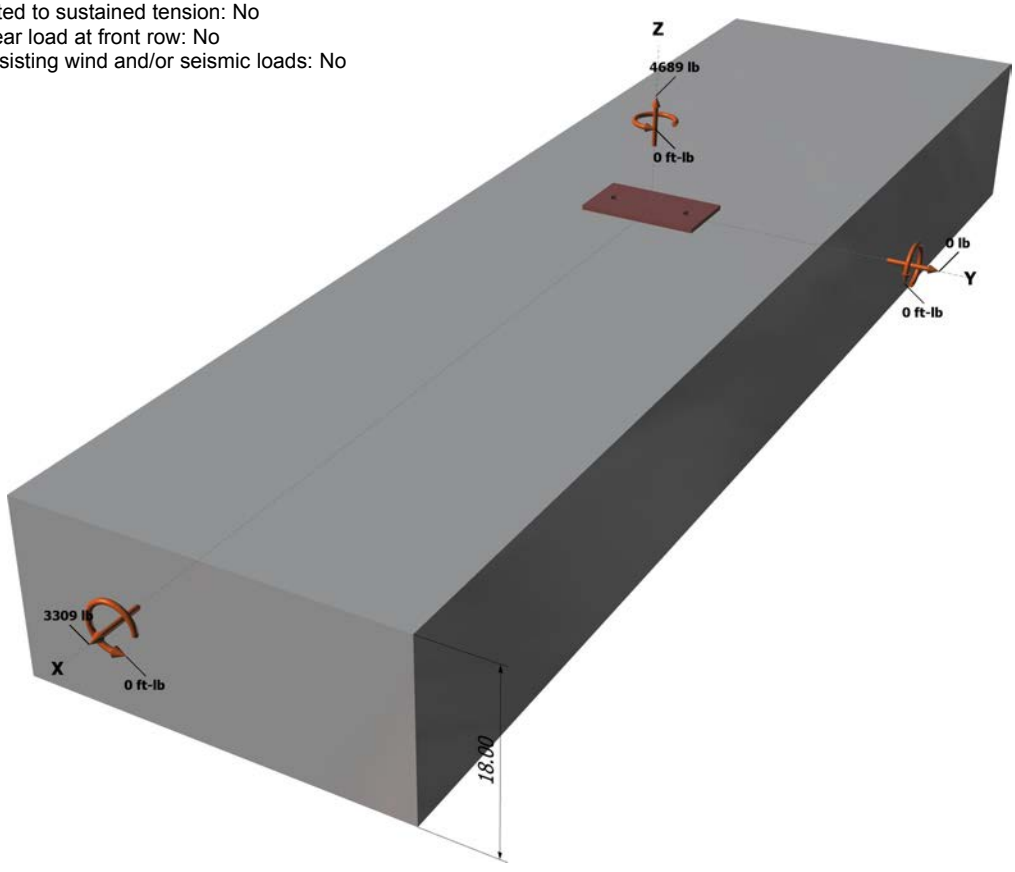
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

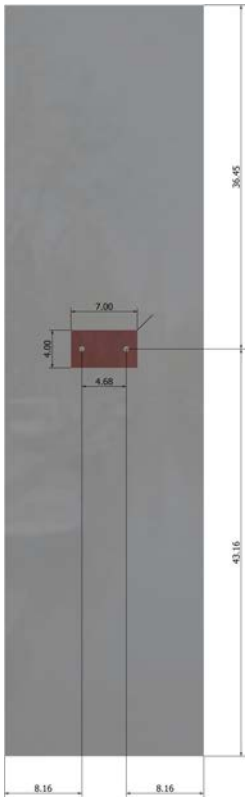
<Figure 1>

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 2>



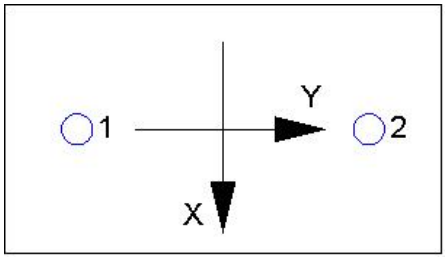
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	2344.5	1654.5	0.0	1654.5
2	2344.5	1654.5	0.0	1654.5
Sum	4689.0	3309.0	0.0	3309.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 4689
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} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
378.00	324.00	1.000	0.972	1.00	1.000	12492	0.65	9208

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

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

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

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

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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
158.66	109.66	1.000	1.043	1.000	1.000	9755	0.55	8093

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
378.00	648.00	1.000	0.836	1.000	1.000	15593	0.70	5323

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.16	8744

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

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
299.64	299.64	1.000	1.000	1.000	8744	0.70	12241

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
378.00	324.00	1.000	0.972	1.000	1.000	12492	14166	0.70

ϕV_{cpg} (lb)
19833

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	2345	6071	0.39	Pass
Concrete breakout	4689	9208	0.51	Pass
Adhesive	**4689**	**8093**	**0.58**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1655	3156	0.52	Pass
T Concrete breakout x+	**3309**	**5323**	**0.62**	**Pass (Governs)**
|| Concrete breakout y-	**1655**	**12241**	**0.14**	**Pass (Governs)**
Pryout	3309	19833	0.17	Pass

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

Sec. D.7.3	0.58	0.62	120.1 %	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.