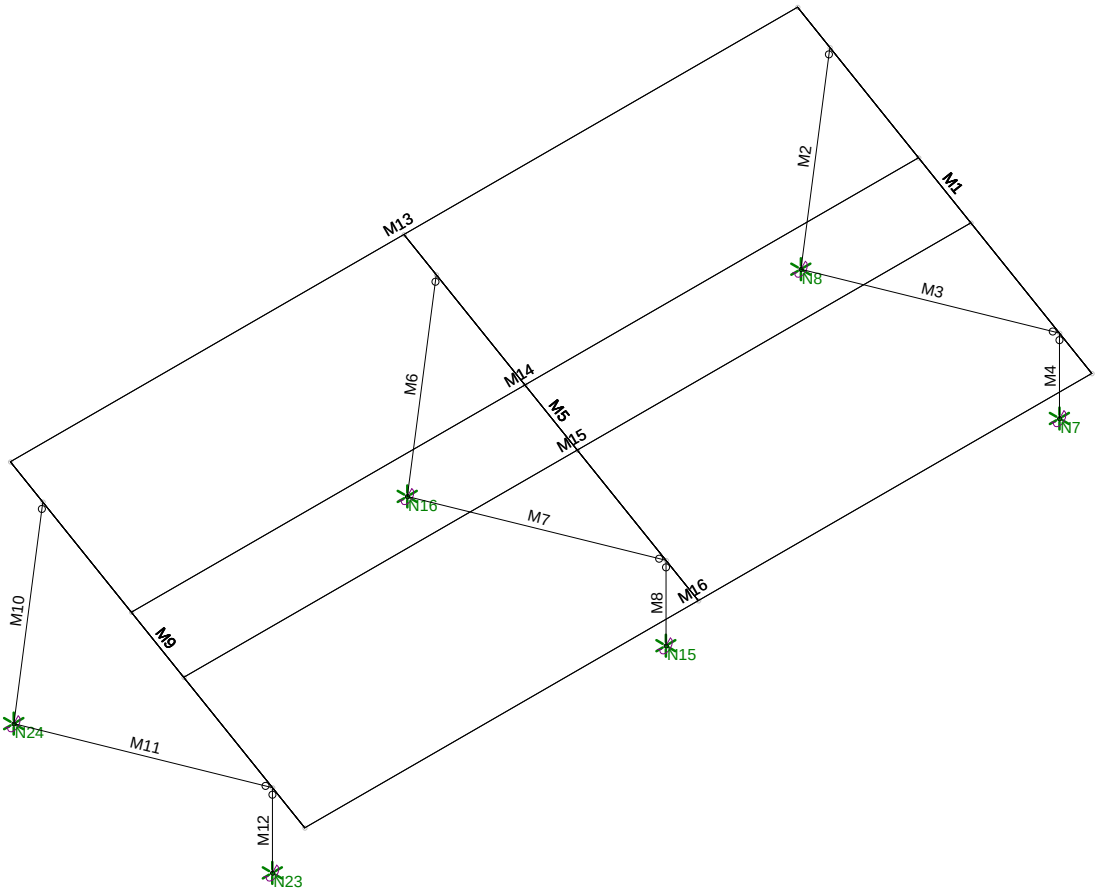


Schletter, Inc.	Standard PVMax Racking System Representative Calculations - ASCE 7-10	30ÁTilt w/o Seismic Design
HCV		

1. INTRODUCTION

1.1 Project Description

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

1.2 Construction

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

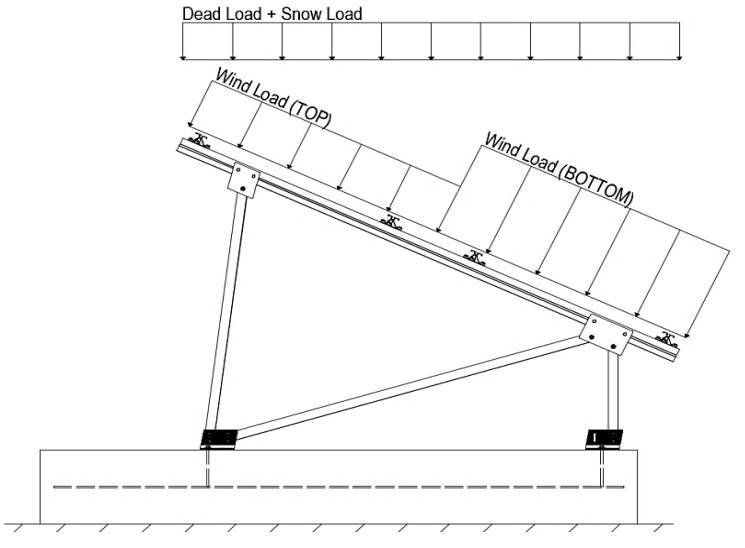
PV modules are required to meet the following specifications:

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

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

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

2.3 Wind Loads

Design Wind Speed, V =	110	mph	Exposure Category = C
Height <	15	ft	Importance Category = II

Peak Velocity Pressure, q_z =	19.00	psf	*Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

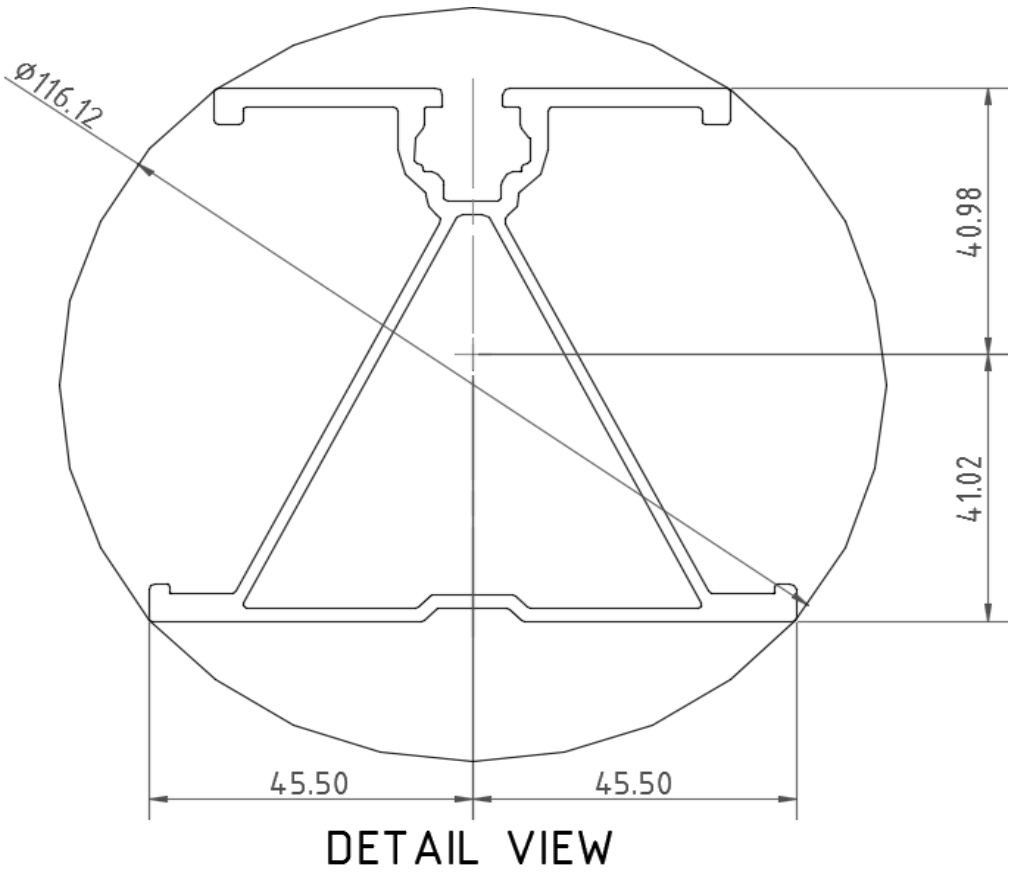
Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

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 =	132	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	25.07	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	23.08	ksi
S_y =	1.33	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	2.16	in^4
I_x =	1.07	in^4
A =	1.25	in^2
g =	1.50	lbs/ft
M_y =	1.767	k-ft
M_z =	0.408	k-ft
$M_{y\ allowable}$ =	2.779	k-ft
$M_{z\ allowable}$ =	1.154	k-ft
Utilization =	99%	

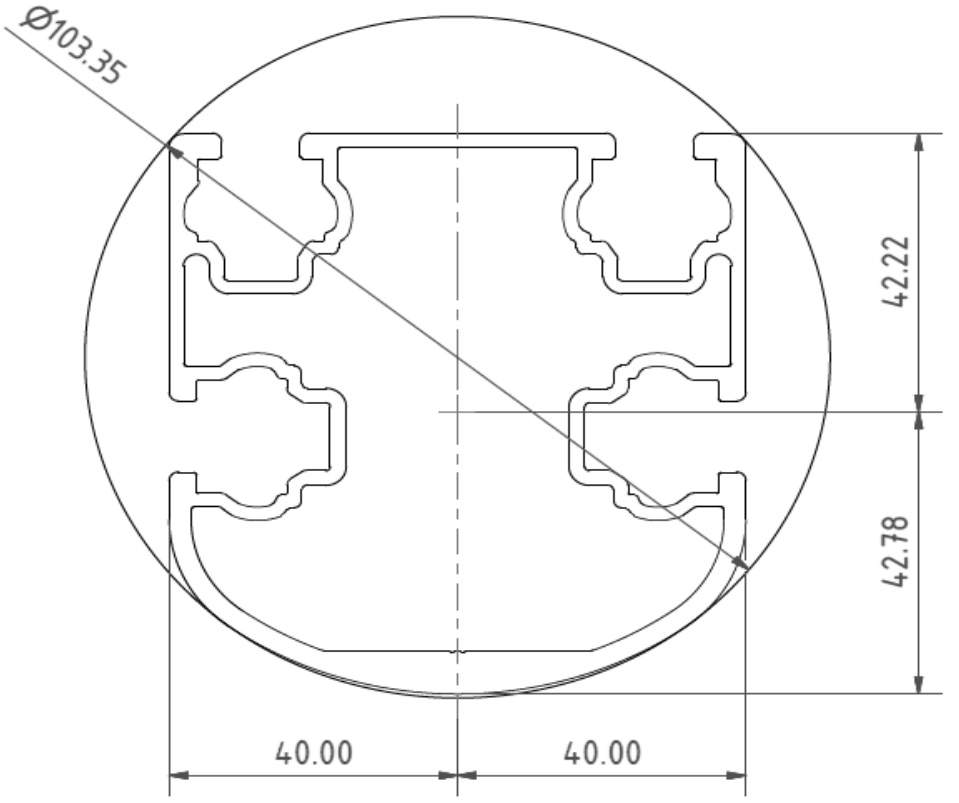


DETAIL VIEW

4.2 Girder Design

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

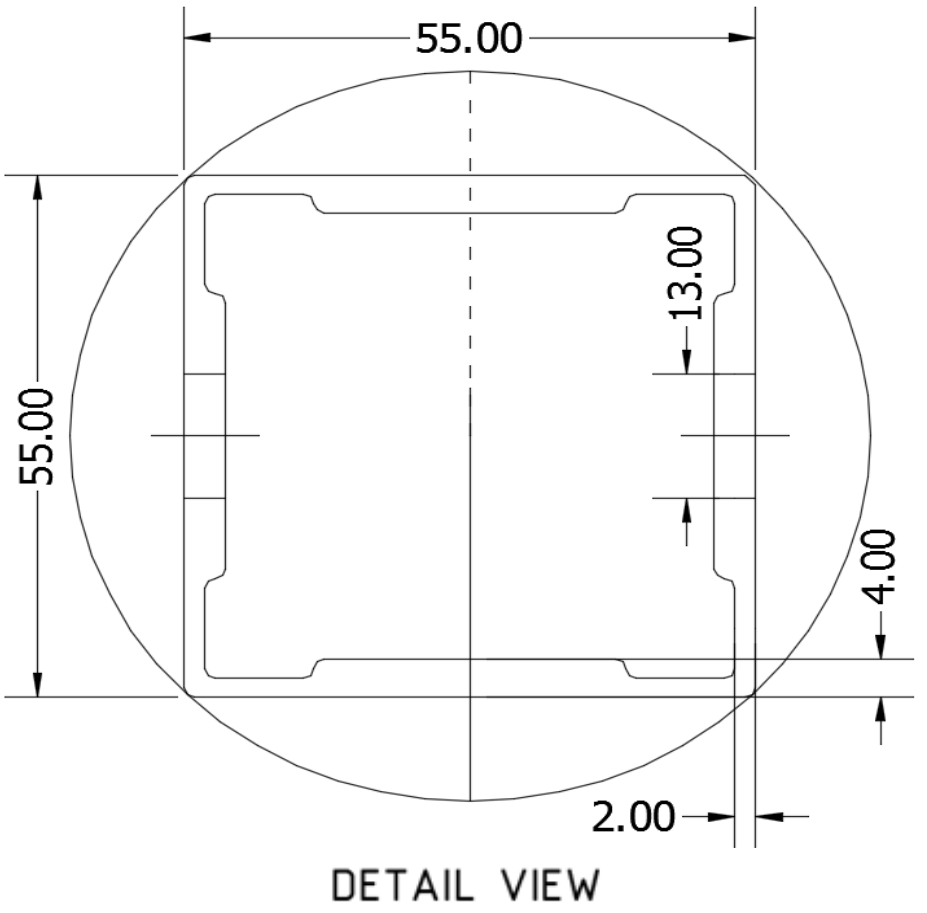
Girder Type =	**BF0**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	88.90	in
$\Phi F_{ty\ AXIAL}$ =	31.09	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.35	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	33.25	ksi
S_y =	1.42	in^3
S_x =	1.41	in^3
E =	10100	ksi
I_y =	2.39	in^4
I_x =	2.22	in^4
A =	1.88	in^2
g =	2.26	lbs/ft
M_y =	-2.584	k-ft
M_z =	0.000	k-ft
P_n =	-0.663	k
$M_{y\ allowable}$ =	3.464	k-ft
$M_{z\ allowable}$ =	3.907	k-ft
$P_{n\ allowable}$ =	58.535	k
Utilization =	76%	



4.3 Front Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	24.80	in
$\Phi F_{ty\ AXIAL}$ =	28.03	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	2.692	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	27.532	k
Utilization =	10%	

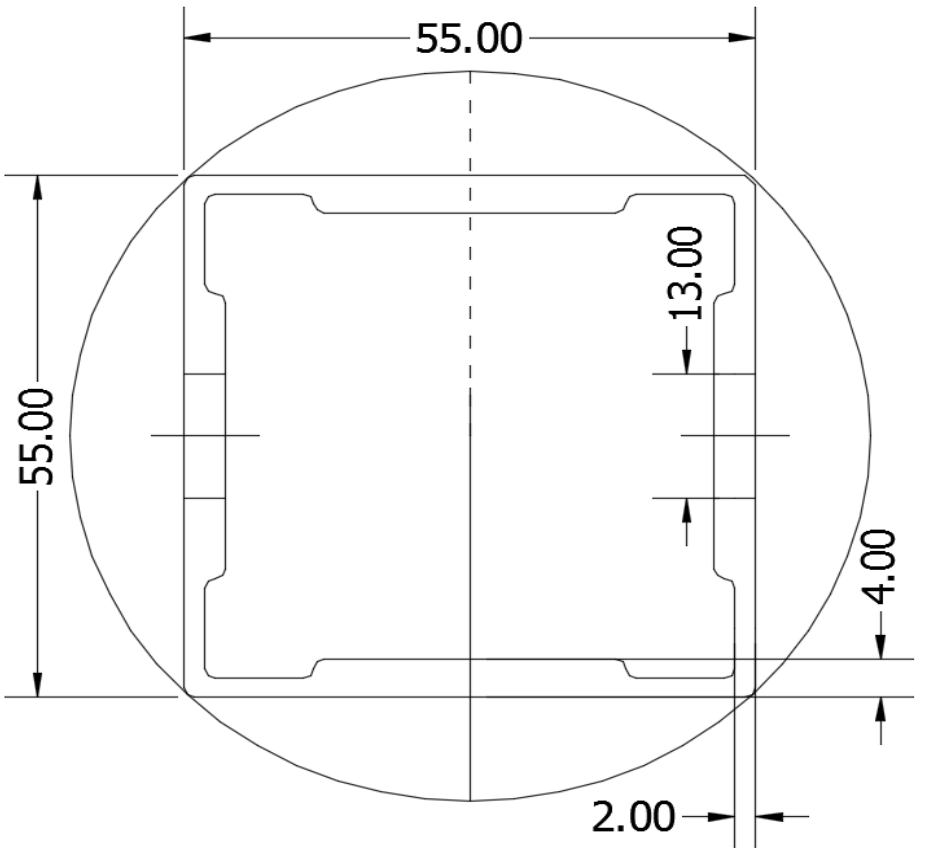


DETAIL VIEW

4.4 Diagonal Strut Design

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

Strut Type =	**55x55**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	86.60	in
$\Phi F_{ty\ AXIAL}$ =	7.50	ksi
$\Phi F_{ty\ BENDING}$ =	28.22	ksi
S_y =	0.60	in^3
S_x =	0.60	in^3
E =	10100	ksi
I_y =	0.67	in^4
I_x =	0.67	in^4
A =	0.98	in^2
g =	1.18	lbs/ft
M_y =	0.009	k-ft
M_z =	0.000	k-ft
P_n =	1.995	k
$M_{y\ allowable}$ =	1.408	k-ft
$M_{z\ allowable}$ =	1.408	k-ft
$P_{n\ allowable}$ =	7.371	k
Utilization =	28%	

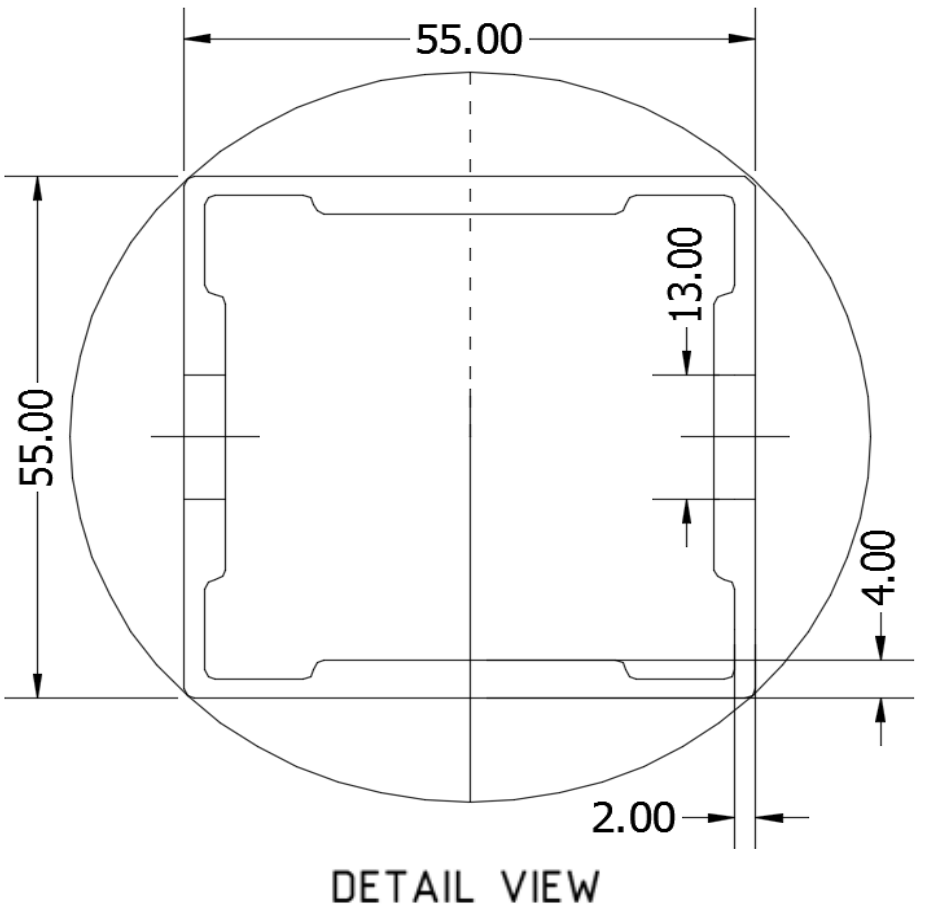


DETAIL VIEW

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	=	70.83	in
$\Phi F_{ty\ AXIAL}$	=	10.55	ksi
$\Phi F_{ty\ BENDING}$	=	28.22	ksi
S_y	=	0.60	in^3
S_x	=	0.60	in^3
E	=	10100	ksi
I_y	=	0.67	in^4
I_x	=	0.67	in^4
A	=	0.98	in^2
g	=	1.18	lbs/ft
M_y	=	-0.008	k-ft
M_z	=	0.000	k-ft
P_n	=	2.914	k
$M_{y\ allowable}$	=	1.408	k-ft
$M_{z\ allowable}$	=	1.408	k-ft
$P_{n\ allowable}$	=	10.365	k
Utilization	=	29%	



5. FOUNDATION DESIGN CALCULATIONS

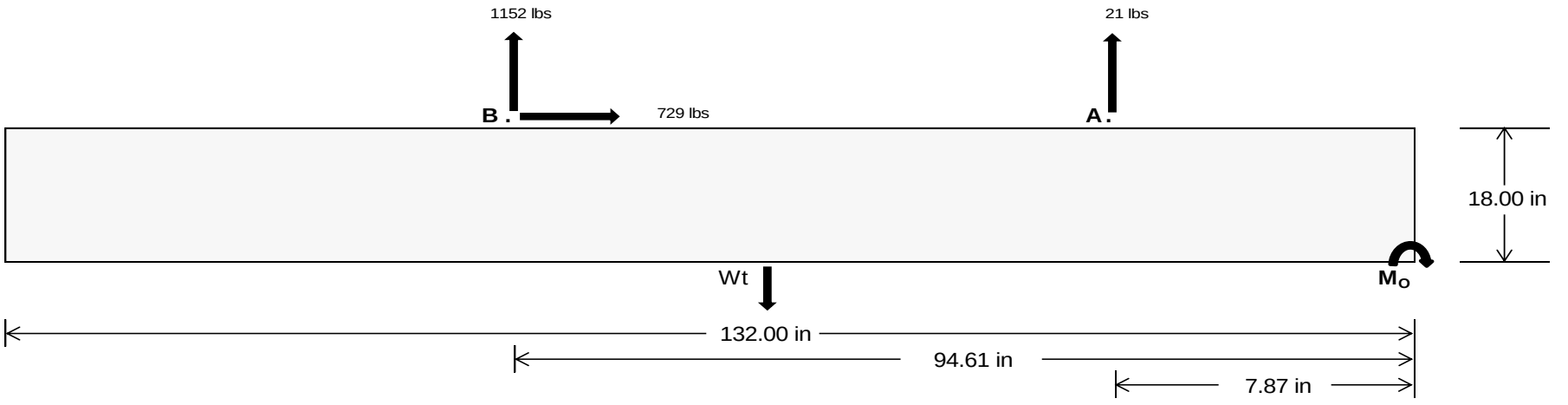
5.1 Helical Pile Foundations

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	=	115.94	5013.26	k
Compressive Load	=	3499.81	4270.44	k
Lateral Load	=	18.16	3161.07	k
Moment (Weak Axis)	=	0.04	0.00	k

5.2 Design of Ballast Foundations

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



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

Overturning Check		
M_O =	122264.4	in-lbs
Resisting Force Required =	1852.49	lbs
S.F. =	1.67	
Weight Required =	3087.48	lbs
Minimum Width =	25 in	in
Weight Provided =	4984.38	lbs

Sliding		
Force =	728.80	lbs
Friction =	0.4	
Weight Required =	1822.00	lbs
Resisting Weight =	4984.38	lbs
Additional Weight Required =	0	lbs

Cohesion		
Sliding Force =	728.80	lbs
Cohesion =	130	psf
Area =	22.92	ft^2
Resisting =	2492.19	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 (2) #5 rebar.

A minimum 132in long x 25in wide x 18in tall ballast foundation is required to resist overturning.

Use a 132in long x 25in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 132in long x 25in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	25 in	26 in	27 in	28 in
P_{ftg} = (145 pcf)(11 ft)(1.5 ft)(2.08 ft) =	4984 lbs	5184 lbs	5383 lbs	5583 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in	25 in	26 in	27 in	28 in
F_A	1347 lbs	1347 lbs	1347 lbs	1347 lbs	1068 lbs	1068 lbs	1068 lbs	1068 lbs	1669 lbs	1669 lbs	1669 lbs	1669 lbs	-43 lbs	-43 lbs	-43 lbs	-43 lbs
F_B	1286 lbs	1286 lbs	1286 lbs	1286 lbs	1742 lbs	1742 lbs	1742 lbs	1742 lbs	2135 lbs	2135 lbs	2135 lbs	2135 lbs	-2304 lbs	-2304 lbs	-2304 lbs	-2304 lbs
F_V	208 lbs	208 lbs	208 lbs	208 lbs	1340 lbs	1340 lbs	1340 lbs	1340 lbs	1141 lbs	1141 lbs	1141 lbs	1141 lbs	-1458 lbs	-1458 lbs	-1458 lbs	-1458 lbs
P_{total}	7617 lbs	7816 lbs	8016 lbs	8215 lbs	7794 lbs	7993 lbs	8193 lbs	8392 lbs	8788 lbs	8988 lbs	9187 lbs	9387 lbs	644 lbs	764 lbs	883 lbs	1003 lbs
M	3770 lbs-ft	3770 lbs-ft	3770 lbs-ft	3770 lbs-ft	3030 lbs-ft	3030 lbs-ft	3030 lbs-ft	3030 lbs-ft	4703 lbs-ft	4703 lbs-ft	4703 lbs-ft	4703 lbs-ft	3099 lbs-ft	3099 lbs-ft	3099 lbs-ft	3099 lbs-ft
e	0.49 ft	0.48 ft	0.47 ft	0.46 ft	0.39 ft	0.38 ft	0.37 ft	0.36 ft	0.54 ft	0.52 ft	0.51 ft	0.50 ft	4.81 ft	4.06 ft	3.51 ft	3.09 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}	242.6 psf	241.7 psf	240.8 psf	239.9 psf	268.0 psf	266.0 psf	264.3 psf	262.6 psf	271.6 psf	269.5 psf	267.6 psf	265.8 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	422.1 psf	414.2 psf	407.0 psf	400.2 psf	412.2 psf	404.7 psf	397.8 psf	391.3 psf	495.4 psf	484.7 psf	474.8 psf	465.6 psf	299.2 psf	162.9 psf	131.4 psf	118.9 psf

Maximum Bearing Pressure = 495 psf
Allowable Bearing Pressure = 1500 psf

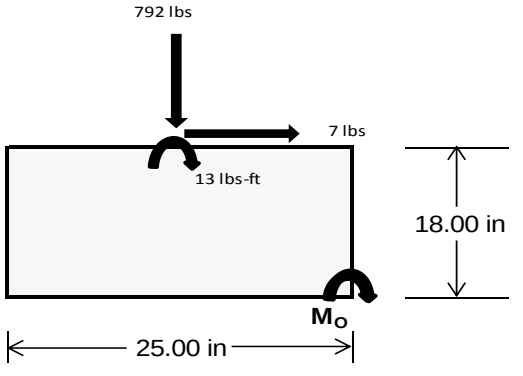
Use a 132in long x 25in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	800.9	ft-lbs
Resisting Force Required =	768.88	lbs
S.F. =	1.67	
Weight Required =	1281.47	lbs
Minimum Width =	25 in	in
Weight Provided =	4984.38	lbs

A minimum 132in long x 25in 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	25 in			25 in			25 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	269 lbs	687 lbs	269 lbs	792 lbs	2213 lbs	792 lbs	79 lbs	201 lbs	79 lbs
F_V	2 lbs	0 lbs	2 lbs	7 lbs	0 lbs	7 lbs	1 lbs	0 lbs	1 lbs
P_{total}	6440 lbs	4984 lbs	6440 lbs	6666 lbs	4984 lbs	6666 lbs	1883 lbs	4984 lbs	1883 lbs
M	7 lbs-ft	0 lbs-ft	7 lbs-ft	24 lbs-ft	0 lbs-ft	24 lbs-ft	2 lbs-ft	0 lbs-ft	2 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	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft	0.35 ft
f_{min}	280.1 psf	217.5 psf	280.1 psf	287.9 psf	217.5 psf	287.9 psf	81.9 psf	217.5 psf	81.9 psf
f_{max}	281.9 psf	217.5 psf	281.9 psf	293.9 psf	217.5 psf	293.9 psf	82.4 psf	217.5 psf	82.4 psf

Maximum Bearing Pressure = 294 psf
Allowable Bearing Pressure = 1500 psf

Use a 132in long x 25in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 132in long x 25in wide x 18in tall ballast foundation and fiber reinforcing with (2) #5 rebar.

5.3 Foundation Anchors

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

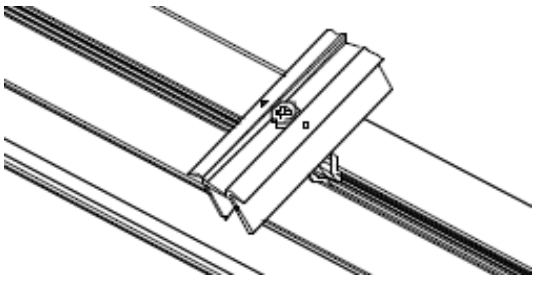
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

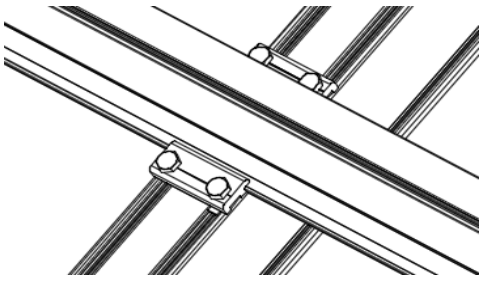
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.459 k
Allowable Uplift	=	1.214 k
Utilization	=	38%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	1.789 k
Allowable Uplift	=	4.357 k
Utilization	=	41%



6.2 Strut Connections

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

Front Strut

Maximum Axial Load	=	2.692 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	36%

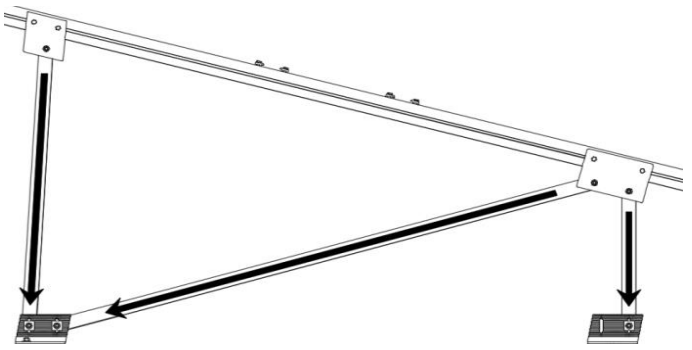
Rear Strut

Maximum Axial Load	=	3.337 k
M12 Bolt Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	45%

Diagonal Strut

Maximum Axial Load	=	2.047 k
M12 Bolt Shear Capacity	=	12.808 k
Strut Bearing Capacity	=	7.421 k
Utilization	=	28%

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



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

7. SEISMIC DESIGN

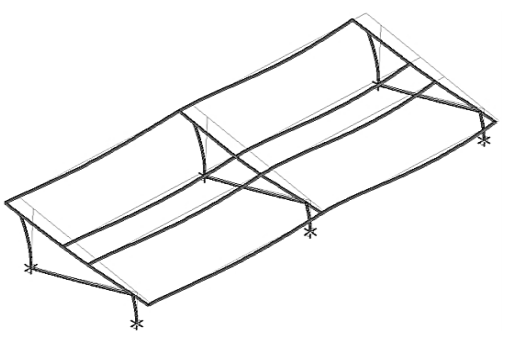
7.1 Seismic Drift - N/A

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

Mean Height, h_{sx}	=	48.27 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.965 in
Max Drift, Δ_{MAX}	=	0.081 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 = 132 in

J = 0.432

365.174

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

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= 27.1 ksi

3.4.16

b/t = 32.195

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 25.1 ksi

3.4.16.1 Not Used

Rb/t =

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 37.0588

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

S1 = 36.9

m = 0.65

C_0 = 40.985

Cc = 41.015

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

S2 = 77.2

φF_L= φb[Bbr-mDbr*h/t]

φF_L= 43.2 ksi

φF_LSt= 25.1 ksi

Ix = 897074 mm^4

2.155 in^4

y = 41.015 mm

Sx = 1.335 in^3

M_{max}St = 2.788 k-ft

Weak Axis:

3.4.14

L_b = 132

J = 0.432

232.229

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

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= 28.4

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 = 70.83 in
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.0 ksi

3.4.16

b/t = 24.5

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

S1 = 12.2

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

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

Weak Axis:

3.4.14

L_b = 70.83
J = 0.942
110.537

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

S1 = 0.51461

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

S2 = 1701.56
φF_L = φb[Bc-1.6Dc*√((LbSc)/(Cb*√(IyJ)/2))]
φF_L = 30.0

3.4.16

b/t = 24.5

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

S1 = 12.2

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

S2 = 46.7
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 = 1.63853

r = 0.81 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.80939

φF_L = (φccFcy)/(λ²)

φF_L = 10.5516 ksi

3.4.9

b/t = 24.5

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

b/t = 24.5

S1 = 12.21

S2 = 32.70

φF_L = φc[Bp-1.6Dp*b/t]

φF_L = 28.2 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi y Fcy$

φF_L = 33.25 ksi

φF_L = 10.55 ksi

A = 663.99 mm^2

1.03 in^2

P_{max} = 10.86 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-39.836	-39.836	0	0
2	M14	Y	-39.836	-39.836	0	0
3	M15	Y	-39.836	-39.836	0	0
4	M16	Y	-39.836	-39.836	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-60.928	-60.928	0	0
2	M14	y	-60.928	-60.928	0	0
3	M15	y	-98.014	-98.014	0	0
4	M16	y	-98.014	-98.014	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	137.749	137.749	0	0
2	M14	y	105.961	105.961	0	0
3	M15	y	58.278	58.278	0	0
4	M16	y	58.278	58.278	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												

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	599.861	2	995.079	2	.788	1	.003	1	0	1	0	1
2		min	-765.634	3	-1172.543	3	.043	15	0	15	0	1	0	1
3	N7	max	.044	9	1059.711	1	-.682	15	-.001	15	0	1	0	1
4		min	-.124	2	3.833	3	-13.971	1	-.028	1	0	1	0	1
5	N15	max	.035	9	2692.165	1	0	10	0	10	0	1	0	1
6		min	-1.448	2	-89.185	3	0	2	0	2	0	1	0	1
7	N16	max	2298.697	2	3284.953	2	0	14	0	14	0	1	0	1
8		min	-2431.593	3	-3856.355	3	0	9	0	1	0	1	0	1
9	N23	max	.044	9	1059.711	1	13.971	1	.028	1	0	1	0	1
10		min	-.124	2	3.833	3	.682	15	.001	15	0	1	0	1
11	N24	max	599.861	2	995.079	2	-.043	15	0	15	0	1	0	1
12		min	-765.634	3	-1172.543	3	-.788	1	-.003	1	0	1	0	1
13	Totals:	max	3496.724	2	9825.325	1	0	10						
14		min	-3962.926	3	-6282.961	3	0	1						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M13	1	max	136.622	1	392.302	1	-9.487	15	0	3	.327	1	0	1
2			min	6.488	15	-549.171	3	-200.382	1	-.011	2	.016	15	0	3
3		2	max	136.622	1	275.068	1	-7.303	15	0	3	.11	1	.572	3
4			min	6.488	15	-386.483	3	-154.193	1	-.011	2	.005	15	-.408	1
5		3	max	136.622	1	157.833	1	-5.12	15	0	3	-.001	12	.945	3
6			min	6.488	15	-223.795	3	-108.005	1	-.011	2	-.05	1	-.672	1
7		4	max	136.622	1	40.599	1	-2.936	15	0	3	-.007	12	1.119	3
8			min	6.488	15	-61.107	3	-61.817	1	-.011	2	-.154	1	-.794	1
9		5	max	136.622	1	101.581	3	-.753	15	0	3	-.009	12	1.094	3
10			min	6.488	15	-76.635	1	-15.628	1	-.011	2	-.201	1	-.772	1
11		6	max	136.622	1	264.268	3	30.56	1	0	3	-.009	15	.871	3
12			min	6.488	15	-193.87	1	.977	12	-.011	2	-.192	1	-.606	1
13		7	max	136.622	1	426.956	3	76.749	1	0	3	-.006	15	.448	3
14			min	6.488	15	-311.104	1	3.16	12	-.011	2	-.126	1	-.298	1
15		8	max	136.622	1	589.644	3	122.937	1	0	3	0	10	.154	1
16			min	6.488	15	-428.338	1	5.343	12	-.011	2	-.004	1	-.173	3
17		9	max	136.622	1	752.332	3	169.125	1	0	3	.174	1	.749	1
18			min	6.488	15	-545.573	1	7.526	12	-.011	2	.006	12	-.993	3
19		10	max	136.622	1	915.02	3	215.314	1	.011	2	.409	1	1.488	1
20			min	6.488	15	-662.807	1	9.71	12	0	3	.017	12	-2.012	3
21		11	max	136.622	1	545.573	1	-7.526	12	.011	2	.174	1	.749	1
22			min	6.488	15	-752.332	3	-169.125	1	0	3	.006	12	-.993	3
23		12	max	136.622	1	428.338	1	-5.343	12	.011	2	0	10	.154	1
24			min	6.488	15	-589.644	3	-122.937	1	0	3	-.004	1	-.173	3
25		13	max	136.622	1	311.104	1	-3.16	12	.011	2	-.006	15	.448	3
26			min	6.488	15	-426.956	3	-76.749	1	0	3	-.126	1	-.298	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	136.622	1	193.87	1	-.977	12	.011	2	-.009	15	.871	3
28			min	6.488	15	-264.268	3	-30.56	1	0	3	-.192	1	-.606	1
29		15	max	136.622	1	76.635	1	15.628	1	.011	2	-.009	12	1.094	3
30			min	6.488	15	-101.581	3	.753	15	0	3	-.201	1	-.772	1
31		16	max	136.622	1	61.107	3	61.817	1	.011	2	-.007	12	1.119	3
32			min	6.488	15	-40.599	1	2.936	15	0	3	-.154	1	-.794	1
33		17	max	136.622	1	223.795	3	108.005	1	.011	2	-.001	12	.945	3
34			min	6.488	15	-157.833	1	5.12	15	0	3	-.05	1	-.672	1
35		18	max	136.622	1	386.483	3	154.193	1	.011	2	.11	1	.572	3
36			min	6.488	15	-275.068	1	7.303	15	0	3	.005	15	-.408	1
37		19	max	136.622	1	549.171	3	200.382	1	.011	2	.327	1	0	1
38			min	6.488	15	-392.302	1	9.487	15	0	3	.016	15	0	3
39	M14	1	max	59.818	1	410.46	1	-9.758	15	.006	3	.369	1	0	1
40			min	2.847	15	-427.719	3	-206.123	1	-.008	2	.018	15	0	3
41		2	max	59.818	1	293.225	1	-7.574	15	.006	3	.145	1	.447	3
42			min	2.847	15	-303.883	3	-159.934	1	-.008	2	.007	15	-.43	1
43		3	max	59.818	1	175.991	1	-5.391	15	.006	3	0	3	.743	3
44			min	2.847	15	-180.047	3	-113.746	1	-.008	2	-.022	1	-.717	1
45		4	max	59.818	1	58.756	1	-3.207	15	.006	3	-.005	12	.887	3
46			min	2.847	15	-56.211	3	-67.557	1	-.008	2	-.133	1	-.86	1
47		5	max	59.818	1	67.625	3	-1.024	15	.006	3	-.009	12	.88	3
48			min	2.847	15	-58.478	1	-21.369	1	-.008	2	-.187	1	-.86	1
49		6	max	59.818	1	191.46	3	24.819	1	.006	3	-.009	15	.722	3
50			min	2.847	15	-175.712	1	.715	12	-.008	2	-.185	1	-.717	1
51		7	max	59.818	1	315.296	3	71.008	1	.006	3	-.006	15	.412	3
52			min	2.847	15	-292.947	1	2.899	12	-.008	2	-.126	1	-.431	1
53		8	max	59.818	1	439.132	3	117.196	1	.006	3	0	10	.004	9
54			min	2.847	15	-410.181	1	5.082	12	-.008	2	-.011	1	-.049	3
55		9	max	59.818	1	562.968	3	163.384	1	.006	3	.16	1	.572	1
56			min	2.847	15	-527.415	1	7.265	12	-.008	2	.006	12	-.661	3
57		10	max	59.818	1	686.804	3	209.573	1	.008	2	.388	1	1.288	1
58			min	2.847	15	-644.65	1	9.448	12	-.006	3	.016	12	-1.425	3
59		11	max	59.818	1	527.415	1	-7.265	12	.008	2	.16	1	.572	1
60			min	2.847	15	-562.968	3	-163.384	1	-.006	3	.006	12	-.661	3
61		12	max	59.818	1	410.181	1	-5.082	12	.008	2	0	10	.004	9
62			min	2.847	15	-439.132	3	-117.196	1	-.006	3	-.011	1	-.049	3
63		13	max	59.818	1	292.947	1	-2.899	12	.008	2	-.006	15	.412	3
64			min	2.847	15	-315.296	3	-71.008	1	-.006	3	-.126	1	-.431	1
65		14	max	59.818	1	175.712	1	-.715	12	.008	2	-.009	15	.722	3
66			min	2.847	15	-191.46	3	-24.819	1	-.006	3	-.185	1	-.717	1
67		15	max	59.818	1	58.478	1	21.369	1	.008	2	-.009	12	.88	3
68			min	2.847	15	-67.625	3	1.024	15	-.006	3	-.187	1	-.86	1
69		16	max	59.818	1	56.211	3	67.557	1	.008	2	-.005	12	.887	3
70			min	2.847	15	-58.756	1	3.207	15	-.006	3	-.133	1	-.86	1
71		17	max	59.818	1	180.047	3	113.746	1	.008	2	0	3	.743	3
72			min	2.847	15	-175.991	1	5.391	15	-.006	3	-.022	1	-.717	1
73		18	max	59.818	1	303.883	3	159.934	1	.008	2	.145	1	.447	3
74			min	2.847	15	-293.225	1	7.574	15	-.006	3	.007	15	-.43	1
75		19	max	59.818	1	427.719	3	206.123	1	.008	2	.369	1	0	1
76			min	2.847	15	-410.46	1	9.758	15	-.006	3	.018	15	0	3
77	M15	1	max	-3.005	15	532.64	2	-9.755	15	.009	2	.369	1	0	2
78			min	-63.143	1	-231.135	3	-206.087	1	-.005	3	.017	15	0	12
79		2	max	-3.005	15	379.226	2	-7.572	15	.009	2	.145	1	.242	3
80			min	-63.143	1	-165.578	3	-159.898	1	-.005	3	.007	15	-.557	2
81		3	max	-3.005	15	225.812	2	-5.388	15	.009	2	0	3	.405	3
82			min	-63.143	1	-100.021	3	-113.71	1	-.005	3	-.022	1	-.927	2
83		4	max	-3.005	15	72.398	2	-3.205	15	.009	2	-.006	12	.487	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	-63.143	1	-34.465	3	-67.522	1	-.005	3	-.133	1	-1.109	2
85		5	max	-3.005	15	31.092	3	-1.021	15	.009	2	-.009	12	.489	3
86			min	-63.143	1	-81.016	2	-21.333	1	-.005	3	-.187	1	-1.104	2
87		6	max	-3.005	15	96.648	3	24.855	1	.009	2	-.009	15	.411	3
88			min	-63.143	1	-234.43	2	.752	12	-.005	3	-.185	1	-.911	2
89		7	max	-3.005	15	162.205	3	71.044	1	.009	2	-.006	15	.253	3
90			min	-63.143	1	-387.844	2	2.935	12	-.005	3	-.127	1	-.531	2
91		8	max	-3.005	15	227.761	3	117.232	1	.009	2	0	15	.037	2
92			min	-63.143	1	-541.259	2	5.119	12	-.005	3	-.011	1	0	15
93		9	max	-3.005	15	293.318	3	163.42	1	.009	2	.16	1	.792	2
94			min	-63.143	1	-694.673	2	7.302	12	-.005	3	.006	12	-.304	3
95		10	max	-3.005	15	358.875	3	209.609	1	.005	3	.388	1	1.735	2
96			min	-63.143	1	-848.087	2	9.485	12	-.009	2	.016	12	-.703	3
97		11	max	-3.005	15	694.673	2	-7.302	12	.005	3	.16	1	.792	2
98			min	-63.143	1	-293.318	3	-163.42	1	-.009	2	.006	12	-.304	3
99		12	max	-3.005	15	541.259	2	-5.119	12	.005	3	0	15	.037	2
100			min	-63.143	1	-227.761	3	-117.232	1	-.009	2	-.011	1	0	15
101		13	max	-3.005	15	387.844	2	-2.935	12	.005	3	-.006	15	.253	3
102			min	-63.143	1	-162.205	3	-71.044	1	-.009	2	-.127	1	-.531	2
103		14	max	-3.005	15	234.43	2	-.752	12	.005	3	-.009	15	.411	3
104			min	-63.143	1	-96.648	3	-24.855	1	-.009	2	-.185	1	-.911	2
105		15	max	-3.005	15	81.016	2	21.333	1	.005	3	-.009	12	.489	3
106			min	-63.143	1	-31.092	3	1.021	15	-.009	2	-.187	1	-1.104	2
107		16	max	-3.005	15	34.465	3	67.522	1	.005	3	-.006	12	.487	3
108			min	-63.143	1	-72.398	2	3.205	15	-.009	2	-.133	1	-1.109	2
109		17	max	-3.005	15	100.021	3	113.71	1	.005	3	0	3	.405	3
110			min	-63.143	1	-225.812	2	5.388	15	-.009	2	-.022	1	-.927	2
111		18	max	-3.005	15	165.578	3	159.898	1	.005	3	.145	1	.242	3
112			min	-63.143	1	-379.226	2	7.572	15	-.009	2	.007	15	-.557	2
113		19	max	-3.005	15	231.135	3	206.087	1	.005	3	.369	1	0	2
114			min	-63.143	1	-532.64	2	9.755	15	-.009	2	.017	15	0	12
115	M16	1	max	-6.969	15	514.84	2	-9.495	15	.009	1	.328	1	0	2
116			min	-146.479	1	-218.531	3	-200.612	1	-.008	3	.016	15	0	3
117		2	max	-6.969	15	361.426	2	-7.311	15	.009	1	.111	1	.227	3
118			min	-146.479	1	-152.974	3	-154.423	1	-.008	3	.005	15	-.535	2
119		3	max	-6.969	15	208.012	2	-5.128	15	.009	1	-.001	12	.374	3
120			min	-146.479	1	-87.417	3	-108.235	1	-.008	3	-.049	1	-.883	2
121		4	max	-6.969	15	54.597	2	-2.944	15	.009	1	-.007	12	.441	3
122			min	-146.479	1	-21.861	3	-62.047	1	-.008	3	-.153	1	-1.044	2
123		5	max	-6.969	15	43.696	3	-.761	15	.009	1	-.009	12	.427	3
124			min	-146.479	1	-98.817	2	-15.858	1	-.008	3	-.201	1	-1.017	2
125		6	max	-6.969	15	109.252	3	30.33	1	.009	1	-.009	15	.334	3
126			min	-146.479	1	-252.231	2	1.094	12	-.008	3	-.192	1	-.802	2
127		7	max	-6.969	15	174.809	3	76.518	1	.009	1	-.006	15	.16	3
128			min	-146.479	1	-405.645	2	3.277	12	-.008	3	-.127	1	-.4	2
129		8	max	-6.969	15	240.365	3	122.707	1	.009	1	0	10	.189	2
130			min	-146.479	1	-559.059	2	5.46	12	-.008	3	-.005	1	-.093	3
131		9	max	-6.969	15	305.922	3	168.895	1	.009	1	.173	1	.966	2
132			min	-146.479	1	-712.473	2	7.643	12	-.008	3	.007	12	-.427	3
133		10	max	-6.969	15	371.479	3	215.084	1	.008	3	.408	1	1.931	2
134			min	-146.479	1	-865.887	2	9.826	12	-.009	1	.017	12	-.841	3
135		11	max	-6.969	15	712.473	2	-7.643	12	.008	3	.173	1	.966	2
136			min	-146.479	1	-305.922	3	-168.895	1	-.009	1	.007	12	-.427	3
137		12	max	-6.969	15	559.059	2	-5.46	12	.008	3	0	10	.189	2
138			min	-146.479	1	-240.365	3	-122.707	1	-.009	1	-.005	1	-.093	3
139		13	max	-6.969	15	405.645	2	-3.277	12	.008	3	-.006	15	.16	3
140			min	-146.479	1	-174.809	3	-76.518	1	-.009	1	-.127	1	-.4	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
141		14	max	-6.969	15	252.231	2	-1.094	12	.008	3	-.009	15	.334	3
142			min	-146.479	1	-109.252	3	-30.33	1	-.009	1	-.192	1	-.802	2
143		15	max	-6.969	15	98.817	2	15.858	1	.008	3	-.009	12	.427	3
144			min	-146.479	1	-43.696	3	.761	15	-.009	1	-.201	1	-1.017	2
145		16	max	-6.969	15	21.861	3	62.047	1	.008	3	-.007	12	.441	3
146			min	-146.479	1	-54.597	2	2.944	15	-.009	1	-.153	1	-1.044	2
147		17	max	-6.969	15	87.417	3	108.235	1	.008	3	-.001	12	.374	3
148			min	-146.479	1	-208.012	2	5.128	15	-.009	1	-.049	1	-.883	2
149		18	max	-6.969	15	152.974	3	154.423	1	.008	3	.111	1	.227	3
150			min	-146.479	1	-361.426	2	7.311	15	-.009	1	.005	15	-.535	2
151		19	max	-6.969	15	218.531	3	200.612	1	.008	3	.328	1	0	2
152			min	-146.479	1	-514.84	2	9.495	15	-.009	1	.016	15	0	3
153	M2	1	max	898.513	1	1.928	4	.629	1	0	5	0	3	0	1
154			min	-1014.41	3	.454	15	.03	15	0	1	0	1	0	1
155		2	max	898.989	1	1.842	4	.629	1	0	5	0	1	0	15
156			min	-1014.054	3	.434	15	.03	15	0	1	0	15	0	4
157		3	max	899.465	1	1.757	4	.629	1	0	5	0	1	0	15
158			min	-1013.697	3	.414	15	.03	15	0	1	0	15	-.001	4
159		4	max	899.941	1	1.671	4	.629	1	0	5	0	1	0	15
160			min	-1013.34	3	.393	15	.03	15	0	1	0	15	-.002	4
161		5	max	900.416	1	1.586	4	.629	1	0	5	0	1	0	15
162			min	-1012.983	3	.373	15	.03	15	0	1	0	15	-.002	4
163		6	max	900.892	1	1.5	4	.629	1	0	5	.001	1	0	15
164			min	-1012.626	3	.353	15	.03	15	0	1	0	15	-.003	4
165		7	max	901.368	1	1.414	4	.629	1	0	5	.001	1	0	15
166			min	-1012.27	3	.333	15	.03	15	0	1	0	15	-.003	4
167		8	max	901.844	1	1.329	4	.629	1	0	5	.001	1	0	15
168			min	-1011.913	3	.313	15	.03	15	0	1	0	15	-.004	4
169		9	max	902.319	1	1.243	4	.629	1	0	5	.002	1	0	15
170			min	-1011.556	3	.293	15	.03	15	0	1	0	15	-.004	4
171		10	max	902.795	1	1.158	4	.629	1	0	5	.002	1	-.001	15
172			min	-1011.199	3	.273	15	.03	15	0	1	0	15	-.004	4
173		11	max	903.271	1	1.072	4	.629	1	0	5	.002	1	-.001	15
174			min	-1010.842	3	.253	15	.03	15	0	1	0	15	-.005	4
175		12	max	903.747	1	.986	4	.629	1	0	5	.002	1	-.001	15
176			min	-1010.486	3	.232	15	.03	15	0	1	0	15	-.005	4
177		13	max	904.222	1	.901	4	.629	1	0	5	.002	1	-.001	15
178			min	-1010.129	3	.212	15	.03	15	0	1	0	15	-.005	4
179		14	max	904.698	1	.815	4	.629	1	0	5	.003	1	-.001	15
180			min	-1009.772	3	.179	12	.03	15	0	1	0	15	-.006	4
181		15	max	905.174	1	.737	2	.629	1	0	5	.003	1	-.001	15
182			min	-1009.415	3	.146	12	.03	15	0	1	0	15	-.006	4
183		16	max	905.65	1	.671	2	.629	1	0	5	.003	1	-.001	15
184			min	-1009.058	3	.113	12	.03	15	0	1	0	15	-.006	4
185		17	max	906.125	1	.604	2	.629	1	0	5	.003	1	-.002	15
186			min	-1008.701	3	.079	12	.03	15	0	1	0	15	-.006	4
187		18	max	906.601	1	.537	2	.629	1	0	5	.003	1	-.002	15
188			min	-1008.345	3	.046	3	.03	15	0	1	0	15	-.007	4
189		19	max	907.077	1	.47	2	.629	1	0	5	.004	1	-.002	15
190			min	-1007.988	3	-.004	3	.03	15	0	1	0	15	-.007	4
191	M3	1	max	501.131	2	7.778	4	.289	1	0	12	0	1	.007	4
192			min	-649.373	3	1.829	15	.014	15	0	1	0	15	.002	15
193		2	max	500.961	2	7.013	4	.289	1	0	12	0	1	.004	2
194			min	-649.501	3	1.649	15	.014	15	0	1	0	15	0	12
195		3	max	500.79	2	6.249	4	.289	1	0	12	0	1	.002	2
196			min	-649.628	3	1.469	15	.014	15	0	1	0	15	0	3
197		4	max	500.62	2	5.484	4	.289	1	0	12	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
198			min	-649.756	3	1.29	15	.014	15	0	1	0	15	-.002	3
199		5	max	500.45	2	4.72	4	.289	1	0	12	.001	1	0	15
200			min	-649.884	3	1.11	15	.014	15	0	1	0	15	-.004	4
201		6	max	500.279	2	3.955	4	.289	1	0	12	.001	1	-.001	15
202			min	-650.012	3	.93	15	.014	15	0	1	0	15	-.006	4
203		7	max	500.109	2	3.191	4	.289	1	0	12	.001	1	-.002	15
204			min	-650.139	3	.751	15	.014	15	0	1	0	15	-.007	4
205		8	max	499.939	2	2.427	4	.289	1	0	12	.001	1	-.002	15
206			min	-650.267	3	.571	15	.014	15	0	1	0	15	-.008	4
207		9	max	499.768	2	1.662	4	.289	1	0	12	.001	1	-.002	15
208			min	-650.395	3	.391	15	.014	15	0	1	0	15	-.009	4
209		10	max	499.598	2	.898	4	.289	1	0	12	.002	1	-.002	15
210			min	-650.523	3	.211	15	.014	15	0	1	0	15	-.01	4
211		11	max	499.428	2	.235	2	.289	1	0	12	.002	1	-.002	15
212			min	-650.65	3	-.101	3	.014	15	0	1	0	15	-.01	4
213		12	max	499.257	2	-.148	15	.289	1	0	12	.002	1	-.002	15
214			min	-650.778	3	-.631	4	.014	15	0	1	0	15	-.01	4
215		13	max	499.087	2	-.328	15	.289	1	0	12	.002	1	-.002	15
216			min	-650.906	3	-1.396	4	.014	15	0	1	0	15	-.009	4
217		14	max	498.917	2	-.507	15	.289	1	0	12	.002	1	-.002	15
218			min	-651.034	3	-2.16	4	.014	15	0	1	0	15	-.009	4
219		15	max	498.746	2	-.687	15	.289	1	0	12	.002	1	-.002	15
220			min	-651.161	3	-2.925	4	.014	15	0	1	0	15	-.007	4
221		16	max	498.576	2	-.867	15	.289	1	0	12	.002	1	-.001	15
222			min	-651.289	3	-3.689	4	.014	15	0	1	0	15	-.006	4
223		17	max	498.406	2	-1.046	15	.289	1	0	12	.002	1	-.001	15
224			min	-651.417	3	-4.453	4	.014	15	0	1	0	15	-.004	4
225		18	max	498.235	2	-1.226	15	.289	1	0	12	.003	1	0	15
226			min	-651.545	3	-5.218	4	.014	15	0	1	0	15	-.002	4
227		19	max	498.065	2	-1.406	15	.289	1	0	12	.003	1	0	1
228			min	-651.673	3	-5.982	4	.014	15	0	1	0	15	0	1
229	M4	1	max	1056.644	1	0	1	-.682	15	0	1	.002	1	0	1
230			min	1.533	3	0	1	-14.398	1	0	1	0	15	0	1
231		2	max	1056.815	1	0	1	-.682	15	0	1	0	1	0	1
232			min	1.661	3	0	1	-14.398	1	0	1	0	15	0	1
233		3	max	1056.985	1	0	1	-.682	15	0	1	0	12	0	1
234			min	1.788	3	0	1	-14.398	1	0	1	-.001	1	0	1
235		4	max	1057.155	1	0	1	-.682	15	0	1	0	15	0	1
236			min	1.916	3	0	1	-14.398	1	0	1	-.003	1	0	1
237		5	max	1057.326	1	0	1	-.682	15	0	1	0	15	0	1
238			min	2.044	3	0	1	-14.398	1	0	1	-.004	1	0	1
239		6	max	1057.496	1	0	1	-.682	15	0	1	0	15	0	1
240			min	2.172	3	0	1	-14.398	1	0	1	-.006	1	0	1
241		7	max	1057.666	1	0	1	-.682	15	0	1	0	15	0	1
242			min	2.3	3	0	1	-14.398	1	0	1	-.008	1	0	1
243		8	max	1057.837	1	0	1	-.682	15	0	1	0	15	0	1
244			min	2.427	3	0	1	-14.398	1	0	1	-.009	1	0	1
245		9	max	1058.007	1	0	1	-.682	15	0	1	0	15	0	1
246			min	2.555	3	0	1	-14.398	1	0	1	-.011	1	0	1
247		10	max	1058.177	1	0	1	-.682	15	0	1	0	15	0	1
248			min	2.683	3	0	1	-14.398	1	0	1	-.013	1	0	1
249		11	max	1058.348	1	0	1	-.682	15	0	1	0	15	0	1
250			min	2.811	3	0	1	-14.398	1	0	1	-.014	1	0	1
251		12	max	1058.518	1	0	1	-.682	15	0	1	0	15	0	1
252			min	2.938	3	0	1	-14.398	1	0	1	-.016	1	0	1
253		13	max	1058.689	1	0	1	-.682	15	0	1	0	15	0	1
254			min	3.066	3	0	1	-14.398	1	0	1	-.018	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	1058.859	1	0	1	-.682	15	0	1	0	15	0	1
256			min	3.194	3	0	1	-14.398	1	0	1	-.019	1	0	1
257		15	max	1059.029	1	0	1	-.682	15	0	1	0	15	0	1
258			min	3.322	3	0	1	-14.398	1	0	1	-.021	1	0	1
259		16	max	1059.2	1	0	1	-.682	15	0	1	-.001	15	0	1
260			min	3.449	3	0	1	-14.398	1	0	1	-.023	1	0	1
261		17	max	1059.37	1	0	1	-.682	15	0	1	-.001	15	0	1
262			min	3.577	3	0	1	-14.398	1	0	1	-.024	1	0	1
263		18	max	1059.54	1	0	1	-.682	15	0	1	-.001	15	0	1
264			min	3.705	3	0	1	-14.398	1	0	1	-.026	1	0	1
265		19	max	1059.711	1	0	1	-.682	15	0	1	-.001	15	0	1
266			min	3.833	3	0	1	-14.398	1	0	1	-.028	1	0	1
267	M6	1	max	2905.381	1	2.124	2	0	1	0	1	0	1	0	1
268			min	-3336.998	3	.304	12	0	1	0	1	0	1	0	1
269		2	max	2905.857	1	2.058	2	0	1	0	1	0	1	0	12
270			min	-3336.641	3	.271	12	0	1	0	1	0	1	0	2
271		3	max	2906.332	1	1.991	2	0	1	0	1	0	1	0	12
272			min	-3336.284	3	.237	12	0	1	0	1	0	1	-.001	2
273		4	max	2906.808	1	1.924	2	0	1	0	1	0	1	0	12
274			min	-3335.928	3	.204	12	0	1	0	1	0	1	-.002	2
275		5	max	2907.284	1	1.858	2	0	1	0	1	0	1	0	12
276			min	-3335.571	3	.171	12	0	1	0	1	0	1	-.003	2
277		6	max	2907.76	1	1.791	2	0	1	0	1	0	1	0	12
278			min	-3335.214	3	.13	3	0	1	0	1	0	1	-.003	2
279		7	max	2908.235	1	1.724	2	0	1	0	1	0	1	0	12
280			min	-3334.857	3	.08	3	0	1	0	1	0	1	-.004	2
281		8	max	2908.711	1	1.658	2	0	1	0	1	0	1	0	12
282			min	-3334.5	3	.03	3	0	1	0	1	0	1	-.004	2
283		9	max	2909.187	1	1.591	2	0	1	0	1	0	1	0	12
284			min	-3334.144	3	-.02	3	0	1	0	1	0	1	-.005	2
285		10	max	2909.663	1	1.524	2	0	1	0	1	0	1	0	12
286			min	-3333.787	3	-.07	3	0	1	0	1	0	1	-.005	2
287		11	max	2910.138	1	1.458	2	0	1	0	1	0	1	0	3
288			min	-3333.43	3	-.12	3	0	1	0	1	0	1	-.006	2
289		12	max	2910.614	1	1.391	2	0	1	0	1	0	1	0	3
290			min	-3333.073	3	-.17	3	0	1	0	1	0	1	-.006	2
291		13	max	2911.09	1	1.324	2	0	1	0	1	0	1	0	3
292			min	-3332.716	3	-.22	3	0	1	0	1	0	1	-.007	2
293		14	max	2911.566	1	1.258	2	0	1	0	1	0	1	0	3
294			min	-3332.359	3	-.27	3	0	1	0	1	0	1	-.007	2
295		15	max	2912.041	1	1.191	2	0	1	0	1	0	1	0	3
296			min	-3332.003	3	-.32	3	0	1	0	1	0	1	-.008	2
297		16	max	2912.517	1	1.124	2	0	1	0	1	0	1	0	3
298			min	-3331.646	3	-.37	3	0	1	0	1	0	1	-.008	2
299		17	max	2912.993	1	1.057	2	0	1	0	1	0	1	0	3
300			min	-3331.289	3	-.42	3	0	1	0	1	0	1	-.008	2
301		18	max	2913.469	1	.991	2	0	1	0	1	0	1	0	3
302			min	-3330.932	3	-.47	3	0	1	0	1	0	1	-.009	2
303		19	max	2913.944	1	.924	2	0	1	0	1	0	1	0	3
304			min	-3330.575	3	-.52	3	0	1	0	1	0	1	-.009	2
305	M7	1	max	1994.642	2	7.814	4	0	1	0	1	0	1	.009	2
306			min	-2044.86	3	1.834	15	0	1	0	1	0	1	0	3
307		2	max	1994.472	2	7.049	4	0	1	0	1	0	1	.006	2
308			min	-2044.988	3	1.655	15	0	1	0	1	0	1	-.002	3
309		3	max	1994.301	2	6.285	4	0	1	0	1	0	1	.004	2
310			min	-2045.116	3	1.475	15	0	1	0	1	0	1	-.003	3
311		4	max	1994.131	2	5.521	4	0	1	0	1	0	1	.002	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
312			min	-2045.243	3	1.295	15	0	1	0	1	0	1	-.005	3
313		5	max	1993.961	2	4.756	4	0	1	0	1	0	1	0	2
314			min	-2045.371	3	1.116	15	0	1	0	1	0	1	-.006	3
315		6	max	1993.79	2	3.992	4	0	1	0	1	0	1	-.001	15
316			min	-2045.499	3	.936	15	0	1	0	1	0	1	-.006	3
317		7	max	1993.62	2	3.227	4	0	1	0	1	0	1	-.002	15
318			min	-2045.627	3	.756	15	0	1	0	1	0	1	-.007	3
319		8	max	1993.45	2	2.463	4	0	1	0	1	0	1	-.002	15
320			min	-2045.754	3	.576	15	0	1	0	1	0	1	-.008	4
321		9	max	1993.279	2	1.778	2	0	1	0	1	0	1	-.002	15
322			min	-2045.882	3	.301	12	0	1	0	1	0	1	-.009	4
323		10	max	1993.109	2	1.182	2	0	1	0	1	0	1	-.002	15
324			min	-2046.01	3	-.054	3	0	1	0	1	0	1	-.009	4
325		11	max	1992.939	2	.586	2	0	1	0	1	0	1	-.002	15
326			min	-2046.138	3	-.501	3	0	1	0	1	0	1	-.01	4
327		12	max	1992.768	2	-.009	2	0	1	0	1	0	1	-.002	15
328			min	-2046.265	3	-.948	3	0	1	0	1	0	1	-.01	4
329		13	max	1992.598	2	-.322	15	0	1	0	1	0	1	-.002	15
330			min	-2046.393	3	-1.395	3	0	1	0	1	0	1	-.009	4
331		14	max	1992.428	2	-.502	15	0	1	0	1	0	1	-.002	15
332			min	-2046.521	3	-2.124	4	0	1	0	1	0	1	-.008	4
333		15	max	1992.257	2	-.681	15	0	1	0	1	0	1	-.002	15
334			min	-2046.649	3	-2.888	4	0	1	0	1	0	1	-.007	4
335		16	max	1992.087	2	-.861	15	0	1	0	1	0	1	-.001	15
336			min	-2046.776	3	-3.653	4	0	1	0	1	0	1	-.006	4
337		17	max	1991.917	2	-1.041	15	0	1	0	1	0	1	-.001	15
338			min	-2046.904	3	-4.417	4	0	1	0	1	0	1	-.004	4
339		18	max	1991.746	2	-1.22	15	0	1	0	1	0	1	0	15
340			min	-2047.032	3	-5.182	4	0	1	0	1	0	1	-.002	4
341		19	max	1991.576	2	-1.4	15	0	1	0	1	0	1	0	1
342			min	-2047.16	3	-5.946	4	0	1	0	1	0	1	0	1
343	M8	1	max	2689.099	1	0	1	0	1	0	1	0	1	0	1
344			min	-91.484	3	0	1	0	1	0	1	0	1	0	1
345		2	max	2689.269	1	0	1	0	1	0	1	0	1	0	1
346			min	-91.357	3	0	1	0	1	0	1	0	1	0	1
347		3	max	2689.44	1	0	1	0	1	0	1	0	1	0	1
348			min	-91.229	3	0	1	0	1	0	1	0	1	0	1
349		4	max	2689.61	1	0	1	0	1	0	1	0	1	0	1
350			min	-91.101	3	0	1	0	1	0	1	0	1	0	1
351		5	max	2689.78	1	0	1	0	1	0	1	0	1	0	1
352			min	-90.973	3	0	1	0	1	0	1	0	1	0	1
353		6	max	2689.951	1	0	1	0	1	0	1	0	1	0	1
354			min	-90.846	3	0	1	0	1	0	1	0	1	0	1
355		7	max	2690.121	1	0	1	0	1	0	1	0	1	0	1
356			min	-90.718	3	0	1	0	1	0	1	0	1	0	1
357		8	max	2690.292	1	0	1	0	1	0	1	0	1	0	1
358			min	-90.59	3	0	1	0	1	0	1	0	1	0	1
359		9	max	2690.462	1	0	1	0	1	0	1	0	1	0	1
360			min	-90.462	3	0	1	0	1	0	1	0	1	0	1
361		10	max	2690.632	1	0	1	0	1	0	1	0	1	0	1
362			min	-90.335	3	0	1	0	1	0	1	0	1	0	1
363		11	max	2690.803	1	0	1	0	1	0	1	0	1	0	1
364			min	-90.207	3	0	1	0	1	0	1	0	1	0	1
365		12	max	2690.973	1	0	1	0	1	0	1	0	1	0	1
366			min	-90.079	3	0	1	0	1	0	1	0	1	0	1
367		13	max	2691.143	1	0	1	0	1	0	1	0	1	0	1
368			min	-89.951	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	2691.314	1	0	1	0	1	0	1	0	1	0	1
370			min	-89.824	3	0	1	0	1	0	1	0	1	0	1
371		15	max	2691.484	1	0	1	0	1	0	1	0	1	0	1
372			min	-89.696	3	0	1	0	1	0	1	0	1	0	1
373		16	max	2691.654	1	0	1	0	1	0	1	0	1	0	1
374			min	-89.568	3	0	1	0	1	0	1	0	1	0	1
375		17	max	2691.825	1	0	1	0	1	0	1	0	1	0	1
376			min	-89.44	3	0	1	0	1	0	1	0	1	0	1
377		18	max	2691.995	1	0	1	0	1	0	1	0	1	0	1
378			min	-89.313	3	0	1	0	1	0	1	0	1	0	1
379		19	max	2692.165	1	0	1	0	1	0	1	0	1	0	1
380			min	-89.185	3	0	1	0	1	0	1	0	1	0	1
381	M10	1	max	898.513	1	1.928	4	-.03	15	0	1	0	1	0	1
382			min	-1014.41	3	.454	15	-.629	1	0	5	0	3	0	1
383		2	max	898.989	1	1.842	4	-.03	15	0	1	0	15	0	15
384			min	-1014.054	3	.434	15	-.629	1	0	5	0	1	0	4
385		3	max	899.465	1	1.757	4	-.03	15	0	1	0	15	0	15
386			min	-1013.697	3	.414	15	-.629	1	0	5	0	1	-.001	4
387		4	max	899.941	1	1.671	4	-.03	15	0	1	0	15	0	15
388			min	-1013.34	3	.393	15	-.629	1	0	5	0	1	-.002	4
389		5	max	900.416	1	1.586	4	-.03	15	0	1	0	15	0	15
390			min	-1012.983	3	.373	15	-.629	1	0	5	0	1	-.002	4
391		6	max	900.892	1	1.5	4	-.03	15	0	1	0	15	0	15
392			min	-1012.626	3	.353	15	-.629	1	0	5	-.001	1	-.003	4
393		7	max	901.368	1	1.414	4	-.03	15	0	1	0	15	0	15
394			min	-1012.27	3	.333	15	-.629	1	0	5	-.001	1	-.003	4
395		8	max	901.844	1	1.329	4	-.03	15	0	1	0	15	0	15
396			min	-1011.913	3	.313	15	-.629	1	0	5	-.001	1	-.004	4
397		9	max	902.319	1	1.243	4	-.03	15	0	1	0	15	0	15
398			min	-1011.556	3	.293	15	-.629	1	0	5	-.002	1	-.004	4
399		10	max	902.795	1	1.158	4	-.03	15	0	1	0	15	-.001	15
400			min	-1011.199	3	.273	15	-.629	1	0	5	-.002	1	-.004	4
401		11	max	903.271	1	1.072	4	-.03	15	0	1	0	15	-.001	15
402			min	-1010.842	3	.253	15	-.629	1	0	5	-.002	1	-.005	4
403		12	max	903.747	1	.986	4	-.03	15	0	1	0	15	-.001	15
404			min	-1010.486	3	.232	15	-.629	1	0	5	-.002	1	-.005	4
405		13	max	904.222	1	.901	4	-.03	15	0	1	0	15	-.001	15
406			min	-1010.129	3	.212	15	-.629	1	0	5	-.002	1	-.005	4
407		14	max	904.698	1	.815	4	-.03	15	0	1	0	15	-.001	15
408			min	-1009.772	3	.179	12	-.629	1	0	5	-.003	1	-.006	4
409		15	max	905.174	1	.737	2	-.03	15	0	1	0	15	-.001	15
410			min	-1009.415	3	.146	12	-.629	1	0	5	-.003	1	-.006	4
411		16	max	905.65	1	.671	2	-.03	15	0	1	0	15	-.001	15
412			min	-1009.058	3	.113	12	-.629	1	0	5	-.003	1	-.006	4
413		17	max	906.125	1	.604	2	-.03	15	0	1	0	15	-.002	15
414			min	-1008.701	3	.079	12	-.629	1	0	5	-.003	1	-.006	4
415		18	max	906.601	1	.537	2	-.03	15	0	1	0	15	-.002	15
416			min	-1008.345	3	.046	3	-.629	1	0	5	-.003	1	-.007	4
417		19	max	907.077	1	.47	2	-.03	15	0	1	0	15	-.002	15
418			min	-1007.988	3	-.004	3	-.629	1	0	5	-.004	1	-.007	4
419	M11	1	max	501.131	2	7.778	4	-.014	15	0	1	0	15	.007	4
420			min	-649.373	3	1.829	15	-.289	1	0	12	0	1	.002	15
421		2	max	500.961	2	7.013	4	-.014	15	0	1	0	15	.004	2
422			min	-649.501	3	1.649	15	-.289	1	0	12	0	1	0	12
423		3	max	500.79	2	6.249	4	-.014	15	0	1	0	15	.002	2
424			min	-649.628	3	1.469	15	-.289	1	0	12	0	1	0	3
425		4	max	500.62	2	5.484	4	-.014	15	0	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
426			min	-649.756	3	1.29	15	-.289	1	0	12	0	1	-.002	3
427		5	max	500.45	2	4.72	4	-.014	15	0	1	0	15	0	15
428			min	-649.884	3	1.11	15	-.289	1	0	12	-.001	1	-.004	4
429		6	max	500.279	2	3.955	4	-.014	15	0	1	0	15	-.001	15
430			min	-650.012	3	.93	15	-.289	1	0	12	-.001	1	-.006	4
431		7	max	500.109	2	3.191	4	-.014	15	0	1	0	15	-.002	15
432			min	-650.139	3	.751	15	-.289	1	0	12	-.001	1	-.007	4
433		8	max	499.939	2	2.427	4	-.014	15	0	1	0	15	-.002	15
434			min	-650.267	3	.571	15	-.289	1	0	12	-.001	1	-.008	4
435		9	max	499.768	2	1.662	4	-.014	15	0	1	0	15	-.002	15
436			min	-650.395	3	.391	15	-.289	1	0	12	-.001	1	-.009	4
437		10	max	499.598	2	.898	4	-.014	15	0	1	0	15	-.002	15
438			min	-650.523	3	.211	15	-.289	1	0	12	-.002	1	-.01	4
439		11	max	499.428	2	.235	2	-.014	15	0	1	0	15	-.002	15
440			min	-650.65	3	-.101	3	-.289	1	0	12	-.002	1	-.01	4
441		12	max	499.257	2	-.148	15	-.014	15	0	1	0	15	-.002	15
442			min	-650.778	3	-.631	4	-.289	1	0	12	-.002	1	-.01	4
443		13	max	499.087	2	-.328	15	-.014	15	0	1	0	15	-.002	15
444			min	-650.906	3	-1.396	4	-.289	1	0	12	-.002	1	-.009	4
445		14	max	498.917	2	-.507	15	-.014	15	0	1	0	15	-.002	15
446			min	-651.034	3	-2.16	4	-.289	1	0	12	-.002	1	-.009	4
447		15	max	498.746	2	-.687	15	-.014	15	0	1	0	15	-.002	15
448			min	-651.161	3	-2.925	4	-.289	1	0	12	-.002	1	-.007	4
449		16	max	498.576	2	-.867	15	-.014	15	0	1	0	15	-.001	15
450			min	-651.289	3	-3.689	4	-.289	1	0	12	-.002	1	-.006	4
451		17	max	498.406	2	-1.046	15	-.014	15	0	1	0	15	-.001	15
452			min	-651.417	3	-4.453	4	-.289	1	0	12	-.002	1	-.004	4
453		18	max	498.235	2	-1.226	15	-.014	15	0	1	0	15	0	15
454			min	-651.545	3	-5.218	4	-.289	1	0	12	-.003	1	-.002	4
455		19	max	498.065	2	-1.406	15	-.014	15	0	1	0	15	0	1
456			min	-651.673	3	-5.982	4	-.289	1	0	12	-.003	1	0	1
457	M12	1	max	1056.644	1	0	1	14.398	1	0	1	0	15	0	1
458			min	1.533	3	0	1	.682	15	0	1	-.002	1	0	1
459		2	max	1056.815	1	0	1	14.398	1	0	1	0	15	0	1
460			min	1.661	3	0	1	.682	15	0	1	0	1	0	1
461		3	max	1056.985	1	0	1	14.398	1	0	1	.001	1	0	1
462			min	1.788	3	0	1	.682	15	0	1	0	12	0	1
463		4	max	1057.155	1	0	1	14.398	1	0	1	.003	1	0	1
464			min	1.916	3	0	1	.682	15	0	1	0	15	0	1
465		5	max	1057.326	1	0	1	14.398	1	0	1	.004	1	0	1
466			min	2.044	3	0	1	.682	15	0	1	0	15	0	1
467		6	max	1057.496	1	0	1	14.398	1	0	1	.006	1	0	1
468			min	2.172	3	0	1	.682	15	0	1	0	15	0	1
469		7	max	1057.666	1	0	1	14.398	1	0	1	.008	1	0	1
470			min	2.3	3	0	1	.682	15	0	1	0	15	0	1
471		8	max	1057.837	1	0	1	14.398	1	0	1	.009	1	0	1
472			min	2.427	3	0	1	.682	15	0	1	0	15	0	1
473		9	max	1058.007	1	0	1	14.398	1	0	1	.011	1	0	1
474			min	2.555	3	0	1	.682	15	0	1	0	15	0	1
475		10	max	1058.177	1	0	1	14.398	1	0	1	.013	1	0	1
476			min	2.683	3	0	1	.682	15	0	1	0	15	0	1
477		11	max	1058.348	1	0	1	14.398	1	0	1	.014	1	0	1
478			min	2.811	3	0	1	.682	15	0	1	0	15	0	1
479		12	max	1058.518	1	0	1	14.398	1	0	1	.016	1	0	1
480			min	2.938	3	0	1	.682	15	0	1	0	15	0	1
481		13	max	1058.689	1	0	1	14.398	1	0	1	.018	1	0	1
482			min	3.066	3	0	1	.682	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	1058.859	1	0	1	14.398	1	0	1	.019	1	0	1
484			min	3.194	3	0	1	.682	15	0	1	0	15	0	1
485		15	max	1059.029	1	0	1	14.398	1	0	1	.021	1	0	1
486			min	3.322	3	0	1	.682	15	0	1	0	15	0	1
487		16	max	1059.2	1	0	1	14.398	1	0	1	.023	1	0	1
488			min	3.449	3	0	1	.682	15	0	1	.001	15	0	1
489		17	max	1059.37	1	0	1	14.398	1	0	1	.024	1	0	1
490			min	3.577	3	0	1	.682	15	0	1	.001	15	0	1
491		18	max	1059.54	1	0	1	14.398	1	0	1	.026	1	0	1
492			min	3.705	3	0	1	.682	15	0	1	.001	15	0	1
493		19	max	1059.711	1	0	1	14.398	1	0	1	.028	1	0	1
494			min	3.833	3	0	1	.682	15	0	1	.001	15	0	1
495	M1	1	max	200.388	1	549.146	3	-6.488	15	0	1	.327	1	0	3
496			min	9.487	15	-390.964	1	-136.43	1	0	3	.016	15	-.011	2
497		2	max	201.104	1	548.215	3	-6.488	15	0	1	.255	1	.196	1
498			min	9.703	15	-392.205	1	-136.43	1	0	3	.012	15	-.289	3
499		3	max	397.085	3	437.582	1	-6.459	15	0	3	.183	1	.393	1
500			min	-232.453	2	-394.656	3	-136.086	1	0	1	.009	15	-.566	3
501		4	max	397.622	3	436.342	1	-6.459	15	0	3	.111	1	.163	1
502			min	-231.737	2	-395.587	3	-136.086	1	0	1	.005	15	-.358	3
503		5	max	398.16	3	435.101	1	-6.459	15	0	3	.039	1	-.003	15
504			min	-231.021	2	-396.517	3	-136.086	1	0	1	.002	15	-.149	3
505		6	max	398.697	3	433.861	1	-6.459	15	0	3	-.002	15	.061	3
506			min	-230.305	2	-397.448	3	-136.086	1	0	1	-.032	1	-.307	2
507		7	max	399.234	3	432.62	1	-6.459	15	0	3	-.005	15	.27	3
508			min	-229.589	2	-398.378	3	-136.086	1	0	1	-.104	1	-.528	2
509		8	max	399.771	3	431.38	1	-6.459	15	0	3	-.008	15	.481	3
510			min	-228.872	2	-399.308	3	-136.086	1	0	1	-.176	1	-.753	1
511		9	max	415.682	3	38.862	2	-9.306	15	0	9	.102	1	.562	3
512			min	-141.993	2	.379	15	-195.942	1	0	3	.005	15	-.859	1
513		10	max	416.219	3	37.622	2	-9.306	15	0	9	0	15	.547	3
514			min	-141.277	2	.005	15	-195.942	1	0	3	-.001	1	-.878	2
515		11	max	416.756	3	36.381	2	-9.306	15	0	9	-.005	15	.532	3
516			min	-140.561	2	-1.501	4	-195.942	1	0	3	-.105	1	-.897	2
517		12	max	432.607	3	259.792	3	-6.301	15	0	2	.174	1	.463	3
518			min	-78.626	10	-497.179	2	-132.892	1	0	3	.008	15	-.795	2
519		13	max	433.144	3	258.861	3	-6.301	15	0	2	.104	1	.326	3
520			min	-78.029	10	-498.419	2	-132.892	1	0	3	.005	15	-.533	2
521		14	max	433.682	3	257.931	3	-6.301	15	0	2	.034	1	.19	3
522			min	-77.432	10	-499.66	2	-132.892	1	0	3	.002	15	-.278	1
523		15	max	434.219	3	257	3	-6.301	15	0	2	-.002	15	.054	3
524			min	-76.835	10	-500.9	2	-132.892	1	0	3	-.037	1	-.027	1
525		16	max	434.756	3	256.07	3	-6.301	15	0	2	-.005	15	.259	2
526			min	-76.238	10	-502.141	2	-132.892	1	0	3	-.107	1	-.081	3
527		17	max	435.293	3	255.14	3	-6.301	15	0	2	-.008	15	.524	2
528			min	-75.641	10	-503.381	2	-132.892	1	0	3	-.177	1	-.216	3
529		18	max	-9.711	15	516.585	2	-6.969	15	0	3	-.012	15	.264	2
530			min	-201.323	1	-217.662	3	-146.665	1	0	2	-.251	1	-.107	3
531		19	max	-9.495	15	515.344	2	-6.969	15	0	3	-.016	15	.008	3
532			min	-200.607	1	-218.593	3	-146.665	1	0	2	-.328	1	-.009	1
533	M5	1	max	430.615	1	1829.933	3	0	1	0	1	0	1	.022	2
534			min	19.42	12	-1317.419	1	0	1	0	1	0	1	-.002	3
535		2	max	431.331	1	1829.003	3	0	1	0	1	0	1	.716	1
536			min	19.778	12	-1318.66	1	0	1	0	1	0	1	-.967	3
537		3	max	1280.113	3	1351.303	1	0	1	0	1	0	1	1.38	1
538			min	-846.048	2	-1283.589	3	0	1	0	1	0	1	-1.894	3
539		4	max	1280.65	3	1350.063	1	0	1	0	1	0	1	.668	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	-845.332	2	-1284.52	3	0	1	0	1	0	1	-1.217	3
541		5	max	1281.187	3	1348.822	1	0	1	0	1	0	1	.002	9
542			min	-844.616	2	-1285.45	3	0	1	0	1	0	1	-.539	3
543		6	max	1281.724	3	1347.582	1	0	1	0	1	0	1	.14	3
544			min	-843.9	2	-1286.38	3	0	1	0	1	0	1	-.781	2
545		7	max	1282.261	3	1346.341	1	0	1	0	1	0	1	.819	3
546			min	-843.183	2	-1287.311	3	0	1	0	1	0	1	-1.467	2
547		8	max	1282.798	3	1345.101	1	0	1	0	1	0	1	1.498	3
548			min	-842.467	2	-1288.241	3	0	1	0	1	0	1	-2.177	1
549		9	max	1311.534	3	129.121	2	0	1	0	1	0	1	1.725	3
550			min	-664.696	2	.377	15	0	1	0	1	0	1	-2.465	1
551		10	max	1312.071	3	127.88	2	0	1	0	1	0	1	1.671	3
552			min	-663.98	2	.002	15	0	1	0	1	0	1	-2.517	2
553		11	max	1312.608	3	126.64	2	0	1	0	1	0	1	1.618	3
554			min	-663.264	2	-1.321	4	0	1	0	1	0	1	-2.584	2
555		12	max	1341.464	3	837.023	3	0	1	0	1	0	1	1.422	3
556			min	-485.505	2	-1559.465	2	0	1	0	1	0	1	-2.313	2
557		13	max	1342.001	3	836.093	3	0	1	0	1	0	1	.98	3
558			min	-484.789	2	-1560.705	2	0	1	0	1	0	1	-1.49	2
559		14	max	1342.538	3	835.162	3	0	1	0	1	0	1	.539	3
560			min	-484.073	2	-1561.946	2	0	1	0	1	0	1	-.696	1
561		15	max	1343.075	3	834.232	3	0	1	0	1	0	1	.158	2
562			min	-483.357	2	-1563.186	2	0	1	0	1	0	1	-.004	13
563		16	max	1343.613	3	833.301	3	0	1	0	1	0	1	.983	2
564			min	-482.64	2	-1564.427	2	0	1	0	1	0	1	-.341	3
565		17	max	1344.15	3	832.371	3	0	1	0	1	0	1	1.809	2
566			min	-481.924	2	-1565.667	2	0	1	0	1	0	1	-.781	3
567		18	max	-20.01	12	1736.014	2	0	1	0	1	0	1	.933	2
568			min	-430.894	1	-742.432	3	0	1	0	1	0	1	-.408	3
569		19	max	-19.652	12	1734.774	2	0	1	0	1	0	1	.018	1
570			min	-430.177	1	-743.362	3	0	1	0	1	0	1	-.016	3
571	M9	1	max	200.388	1	549.146	3	136.43	1	0	3	-.016	15	0	3
572			min	9.487	15	-390.964	1	6.488	15	0	1	-.327	1	-.011	2
573		2	max	201.104	1	548.215	3	136.43	1	0	3	-.012	15	.196	1
574			min	9.703	15	-392.205	1	6.488	15	0	1	-.255	1	-.289	3
575		3	max	397.085	3	437.582	1	136.086	1	0	1	-.009	15	.393	1
576			min	-232.453	2	-394.656	3	6.459	15	0	3	-.183	1	-.566	3
577		4	max	397.622	3	436.342	1	136.086	1	0	1	-.005	15	.163	1
578			min	-231.737	2	-395.587	3	6.459	15	0	3	-.111	1	-.358	3
579		5	max	398.16	3	435.101	1	136.086	1	0	1	-.002	15	-.003	15
580			min	-231.021	2	-396.517	3	6.459	15	0	3	-.039	1	-.149	3
581		6	max	398.697	3	433.861	1	136.086	1	0	1	.032	1	.061	3
582			min	-230.305	2	-397.448	3	6.459	15	0	3	.002	15	-.307	2
583		7	max	399.234	3	432.62	1	136.086	1	0	1	.104	1	.27	3
584			min	-229.589	2	-398.378	3	6.459	15	0	3	.005	15	-.528	2
585		8	max	399.771	3	431.38	1	136.086	1	0	1	.176	1	.481	3
586			min	-228.872	2	-399.308	3	6.459	15	0	3	.008	15	-.753	1
587		9	max	415.682	3	38.862	2	195.942	1	0	3	-.005	15	.562	3
588			min	-141.993	2	.379	15	9.306	15	0	9	-.102	1	-.859	1
589		10	max	416.219	3	37.622	2	195.942	1	0	3	.001	1	.547	3
590			min	-141.277	2	.005	15	9.306	15	0	9	0	15	-.878	2
591		11	max	416.756	3	36.381	2	195.942	1	0	3	.105	1	.532	3
592			min	-140.561	2	-1.501	4	9.306	15	0	9	.005	15	-.897	2
593		12	max	432.607	3	259.792	3	132.892	1	0	3	-.008	15	.463	3
594			min	-78.626	10	-497.179	2	6.301	15	0	2	-.174	1	-.795	2
595		13	max	433.144	3	258.861	3	132.892	1	0	3	-.005	15	.326	3
596			min	-78.029	10	-498.419	2	6.301	15	0	2	-.104	1	-.533	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
597		14	max	433.682	3	257.931	3	132.892	1	0	3	-.002	15	.19	3
598			min	-77.432	10	-499.66	2	6.301	15	0	2	-.034	1	-.278	1
599		15	max	434.219	3	257	3	132.892	1	0	3	.037	1	.054	3
600			min	-76.835	10	-500.9	2	6.301	15	0	2	.002	15	-.027	1
601		16	max	434.756	3	256.07	3	132.892	1	0	3	.107	1	.259	2
602			min	-76.238	10	-502.141	2	6.301	15	0	2	.005	15	-.081	3
603		17	max	435.293	3	255.14	3	132.892	1	0	3	.177	1	.524	2
604			min	-75.641	10	-503.381	2	6.301	15	0	2	.008	15	-.216	3
605		18	max	-9.711	15	516.585	2	146.665	1	0	2	.251	1	.264	2
606			min	-201.323	1	-217.662	3	6.969	15	0	3	.012	15	-.107	3
607		19	max	-9.495	15	515.344	2	146.665	1	0	2	.328	1	.008	3
608			min	-200.607	1	-218.593	3	6.969	15	0	3	.016	15	-.009	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	.001	1	.087	2	.007	3	7.28e-3	2	NC	1	NC	1
2			min	0	15	-.01	3	-.003	2	-1.114e-3	3	NC	1	NC	1
3		2	max	.001	1	.335	3	.06	1	8.471e-3	2	NC	5	NC	2
4			min	0	15	-.144	1	.003	15	-1.197e-3	3	763.649	3	4568.487	1
5		3	max	.001	1	.615	3	.145	1	9.661e-3	2	NC	5	NC	3
6			min	0	15	-.326	1	.007	15	-1.28e-3	3	421.993	3	1846.802	1
7		4	max	0	1	.785	3	.219	1	1.085e-2	2	NC	5	NC	3
8			min	0	15	-.43	1	.011	15	-1.363e-3	3	331.879	3	1214.787	1
9		5	max	0	1	.824	3	.258	1	1.204e-2	2	NC	15	NC	3
10			min	0	15	-.441	1	.012	15	-1.446e-3	3	316.291	3	1030.506	1
11		6	max	0	1	.736	3	.25	1	1.323e-2	2	NC	5	NC	5
12			min	0	15	-.362	1	.012	15	-1.528e-3	3	353.818	3	1063.379	1
13		7	max	0	1	.546	3	.198	1	1.442e-2	2	NC	5	NC	3
14			min	0	15	-.212	1	.01	15	-1.611e-3	3	474.489	3	1348.751	1
15		8	max	0	1	.305	3	.116	1	1.562e-2	2	NC	5	NC	3
16			min	0	15	-.029	1	.006	15	-1.694e-3	3	836.834	3	2311.35	1
17		9	max	0	1	.147	2	.035	1	1.681e-2	2	NC	4	NC	2
18			min	0	15	.004	15	-.004	10	-1.777e-3	3	2720.2	3	8054.048	1
19		10	max	0	1	.215	2	.022	3	1.8e-2	2	NC	3	NC	1
20			min	0	1	-.012	3	-.015	2	-1.86e-3	3	2076.352	2	NC	1
21		11	max	0	15	.147	2	.035	1	1.681e-2	2	NC	4	NC	2
22			min	0	1	.004	15	-.004	10	-1.777e-3	3	2720.2	3	8054.048	1
23		12	max	0	15	.305	3	.116	1	1.562e-2	2	NC	5	NC	3
24			min	0	1	-.029	1	.006	15	-1.694e-3	3	836.834	3	2311.35	1
25		13	max	0	15	.546	3	.198	1	1.442e-2	2	NC	5	NC	3
26			min	0	1	-.212	1	.01	15	-1.611e-3	3	474.489	3	1348.751	1
27		14	max	0	15	.736	3	.25	1	1.323e-2	2	NC	5	NC	5
28			min	0	1	-.362	1	.012	15	-1.528e-3	3	353.818	3	1063.379	1
29		15	max	0	15	.824	3	.258	1	1.204e-2	2	NC	15	NC	3
30			min	0	1	-.441	1	.012	15	-1.446e-3	3	316.291	3	1030.506	1
31		16	max	0	15	.785	3	.219	1	1.085e-2	2	NC	5	NC	3
32			min	0	1	-.43	1	.011	15	-1.363e-3	3	331.879	3	1214.787	1
33		17	max	0	15	.615	3	.145	1	9.661e-3	2	NC	5	NC	3
34			min	-.001	1	-.326	1	.007	15	-1.28e-3	3	421.993	3	1846.802	1
35		18	max	0	15	.335	3	.06	1	8.471e-3	2	NC	5	NC	2
36			min	-.001	1	-.144	1	.003	15	-1.197e-3	3	763.649	3	4568.487	1
37		19	max	0	15	.087	2	.007	3	7.28e-3	2	NC	1	NC	1
38			min	-.001	1	-.01	3	-.003	2	-1.114e-3	3	NC	1	NC	1
39	M14	1	max	0	1	.168	3	.006	3	4.337e-3	2	NC	1	NC	1
40			min	0	15	-.287	2	-.003	2	-2.967e-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	.488	3	.042	1	5.236e-3	2	NC	5	NC	2
42			min	0	15	-.618	1	.002	15	-3.642e-3	3	787.58	1	6581.831	1
43		3	max	0	1	.756	3	.118	1	6.134e-3	2	NC	15	NC	3
44			min	0	15	-.904	1	.006	15	-4.317e-3	3	425.225	1	2277.097	1
45		4	max	0	1	.938	3	.19	1	7.032e-3	2	NC	15	NC	3
46			min	0	15	-1.106	1	.009	15	-4.992e-3	3	320.802	1	1406.926	1
47		5	max	0	1	1.016	3	.231	1	7.93e-3	2	9108.323	15	NC	3
48			min	0	15	-1.207	1	.011	15	-5.666e-3	3	285.569	1	1153.656	1
49		6	max	0	1	.992	3	.229	1	8.828e-3	2	9151.665	15	NC	3
50			min	0	15	-1.208	1	.011	15	-6.341e-3	3	285.274	1	1165.167	1
51		7	max	0	1	.883	3	.183	1	9.727e-3	2	NC	15	NC	3
52			min	0	15	-1.126	1	.009	15	-7.016e-3	3	313.253	1	1455.644	1
53		8	max	0	1	.727	3	.109	1	1.062e-2	2	NC	15	NC	3
54			min	0	15	-.993	1	.006	15	-7.691e-3	3	371.595	1	2463.966	1
55		9	max	0	1	.578	3	.033	1	1.152e-2	2	NC	15	NC	2
56			min	0	15	-.863	2	-.003	10	-8.365e-3	3	455.639	1	8430.192	1
57		10	max	0	1	.509	3	.02	3	1.242e-2	2	NC	5	NC	1
58			min	0	1	-.807	2	-.013	2	-9.04e-3	3	507.611	2	NC	1
59		11	max	0	15	.578	3	.033	1	1.152e-2	2	NC	15	NC	2
60			min	0	1	-.863	2	-.003	10	-8.365e-3	3	455.639	1	8430.192	1
61		12	max	0	15	.727	3	.109	1	1.062e-2	2	NC	15	NC	3
62			min	0	1	-.993	1	.006	15	-7.691e-3	3	371.595	1	2463.966	1
63		13	max	0	15	.883	3	.183	1	9.727e-3	2	NC	15	NC	3
64			min	0	1	-1.126	1	.009	15	-7.016e-3	3	313.253	1	1455.644	1
65		14	max	0	15	.992	3	.229	1	8.828e-3	2	9151.665	15	NC	3
66			min	0	1	-1.208	1	.011	15	-6.341e-3	3	285.274	1	1165.167	1
67		15	max	0	15	1.016	3	.231	1	7.93e-3	2	9108.323	15	NC	3
68			min	0	1	-1.207	1	.011	15	-5.666e-3	3	285.569	1	1153.656	1
69		16	max	0	15	.938	3	.19	1	7.032e-3	2	NC	15	NC	3
70			min	0	1	-1.106	1	.009	15	-4.992e-3	3	320.802	1	1406.926	1
71		17	max	0	15	.756	3	.118	1	6.134e-3	2	NC	15	NC	3
72			min	0	1	-.904	1	.006	15	-4.317e-3	3	425.225	1	2277.097	1
73		18	max	0	15	.488	3	.042	1	5.236e-3	2	NC	5	NC	2
74			min	0	1	-.618	1	.002	15	-3.642e-3	3	787.58	1	6581.831	1
75		19	max	0	15	.168	3	.006	3	4.337e-3	2	NC	1	NC	1
76			min	0	1	-.287	2	-.003	2	-2.967e-3	3	NC	1	NC	1
77	M15	1	max	0	15	.172	3	.006	3	2.557e-3	3	NC	1	NC	1
78			min	0	1	-.286	2	-.003	2	-4.527e-3	2	NC	1	NC	1
79		2	max	0	15	.368	3	.042	1	3.145e-3	3	NC	5	NC	2
80			min	0	1	-.698	2	.002	15	-5.468e-3	2	640.175	2	6552.317	1
81		3	max	0	15	.537	3	.118	1	3.732e-3	3	NC	15	NC	3
82			min	0	1	-1.047	2	.006	15	-6.409e-3	2	347.108	2	2271.201	1
83		4	max	0	15	.659	3	.19	1	4.319e-3	3	NC	15	NC	3
84			min	0	1	-1.287	2	.009	15	-7.351e-3	2	263.811	2	1404.147	1
85		5	max	0	15	.724	3	.231	1	4.907e-3	3	9122.243	15	NC	3
86			min	0	1	-1.397	2	.011	15	-8.292e-3	2	237.575	2	1151.631	1
87		6	max	0	15	.731	3	.229	1	5.494e-3	3	9168.541	15	NC	3
88			min	0	1	-1.379	2	.011	15	-9.233e-3	2	241.599	2	1163.092	1
89		7	max	0	15	.691	3	.184	1	6.081e-3	3	NC	15	NC	3
90			min	0	1	-1.254	2	.009	15	-1.017e-2	2	272.712	2	1452.542	1
91		8	max	0	15	.622	3	.11	1	6.669e-3	3	NC	15	NC	3
92			min	0	1	-1.068	2	.006	15	-1.112e-2	2	337.465	2	2455.66	1
93		9	max	0	15	.551	3	.034	1	7.256e-3	3	NC	15	NC	2
94			min	0	1	-.889	2	-.003	10	-1.206e-2	2	437.972	2	8339.712	1
95		10	max	0	1	.518	3	.018	3	7.843e-3	3	NC	5	NC	1
96			min	0	1	-.805	2	-.013	2	-1.3e-2	2	508.661	2	NC	1
97		11	max	0	1	.551	3	.034	1	7.256e-3	3	NC	15	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
98			min	0	15	-.889	2	-.003	10	-1.206e-2	2	437.972	2	8339.712	1
99		12	max	0	1	.622	3	.11	1	6.669e-3	3	NC	15	NC	3
100			min	0	15	-1.068	2	.006	15	-1.112e-2	2	337.465	2	2455.66	1
101		13	max	0	1	.691	3	.184	1	6.081e-3	3	NC	15	NC	3
102			min	0	15	-1.254	2	.009	15	-1.017e-2	2	272.712	2	1452.542	1
103		14	max	0	1	.731	3	.229	1	5.494e-3	3	9168.541	15	NC	3
104			min	0	15	-1.379	2	.011	15	-9.233e-3	2	241.599	2	1163.092	1
105		15	max	0	1	.724	3	.231	1	4.907e-3	3	9122.243	15	NC	3
106			min	0	15	-1.397	2	.011	15	-8.292e-3	2	237.575	2	1151.631	1
107		16	max	0	1	.659	3	.19	1	4.319e-3	3	NC	15	NC	3
108			min	0	15	-1.287	2	.009	15	-7.351e-3	2	263.811	2	1404.147	1
109		17	max	0	1	.537	3	.118	1	3.732e-3	3	NC	15	NC	3
110			min	0	15	-1.047	2	.006	15	-6.409e-3	2	347.108	2	2271.201	1
111		18	max	0	1	.368	3	.042	1	3.145e-3	3	NC	5	NC	2
112			min	0	15	-.698	2	.002	15	-5.468e-3	2	640.175	2	6552.317	1
113		19	max	0	1	.172	3	.006	3	2.557e-3	3	NC	1	NC	1
114			min	0	15	-.286	2	-.003	2	-4.527e-3	2	NC	1	NC	1
115	M16	1	max	0	15	.083	1	.005	3	4.434e-3	3	NC	1	NC	1
116			min	-.002	1	-.055	3	-.002	2	-6.379e-3	1	NC	1	NC	1
117		2	max	0	15	.068	3	.059	1	5.298e-3	3	NC	5	NC	2
118			min	-.001	1	-.23	2	.003	15	-7.368e-3	1	856.288	2	4601.266	1
119		3	max	0	15	.165	3	.144	1	6.162e-3	3	NC	5	NC	3
120			min	-.001	1	-.477	2	.007	15	-8.357e-3	1	475.684	2	1853.596	1
121		4	max	0	15	.219	3	.219	1	7.025e-3	3	NC	5	NC	3
122			min	-.001	1	-.62	2	.011	15	-9.346e-3	1	377.793	2	1217.048	1
123		5	max	0	15	.221	3	.258	1	7.889e-3	3	NC	5	NC	3
124			min	0	1	-.642	2	.012	15	-1.033e-2	1	366.31	2	1030.982	1
125		6	max	0	15	.173	3	.25	1	8.753e-3	3	NC	5	NC	3
126			min	0	1	-.546	2	.012	15	-1.132e-2	1	423.139	2	1062.242	1
127		7	max	0	15	.086	3	.198	1	9.617e-3	3	NC	5	NC	3
128			min	0	1	-.355	2	.01	15	-1.231e-2	1	608.505	2	1344.074	1
129		8	max	0	15	0	15	.117	1	1.048e-2	3	NC	4	NC	3
130			min	0	1	-.12	2	.006	15	-1.33e-2	1	1332.102	2	2290.078	1
131		9	max	0	15	.114	1	.036	1	1.134e-2	3	NC	2	NC	2
132			min	0	1	-.111	3	-.002	10	-1.429e-2	1	4672.95	3	7738.128	1
133		10	max	0	1	.201	1	.016	3	1.221e-2	3	NC	4	NC	1
134			min	0	1	-.153	3	-.012	2	-1.528e-2	1	2228.435	1	NC	1
135		11	max	0	1	.114	1	.036	1	1.134e-2	3	NC	2	NC	2
136			min	0	15	-.111	3	-.002	10	-1.429e-2	1	4672.95	3	7738.128	1
137		12	max	0	1	0	15	.117	1	1.048e-2	3	NC	4	NC	3
138			min	0	15	-.12	2	.006	15	-1.33e-2	1	1332.102	2	2290.078	1
139		13	max	0	1	.086	3	.198	1	9.617e-3	3	NC	5	NC	3
140			min	0	15	-.355	2	.01	15	-1.231e-2	1	608.505	2	1344.074	1
141		14	max	0	1	.173	3	.25	1	8.753e-3	3	NC	5	NC	3
142			min	0	15	-.546	2	.012	15	-1.132e-2	1	423.139	2	1062.242	1
143		15	max	0	1	.221	3	.258	1	7.889e-3	3	NC	5	NC	3
144			min	0	15	-.642	2	.012	15	-1.033e-2	1	366.31	2	1030.982	1
145		16	max	.001	1	.219	3	.219	1	7.025e-3	3	NC	5	NC	3
146			min	0	15	-.62	2	.011	15	-9.346e-3	1	377.793	2	1217.048	1
147		17	max	.001	1	.165	3	.144	1	6.162e-3	3	NC	5	NC	3
148			min	0	15	-.477	2	.007	15	-8.357e-3	1	475.684	2	1853.596	1
149		18	max	.001	1	.068	3	.059	1	5.298e-3	3	NC	5	NC	2
150			min	0	15	-.23	2	.003	15	-7.368e-3	1	856.288	2	4601.266	1
151		19	max	.002	1	.083	1	.005	3	4.434e-3	3	NC	1	NC	1
152			min	0	15	-.055	3	-.002	2	-6.379e-3	1	NC	1	NC	1
153	M2	1	max	.006	1	.006	2	.011	1	-1.442e-5	15	NC	1	NC	2
154			min	-.007	3	-.01	3	0	15	-3.041e-4	1	NC	1	6635.32	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
155		2	max	.006	1	.005	2	.01	1	-1.359e-5	15	NC	1	NC	2
156			min	-.006	3	-.01	3	0	15	-2.865e-4	1	NC	1	7236.423	1
157		3	max	.005	1	.004	2	.009	1	-1.276e-5	15	NC	1	NC	2
158			min	-.006	3	-.01	3	0	15	-2.69e-4	1	NC	1	7952.748	1
159		4	max	.005	1	.003	2	.008	1	-1.193e-5	15	NC	1	NC	2
160			min	-.006	3	-.01	3	0	15	-2.514e-4	1	NC	1	8814.822	1
161		5	max	.005	1	.002	2	.007	1	-1.109e-5	15	NC	1	NC	2
162			min	-.005	3	-.009	3	0	15	-2.339e-4	1	NC	1	9864.306	1
163		6	max	.004	1	.001	2	.006	1	-1.026e-5	15	NC	1	NC	1
164			min	-.005	3	-.009	3	0	15	-2.163e-4	1	NC	1	NC	1
165		7	max	.004	1	0	2	.005	1	-9.429e-6	15	NC	1	NC	1
166			min	-.005	3	-.009	3	0	15	-1.988e-4	1	NC	1	NC	1
167		8	max	.004	1	0	2	.005	1	-8.597e-6	15	NC	1	NC	1
168			min	-.004	3	-.008	3	0	15	-1.812e-4	1	NC	1	NC	1
169		9	max	.003	1	0	2	.004	1	-7.765e-6	15	NC	1	NC	1
170			min	-.004	3	-.008	3	0	15	-1.637e-4	1	NC	1	NC	1
171		10	max	.003	1	-.001	15	.003	1	-6.933e-6	15	NC	1	NC	1
172			min	-.003	3	-.007	3	0	15	-1.461e-4	1	NC	1	NC	1
173		11	max	.003	1	-.001	15	.003	1	-6.101e-6	15	NC	1	NC	1
174			min	-.003	3	-.007	3	0	15	-1.286e-4	1	NC	1	NC	1
175		12	max	.002	1	-.001	15	.002	1	-5.269e-6	15	NC	1	NC	1
176			min	-.003	3	-.006	3	0	15	-1.11e-4	1	NC	1	NC	1
177		13	max	.002	1	-.001	15	.002	1	-4.437e-6	15	NC	1	NC	1
178			min	-.002	3	-.005	3	0	15	-9.347e-5	1	NC	1	NC	1
179		14	max	.002	1	-.001	15	.001	1	-3.605e-6	15	NC	1	NC	1
180			min	-.002	3	-.005	3	0	15	-7.591e-5	1	NC	1	NC	1
181		15	max	.001	1	0	15	0	1	-2.773e-6	15	NC	1	NC	1
182			min	-.002	3	-.004	4	0	15	-5.836e-5	1	NC	1	NC	1
183		16	max	.001	1	0	15	0	1	-1.941e-6	15	NC	1	NC	1
184			min	-.001	3	-.003	4	0	15	-4.081e-5	1	NC	1	NC	1
185		17	max	0	1	0	15	0	1	-1.109e-6	15	NC	1	NC	1
186			min	0	3	-.002	4	0	15	-2.326e-5	1	NC	1	NC	1
187		18	max	0	1	0	15	0	1	-2.766e-7	15	NC	1	NC	1
188			min	0	3	-.001	4	0	15	-5.708e-6	1	NC	1	NC	1
189		19	max	0	1	0	1	0	1	1.184e-5	1	NC	1	NC	1
190			min	0	1	0	1	0	1	5.249e-7	12	NC	1	NC	1
191	M3	1	max	0	1	0	1	0	1	-2.221e-7	12	NC	1	NC	1
192			min	0	1	0	1	0	1	-4.723e-6	1	NC	1	NC	1
193		2	max	0	3	0	15	0	1	2.414e-5	1	NC	1	NC	1
194			min	0	2	-.002	4	0	12	1.145e-6	15	NC	1	NC	1
195		3	max	0	3	0	15	0	1	5.301e-5	1	NC	1	NC	1
196			min	0	2	-.004	4	0	12	2.511e-6	15	NC	1	NC	1
197		4	max	0	3	-.001	15	0	1	8.188e-5	1	NC	1	NC	1
198			min	0	2	-.006	4	0	15	3.878e-6	15	NC	1	NC	1
199		5	max	.001	3	-.002	15	0	1	1.107e-4	1	NC	1	NC	1
200			min	0	2	-.008	4	0	15	5.245e-6	15	NC	1	NC	1
201		6	max	.002	3	-.002	15	0	1	1.396e-4	1	NC	1	NC	1
202			min	-.001	2	-.01	4	0	15	6.612e-6	15	9624.063	4	NC	1
203		7	max	.002	3	-.003	15	0	1	1.685e-4	1	NC	1	NC	1
204			min	-.001	2	-.011	4	0	15	7.979e-6	15	8289.99	4	NC	1
205		8	max	.002	3	-.003	15	.001	1	1.973e-4	1	NC	2	NC	1
206			min	-.002	2	-.012	4	0	15	9.346e-6	15	7467.797	4	NC	1
207		9	max	.003	3	-.003	15	.002	1	2.262e-4	1	NC	3	NC	1
208			min	-.002	2	-.013	4	0	15	1.071e-5	15	6984.719	4	NC	1
209		10	max	.003	3	-.003	15	.002	1	2.551e-4	1	NC	3	NC	1
210			min	-.002	2	-.014	4	0	15	1.208e-5	15	6757.21	4	NC	1
211		11	max	.003	3	-.003	15	.003	1	2.84e-4	1	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
212			min	-.002	2	-.014	4	0	15	1.345e-5	15	6751.943	4	NC	1
213		12	max	.003	3	-.003	15	.003	1	3.128e-4	1	NC	3	NC	1
214			min	-.003	2	-.013	4	0	15	1.481e-5	15	6973.025	4	NC	1
215		13	max	.004	3	-.003	15	.004	1	3.417e-4	1	NC	2	NC	1
216			min	-.003	2	-.013	4	0	15	1.618e-5	15	7465.24	4	NC	1
217		14	max	.004	3	-.003	15	.005	1	3.706e-4	1	NC	1	NC	1
218			min	-.003	2	-.011	4	0	15	1.755e-5	15	8336.968	4	NC	1
219		15	max	.004	3	-.002	15	.006	1	3.994e-4	1	NC	1	NC	1
220			min	-.003	2	-.01	4	0	15	1.891e-5	15	9827.343	4	NC	1
221		16	max	.005	3	-.002	15	.006	1	4.283e-4	1	NC	1	NC	1
222			min	-.004	2	-.008	4	0	15	2.028e-5	15	NC	1	NC	1
223		17	max	.005	3	-.001	15	.008	1	4.572e-4	1	NC	1	NC	1
224			min	-.004	2	-.006	1	0	15	2.165e-5	15	NC	1	NC	1
225		18	max	.005	3	0	15	.009	1	4.86e-4	1	NC	1	NC	1
226			min	-.004	2	-.004	1	0	15	2.301e-5	15	NC	1	NC	1
227		19	max	.006	3	0	10	.01	1	5.149e-4	1	NC	1	NC	2
228			min	-.004	2	-.003	1	0	15	2.438e-5	15	NC	1	9014.597	1
229	M4	1	max	.003	1	.004	2	0	15	1.172e-4	1	NC	1	NC	3
230			min	0	3	-.006	3	-.01	1	5.562e-6	15	NC	1	2478.579	1
231		2	max	.002	1	.004	2	0	15	1.172e-4	1	NC	1	NC	3
232			min	0	3	-.006	3	-.009	1	5.562e-6	15	NC	1	2691.609	1
233		3	max	.002	1	.004	2	0	15	1.172e-4	1	NC	1	NC	3
234			min	0	3	-.005	3	-.008	1	5.562e-6	15	NC	1	2945.373	1
235		4	max	.002	1	.003	2	0	15	1.172e-4	1	NC	1	NC	3
236			min	0	3	-.005	3	-.008	1	5.562e-6	15	NC	1	3250.41	1
237		5	max	.002	1	.003	2	0	15	1.172e-4	1	NC	1	NC	3
238			min	0	3	-.005	3	-.007	1	5.562e-6	15	NC	1	3621.051	1
239		6	max	.002	1	.003	2	0	15	1.172e-4	1	NC	1	NC	3
240			min	0	3	-.004	3	-.006	1	5.562e-6	15	NC	1	4077.165	1
241		7	max	.002	1	.003	2	0	15	1.172e-4	1	NC	1	NC	2
242			min	0	3	-.004	3	-.005	1	5.562e-6	15	NC	1	4646.96	1
243		8	max	.002	1	.002	2	0	15	1.172e-4	1	NC	1	NC	2
244			min	0	3	-.004	3	-.005	1	5.562e-6	15	NC	1	5371.567	1
245		9	max	.001	1	.002	2	0	15	1.172e-4	1	NC	1	NC	2
246			min	0	3	-.003	3	-.004	1	5.562e-6	15	NC	1	6312.904	1
247		10	max	.001	1	.002	2	0	15	1.172e-4	1	NC	1	NC	2
248			min	0	3	-.003	3	-.003	1	5.562e-6	15	NC	1	7567.741	1
249		11	max	.001	1	.002	2	0	15	1.172e-4	1	NC	1	NC	2
250			min	0	3	-.003	3	-.003	1	5.562e-6	15	NC	1	9294.356	1
251		12	max	0	1	.002	2	0	15	1.172e-4	1	NC	1	NC	1
252			min	0	3	-.002	3	-.002	1	5.562e-6	15	NC	1	NC	1
253		13	max	0	1	.001	2	0	15	1.172e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	-.002	1	5.562e-6	15	NC	1	NC	1
255		14	max	0	1	.001	2	0	15	1.172e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	-.001	1	5.562e-6	15	NC	1	NC	1
257		15	max	0	1	0	2	0	15	1.172e-4	1	NC	1	NC	1
258			min	0	3	-.001	3	0	1	5.562e-6	15	NC	1	NC	1
259		16	max	0	1	0	2	0	15	1.172e-4	1	NC	1	NC	1
260			min	0	3	0	3	0	1	5.562e-6	15	NC	1	NC	1
261		17	max	0	1	0	2	0	15	1.172e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	5.562e-6	15	NC	1	NC	1
263		18	max	0	1	0	2	0	15	1.172e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	5.562e-6	15	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.172e-4	1	NC	1	NC	1
266			min	0	1	0	1	0	1	5.562e-6	15	NC	1	NC	1
267	M6	1	max	.02	1	.023	2	0	1	0	1	NC	3	NC	1
268			min	-.022	3	-.033	3	0	1	0	1	2981.261	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	.018	1	.021	2	0	1	0	1	NC	3	NC	1
270			min	-.021	3	-.031	3	0	1	0	1	3282.744	2	NC	1
271		3	max	.017	1	.019	2	0	1	0	1	NC	3	NC	1
272			min	-.02	3	-.029	3	0	1	0	1	3648.618	2	NC	1
273		4	max	.016	1	.017	2	0	1	0	1	NC	3	NC	1
274			min	-.019	3	-.028	3	0	1	0	1	4097.703	2	NC	1
275		5	max	.015	1	.015	2	0	1	0	1	NC	1	NC	1
276			min	-.017	3	-.026	3	0	1	0	1	4656.485	2	NC	1
277		6	max	.014	1	.013	2	0	1	0	1	NC	1	NC	1
278			min	-.016	3	-.024	3	0	1	0	1	5363.194	2	NC	1
279		7	max	.013	1	.011	2	0	1	0	1	NC	1	NC	1
280			min	-.015	3	-.022	3	0	1	0	1	6274.677	2	NC	1
281		8	max	.012	1	.009	2	0	1	0	1	NC	1	NC	1
282			min	-.014	3	-.02	3	0	1	0	1	7478.52	2	NC	1
283		9	max	.011	1	.008	2	0	1	0	1	NC	1	NC	1
284			min	-.012	3	-.019	3	0	1	0	1	9115.577	2	NC	1
285		10	max	.01	1	.006	2	0	1	0	1	NC	1	NC	1
286			min	-.011	3	-.017	3	0	1	0	1	NC	1	NC	1
287		11	max	.009	1	.005	2	0	1	0	1	NC	1	NC	1
288			min	-.01	3	-.015	3	0	1	0	1	NC	1	NC	1
289		12	max	.008	1	.003	2	0	1	0	1	NC	1	NC	1
290			min	-.009	3	-.013	3	0	1	0	1	NC	1	NC	1
291		13	max	.007	1	.002	2	0	1	0	1	NC	1	NC	1
292			min	-.007	3	-.011	3	0	1	0	1	NC	1	NC	1
293		14	max	.005	1	.001	2	0	1	0	1	NC	1	NC	1
294			min	-.006	3	-.009	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	-.005	3	-.007	3	0	1	0	1	NC	1	NC	1
297		16	max	.003	1	0	2	0	1	0	1	NC	1	NC	1
298			min	-.004	3	-.006	3	0	1	0	1	NC	1	NC	1
299		17	max	.002	1	0	2	0	1	0	1	NC	1	NC	1
300			min	-.002	3	-.004	3	0	1	0	1	NC	1	NC	1
301		18	max	.001	1	0	2	0	1	0	1	NC	1	NC	1
302			min	-.001	3	-.002	3	0	1	0	1	NC	1	NC	1
303		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
304			min	0	1	0	1	0	1	0	1	NC	1	NC	1
305	M7	1	max	0	1	0	1	0	1	0	1	NC	1	NC	1
306			min	0	1	0	1	0	1	0	1	NC	1	NC	1
307		2	max	0	3	0	15	0	1	0	1	NC	1	NC	1
308			min	0	2	-.002	3	0	1	0	1	NC	1	NC	1
309		3	max	.002	3	0	15	0	1	0	1	NC	1	NC	1
310			min	-.002	2	-.005	3	0	1	0	1	NC	1	NC	1
311		4	max	.003	3	-.001	15	0	1	0	1	NC	1	NC	1
312			min	-.003	2	-.007	3	0	1	0	1	NC	1	NC	1
313		5	max	.004	3	-.002	15	0	1	0	1	NC	1	NC	1
314			min	-.004	2	-.009	3	0	1	0	1	NC	1	NC	1
315		6	max	.005	3	-.002	15	0	1	0	1	NC	1	NC	1
316			min	-.005	2	-.01	3	0	1	0	1	9862.229	4	NC	1
317		7	max	.006	3	-.003	15	0	1	0	1	NC	1	NC	1
318			min	-.006	2	-.012	3	0	1	0	1	8479.061	4	NC	1
319		8	max	.007	3	-.003	15	0	1	0	1	NC	1	NC	1
320			min	-.007	2	-.013	3	0	1	0	1	7626.162	4	NC	1
321		9	max	.008	3	-.003	15	0	1	0	1	NC	1	NC	1
322			min	-.008	2	-.014	3	0	1	0	1	7123.51	4	NC	1
323		10	max	.009	3	-.003	15	0	1	0	1	NC	1	NC	1
324			min	-.009	2	-.014	3	0	1	0	1	6883.894	4	NC	1
325		11	max	.01	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	-.01	2	-.014	3	0	1	0	1	6872.129	4	NC	1
327		12	max	.011	3	-.003	15	0	1	0	1	NC	1	NC	1
328			min	-.011	2	-.014	3	0	1	0	1	7091.565	4	NC	1
329		13	max	.012	3	-.003	15	0	1	0	1	NC	1	NC	1
330			min	-.012	2	-.013	3	0	1	0	1	7587.121	4	NC	1
331		14	max	.013	3	-.003	15	0	1	0	1	NC	1	NC	1
332			min	-.012	2	-.013	3	0	1	0	1	8468.407	4	NC	1
333		15	max	.014	3	-.002	15	0	1	0	1	NC	1	NC	1
334			min	-.013	2	-.011	3	0	1	0	1	9977.779	4	NC	1
335		16	max	.015	3	-.002	15	0	1	0	1	NC	1	NC	1
336			min	-.014	2	-.01	3	0	1	0	1	NC	1	NC	1
337		17	max	.016	3	-.001	15	0	1	0	1	NC	1	NC	1
338			min	-.015	2	-.008	3	0	1	0	1	NC	1	NC	1
339		18	max	.017	3	0	15	0	1	0	1	NC	1	NC	1
340			min	-.016	2	-.007	3	0	1	0	1	NC	1	NC	1
341		19	max	.018	3	0	10	0	1	0	1	NC	1	NC	1
342			min	-.017	2	-.005	3	0	1	0	1	NC	1	NC	1
343	M8	1	max	.006	1	.017	2	0	1	0	1	NC	1	NC	1
344			min	0	3	-.018	3	0	1	0	1	NC	1	NC	1
345		2	max	.006	1	.016	2	0	1	0	1	NC	1	NC	1
346			min	0	3	-.017	3	0	1	0	1	NC	1	NC	1
347		3	max	.006	1	.015	2	0	1	0	1	NC	1	NC	1
348			min	0	3	-.016	3	0	1	0	1	NC	1	NC	1
349		4	max	.005	1	.014	2	0	1	0	1	NC	1	NC	1
350			min	0	3	-.015	3	0	1	0	1	NC	1	NC	1
351		5	max	.005	1	.013	2	0	1	0	1	NC	1	NC	1
352			min	0	3	-.014	3	0	1	0	1	NC	1	NC	1
353		6	max	.005	1	.012	2	0	1	0	1	NC	1	NC	1
354			min	0	3	-.013	3	0	1	0	1	NC	1	NC	1
355		7	max	.004	1	.011	2	0	1	0	1	NC	1	NC	1
356			min	0	3	-.012	3	0	1	0	1	NC	1	NC	1
357		8	max	.004	1	.01	2	0	1	0	1	NC	1	NC	1
358			min	0	3	-.011	3	0	1	0	1	NC	1	NC	1
359		9	max	.004	1	.009	2	0	1	0	1	NC	1	NC	1
360			min	0	3	-.01	3	0	1	0	1	NC	1	NC	1
361		10	max	.003	1	.008	2	0	1	0	1	NC	1	NC	1
362			min	0	3	-.009	3	0	1	0	1	NC	1	NC	1
363		11	max	.003	1	.007	2	0	1	0	1	NC	1	NC	1
364			min	0	3	-.008	3	0	1	0	1	NC	1	NC	1
365		12	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
366			min	0	3	-.007	3	0	1	0	1	NC	1	NC	1
367		13	max	.002	1	.006	2	0	1	0	1	NC	1	NC	1
368			min	0	3	-.006	3	0	1	0	1	NC	1	NC	1
369		14	max	.002	1	.005	2	0	1	0	1	NC	1	NC	1
370			min	0	3	-.005	3	0	1	0	1	NC	1	NC	1
371		15	max	.001	1	.004	2	0	1	0	1	NC	1	NC	1
372			min	0	3	-.004	3	0	1	0	1	NC	1	NC	1
373		16	max	.001	1	.003	2	0	1	0	1	NC	1	NC	1
374			min	0	3	-.003	3	0	1	0	1	NC	1	NC	1
375		17	max	0	1	.002	2	0	1	0	1	NC	1	NC	1
376			min	0	3	-.002	3	0	1	0	1	NC	1	NC	1
377		18	max	0	1	0	2	0	1	0	1	NC	1	NC	1
378			min	0	3	-.001	3	0	1	0	1	NC	1	NC	1
379		19	max	0	1	0	1	0	1	0	1	NC	1	NC	1
380			min	0	1	0	1	0	1	0	1	NC	1	NC	1
381	M10	1	max	.006	1	.006	2	0	15	3.041e-4	1	NC	1	NC	2
382			min	-.007	3	-.01	3	-.011	1	1.442e-5	15	NC	1	6635.32	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
383		2	max	.006	1	.005	2	0	15	2.865e-4	1	NC	1	NC	2
384			min	-.006	3	-.01	3	-.01	1	1.359e-5	15	NC	1	7236.423	1
385		3	max	.005	1	.004	2	0	15	2.69e-4	1	NC	1	NC	2
386			min	-.006	3	-.01	3	-.009	1	1.276e-5	15	NC	1	7952.748	1
387		4	max	.005	1	.003	2	0	15	2.514e-4	1	NC	1	NC	2
388			min	-.006	3	-.01	3	-.008	1	1.193e-5	15	NC	1	8814.822	1
389		5	max	.005	1	.002	2	0	15	2.339e-4	1	NC	1	NC	2
390			min	-.005	3	-.009	3	-.007	1	1.109e-5	15	NC	1	9864.306	1
391		6	max	.004	1	.001	2	0	15	2.163e-4	1	NC	1	NC	1
392			min	-.005	3	-.009	3	-.006	1	1.026e-5	15	NC	1	NC	1
393		7	max	.004	1	0	2	0	15	1.988e-4	1	NC	1	NC	1
394			min	-.005	3	-.009	3	-.005	1	9.429e-6	15	NC	1	NC	1
395		8	max	.004	1	0	2	0	15	1.812e-4	1	NC	1	NC	1
396			min	-.004	3	-.008	3	-.005	1	8.597e-6	15	NC	1	NC	1
397		9	max	.003	1	0	2	0	15	1.637e-4	1	NC	1	NC	1
398			min	-.004	3	-.008	3	-.004	1	7.765e-6	15	NC	1	NC	1
399		10	max	.003	1	-.001	15	0	15	1.461e-4	1	NC	1	NC	1
400			min	-.003	3	-.007	3	-.003	1	6.933e-6	15	NC	1	NC	1
401		11	max	.003	1	-.001	15	0	15	1.286e-4	1	NC	1	NC	1
402			min	-.003	3	-.007	3	-.003	1	6.101e-6	15	NC	1	NC	1
403		12	max	.002	1	-.001	15	0	15	1.11e-4	1	NC	1	NC	1
404			min	-.003	3	-.006	3	-.002	1	5.269e-6	15	NC	1	NC	1
405		13	max	.002	1	-.001	15	0	15	9.347e-5	1	NC	1	NC	1
406			min	-.002	3	-.005	3	-.002	1	4.437e-6	15	NC	1	NC	1
407		14	max	.002	1	-.001	15	0	15	7.591e-5	1	NC	1	NC	1
408			min	-.002	3	-.005	3	-.001	1	3.605e-6	15	NC	1	NC	1
409		15	max	.001	1	0	15	0	15	5.836e-5	1	NC	1	NC	1
410			min	-.002	3	-.004	4	0	1	2.773e-6	15	NC	1	NC	1
411		16	max	.001	1	0	15	0	15	4.081e-5	1	NC	1	NC	1
412			min	-.001	3	-.003	4	0	1	1.941e-6	15	NC	1	NC	1
413		17	max	0	1	0	15	0	15	2.326e-5	1	NC	1	NC	1
414			min	0	3	-.002	4	0	1	1.109e-6	15	NC	1	NC	1
415		18	max	0	1	0	15	0	15	5.708e-6	1	NC	1	NC	1
416			min	0	3	-.001	4	0	1	2.766e-7	15	NC	1	NC	1
417		19	max	0	1	0	1	0	1	-5.249e-7	12	NC	1	NC	1
418			min	0	1	0	1	0	1	-1.184e-5	1	NC	1	NC	1
419	M11	1	max	0	1	0	1	0	1	4.723e-6	1	NC	1	NC	1
420			min	0	1	0	1	0	1	2.221e-7	12	NC	1	NC	1
421		2	max	0	3	0	15	0	12	-1.145e-6	15	NC	1	NC	1
422			min	0	2	-.002	4	0	1	-2.414e-5	1	NC	1	NC	1
423		3	max	0	3	0	15	0	12	-2.511e-6	15	NC	1	NC	1
424			min	0	2	-.004	4	0	1	-5.301e-5	1	NC	1	NC	1
425		4	max	0	3	-.001	15	0	15	-3.878e-6	15	NC	1	NC	1
426			min	0	2	-.006	4	0	1	-8.188e-5	1	NC	1	NC	1
427		5	max	.001	3	-.002	15	0	15	-5.245e-6	15	NC	1	NC	1
428			min	0	2	-.008	4	0	1	-1.107e-4	1	NC	1	NC	1
429		6	max	.002	3	-.002	15	0	15	-6.612e-6	15	NC	1	NC	1
430			min	-.001	2	-.01	4	0	1	-1.396e-4	1	9624.063	4	NC	1
431		7	max	.002	3	-.003	15	0	15	-7.979e-6	15	NC	1	NC	1
432			min	-.001	2	-.011	4	0	1	-1.685e-4	1	8289.99	4	NC	1
433		8	max	.002	3	-.003	15	0	15	-9.346e-6	15	NC	2	NC	1
434			min	-.002	2	-.012	4	-.001	1	-1.973e-4	1	7467.797	4	NC	1
435		9	max	.003	3	-.003	15	0	15	-1.071e-5	15	NC	3	NC	1
436			min	-.002	2	-.013	4	-.002	1	-2.262e-4	1	6984.719	4	NC	1
437		10	max	.003	3	-.003	15	0	15	-1.208e-5	15	NC	3	NC	1
438			min	-.002	2	-.014	4	-.002	1	-2.551e-4	1	6757.21	4	NC	1
439		11	max	.003	3	-.003	15	0	15	-1.345e-5	15	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
440			min	-.002	2	-.014	4	-.003	1	-2.84e-4	1	6751.943	4	NC	1
441		12	max	.003	3	-.003	15	0	15	-1.481e-5	15	NC	3	NC	1
442			min	-.003	2	-.013	4	-.003	1	-3.128e-4	1	6973.025	4	NC	1
443		13	max	.004	3	-.003	15	0	15	-1.618e-5	15	NC	2	NC	1
444			min	-.003	2	-.013	4	-.004	1	-3.417e-4	1	7465.24	4	NC	1
445		14	max	.004	3	-.003	15	0	15	-1.755e-5	15	NC	1	NC	1
446			min	-.003	2	-.011	4	-.005	1	-3.706e-4	1	8336.968	4	NC	1
447		15	max	.004	3	-.002	15	0	15	-1.891e-5	15	NC	1	NC	1
448			min	-.003	2	-.01	4	-.006	1	-3.994e-4	1	9827.343	4	NC	1
449		16	max	.005	3	-.002	15	0	15	-2.028e-5	15	NC	1	NC	1
450			min	-.004	2	-.008	4	-.006	1	-4.283e-4	1	NC	1	NC	1
451		17	max	.005	3	-.001	15	0	15	-2.165e-5	15	NC	1	NC	1
452			min	-.004	2	-.006	1	-.008	1	-4.572e-4	1	NC	1	NC	1
453		18	max	.005	3	0	15	0	15	-2.301e-5	15	NC	1	NC	1
454			min	-.004	2	-.004	1	-.009	1	-4.86e-4	1	NC	1	NC	1
455		19	max	.006	3	0	10	0	15	-2.438e-5	15	NC	1	NC	2
456			min	-.004	2	-.003	1	-.01	1	-5.149e-4	1	NC	1	9014.597	1
457	M12	1	max	.003	1	.004	2	.01	1	-5.562e-6	15	NC	1	NC	3
458			min	0	3	-.006	3	0	15	-1.172e-4	1	NC	1	2478.579	1
459		2	max	.002	1	.004	2	.009	1	-5.562e-6	15	NC	1	NC	3
460			min	0	3	-.006	3	0	15	-1.172e-4	1	NC	1	2691.609	1
461		3	max	.002	1	.004	2	.008	1	-5.562e-6	15	NC	1	NC	3
462			min	0	3	-.005	3	0	15	-1.172e-4	1	NC	1	2945.373	1
463		4	max	.002	1	.003	2	.008	1	-5.562e-6	15	NC	1	NC	3
464			min	0	3	-.005	3	0	15	-1.172e-4	1	NC	1	3250.41	1
465		5	max	.002	1	.003	2	.007	1	-5.562e-6	15	NC	1	NC	3
466			min	0	3	-.005	3	0	15	-1.172e-4	1	NC	1	3621.051	1
467		6	max	.002	1	.003	2	.006	1	-5.562e-6	15	NC	1	NC	3
468			min	0	3	-.004	3	0	15	-1.172e-4	1	NC	1	4077.165	1
469		7	max	.002	1	.003	2	.005	1	-5.562e-6	15	NC	1	NC	2
470			min	0	3	-.004	3	0	15	-1.172e-4	1	NC	1	4646.96	1
471		8	max	.002	1	.002	2	.005	1	-5.562e-6	15	NC	1	NC	2
472			min	0	3	-.004	3	0	15	-1.172e-4	1	NC	1	5371.567	1
473		9	max	.001	1	.002	2	.004	1	-5.562e-6	15	NC	1	NC	2
474			min	0	3	-.003	3	0	15	-1.172e-4	1	NC	1	6312.904	1
475		10	max	.001	1	.002	2	.003	1	-5.562e-6	15	NC	1	NC	2
476			min	0	3	-.003	3	0	15	-1.172e-4	1	NC	1	7567.741	1
477		11	max	.001	1	.002	2	.003	1	-5.562e-6	15	NC	1	NC	2
478			min	0	3	-.003	3	0	15	-1.172e-4	1	NC	1	9294.356	1
479		12	max	0	1	.002	2	.002	1	-5.562e-6	15	NC	1	NC	1
480			min	0	3	-.002	3	0	15	-1.172e-4	1	NC	1	NC	1
481		13	max	0	1	.001	2	.002	1	-5.562e-6	15	NC	1	NC	1
482			min	0	3	-.002	3	0	15	-1.172e-4	1	NC	1	NC	1
483		14	max	0	1	.001	2	.001	1	-5.562e-6	15	NC	1	NC	1
484			min	0	3	-.002	3	0	15	-1.172e-4	1	NC	1	NC	1
485		15	max	0	1	0	2	0	1	-5.562e-6	15	NC	1	NC	1
486			min	0	3	-.001	3	0	15	-1.172e-4	1	NC	1	NC	1
487		16	max	0	1	0	2	0	1	-5.562e-6	15	NC	1	NC	1
488			min	0	3	0	3	0	15	-1.172e-4	1	NC	1	NC	1
489		17	max	0	1	0	2	0	1	-5.562e-6	15	NC	1	NC	1
490			min	0	3	0	3	0	15	-1.172e-4	1	NC	1	NC	1
491		18	max	0	1	0	2	0	1	-5.562e-6	15	NC	1	NC	1
492			min	0	3	0	3	0	15	-1.172e-4	1	NC	1	NC	1
493		19	max	0	1	0	1	0	1	-5.562e-6	15	NC	1	NC	1
494			min	0	1	0	1	0	1	-1.172e-4	1	NC	1	NC	1
495	M1	1	max	.007	3	.087	2	.001	1	1.624e-2	1	NC	1	NC	1
496			min	-.003	2	-.01	3	0	15	-2.445e-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	.007	3	.041	2	0	15	7.864e-3	1	NC	3	NC	1
498			min	-.003	2	-.003	3	-.007	1	-1.21e-2	3	2488.914	2	NC	1
499		3	max	.007	3	.011	3	0	15	7.989e-6	10	NC	5	NC	2
500			min	-.003	2	-.009	2	-.011	1	-2.227e-4	1	1197.309	2	9772.676	1
501		4	max	.007	3	.035	3	0	15	4.173e-3	1	NC	5	NC	1
502			min	-.003	2	-.065	2	-.01	1	-4.265e-3	3	753.828	2	NC	1
503		5	max	.007	3	.066	3	0	15	8.568e-3	1	NC	15	NC	1
504			min	-.003	2	-.125	2	-.007	1	-8.408e-3	3	542.848	2	NC	1
505		6	max	.007	3	.1	3	0	15	1.296e-2	1	NC	15	NC	1
506			min	-.003	2	-.182	2	-.003	1	-1.255e-2	3	426.826	2	NC	1
507		7	max	.007	3	.132	3	0	1	1.736e-2	1	NC	15	NC	1
508			min	-.003	2	-.234	2	0	12	-1.669e-2	3	358.442	2	NC	1
509		8	max	.006	3	.16	3	.001	1	2.175e-2	1	9051.708	15	NC	1
510			min	-.003	2	-.274	2	0	15	-2.084e-2	3	318.039	2	NC	1
511		9	max	.006	3	.178	3	0	15	2.414e-2	1	8455.406	15	NC	1
512			min	-.003	2	-.3	2	0	1	-2.086e-2	3	297.026	2	NC	1
513		10	max	.006	3	.184	3	0	1	2.556e-2	2	8273.92	15	NC	1
514			min	-.003	2	-.309	2	0	12	-1.814e-2	3	290.856	2	NC	1
515		11	max	.006	3	.179	3	0	1	2.769e-2	2	8455.121	15	NC	1
516			min	-.003	2	-.3	2	0	15	-1.542e-2	3	298.001	2	NC	1
517		12	max	.006	3	.164	3	0	15	2.685e-2	2	9051.116	15	NC	1
518			min	-.003	2	-.273	2	-.001	1	-1.277e-2	3	321.034	2	NC	1
519		13	max	.006	3	.14	3	0	15	2.155e-2	2	NC	15	NC	1
520			min	-.003	2	-.23	2	0	1	-1.022e-2	3	365.782	2	NC	1
521		14	max	.006	3	.109	3	.003	1	1.625e-2	2	NC	15	NC	1
522			min	-.003	2	-.177	2	0	15	-7.668e-3	3	441.448	1	NC	1
523		15	max	.005	3	.074	3	.006	1	1.095e-2	2	NC	15	NC	1
524			min	-.003	2	-.118	2	0	15	-5.117e-3	3	570.425	1	NC	1
525		16	max	.005	3	.038	3	.009	1	5.65e-3	2	NC	5	NC	1
526			min	-.003	2	-.059	2	0	15	-2.566e-3	3	808.933	1	NC	1
527		17	max	.005	3	.004	3	.01	1	6.622e-4	1	NC	5	NC	1
528			min	-.003	2	-.005	2	0	15	-1.45e-5	3	1317.988	1	NC	1
529		18	max	.005	3	.042	1	.007	1	1.091e-2	2	NC	4	NC	1
530			min	-.003	2	-.027	3	0	15	-4.3e-3	3	2790.946	1	NC	1
531		19	max	.005	3	.083	1	0	15	2.184e-2	2	NC	1	NC	1
532			min	-.002	2	-.055	3	-.002	1	-8.746e-3	3	NC	1	NC	1
533	M5	1	max	.022	3	.215	2	0	1	0	1	NC	1	NC	1
534			min	-.015	2	-.012	3	0	1	0	1	NC	1	NC	1
535		2	max	.022	3	.099	2	0	1	0	1	NC	5	NC	1
536			min	-.015	2	.001	3	0	1	0	1	1002.627	2	NC	1
537		3	max	.022	3	.034	3	0	1	0	1	NC	15	NC	1
538			min	-.015	2	-.029	2	0	1	0	1	473.487	2	NC	1
539		4	max	.022	3	.102	3	0	1	0	1	9409.466	15	NC	1
540			min	-.015	2	-.181	2	0	1	0	1	291.24	2	NC	1
541		5	max	.021	3	.195	3	0	1	0	1	6590.451	15	NC	1
542			min	-.014	2	-.345	2	0	1	0	1	205.8	2	NC	1
543		6	max	.021	3	.298	3	0	1	0	1	5077.089	15	NC	1
544			min	-.014	2	-.508	2	0	1	0	1	159.541	2	NC	1
545		7	max	.02	3	.399	3	0	1	0	1	4202.496	15	NC	1
546			min	-.014	2	-.654	2	0	1	0	1	132.626	2	NC	1
547		8	max	.02	3	.483	3	0	1	0	1	3693.689	15	NC	1
548			min	-.013	2	-.771	2	0	1	0	1	116.891	2	NC	1
549		9	max	.019	3	.537	3	0	1	0	1	3432.655	15	NC	1
550			min	-.013	2	-.846	2	0	1	0	1	108.79	2	NC	1
551		10	max	.019	3	.556	3	0	1	0	1	3354.003	15	NC	1
552			min	-.013	2	-.87	2	0	1	0	1	106.416	2	NC	1
553		11	max	.019	3	.542	3	0	1	0	1	3432.751	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	-.013	2	-.845	2	0	1	0	1	109.158	2	NC	1
555		12	max	.018	3	.495	3	0	1	0	1	3693.919	15	NC	1
556			min	-.013	2	-.768	2	0	1	0	1	118.089	2	NC	1
557		13	max	.018	3	.42	3	0	1	0	1	4202.98	15	NC	1
558			min	-.012	2	-.644	2	0	1	0	1	135.255	1	NC	1
559		14	max	.017	3	.325	3	0	1	0	1	5078.058	15	NC	1
560			min	-.012	2	-.49	2	0	1	0	1	164.988	1	NC	1
561		15	max	.017	3	.22	3	0	1	0	1	6592.395	15	NC	1
562			min	-.012	2	-.323	2	0	1	0	1	217.074	1	NC	1
563		16	max	.016	3	.112	3	0	1	0	1	9413.578	15	NC	1
564			min	-.012	2	-.16	2	0	1	0	1	315.679	1	NC	1
565		17	max	.016	3	.012	3	0	1	0	1	NC	5	NC	1
566			min	-.012	2	-.016	2	0	1	0	1	531.373	1	NC	1
567		18	max	.016	3	.103	1	0	1	0	1	NC	5	NC	1
568			min	-.012	2	-.075	3	0	1	0	1	1155.302	1	NC	1
569		19	max	.016	3	.201	1	0	1	0	1	NC	1	NC	1
570			min	-.012	2	-.153	3	0	1	0	1	NC	1	NC	1
571	M9	1	max	.007	3	.087	2	0	15	2.445e-2	3	NC	1	NC	1
572			min	-.003	2	-.01	3	-.001	1	-1.624e-2	1	NC	1	NC	1
573		2	max	.007	3	.041	2	.007	1	1.21e-2	3	NC	3	NC	1
574			min	-.003	2	-.003	3	0	15	-7.864e-3	1	2488.914	2	NC	1
575		3	max	.007	3	.011	3	.011	1	2.227e-4	1	NC	5	NC	2
576			min	-.003	2	-.009	2	0	15	-7.989e-6	10	1197.309	2	9772.676	1
577		4	max	.007	3	.035	3	.01	1	4.265e-3	3	NC	5	NC	1
578			min	-.003	2	-.065	2	0	15	-4.173e-3	1	753.828	2	NC	1
579		5	max	.007	3	.066	3	.007	1	8.408e-3	3	NC	15	NC	1
580			min	-.003	2	-.125	2	0	15	-8.568e-3	1	542.848	2	NC	1
581		6	max	.007	3	.1	3	.003	1	1.255e-2	3	NC	15	NC	1
582			min	-.003	2	-.182	2	0	15	-1.296e-2	1	426.826	2	NC	1
583		7	max	.007	3	.132	3	0	12	1.669e-2	3	NC	15	NC	1
584			min	-.003	2	-.234	2	0	1	-1.736e-2	1	358.442	2	NC	1
585		8	max	.006	3	.16	3	0	15	2.084e-2	3	9051.708	15	NC	1
586			min	-.003	2	-.274	2	-.001	1	-2.175e-2	1	318.039	2	NC	1
587		9	max	.006	3	.178	3	0	1	2.086e-2	3	8455.406	15	NC	1
588			min	-.003	2	-.3	2	0	15	-2.414e-2	1	297.026	2	NC	1
589		10	max	.006	3	.184	3	0	12	1.814e-2	3	8273.92	15	NC	1
590			min	-.003	2	-.309	2	0	1	-2.556e-2	2	290.856	2	NC	1
591		11	max	.006	3	.179	3	0	15	1.542e-2	3	8455.121	15	NC	1
592			min	-.003	2	-.3	2	0	1	-2.769e-2	2	298.001	2	NC	1
593		12	max	.006	3	.164	3	.001	1	1.277e-2	3	9051.116	15	NC	1
594			min	-.003	2	-.273	2	0	15	-2.685e-2	2	321.034	2	NC	1
595		13	max	.006	3	.14	3	0	1	1.022e-2	3	NC	15	NC	1
596			min	-.003	2	-.23	2	0	15	-2.155e-2	2	365.782	2	NC	1
597		14	max	.006	3	.109	3	0	15	7.668e-3	3	NC	15	NC	1
598			min	-.003	2	-.177	2	-.003	1	-1.625e-2	2	441.448	1	NC	1
599		15	max	.005	3	.074	3	0	15	5.117e-3	3	NC	15	NC	1
600			min	-.003	2	-.118	2	-.006	1	-1.095e-2	2	570.425	1	NC	1
601		16	max	.005	3	.038	3	0	15	2.566e-3	3	NC	5	NC	1
602			min	-.003	2	-.059	2	-.009	1	-5.65e-3	2	808.933	1	NC	1
603		17	max	.005	3	.004	3	0	15	1.45e-5	3	NC	5	NC	1
604			min	-.003	2	-.005	2	-.01	1	-6.622e-4	1	1317.988	1	NC	1
605		18	max	.005	3	.042	1	0	15	4.3e-3	3	NC	4	NC	1
606			min	-.003	2	-.027	3	-.007	1	-1.091e-2	2	2790.946	1	NC	1
607		19	max	.005	3	.083	1	.002	1	8.746e-3	3	NC	1	NC	1
608			min	-.002	2	-.055	3	0	15	-2.184e-2	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

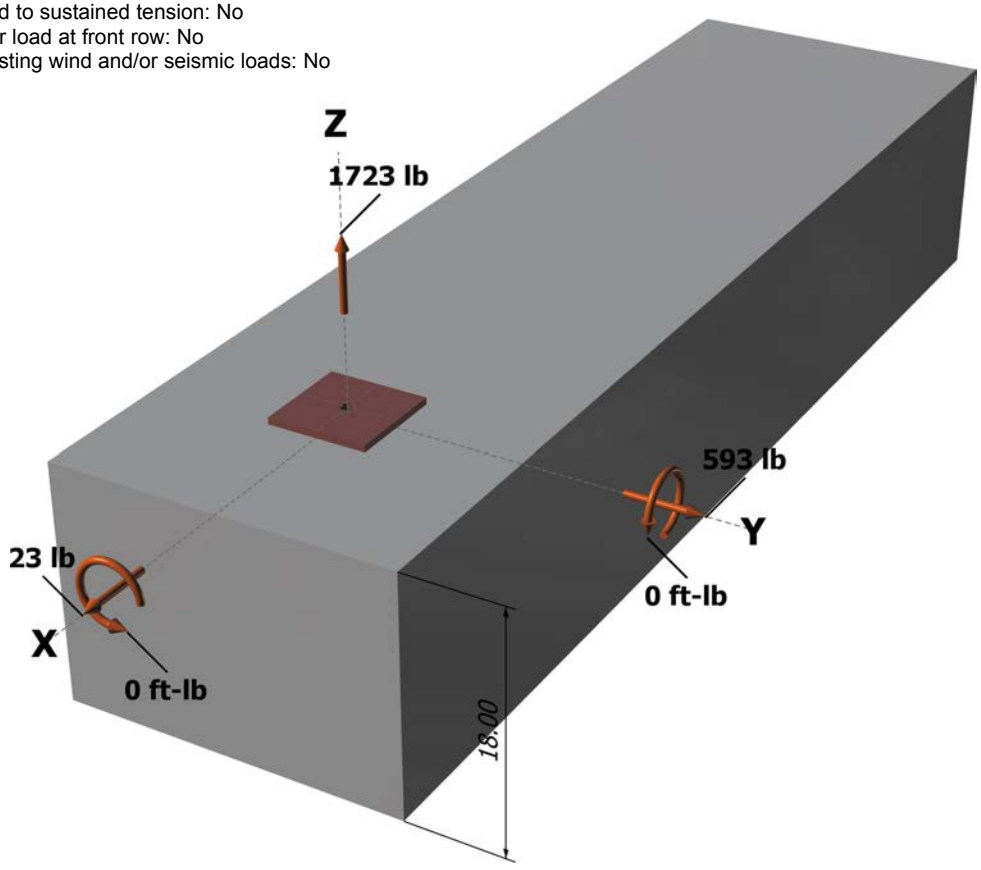
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



<Figure 2>

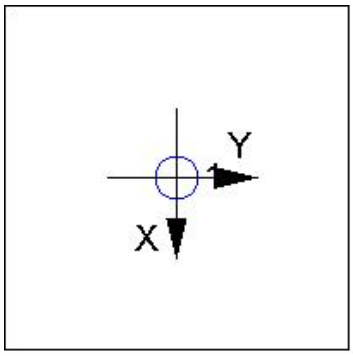
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

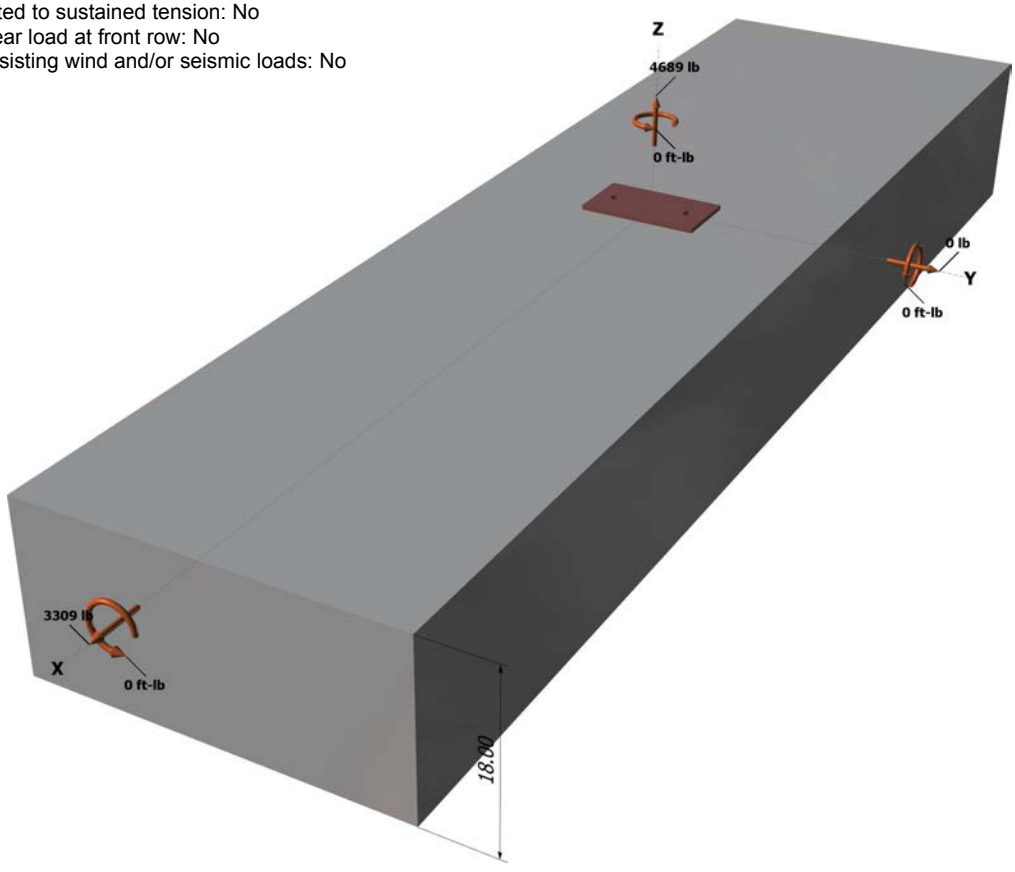
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

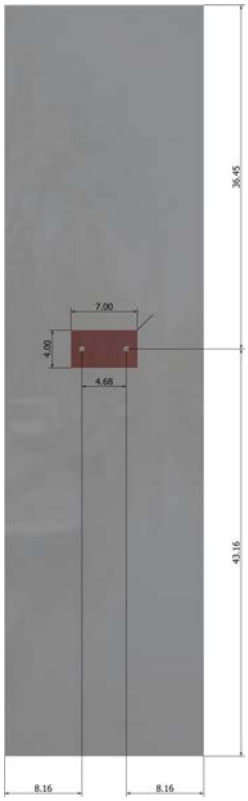
<Figure 1>

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>



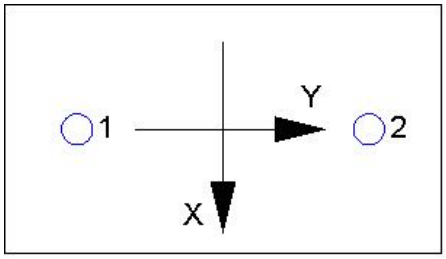
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.