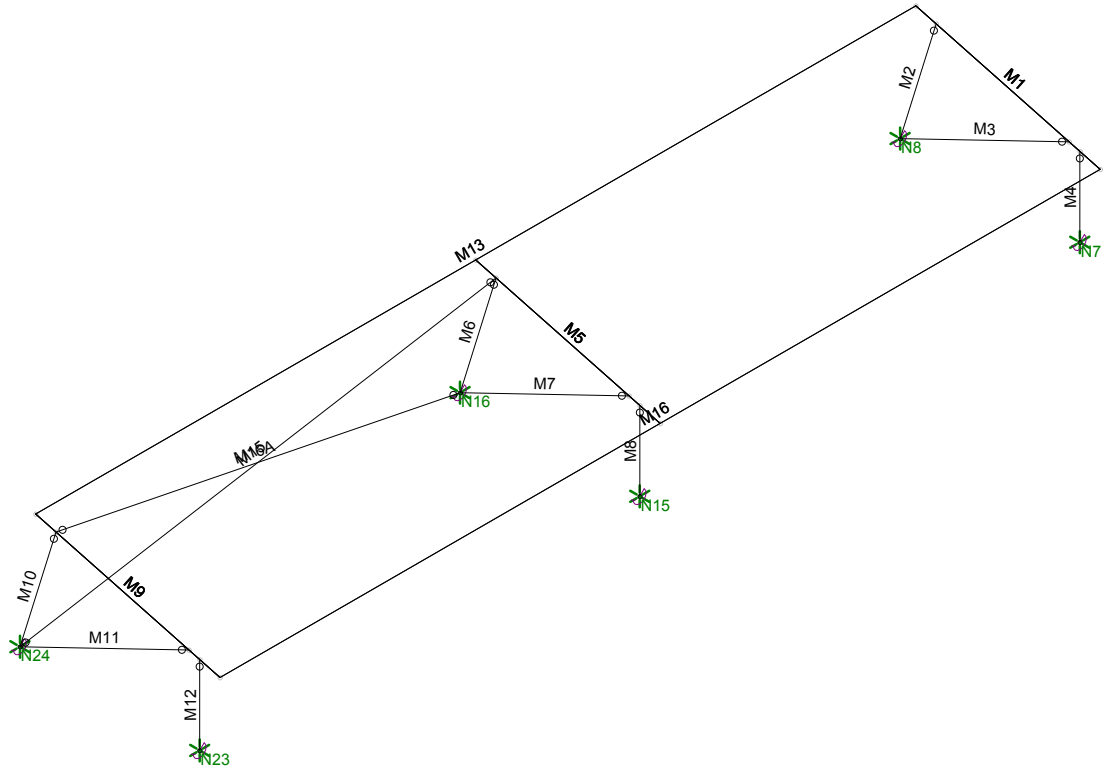


Schletter, Inc.		15° Tilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

1. INTRODUCTION

1.1 Project Description

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

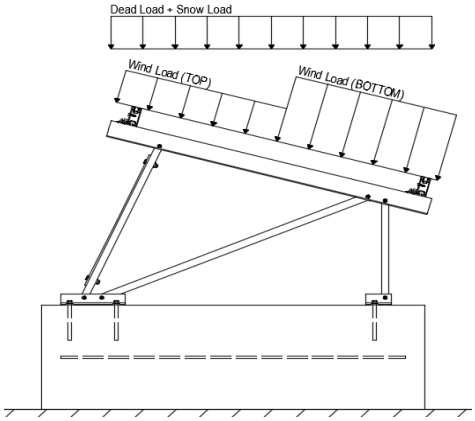
1.2 Construction

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	1550	mm
Width =	1050	mm	970	mm
Dead Load =	3.00	psf	1.75	psf

Modules Per Row =	1
Module Tilt =	15°
Maximum Height Above Grade =	3 ft



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

1.3 Technical Codes

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

2. LOAD ACTIONS

2.1 Permanent Loads

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

2.2 Snow Loads

Ground Snow Load, P_g =	30.00	psf	
Sloped Roof Snow Load, P_s =	22.68	psf	*(ASCE 7-05, Eq. 7-2)*
I_s =	1.00		
C_s =	1.00		
C_e =	0.90		
C_t =	1.20		

2.3 Wind Loads

Design Wind Speed, V =	90	mph	Exposure Category = C
Height ≤	15	ft	Importance Category = II
Peak Velocity Pressure, q_z =	12.72	psf	*Including the gust factor, G=0.85. (ASCE 7-05, Eq. 6-15)*

Pressure Coefficients

$Cf+_{TOP}$ =	1		*(Pressure)*
$Cf+_{BOTTOM}$ =	1.6		
$Cf-_{TOP}$ =	-2.04		*(Suction)*
$Cf-_{BOTTOM}$ =	-1		

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.8W
1.2D + 1.6W + 0.5S
0.9D + 1.6W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 1.0W
1.0D + 0.75L + 0.75W + 0.75S
0.6D + 1.0W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M16	Bottom

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Bracing
M15
M16A

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

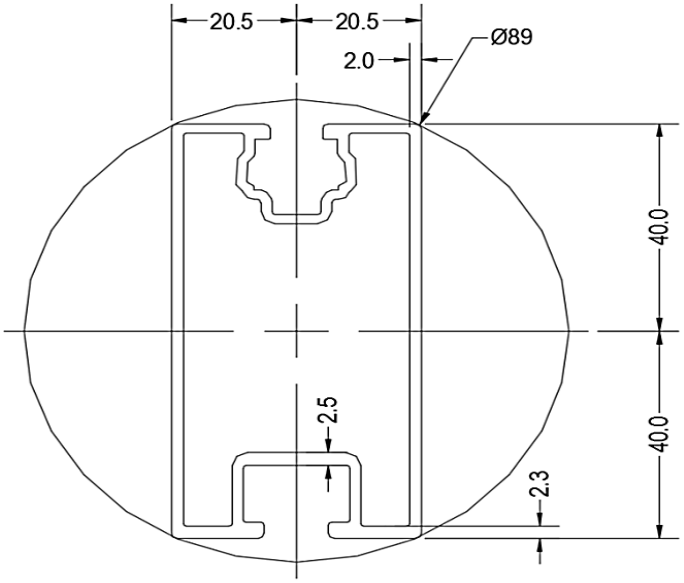
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

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).

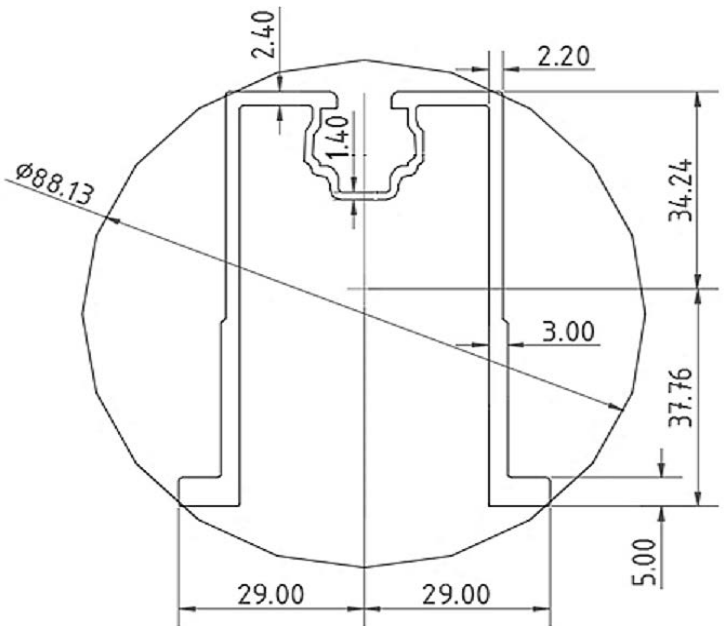
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	99	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.68	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.289	k-ft
M_z =	0.183	k-ft
$M_{y\ allowable}$ =	1.782	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	94%	



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).

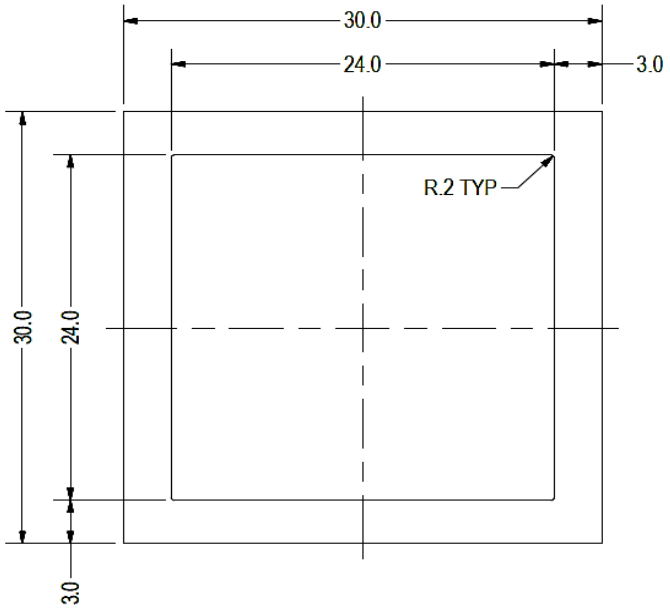
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.647	k-ft
M_z =	0.000	k-ft
P_n =	0.203	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	46%	



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 M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

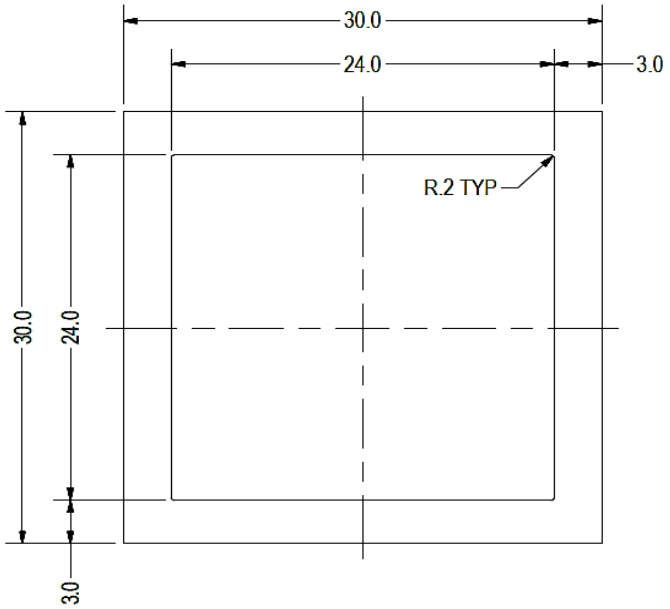
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.752	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	14%	



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 M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

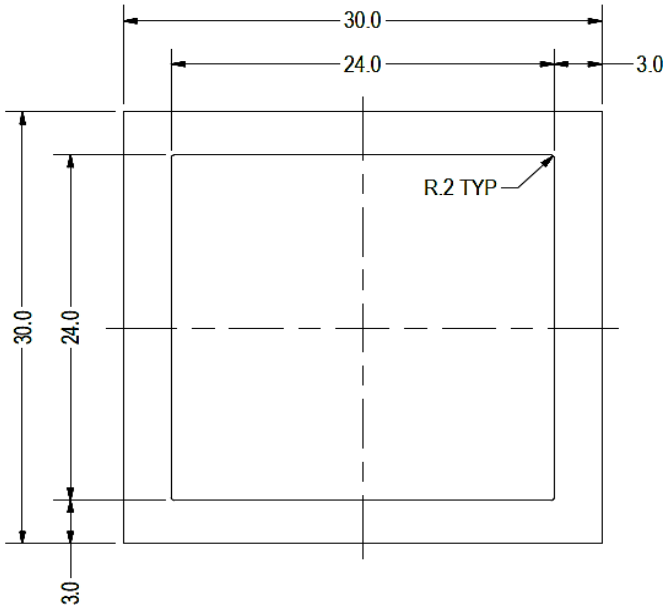
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.164	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	4%	



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 M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

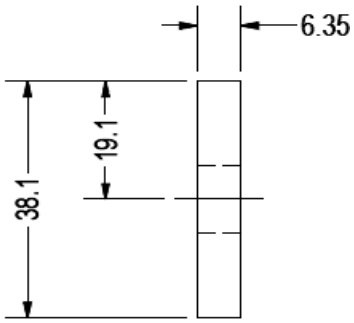
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.408	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	17%	



4.6 Cross Brace Design

In order to resist weak side loading, aluminum cross bracing kits are provided. The cross bracing is attached at one end of a rear aluminum strut diagonally down to the bottom end of an adjacent strut. Single M10 bolts are provided at each of the cross bracing. Section units are in (mm).

Brace Type =	**1.5x0.25**	
Aluminum Type =	6061-T6	
F_{ty} =	35	ksi
Φ =	0.90	
S_y =	0.02	in^3
E =	10100	ksi
I_y =	33.25	in^4
A =	0.38	in^2
g =	0.45	lbs/ft
M_y =	0.006	k-ft
P_n =	0.028	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	13%	



A cross brace kit is required every 14 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

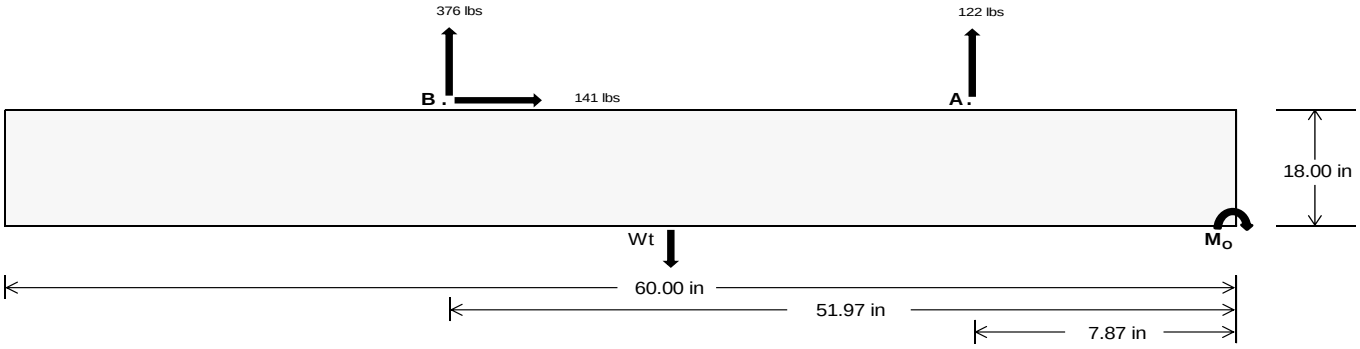
5.1 Helical Pile Foundations

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 =	511.37	1566.57	k
Compressive Load =	2277.82	1670.25	k
Lateral Load =	4.10	588.58	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Overturning Check

M_O =	23021.8 in-lbs
Resisting Force Required =	767.39 lbs
S.F. =	1.67
Weight Required =	1278.99 lbs
Minimum Width =	23 in in
Weight Provided =	2084.38 lbs

Sliding

Force =	141.44 lbs
Friction =	0.4
Weight Required =	353.59 lbs
Resisting Weight =	2084.38 lbs
Additional Weight Required =	0 lbs

Cohesion

Sliding Force =	141.44 lbs
Cohesion =	130 psf
Area =	9.58 ft^2
Resisting =	1042.19 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 (1) #5 rebar.

A minimum 60in long x 23in wide x 18in tall ballast foundation is required to resist overturning.

Use a 60in long x 23in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Use a 60in long x 23in wide x 18in tall ballast foundation. Cohesion is OK.

Shear key is not required.

Bearing Pressure

	Ballast Width			
	23 in	24 in	25 in	26 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.92 ft) =	2084 lbs	2175 lbs	2266 lbs	2356 lbs

ASD LC	1.0D + 1.0S				1.0D + 1.0W				1.0D + 0.75L + 0.75W + 0.75S				0.6D + 1.0W			
Width	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in	23 in	24 in	25 in	26 in
F_A	860 lbs	860 lbs	860 lbs	860 lbs	648 lbs	648 lbs	648 lbs	648 lbs	1072 lbs	1072 lbs	1072 lbs	1072 lbs	-243 lbs	-243 lbs	-243 lbs	-243 lbs
F_B	632 lbs	632 lbs	632 lbs	632 lbs	474 lbs	474 lbs	474 lbs	474 lbs	785 lbs	785 lbs	785 lbs	785 lbs	-751 lbs	-751 lbs	-751 lbs	-751 lbs
F_V	60 lbs	60 lbs	60 lbs	60 lbs	252 lbs	252 lbs	252 lbs	252 lbs	231 lbs	231 lbs	231 lbs	231 lbs	-283 lbs	-283 lbs	-283 lbs	-283 lbs
P_{total}	3576 lbs	3667 lbs	3758 lbs	3848 lbs	3206 lbs	3297 lbs	3387 lbs	3478 lbs	3942 lbs	4032 lbs	4123 lbs	4213 lbs	256 lbs	311 lbs	365 lbs	419 lbs
M	517 lbs-ft	517 lbs-ft	517 lbs-ft	517 lbs-ft	706 lbs-ft	706 lbs-ft	706 lbs-ft	706 lbs-ft	885 lbs-ft	885 lbs-ft	885 lbs-ft	885 lbs-ft	503 lbs-ft	503 lbs-ft	503 lbs-ft	503 lbs-ft
e	0.14 ft	0.14 ft	0.14 ft	0.13 ft	0.22 ft	0.21 ft	0.21 ft	0.20 ft	0.22 ft	0.22 ft	0.21 ft	0.21 ft	1.96 ft	1.62 ft	1.38 ft	1.20 ft
L/6	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft	0.83 ft
f_{min}	308.4 psf	304.7 psf	301.2 psf	298.0 psf	246.1 psf	244.9 psf	243.8 psf	242.8 psf	300.4 psf	297.0 psf	293.8 psf	290.9 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	437.9 psf	428.7 psf	420.3 psf	412.5 psf	423.0 psf	414.4 psf	406.6 psf	399.3 psf	522.1 psf	509.4 psf	497.8 psf	487.0 psf	165.4 psf	117.4 psf	104.0 psf	99.2 psf

Maximum Bearing Pressure = 522 psf
Allowable Bearing Pressure = 1500 psf

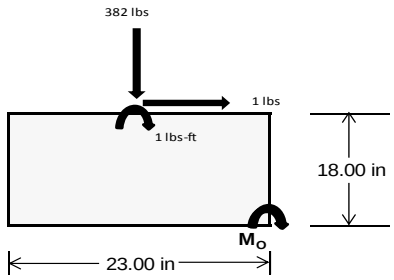
Use a 60in long x 23in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	364.0 ft-lbs
Resisting Force Required =	379.82 lbs
S.F. =	1.67
Weight Required =	633.04 lbs
Minimum Width =	23 in in
Weight Provided =	2084.38 lbs

A minimum 60in long x 23in 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	23 in			23 in			23 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	91 lbs	255 lbs	86 lbs	387 lbs	1207 lbs	382 lbs	27 lbs	75 lbs	25 lbs
F_V	3 lbs	3 lbs	0 lbs	17 lbs	16 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2671 lbs	2836 lbs	2666 lbs	2844 lbs	3664 lbs	2839 lbs	781 lbs	829 lbs	780 lbs
M	5 lbs-ft	5 lbs-ft	0 lbs-ft	29 lbs-ft	24 lbs-ft	2 lbs-ft	1 lbs-ft	1 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.32 ft	1.91 ft	1.92 ft	1.90 ft	1.90 ft	1.92 ft	1.91 ft	1.91 ft	1.92 ft
f_{min}	277.1 sqft	294.4 sqft	278.1 sqft	287.2 sqft	374.5 sqft	295.5 sqft	81.0 sqft	86.1 sqft	81.3 sqft
f_{max}	280.3 psf	297.4 psf	278.3 psf	306.2 psf	390.1 psf	296.9 psf	82.0 psf	87.0 psf	81.4 psf

Maximum Bearing Pressure = 390 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 23in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 23in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

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

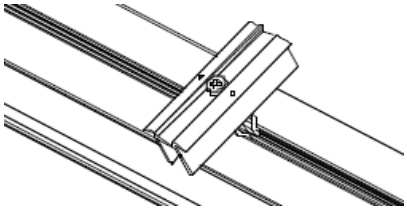
6. DESIGN OF JOINTS AND CONNECTIONS

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

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

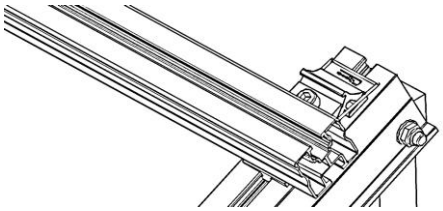
Fastening of Modules to Purlins

Maximum Uplifting Force	=	0.384 k
Allowable Uplift	=	1.214 k
Utilization	=	32%



Fastening of Purlins to Girders

Maximum Uplifting Force	=	1.106 k
Allowable Uplift	=	1.116 k
Utilization	=	99%



6.2 Bolted Connections

The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 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	=	1.752 k
M8 Bolt Capacity	=	5.692 k
Strut Bearing Capacity	=	7.952 k
Utilization	=	31%

Rear Strut

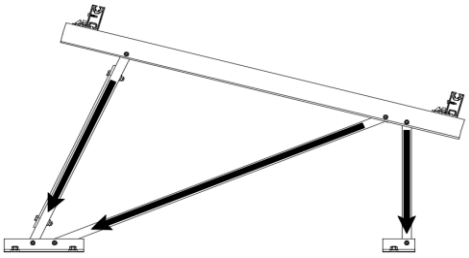
Maximum Axial Load	=	1.408 k
M8 Bolt Capacity	=	5.692 k
Strut Bearing Capacity	=	7.952 k
Utilization	=	25%

Diagonal Strut

Maximum Axial Load	=	0.164 k
M8 Bolt Shear Capacity	=	5.692 k
Strut Bearing Capacity	=	7.952 k
Utilization	=	3%

Bracing

Maximum Axial Load	=	0.028 k
M10 Bolt Capacity	=	8.894 k
Strut Bearing Capacity	=	7.952 k
Utilization	=	0%



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 M8 bolts are located at each end of the strut and are subjected to double shear.

7. SEISMIC DESIGN

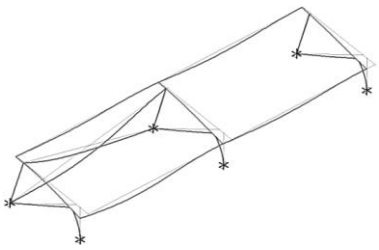
7.1 Seismic Drift - N/A

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}	=	28.39 in
Allowable Story Drift for All Other Structures, Δ	= {	$0.020h_{sx}$
		0.568 in
Max Drift, Δ_{MAX}	=	0.047 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 = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 99.00 in

J = 0.427

206.479

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

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= 28.7 ksi

3.4.16

b/t = 6.6

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

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 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

Weak Axis:

3.4.14

L_b = 99.00 in

J = 0.427

224.369

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

S1 = 38.1
m = 0.63
C_0 = 40.784
Cc = 39.216

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

S2 = 79.7
φF_L = 1.3φyFcy
φF_L = 43.2 ksi

φF_LSt = 28.7 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
M_{max}St = 1.782 k-ft

3.4.18

h/t = 6.6

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

S1 = 36.9
m = 0.65
C_0 = 20.5
Cc = 20.5

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

S2 = 77.3
φF_L = 1.3φyFcy
φF_L = 43.2 ksi

φF_LWk = 22.7 ksi
Iy = 148662 mm^4
0.357 in^4
x = 20.5 mm
Sy = 0.443 in^3
M_{max}Wk = 0.838 k-ft

Compression

3.4.9

b/t = 6.6
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L = φyFcy
φF_L = 33.3 ksi

b/t = 37.95
S1 = 12.21
S2 = 32.70
φF_L = (φck2*√(BpE))/(1.6b/t)
φF_L = 21.4 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 = 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.25
21.9891

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.7 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7
φF_L= φyFcy
φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in
ry = 1.374
Cb = 1.25
24.5845

$$S1 = \frac{1.2(Bc - \frac{\theta_y}{\theta_b} Fcy)}{Dc}$$

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2
φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))
φF_L= 29.7 ksi

3.4.15

b/t = 24.46

$$S1 = \frac{Bp - \frac{\theta_y}{\theta_b} Fcy}{5.1Dp}$$

S1 = 3.8

$$S2 = \frac{k_1 Bp}{5.1Dp}$$

S2 = 14.7
F_{UT}= (φbk2*√(BpE))/(5.1b/t)
F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7
F_{ST}= φb[Bp-1.6Dp*b/t]
F_{ST}= 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

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

$M_{max}St$ = 1.455 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

$M_{max}Wk$ = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

b/t = 24.46
S1 = 3.83
S2 = 10.30
φF_L = (φck2*√(BpE))/(5.1b/t)
φF_L = 10.4 ksi

3.4.9

b/t = 4.29
S1 = 12.21 (See 3.4.16 above for formula)
S2 = 32.70 (See 3.4.16 above for formula)
φF_L = φyFcy
φF_L = 33.3 ksi

b/t = 24.46
S1 = 12.21
S2 = 32.70
φF_L = φc[Bp-1.6Dp*b/t]
φF_L = 28.2 ksi

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT} = 10.43
F_{ST} = 28.24
φF_L = Fut + (Fst - Fut)ρst < Fst
φF_L = 14.3 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 = 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

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= 31.2 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

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= 31.2

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L = φcc(Bc-Dc*λ)

φF_L = 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L = φyFcy

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L = φyFcy

φF_L = 33.3 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 = 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

$M_{max}St$ = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

$M_{max}Wk$ = 0.450 k-ft

Compression

3.4.7

λ = 1.98863

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.85841

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

φF_L = 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

φF_L = 33.25 ksi

φF_L = 7.60 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

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= 30.5 ksi

3.4.16

b/t = 7.75

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

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 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 = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L St$= 30.5 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

$M_{max}St$ = 0.413 k-ft

Weak Axis:

3.4.14

L_b = 29.96 in

J = 0.16

78.5957

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

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= 30.5

3.4.16

b/t = 7.75

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

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

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

$\varphi F_L Wk$= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

$M_{max}Wk$ = 0.450 k-ft

Compression

3.4.7

λ = 1.28467

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.75985

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

φF_L = 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

φF_L = 33.25 ksi

φF_L = 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 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				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
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	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	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	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	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	-35.466	-35.466	0	0
2	M16	y	-56.746	-56.746	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	72.351	72.351	0	0
2	M16	y	35.466	35.466	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8																
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6																
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6														
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3														
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3														
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25														
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25														
8																										
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																		
10	ASD 1.0D + 1.0W	Yes	Y		1	1			4	1																
11	ASD 1.0D + 0.75L + 0.75W + 0....	Yes	Y		1	1	3	.75	4	.75																
12	ASD 0.6D + 1.0W	Yes	Y		2	.6					5	1														
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875														
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656														
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875														

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	102.071	2	358.384	1	.034	2	0	1	0	1	0	1
2		min	-141.762	3	-366.172	3	-.106	3	0	3	0	1	0	1
3	N7	max	0	15	587.369	1	-.05	15	0	15	0	1	0	1
4		min	-.192	1	-112.158	3	-1.392	1	-.003	1	0	1	0	1
5	N15	max	0	15	1752.17	1	.502	1	.001	1	0	1	0	1
6		min	-2.036	1	-393.358	3	-.227	3	0	3	0	1	0	1
7	N16	max	427.481	2	1284.805	1	-.185	10	0	1	0	1	0	1
8		min	-452.751	3	-1205.056	3	-26.187	1	0	3	0	1	0	1
9	N23	max	0	15	587.27	1	3.15	1	.006	1	0	1	0	1
10		min	-.192	1	-111.753	3	.106	15	0	15	0	1	0	1
11	N24	max	102.478	2	363.855	1	25.737	3	.002	1	0	1	0	1
12		min	-141.817	3	-363.193	3	.038	10	0	3	0	1	0	1
13	Totals:	max	630.068	2	4933.853	1	0	3						
14		min	-736.694	3	-2551.69	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	M2	1	max	428.124	1	.66	4	.863	1	0	15	0	3	0	1
2			min	-368.07	3	.157	15	-.054	3	-.001	1	0	2	0	1
3		2	max	428.221	1	.622	4	.863	1	0	15	0	1	0	15
4			min	-367.998	3	.148	15	-.054	3	-.001	1	0	10	0	4
5		3	max	428.317	1	.584	4	.863	1	0	15	0	1	0	15
6			min	-367.925	3	.139	15	-.054	3	-.001	1	0	15	0	4
7		4	max	428.414	1	.547	4	.863	1	0	15	0	1	0	15
8			min	-367.853	3	.13	15	-.054	3	-.001	1	0	12	0	4
9		5	max	428.51	1	.509	4	.863	1	0	15	0	1	0	15
10			min	-367.781	3	.121	15	-.054	3	-.001	1	0	3	0	4
11		6	max	428.606	1	.471	4	.863	1	0	15	0	1	0	15
12			min	-367.708	3	.112	15	-.054	3	-.001	1	0	3	0	4
13		7	max	428.703	1	.433	4	.863	1	0	15	0	1	0	15
14			min	-367.636	3	.104	15	-.054	3	-.001	1	0	3	0	4
15		8	max	428.799	1	.395	4	.863	1	0	15	0	1	0	15
16			min	-367.564	3	.095	15	-.054	3	-.001	1	0	3	0	4
17		9	max	428.895	1	.357	4	.863	1	0	15	0	1	0	15
18			min	-367.492	3	.086	15	-.054	3	-.001	1	0	3	0	4
19		10	max	428.992	1	.32	4	.863	1	0	15	.001	1	0	15
20			min	-367.419	3	.077	15	-.054	3	-.001	1	0	3	0	4
21		11	max	429.088	1	.282	4	.863	1	0	15	.001	1	0	15
22			min	-367.347	3	.068	15	-.054	3	-.001	1	0	3	0	4
23		12	max	429.184	1	.244	4	.863	1	0	15	.001	1	0	15
24			min	-367.275	3	.059	15	-.054	3	-.001	1	0	3	0	4
25		13	max	429.281	1	.206	4	.863	1	0	15	.001	1	0	15
26			min	-367.202	3	.05	15	-.054	3	-.001	1	0	3	0	4
27		14	max	429.377	1	.168	4	.863	1	0	15	.002	1	0	15
28			min	-367.13	3	.041	15	-.054	3	-.001	1	0	3	0	4
29		15	max	429.474	1	.13	4	.863	1	0	15	.002	1	0	15
30			min	-367.058	3	.032	15	-.054	3	-.001	1	0	3	0	4
31		16	max	429.57	1	.093	4	.863	1	0	15	.002	1	0	15
32			min	-366.986	3	.024	15	-.054	3	-.001	1	0	3	0	4
33		17	max	429.666	1	.055	4	.863	1	0	15	.002	1	0	15
34			min	-366.913	3	0	1	-.054	3	-.001	1	0	3	0	4
35		18	max	429.763	1	.029	10	.863	1	0	15	.002	1	0	15
36			min	-366.841	3	-.03	1	-.054	3	-.001	1	0	3	0	4
37		19	max	429.859	1	.005	10	.863	1	0	15	.002	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
38			min	-366.769	3	-.059	1	-.054	3	-.001	1	0	3	0	4
39	M3	1	max	36.749	10	1.811	4	-.023	15	0	15	.002	1	0	4
40			min	-123.867	1	.427	15	-.738	1	0	1	0	15	0	15
41		2	max	36.693	10	1.633	4	-.023	15	0	15	.002	1	0	4
42			min	-123.934	1	.385	15	-.738	1	0	1	0	15	0	15
43		3	max	36.638	10	1.455	4	-.023	15	0	15	.002	1	0	10
44			min	-124.001	1	.343	15	-.738	1	0	1	0	15	0	1
45		4	max	36.582	10	1.277	4	-.023	15	0	15	.002	1	0	15
46			min	-124.068	1	.301	15	-.738	1	0	1	0	15	0	1
47		5	max	36.526	10	1.099	4	-.023	15	0	15	.001	1	0	15
48			min	-124.135	1	.26	15	-.738	1	0	1	0	15	0	4
49		6	max	36.47	10	.921	4	-.023	15	0	15	.001	1	0	15
50			min	-124.202	1	.218	15	-.738	1	0	1	0	15	0	4
51		7	max	36.414	10	.743	4	-.023	15	0	15	.001	1	0	15
52			min	-124.269	1	.176	15	-.738	1	0	1	0	15	0	4
53		8	max	36.358	10	.565	4	-.023	15	0	15	.001	1	0	15
54			min	-124.336	1	.134	15	-.738	1	0	1	0	15	0	4
55		9	max	36.302	10	.387	4	-.023	15	0	15	0	1	0	15
56			min	-124.404	1	.092	15	-.738	1	0	1	0	15	-.001	4
57		10	max	36.246	10	.209	4	-.023	15	0	15	0	1	0	15
58			min	-124.471	1	.05	15	-.738	1	0	1	0	15	-.001	4
59		11	max	36.19	10	.032	10	-.023	15	0	15	0	1	0	15
60			min	-124.538	1	-.004	1	-.738	1	0	1	0	15	-.001	4
61		12	max	36.134	10	-.033	15	-.023	15	0	15	0	1	0	15
62			min	-124.605	1	-.147	4	-.738	1	0	1	0	12	-.001	4
63		13	max	36.078	10	-.075	15	-.023	15	0	15	0	1	0	15
64			min	-124.672	1	-.325	4	-.738	1	0	1	0	12	-.001	4
65		14	max	36.022	10	-.117	15	-.023	15	0	15	0	1	0	15
66			min	-124.739	1	-.503	4	-.738	1	0	1	0	3	-.001	4
67		15	max	35.967	10	-.159	15	-.023	15	0	15	0	15	0	15
68			min	-124.806	1	-.681	4	-.738	1	0	1	0	1	0	4
69		16	max	35.911	10	-.201	15	-.023	15	0	15	0	15	0	15
70			min	-124.873	1	-.859	4	-.738	1	0	1	0	1	0	4
71		17	max	35.855	10	-.243	15	-.023	15	0	15	0	15	0	15
72			min	-124.94	1	-1.037	4	-.738	1	0	1	0	1	0	4
73		18	max	35.799	10	-.284	15	-.023	15	0	15	0	15	0	15
74			min	-125.007	1	-1.215	4	-.738	1	0	1	0	1	0	4
75		19	max	35.743	10	-.326	15	-.023	15	0	15	0	15	0	1
76			min	-125.074	1	-1.393	4	-.738	1	0	1	0	1	0	1
77	M4	1	max	586.205	1	0	1	-.05	15	0	1	0	3	0	1
78			min	-113.031	3	0	1	-1.544	1	0	1	0	1	0	1
79		2	max	586.269	1	0	1	-.05	15	0	1	0	12	0	1
80			min	-112.983	3	0	1	-1.544	1	0	1	0	1	0	1
81		3	max	586.334	1	0	1	-.05	15	0	1	0	15	0	1
82			min	-112.934	3	0	1	-1.544	1	0	1	0	1	0	1
83		4	max	586.399	1	0	1	-.05	15	0	1	0	15	0	1
84			min	-112.886	3	0	1	-1.544	1	0	1	0	1	0	1
85		5	max	586.463	1	0	1	-.05	15	0	1	0	15	0	1
86			min	-112.837	3	0	1	-1.544	1	0	1	0	1	0	1
87		6	max	586.528	1	0	1	-.05	15	0	1	0	15	0	1
88			min	-112.789	3	0	1	-1.544	1	0	1	0	1	0	1
89		7	max	586.593	1	0	1	-.05	15	0	1	0	15	0	1
90			min	-112.74	3	0	1	-1.544	1	0	1	0	1	0	1
91		8	max	586.658	1	0	1	-.05	15	0	1	0	15	0	1
92			min	-112.692	3	0	1	-1.544	1	0	1	-.001	1	0	1
93		9	max	586.722	1	0	1	-.05	15	0	1	0	15	0	1
94			min	-112.643	3	0	1	-1.544	1	0	1	-.001	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
95		10	max	586.787	1	0	1	-.05	15	0	1	0	15	0	1
96			min	-112.594	3	0	1	-1.544	1	0	1	-.001	1	0	1
97		11	max	586.852	1	0	1	-.05	15	0	1	0	15	0	1
98			min	-112.546	3	0	1	-1.544	1	0	1	-.001	1	0	1
99		12	max	586.916	1	0	1	-.05	15	0	1	0	15	0	1
100			min	-112.497	3	0	1	-1.544	1	0	1	-.002	1	0	1
101		13	max	586.981	1	0	1	-.05	15	0	1	0	15	0	1
102			min	-112.449	3	0	1	-1.544	1	0	1	-.002	1	0	1
103		14	max	587.046	1	0	1	-.05	15	0	1	0	15	0	1
104			min	-112.4	3	0	1	-1.544	1	0	1	-.002	1	0	1
105		15	max	587.11	1	0	1	-.05	15	0	1	0	15	0	1
106			min	-112.352	3	0	1	-1.544	1	0	1	-.002	1	0	1
107		16	max	587.175	1	0	1	-.05	15	0	1	0	15	0	1
108			min	-112.303	3	0	1	-1.544	1	0	1	-.002	1	0	1
109		17	max	587.24	1	0	1	-.05	15	0	1	0	15	0	1
110			min	-112.255	3	0	1	-1.544	1	0	1	-.002	1	0	1
111		18	max	587.305	1	0	1	-.05	15	0	1	0	15	0	1
112			min	-112.206	3	0	1	-1.544	1	0	1	-.002	1	0	1
113		19	max	587.369	1	0	1	-.05	15	0	1	0	15	0	1
114			min	-112.158	3	0	1	-1.544	1	0	1	-.003	1	0	1
115	M6	1	max	1405.827	1	.642	4	.337	1	0	1	0	3	0	1
116			min	-1207.953	3	.155	15	-.12	3	0	15	0	1	0	1
117		2	max	1405.923	1	.605	4	.337	1	0	1	0	3	0	15
118			min	-1207.881	3	.146	15	-.12	3	0	15	0	2	0	4
119		3	max	1406.02	1	.567	4	.337	1	0	1	0	1	0	15
120			min	-1207.809	3	.137	15	-.12	3	0	15	0	15	0	4
121		4	max	1406.116	1	.529	4	.337	1	0	1	0	1	0	15
122			min	-1207.737	3	.128	15	-.12	3	0	15	0	3	0	4
123		5	max	1406.213	1	.491	4	.337	1	0	1	0	1	0	15
124			min	-1207.664	3	.119	15	-.12	3	0	15	0	3	0	4
125		6	max	1406.309	1	.453	4	.337	1	0	1	0	1	0	15
126			min	-1207.592	3	.11	15	-.12	3	0	15	0	3	0	4
127		7	max	1406.405	1	.415	4	.337	1	0	1	0	1	0	15
128			min	-1207.52	3	.101	15	-.12	3	0	15	0	3	0	4
129		8	max	1406.502	1	.378	4	.337	1	0	1	0	1	0	15
130			min	-1207.447	3	.092	15	-.12	3	0	15	0	3	0	4
131		9	max	1406.598	1	.34	4	.337	1	0	1	0	1	0	15
132			min	-1207.375	3	.083	15	-.12	3	0	15	0	3	0	4
133		10	max	1406.694	1	.302	4	.337	1	0	1	0	1	0	15
134			min	-1207.303	3	.075	15	-.12	3	0	15	0	3	0	4
135		11	max	1406.791	1	.264	4	.337	1	0	1	0	1	0	15
136			min	-1207.231	3	.066	15	-.12	3	0	15	0	3	0	4
137		12	max	1406.887	1	.226	4	.337	1	0	1	0	1	0	15
138			min	-1207.158	3	.057	15	-.12	3	0	15	0	3	0	4
139		13	max	1406.983	1	.188	4	.337	1	0	1	0	1	0	15
140			min	-1207.086	3	.048	15	-.12	3	0	15	0	3	0	4
141		14	max	1407.08	1	.154	2	.337	1	0	1	0	1	0	15
142			min	-1207.014	3	.032	9	-.12	3	0	15	0	3	0	4
143		15	max	1407.176	1	.124	2	.337	1	0	1	0	1	0	15
144			min	-1206.941	3	.008	9	-.12	3	0	15	0	3	0	4
145		16	max	1407.273	1	.097	10	.337	1	0	1	0	1	0	15
146			min	-1206.869	3	-.019	1	-.12	3	0	15	0	3	0	4
147		17	max	1407.369	1	.072	10	.337	1	0	1	0	1	0	15
148			min	-1206.797	3	-.048	1	-.12	3	0	15	0	3	0	4
149		18	max	1407.465	1	.048	10	.337	1	0	1	0	1	0	15
150			min	-1206.725	3	-.078	1	-.12	3	0	15	0	3	0	4
151		19	max	1407.562	1	.023	10	.337	1	0	1	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
152			min	-1206.652	3	-.107	1	-.12	3	0	15	0	3	0	4
153	M7	1	max	164.064	2	1.803	4	.015	1	0	2	0	2	0	4
154			min	-172.001	9	.426	15	-.008	3	0	3	0	3	0	15
155		2	max	163.997	2	1.625	4	.015	1	0	2	0	2	0	2
156			min	-172.057	9	.384	15	-.008	3	0	3	0	3	0	15
157		3	max	163.93	2	1.447	4	.015	1	0	2	0	2	0	2
158			min	-172.113	9	.342	15	-.008	3	0	3	0	3	0	9
159		4	max	163.862	2	1.269	4	.015	1	0	2	0	2	0	10
160			min	-172.169	9	.3	15	-.008	3	0	3	0	3	0	1
161		5	max	163.795	2	1.091	4	.015	1	0	2	0	2	0	15
162			min	-172.225	9	.259	15	-.008	3	0	3	0	3	0	1
163		6	max	163.728	2	.913	4	.015	1	0	2	0	2	0	15
164			min	-172.281	9	.217	15	-.008	3	0	3	0	3	0	4
165		7	max	163.661	2	.735	4	.015	1	0	2	0	2	0	15
166			min	-172.337	9	.175	15	-.008	3	0	3	0	3	0	4
167		8	max	163.594	2	.557	4	.015	1	0	2	0	2	0	15
168			min	-172.393	9	.133	15	-.008	3	0	3	0	3	0	4
169		9	max	163.527	2	.379	4	.015	1	0	2	0	2	0	15
170			min	-172.449	9	.091	15	-.008	3	0	3	0	3	-.001	4
171		10	max	163.46	2	.201	4	.015	1	0	2	0	2	0	15
172			min	-172.505	9	.049	15	-.008	3	0	3	0	3	-.001	4
173		11	max	163.393	2	.053	2	.015	1	0	2	0	2	0	15
174			min	-172.561	9	-.022	9	-.008	3	0	3	0	3	-.001	4
175		12	max	163.326	2	-.034	15	.015	1	0	2	0	2	0	15
176			min	-172.616	9	-.157	1	-.008	3	0	3	0	3	-.001	4
177		13	max	163.259	2	-.076	15	.015	1	0	2	0	2	0	15
178			min	-172.672	9	-.333	4	-.008	3	0	3	0	3	-.001	4
179		14	max	163.192	2	-.118	15	.015	1	0	2	0	2	0	15
180			min	-172.728	9	-.511	4	-.008	3	0	3	0	3	-.001	4
181		15	max	163.124	2	-.16	15	.015	1	0	2	0	2	0	15
182			min	-172.784	9	-.689	4	-.008	3	0	3	0	3	0	4
183		16	max	163.057	2	-.202	15	.015	1	0	2	0	2	0	15
184			min	-172.84	9	-.867	4	-.008	3	0	3	0	3	0	4
185		17	max	162.99	2	-.244	15	.015	1	0	2	0	2	0	15
186			min	-172.896	9	-1.045	4	-.008	3	0	3	0	3	0	4
187		18	max	162.923	2	-.285	15	.015	1	0	2	0	2	0	15
188			min	-172.952	9	-1.223	4	-.008	3	0	3	0	3	0	4
189		19	max	162.856	2	-.327	15	.015	1	0	2	0	2	0	1
190			min	-173.008	9	-1.401	4	-.008	3	0	3	0	3	0	1
191	M8	1	max	1751.006	1	0	1	.703	1	0	1	0	15	0	1
192			min	-394.232	3	0	1	-.213	3	0	1	0	1	0	1
193		2	max	1751.07	1	0	1	.703	1	0	1	0	1	0	1
194			min	-394.183	3	0	1	-.213	3	0	1	0	3	0	1
195		3	max	1751.135	1	0	1	.703	1	0	1	0	1	0	1
196			min	-394.135	3	0	1	-.213	3	0	1	0	3	0	1
197		4	max	1751.2	1	0	1	.703	1	0	1	0	1	0	1
198			min	-394.086	3	0	1	-.213	3	0	1	0	3	0	1
199		5	max	1751.265	1	0	1	.703	1	0	1	0	1	0	1
200			min	-394.037	3	0	1	-.213	3	0	1	0	3	0	1
201		6	max	1751.329	1	0	1	.703	1	0	1	0	1	0	1
202			min	-393.989	3	0	1	-.213	3	0	1	0	3	0	1
203		7	max	1751.394	1	0	1	.703	1	0	1	0	1	0	1
204			min	-393.94	3	0	1	-.213	3	0	1	0	3	0	1
205		8	max	1751.459	1	0	1	.703	1	0	1	0	1	0	1
206			min	-393.892	3	0	1	-.213	3	0	1	0	3	0	1
207		9	max	1751.523	1	0	1	.703	1	0	1	0	1	0	1
208			min	-393.843	3	0	1	-.213	3	0	1	0	3	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
209		10	max	1751.588	1	0	1	.703	1	0	1	0	1	0	1
210			min	-393.795	3	0	1	-.213	3	0	1	0	3	0	1
211		11	max	1751.653	1	0	1	.703	1	0	1	0	1	0	1
212			min	-393.746	3	0	1	-.213	3	0	1	0	3	0	1
213		12	max	1751.718	1	0	1	.703	1	0	1	0	1	0	1
214			min	-393.698	3	0	1	-.213	3	0	1	0	3	0	1
215		13	max	1751.782	1	0	1	.703	1	0	1	0	1	0	1
216			min	-393.649	3	0	1	-.213	3	0	1	0	3	0	1
217		14	max	1751.847	1	0	1	.703	1	0	1	0	1	0	1
218			min	-393.601	3	0	1	-.213	3	0	1	0	3	0	1
219		15	max	1751.912	1	0	1	.703	1	0	1	0	1	0	1
220			min	-393.552	3	0	1	-.213	3	0	1	0	3	0	1
221		16	max	1751.976	1	0	1	.703	1	0	1	0	1	0	1
222			min	-393.504	3	0	1	-.213	3	0	1	0	3	0	1
223		17	max	1752.041	1	0	1	.703	1	0	1	.001	1	0	1
224			min	-393.455	3	0	1	-.213	3	0	1	0	3	0	1
225		18	max	1752.106	1	0	1	.703	1	0	1	.001	1	0	1
226			min	-393.407	3	0	1	-.213	3	0	1	0	3	0	1
227		19	max	1752.17	1	0	1	.703	1	0	1	.001	1	0	1
228			min	-393.358	3	0	1	-.213	3	0	1	0	3	0	1
229	M10	1	max	438.328	1	.647	4	-.004	15	.001	1	0	2	0	1
230			min	-358.622	3	.155	15	-.118	1	0	3	0	3	0	1
231		2	max	438.424	1	.61	4	-.004	15	.001	1	0	2	0	15
232			min	-358.55	3	.146	15	-.118	1	0	3	0	3	0	4
233		3	max	438.52	1	.572	4	-.004	15	.001	1	0	2	0	15
234			min	-358.477	3	.137	15	-.118	1	0	3	0	3	0	4
235		4	max	438.617	1	.534	4	-.004	15	.001	1	0	2	0	15
236			min	-358.405	3	.128	15	-.118	1	0	3	0	3	0	4
237		5	max	438.713	1	.496	4	-.004	15	.001	1	0	2	0	15
238			min	-358.333	3	.12	15	-.118	1	0	3	0	3	0	4
239		6	max	438.81	1	.458	4	-.004	15	.001	1	0	2	0	15
240			min	-358.261	3	.111	15	-.118	1	0	3	0	1	0	4
241		7	max	438.906	1	.42	4	-.004	15	.001	1	0	15	0	15
242			min	-358.188	3	.102	15	-.118	1	0	3	0	1	0	4
243		8	max	439.002	1	.383	4	-.004	15	.001	1	0	15	0	15
244			min	-358.116	3	.093	15	-.118	1	0	3	0	1	0	4
245		9	max	439.099	1	.345	4	-.004	15	.001	1	0	15	0	15
246			min	-358.044	3	.084	15	-.118	1	0	3	0	1	0	4
247		10	max	439.195	1	.307	4	-.004	15	.001	1	0	15	0	15
248			min	-357.972	3	.075	15	-.118	1	0	3	0	1	0	4
249		11	max	439.291	1	.269	4	-.004	15	.001	1	0	15	0	15
250			min	-357.899	3	.066	15	-.118	1	0	3	0	1	0	4
251		12	max	439.388	1	.231	4	-.004	15	.001	1	0	15	0	15
252			min	-357.827	3	.057	15	-.118	1	0	3	0	1	0	4
253		13	max	439.484	1	.193	4	-.004	15	.001	1	0	15	0	15
254			min	-357.755	3	.048	15	-.118	1	0	3	0	1	0	4
255		14	max	439.58	1	.156	4	-.004	15	.001	1	0	15	0	15
256			min	-357.682	3	.025	1	-.118	1	0	3	0	1	0	4
257		15	max	439.677	1	.119	3	-.004	15	.001	1	0	15	0	15
258			min	-357.61	3	-.004	1	-.118	1	0	3	0	1	0	4
259		16	max	439.773	1	.097	3	-.004	15	.001	1	0	15	0	15
260			min	-357.538	3	-.034	1	-.118	1	0	3	0	1	0	4
261		17	max	439.87	1	.075	3	-.004	15	.001	1	0	15	0	15
262			min	-357.466	3	-.063	1	-.118	1	0	3	0	1	0	4
263		18	max	439.966	1	.053	3	-.004	15	.001	1	0	15	0	15
264			min	-357.393	3	-.093	1	-.118	1	0	3	0	1	0	4
265		19	max	440.062	1	.031	3	-.004	15	.001	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
266			min	-357.321	3	-.122	1	-.118	1	0	3	0	1	0	4
267	M11	1	max	36.185	10	1.816	4	.874	1	.001	1	0	3	0	4
268			min	-123.676	1	.428	15	.02	12	0	15	-.002	1	0	15
269		2	max	36.13	10	1.638	4	.874	1	.001	1	0	3	0	4
270			min	-123.743	1	.386	15	.02	12	0	15	-.002	1	0	15
271		3	max	36.074	10	1.46	4	.874	1	.001	1	0	3	0	2
272			min	-123.81	1	.344	15	.02	12	0	15	-.002	1	0	3
273		4	max	36.018	10	1.282	4	.874	1	.001	1	0	3	0	15
274			min	-123.877	1	.302	15	.02	12	0	15	-.002	1	0	4
275		5	max	35.962	10	1.104	4	.874	1	.001	1	0	3	0	15
276			min	-123.944	1	.26	15	.02	12	0	15	-.001	1	0	4
277		6	max	35.906	10	.926	4	.874	1	.001	1	0	3	0	15
278			min	-124.012	1	.218	15	.02	12	0	15	-.001	1	0	4
279		7	max	35.85	10	.748	4	.874	1	.001	1	0	3	0	15
280			min	-124.079	1	.176	15	.02	12	0	15	0	1	0	4
281		8	max	35.794	10	.57	4	.874	1	.001	1	0	3	0	15
282			min	-124.146	1	.135	15	.02	12	0	15	0	1	0	4
283		9	max	35.738	10	.392	4	.874	1	.001	1	0	3	0	15
284			min	-124.213	1	.093	15	.02	12	0	15	0	1	-.001	4
285		10	max	35.682	10	.214	4	.874	1	.001	1	0	3	0	15
286			min	-124.28	1	.051	15	.02	12	0	15	0	1	-.001	4
287		11	max	35.626	10	.051	2	.874	1	.001	1	0	3	0	15
288			min	-124.347	1	.002	3	.02	12	0	15	0	1	-.001	4
289		12	max	35.57	10	-.033	15	.874	1	.001	1	0	3	0	15
290			min	-124.414	1	-.142	4	.02	12	0	15	0	2	-.001	4
291		13	max	35.514	10	-.075	15	.874	1	.001	1	0	3	0	15
292			min	-124.481	1	-.32	4	.02	12	0	15	0	2	-.001	4
293		14	max	35.459	10	-.116	15	.874	1	.001	1	0	1	0	15
294			min	-124.548	1	-.498	4	.02	12	0	15	0	15	-.001	4
295		15	max	35.403	10	-.158	15	.874	1	.001	1	0	1	0	15
296			min	-124.615	1	-.676	4	.02	12	0	15	0	15	0	4
297		16	max	35.347	10	-.2	15	.874	1	.001	1	0	1	0	15
298			min	-124.682	1	-.854	4	.02	12	0	15	0	15	0	4
299		17	max	35.291	10	-.242	15	.874	1	.001	1	0	1	0	15
300			min	-124.75	1	-1.032	4	.02	12	0	15	0	15	0	4
301		18	max	35.235	10	-.284	15	.874	1	.001	1	.001	1	0	15
302			min	-124.817	1	-1.21	4	.02	12	0	15	0	15	0	4
303		19	max	35.179	10	-.326	15	.874	1	.001	1	.001	1	0	1
304			min	-124.884	1	-1.388	4	.02	12	0	15	0	15	0	1
305	M12	1	max	586.105	1	0	1	3.487	1	0	1	0	1	0	1
306			min	-112.627	3	0	1	.106	15	0	1	0	3	0	1
307		2	max	586.17	1	0	1	3.487	1	0	1	0	1	0	1
308			min	-112.578	3	0	1	.106	15	0	1	0	12	0	1
309		3	max	586.235	1	0	1	3.487	1	0	1	0	1	0	1
310			min	-112.53	3	0	1	.106	15	0	1	0	15	0	1
311		4	max	586.299	1	0	1	3.487	1	0	1	0	1	0	1
312			min	-112.481	3	0	1	.106	15	0	1	0	15	0	1
313		5	max	586.364	1	0	1	3.487	1	0	1	.001	1	0	1
314			min	-112.433	3	0	1	.106	15	0	1	0	15	0	1
315		6	max	586.429	1	0	1	3.487	1	0	1	.002	1	0	1
316			min	-112.384	3	0	1	.106	15	0	1	0	15	0	1
317		7	max	586.494	1	0	1	3.487	1	0	1	.002	1	0	1
318			min	-112.336	3	0	1	.106	15	0	1	0	15	0	1
319		8	max	586.558	1	0	1	3.487	1	0	1	.002	1	0	1
320			min	-112.287	3	0	1	.106	15	0	1	0	15	0	1
321		9	max	586.623	1	0	1	3.487	1	0	1	.003	1	0	1
322			min	-112.239	3	0	1	.106	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
323		10	max	586.688	1	0	1	3.487	1	0	1	.003	1	0	1
324			min	-112.19	3	0	1	.106	15	0	1	0	15	0	1
325		11	max	586.752	1	0	1	3.487	1	0	1	.003	1	0	1
326			min	-112.142	3	0	1	.106	15	0	1	0	15	0	1
327		12	max	586.817	1	0	1	3.487	1	0	1	.003	1	0	1
328			min	-112.093	3	0	1	.106	15	0	1	0	15	0	1
329		13	max	586.882	1	0	1	3.487	1	0	1	.004	1	0	1
330			min	-112.045	3	0	1	.106	15	0	1	0	15	0	1
331		14	max	586.947	1	0	1	3.487	1	0	1	.004	1	0	1
332			min	-111.996	3	0	1	.106	15	0	1	0	15	0	1
333		15	max	587.011	1	0	1	3.487	1	0	1	.004	1	0	1
334			min	-111.948	3	0	1	.106	15	0	1	0	15	0	1
335		16	max	587.076	1	0	1	3.487	1	0	1	.005	1	0	1
336			min	-111.899	3	0	1	.106	15	0	1	0	15	0	1
337		17	max	587.141	1	0	1	3.487	1	0	1	.005	1	0	1
338			min	-111.851	3	0	1	.106	15	0	1	0	15	0	1
339		18	max	587.205	1	0	1	3.487	1	0	1	.005	1	0	1
340			min	-111.802	3	0	1	.106	15	0	1	0	15	0	1
341		19	max	587.27	1	0	1	3.487	1	0	1	.006	1	0	1
342			min	-111.753	3	0	1	.106	15	0	1	0	15	0	1
343	M1	1	max	114.791	1	344.851	3	-2.119	15	0	1	.135	1	.015	1
344			min	3.521	15	-427.406	1	-68.456	1	0	3	.004	15	-.01	3
345		2	max	114.863	1	344.648	3	-2.119	15	0	1	.12	1	.108	1
346			min	3.543	15	-427.676	1	-68.456	1	0	3	.004	15	-.085	3
347		3	max	130.336	1	7.002	9	-2.094	15	0	12	.104	1	.199	1
348			min	-6.681	3	-23.433	3	-68.042	1	0	1	.003	15	-.158	3
349		4	max	130.409	1	6.777	9	-2.094	15	0	12	.089	1	.199	1
350			min	-6.627	3	-23.635	3	-68.042	1	0	1	.003	15	-.153	3
351		5	max	130.481	1	6.553	9	-2.094	15	0	12	.075	1	.199	1
352			min	-6.573	3	-23.838	3	-68.042	1	0	1	.002	15	-.148	3
353		6	max	130.553	1	6.328	9	-2.094	15	0	12	.06	1	.199	1
354			min	-6.519	3	-24.04	3	-68.042	1	0	1	.002	15	-.143	3
355		7	max	130.625	1	6.103	9	-2.094	15	0	12	.045	1	.199	1
356			min	-6.464	3	-24.242	3	-68.042	1	0	1	.001	15	-.137	3
357		8	max	130.698	1	5.878	9	-2.094	15	0	12	.03	1	.199	1
358			min	-6.41	3	-24.445	3	-68.042	1	0	1	0	15	-.132	3
359		9	max	130.77	1	5.654	9	-2.094	15	0	12	.016	1	.199	1
360			min	-6.356	3	-24.647	3	-68.042	1	0	1	0	15	-.127	3
361		10	max	130.842	1	5.429	9	-2.094	15	0	12	0	1	.199	1
362			min	-6.302	3	-24.849	3	-68.042	1	0	1	0	15	-.121	3
363		11	max	130.914	1	5.204	9	-2.094	15	0	12	0	12	.2	1
364			min	-6.248	3	-25.052	3	-68.042	1	0	1	-.014	1	-.116	3
365		12	max	130.987	1	4.979	9	-2.094	15	0	12	0	12	.2	1
366			min	-6.193	3	-25.254	3	-68.042	1	0	1	-.029	1	-.111	3
367		13	max	131.059	1	4.755	9	-2.094	15	0	12	-.001	12	.2	1
368			min	-6.139	3	-25.456	3	-68.042	1	0	1	-.043	1	-.105	3
369		14	max	131.131	1	4.53	9	-2.094	15	0	12	-.002	15	.201	1
370			min	-6.085	3	-25.658	3	-68.042	1	0	1	-.058	1	-.1	3
371		15	max	131.204	1	4.305	9	-2.094	15	0	12	-.002	15	.202	1
372			min	-6.031	3	-25.861	3	-68.042	1	0	1	-.073	1	-.094	3
373		16	max	69.1	2	9.957	10	-2.117	15	0	1	-.003	15	.203	1
374			min	-34.682	3	-85.41	1	-68.7	1	0	12	-.089	1	-.088	3
375		17	max	69.172	2	9.732	10	-2.117	15	0	1	-.003	15	.221	1
376			min	-34.627	3	-85.679	1	-68.7	1	0	12	-.104	1	-.077	3
377		18	max	-3.527	15	479.405	1	-2.167	15	0	3	-.004	15	.12	1
378			min	-114.403	1	-161.492	3	-70.297	1	0	1	-.119	1	-.042	3
379		19	max	-3.505	15	479.135	1	-2.167	15	0	3	-.004	15	.016	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
380			min	-114.331	1	-161.695	3	-70.297	1	0	1	-.134	1	-.007	3
381	M5	1	max	251.888	1	1140.143	3	-.068	10	0	1	.004	1	.02	3
382			min	6.802	12	-1413.652	1	-22.921	3	0	3	0	10	-.03	1
383		2	max	251.96	1	1139.94	3	-.068	10	0	1	0	2	.277	1
384			min	6.838	12	-1413.922	1	-22.921	3	0	3	-.002	3	-.227	3
385		3	max	301.193	1	10.416	9	2.628	3	0	3	0	2	.578	1
386			min	-32.025	3	-77.11	3	-.339	2	0	1	-.007	3	-.469	3
387		4	max	301.265	1	10.191	9	2.628	3	0	3	0	2	.581	1
388			min	-31.97	3	-77.312	3	-.339	2	0	1	-.007	3	-.452	3
389		5	max	301.337	1	9.966	9	2.628	3	0	3	0	2	.584	1
390			min	-31.916	3	-77.514	3	-.339	2	0	1	-.006	3	-.436	3
391		6	max	301.409	1	9.742	9	2.628	3	0	3	0	2	.588	1
392			min	-31.862	3	-77.716	3	-.339	2	0	1	-.005	3	-.419	3
393		7	max	301.482	1	9.517	9	2.628	3	0	3	0	2	.591	1
394			min	-31.808	3	-77.919	3	-.339	2	0	1	-.005	3	-.402	3
395		8	max	301.554	1	9.292	9	2.628	3	0	3	0	2	.595	1
396			min	-31.754	3	-78.121	3	-.339	2	0	1	-.004	3	-.385	3
397		9	max	301.626	1	9.067	9	2.628	3	0	3	0	10	.598	1
398			min	-31.699	3	-78.323	3	-.339	2	0	1	-.004	3	-.368	3
399		10	max	301.699	1	8.843	9	2.628	3	0	3	0	10	.602	1
400			min	-31.645	3	-78.526	3	-.339	2	0	1	-.003	3	-.351	3
401		11	max	301.771	1	8.618	9	2.628	3	0	3	0	10	.605	1
402			min	-31.591	3	-78.728	3	-.339	2	0	1	-.003	1	-.334	3
403		12	max	301.843	1	8.393	9	2.628	3	0	3	0	10	.609	1
404			min	-31.537	3	-78.93	3	-.339	2	0	1	-.002	1	-.317	3
405		13	max	301.915	1	8.168	9	2.628	3	0	3	0	10	.613	1
406			min	-31.483	3	-79.132	3	-.339	2	0	1	-.002	1	-.3	3
407		14	max	301.988	1	7.944	9	2.628	3	0	3	0	10	.616	1
408			min	-31.428	3	-79.335	3	-.339	2	0	1	-.002	1	-.283	3
409		15	max	302.06	1	7.719	9	2.628	3	0	3	0	15	.62	1
410			min	-31.374	3	-79.537	3	-.339	2	0	1	-.001	1	-.265	3
411		16	max	256.161	2	54.25	10	2.607	3	0	1	0	3	.625	1
412			min	-112.685	3	-150.197	3	-.338	2	0	15	-.001	1	-.247	3
413		17	max	256.233	2	54.026	10	2.607	3	0	1	0	3	.647	1
414			min	-112.631	3	-150.4	3	-.338	2	0	15	0	1	-.215	3
415		18	max	-7.244	12	1580.313	1	2.392	3	0	3	.001	3	.311	1
416			min	-252.583	1	-532.2	3	-.062	2	0	1	0	2	-.101	3
417		19	max	-7.208	12	1580.044	1	2.392	3	0	3	.002	3	.014	3
418			min	-252.511	1	-532.403	3	-.062	2	0	1	0	2	-.031	1
419	M9	1	max	114.267	1	344.84	3	90.376	1	0	3	-.004	15	.015	1
420			min	3.503	15	-427.389	1	2.891	15	0	1	-.135	1	-.01	3
421		2	max	114.34	1	344.637	3	90.376	1	0	3	-.002	12	.108	1
422			min	3.525	15	-427.659	1	2.891	15	0	1	-.115	1	-.085	3
423		3	max	130.41	1	6.982	9	64.15	1	0	1	.002	3	.198	1
424			min	-6.261	3	-23.378	3	.896	12	0	15	-.094	1	-.158	3
425		4	max	130.482	1	6.757	9	64.15	1	0	1	.002	3	.198	1
426			min	-6.207	3	-23.581	3	.896	12	0	15	-.08	1	-.153	3
427		5	max	130.555	1	6.532	9	64.15	1	0	1	.003	3	.198	1
428			min	-6.153	3	-23.783	3	.896	12	0	15	-.066	1	-.148	3
429		6	max	130.627	1	6.307	9	64.15	1	0	1	.003	3	.198	1
430			min	-6.099	3	-23.985	3	.896	12	0	15	-.052	1	-.143	3
431		7	max	130.699	1	6.083	9	64.15	1	0	1	.003	3	.199	1
432			min	-6.044	3	-24.188	3	.896	12	0	15	-.038	1	-.137	3
433		8	max	130.771	1	5.858	9	64.15	1	0	1	.003	3	.199	1
434			min	-5.99	3	-24.39	3	.896	12	0	15	-.025	1	-.132	3
435		9	max	130.844	1	5.633	9	64.15	1	0	1	.004	3	.199	1
436			min	-5.936	3	-24.592	3	.896	12	0	15	-.011	1	-.127	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
437		10	max	130.916	1	5.408	9	64.15	1	0	1	.004	3	.199	1
438			min	-5.882	3	-24.795	3	.896	12	0	15	0	2	-.121	3
439		11	max	130.988	1	5.184	9	64.15	1	0	1	.017	1	.2	1
440			min	-5.828	3	-24.997	3	.896	12	0	15	0	15	-.116	3
441		12	max	131.06	1	4.959	9	64.15	1	0	1	.031	1	.2	1
442			min	-5.773	3	-25.199	3	.896	12	0	15	0	15	-.111	3
443		13	max	131.133	1	4.734	9	64.15	1	0	1	.045	1	.2	1
444			min	-5.719	3	-25.401	3	.896	12	0	15	.001	15	-.105	3
445		14	max	131.205	1	4.509	9	64.15	1	0	1	.059	1	.201	1
446			min	-5.665	3	-25.604	3	.896	12	0	15	.002	15	-.1	3
447		15	max	131.277	1	4.285	9	64.15	1	0	1	.073	1	.202	1
448			min	-5.611	3	-25.806	3	.896	12	0	15	.002	15	-.094	3
449		16	max	69.303	2	9.603	10	64.969	1	0	15	.088	1	.203	1
450			min	-34.75	3	-85.314	1	.919	12	0	1	.003	15	-.088	3
451		17	max	69.376	2	9.378	10	64.969	1	0	15	.103	1	.221	1
452			min	-34.695	3	-85.584	1	.919	12	0	1	.003	15	-.077	3
453		18	max	-3.52	15	479.405	1	68.357	1	0	1	.117	1	.12	1
454			min	-114.177	1	-161.491	3	1.109	12	0	3	.004	15	-.042	3
455		19	max	-3.498	15	479.135	1	68.357	1	0	1	.132	1	.016	1
456			min	-114.105	1	-161.693	3	1.109	12	0	3	.004	15	-.007	3
457	M13	1	max	90.547	1	426.817	1	-3.503	15	.015	1	.135	1	0	1
458			min	2.891	15	-344.83	3	-114.255	1	-.01	3	.004	15	0	3
459		2	max	90.547	1	301.091	1	-2.686	15	.015	1	.042	1	.269	3
460			min	2.891	15	-243.181	3	-87.536	1	-.01	3	.001	15	-.334	1
461		3	max	90.547	1	175.365	1	-1.868	15	.015	1	.001	3	.446	3
462			min	2.891	15	-141.533	3	-60.817	1	-.01	3	-.026	1	-.552	1
463		4	max	90.547	1	49.638	1	-1.05	15	.015	1	0	12	.529	3
464			min	2.891	15	-39.884	3	-34.097	1	-.01	3	-.069	1	-.655	1
465		5	max	90.547	1	61.765	3	-.233	15	.015	1	-.002	12	.519	3
466			min	2.891	15	-76.088	1	-7.378	1	-.01	3	-.088	1	-.643	1
467		6	max	90.547	1	163.413	3	19.341	1	.015	1	-.002	12	.416	3
468			min	2.891	15	-201.814	1	.254	12	-.01	3	-.083	1	-.516	1
469		7	max	90.547	1	265.062	3	46.061	1	.015	1	-.001	12	.219	3
470			min	2.891	15	-327.54	1	1.051	12	-.01	3	-.053	1	-.273	1
471		8	max	90.547	1	366.71	3	72.78	1	.015	1	.001	1	.085	1
472			min	2.891	15	-453.267	1	1.849	12	-.01	3	0	12	-.07	3
473		9	max	90.547	1	468.359	3	99.499	1	.015	1	.08	1	.558	1
474			min	2.891	15	-578.993	1	2.647	12	-.01	3	.002	12	-.453	3
475		10	max	90.547	1	570.008	3	126.219	1	.011	2	.184	1	1.146	1
476			min	2.891	15	-704.719	1	3.445	12	-.015	1	.005	12	-.929	3
477		11	max	68.646	1	578.993	1	-2.558	12	.01	3	.077	1	.558	1
478			min	2.12	15	-468.359	3	-98.973	1	-.015	1	0	12	-.453	3
479		12	max	68.646	1	453.267	1	-1.76	12	.01	3	0	2	.085	1
480			min	2.12	15	-366.71	3	-72.253	1	-.015	1	-.002	3	-.07	3
481		13	max	68.646	1	327.54	1	-.963	12	.01	3	-.002	15	.219	3
482			min	2.12	15	-265.062	3	-45.534	1	-.015	1	-.056	1	-.273	1
483		14	max	68.646	1	201.814	1	-.165	12	.01	3	-.003	15	.416	3
484			min	2.12	15	-163.413	3	-18.815	1	-.015	1	-.085	1	-.516	1
485		15	max	68.646	1	76.088	1	7.905	1	.01	3	-.003	15	.519	3
486			min	2.12	15	-61.765	3	.25	15	-.015	1	-.09	1	-.643	1
487		16	max	68.646	1	39.884	3	34.624	1	.01	3	-.002	12	.529	3
488			min	2.12	15	-49.639	1	1.068	15	-.015	1	-.071	1	-.655	1
489		17	max	68.646	1	141.533	3	61.343	1	.01	3	0	12	.446	3
490			min	2.12	15	-175.365	1	1.886	15	-.015	1	-.027	1	-.552	1
491		18	max	68.646	1	243.181	3	88.063	1	.01	3	.042	1	.269	3
492			min	2.12	15	-301.091	1	2.703	15	-.015	1	.001	15	-.334	1
493		19	max	68.646	1	344.83	3	114.782	1	.01	3	.135	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
494			min	2.12	15	-426.818	1	3.521	15	-.015	1	.004	15	0	3
495	M16	1	max	-1.109	12	479.74	1	-3.498	15	.007	3	.132	1	0	1
496			min	-68.151	1	-161.709	3	-114.115	1	-.016	1	.004	15	0	3
497		2	max	-1.109	12	338.409	1	-2.68	15	.007	3	.04	1	.126	3
498			min	-68.151	1	-114.158	3	-87.396	1	-.016	1	.001	15	-.375	1
499		3	max	-1.109	12	197.077	1	-1.863	15	.007	3	0	12	.209	3
500			min	-68.151	1	-66.608	3	-60.676	1	-.016	1	-.028	1	-.62	1
501		4	max	-1.109	12	55.745	1	-1.045	15	.007	3	-.002	15	.249	3
502			min	-68.151	1	-19.057	3	-33.957	1	-.016	1	-.071	1	-.736	1
503		5	max	-1.109	12	28.494	3	-.227	15	.007	3	-.003	15	.244	3
504			min	-68.151	1	-85.586	1	-7.238	1	-.016	1	-.09	1	-.723	1
505		6	max	-1.109	12	76.044	3	19.482	1	.007	3	-.003	15	.196	3
506			min	-68.151	1	-226.918	1	.359	12	-.016	1	-.085	1	-.579	1
507		7	max	-1.109	12	123.595	3	46.201	1	.007	3	-.002	15	.105	3
508			min	-68.151	1	-368.25	1	1.157	12	-.016	1	-.055	1	-.307	1
509		8	max	-1.109	12	171.145	3	72.92	1	.007	3	.001	2	.096	1
510			min	-68.151	1	-509.581	1	1.955	12	-.016	1	-.001	3	-.03	3
511		9	max	-1.109	12	218.696	3	99.64	1	.007	3	.079	1	.628	1
512			min	-68.151	1	-650.913	1	2.753	12	-.016	1	.001	12	-.209	3
513		10	max	-2.167	15	-17.106	15	126.359	1	0	15	.183	1	1.289	1
514			min	-70.115	1	-792.245	1	-5.477	3	-.016	1	.005	12	-.431	3
515		11	max	-2.167	15	650.913	1	-2.86	12	.016	1	.079	1	.628	1
516			min	-70.115	1	-218.696	3	-99.413	1	-.007	3	.002	12	-.209	3
517		12	max	-2.167	15	509.581	1	-2.062	12	.016	1	0	2	.096	1
518			min	-70.115	1	-171.145	3	-72.694	1	-.007	3	0	3	-.03	3
519		13	max	-2.167	15	368.25	1	-1.264	12	.016	1	-.002	12	.105	3
520			min	-70.115	1	-123.595	3	-45.975	1	-.007	3	-.054	1	-.307	1
521		14	max	-2.167	15	226.918	1	-.467	12	.016	1	-.002	12	.196	3
522			min	-70.115	1	-76.044	3	-19.255	1	-.007	3	-.084	1	-.579	1
523		15	max	-2.167	15	85.586	1	7.464	1	.016	1	-.002	12	.244	3
524			min	-70.115	1	-28.494	3	.234	15	-.007	3	-.089	1	-.723	1
525		16	max	-2.167	15	19.057	3	34.183	1	.016	1	-.002	12	.249	3
526			min	-70.115	1	-55.745	1	1.052	15	-.007	3	-.07	1	-.736	1
527		17	max	-2.167	15	66.608	3	60.903	1	.016	1	0	12	.209	3
528			min	-70.115	1	-197.077	1	1.87	15	-.007	3	-.027	1	-.62	1
529		18	max	-2.167	15	114.158	3	87.622	1	.016	1	.042	1	.126	3
530			min	-70.115	1	-338.409	1	2.687	15	-.007	3	.001	15	-.375	1
531		19	max	-2.167	15	161.709	3	114.341	1	.016	1	.134	1	0	1
532			min	-70.115	1	-479.74	1	3.505	15	-.007	3	.004	15	0	3
533	M15	1	max	.348	2	2.87	4	.023	3	0	1	0	1	0	1
534			min	-26.423	3	0	10	-.031	1	0	3	0	3	0	1
535		2	max	.276	2	2.551	4	.023	3	0	1	0	1	0	10
536			min	-26.477	3	0	10	-.031	1	0	3	0	3	-.001	4
537		3	max	.204	2	2.232	4	.023	3	0	1	0	1	0	10
538			min	-26.531	3	0	10	-.031	1	0	3	0	3	-.002	4
539		4	max	.132	2	1.913	4	.023	3	0	1	0	1	0	10
540			min	-26.585	3	0	10	-.031	1	0	3	0	3	-.003	4
541		5	max	.06	2	1.594	4	.023	3	0	1	0	1	0	10
542			min	-26.639	3	0	10	-.031	1	0	3	0	3	-.004	4
543		6	max	0	10	1.276	4	.023	3	0	1	0	1	0	10
544			min	-26.693	3	0	10	-.031	1	0	3	0	3	-.005	4
545		7	max	0	10	.957	4	.023	3	0	1	0	3	0	10
546			min	-26.747	3	0	10	-.031	1	0	3	0	1	-.005	4
547		8	max	0	10	.638	4	.023	3	0	1	0	3	0	10
548			min	-26.801	3	0	10	-.031	1	0	3	0	1	-.006	4
549		9	max	0	10	.319	4	.023	3	0	1	0	3	0	10
550			min	-26.855	3	0	10	-.031	1	0	3	0	1	-.006	4

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
551		10	max	0	10	0	1	.023	3	0	1	0	3	0	10
552			min	-26.909	3	0	1	-.031	1	0	3	0	1	-.006	4
553		11	max	0	10	0	10	.023	3	0	1	0	3	0	10
554			min	-26.963	3	-.319	4	-.031	1	0	3	0	1	-.006	4
555		12	max	0	10	0	10	.023	3	0	1	0	3	0	10
556			min	-27.017	3	-.638	4	-.031	1	0	3	0	1	-.006	4
557		13	max	0	10	0	10	.023	3	0	1	0	3	0	10
558			min	-27.071	3	-.957	4	-.031	1	0	3	0	1	-.005	4
559		14	max	0	10	0	10	.023	3	0	1	0	3	0	10
560			min	-27.125	3	-1.276	4	-.031	1	0	3	0	1	-.005	4
561		15	max	0	10	0	10	.023	3	0	1	0	3	0	10
562			min	-27.179	3	-1.594	4	-.031	1	0	3	0	1	-.004	4
563		16	max	0	10	0	10	.023	3	0	1	0	3	0	10
564			min	-27.233	3	-1.913	4	-.031	1	0	3	0	1	-.003	4
565		17	max	0	10	0	10	.023	3	0	1	0	3	0	10
566			min	-27.287	3	-2.232	4	-.031	1	0	3	0	1	-.002	4
567		18	max	0	10	0	10	.023	3	0	1	0	3	0	10
568			min	-27.341	3	-2.551	4	-.031	1	0	3	0	1	-.001	4
569		19	max	0	10	0	10	.023	3	0	1	0	3	0	1
570			min	-27.395	3	-2.87	4	-.031	1	0	3	0	1	0	1
571	M16A	1	max	-.747	10	2.87	4	.019	1	0	3	0	3	0	1
572			min	-28.204	1	.675	15	-.009	3	0	1	0	1	0	1
573		2	max	-.687	10	2.551	4	.019	1	0	3	0	3	0	15
574			min	-28.132	1	.6	15	-.009	3	0	1	0	1	-.001	4
575		3	max	-.627	10	2.232	4	.019	1	0	3	0	3	0	15
576			min	-28.06	1	.525	15	-.009	3	0	1	0	1	-.002	4
577		4	max	-.567	10	1.913	4	.019	1	0	3	0	3	0	15
578			min	-27.989	1	.45	15	-.009	3	0	1	0	1	-.003	4
579		5	max	-.507	10	1.594	4	.019	1	0	3	0	3	-.001	15
580			min	-27.917	1	.375	15	-.009	3	0	1	0	1	-.004	4
581		6	max	-.447	10	1.276	4	.019	1	0	3	0	3	-.001	15
582			min	-27.845	1	.3	15	-.009	3	0	1	0	1	-.005	4
583		7	max	-.387	10	.957	4	.019	1	0	3	0	3	-.001	15
584			min	-27.773	1	.225	15	-.009	3	0	1	0	1	-.005	4
585		8	max	-.327	10	.638	4	.019	1	0	3	0	3	-.001	15
586			min	-27.701	1	.15	15	-.009	3	0	1	0	1	-.006	4
587		9	max	-.267	10	.319	4	.019	1	0	3	0	3	-.001	15
588			min	-27.629	1	.075	15	-.009	3	0	1	0	1	-.006	4
589		10	max	-.207	10	0	1	.019	1	0	3	0	3	-.001	15
590			min	-27.557	1	0	1	-.009	3	0	1	0	1	-.006	4
591		11	max	-.147	10	-.075	15	.019	1	0	3	0	3	-.001	15
592			min	-27.485	1	-.319	4	-.009	3	0	1	0	1	-.006	4
593		12	max	-.087	10	-.15	15	.019	1	0	3	0	3	-.001	15
594			min	-27.413	1	-.638	4	-.009	3	0	1	0	1	-.006	4
595		13	max	-.027	10	-.225	15	.019	1	0	3	0	1	-.001	15
596			min	-27.341	1	-.957	4	-.009	3	0	1	0	4	-.005	4
597		14	max	.033	10	-.3	15	.019	1	0	3	0	1	-.001	15
598			min	-27.269	1	-1.276	4	-.009	3	0	1	0	3	-.005	4
599		15	max	.093	10	-.375	15	.019	1	0	3	0	1	-.001	15
600			min	-27.197	1	-1.594	4	-.009	3	0	1	0	3	-.004	4
601		16	max	.153	10	-.45	15	.019	1	0	3	0	1	0	15
602			min	-27.125	1	-1.913	4	-.009	3	0	1	0	3	-.003	4
603		17	max	.213	10	-.525	15	.019	1	0	3	0	1	0	15
604			min	-27.053	1	-2.232	4	-.009	3	0	1	0	3	-.002	4
605		18	max	.273	10	-.6	15	.019	1	0	3	0	1	0	15
606			min	-26.981	1	-2.551	4	-.009	3	0	1	0	3	-.001	4
607		19	max	.333	10	-.675	15	.019	1	0	3	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
608			min	-26.909	1	-2.87	4	-.009	3	0	1	0	3	0	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	M2	1	max	.003	1	.006	2	.013	1	-3.026e-5	15	NC	3	NC	3
2			min	-.003	3	-.005	3	0	3	-9.817e-4	1	4821.366	2	2341.822	1
3		2	max	.003	1	.006	2	.012	1	-2.906e-5	15	NC	3	NC	3
4			min	-.003	3	-.005	3	0	3	-9.431e-4	1	5217.292	2	2538.703	1
5		3	max	.003	1	.005	2	.011	1	-2.786e-5	15	NC	3	NC	3
6			min	-.002	3	-.004	3	0	3	-9.046e-4	1	5680.783	2	2770.336	1
7		4	max	.003	1	.005	2	.01	1	-2.666e-5	15	NC	3	NC	3
8			min	-.002	3	-.004	3	0	3	-8.66e-4	1	6226.975	2	3045.189	1
9		5	max	.002	1	.004	2	.009	1	-2.546e-5	15	NC	3	NC	3
10			min	-.002	3	-.004	3	0	3	-8.274e-4	1	6875.726	2	3374.567	1
11		6	max	.002	1	.004	2	.008	1	-2.425e-5	15	NC	1	NC	3
12			min	-.002	3	-.004	3	0	3	-7.888e-4	1	7653.504	2	3773.833	1
13		7	max	.002	1	.004	2	.007	1	-2.305e-5	15	NC	1	NC	2
14			min	-.002	3	-.004	3	0	3	-7.502e-4	1	8596.252	2	4264.301	1
15		8	max	.002	1	.003	2	.006	1	-2.185e-5	15	NC	1	NC	2
16			min	-.002	3	-.003	3	0	3	-7.116e-4	1	9753.844	2	4876.27	1
17		9	max	.002	1	.003	2	.005	1	-2.065e-5	15	NC	1	NC	2
18			min	-.002	3	-.003	3	0	3	-6.73e-4	1	NC	1	5654.029	1
19		10	max	.002	1	.002	2	.005	1	-1.945e-5	15	NC	1	NC	2
20			min	-.001	3	-.003	3	0	3	-6.344e-4	1	NC	1	6664.49	1
21		11	max	.001	1	.002	2	.004	1	-1.825e-5	15	NC	1	NC	2
22			min	-.001	3	-.003	3	0	3	-5.958e-4	1	NC	1	8012.829	1
23		12	max	.001	1	.002	2	.003	1	-1.705e-5	15	NC	1	NC	2
24			min	-.001	3	-.002	3	0	3	-5.572e-4	1	NC	1	9872.56	1
25		13	max	.001	1	.001	2	.002	1	-1.585e-5	15	NC	1	NC	1
26			min	0	3	-.002	3	0	3	-5.187e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-1.465e-5	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-4.801e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	-1.345e-5	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-4.415e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.224e-5	15	NC	1	NC	1
32			min	0	3	-.001	3	0	3	-4.029e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.104e-5	15	NC	1	NC	1
34			min	0	3	0	3	0	3	-3.643e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-9.843e-6	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.257e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-6.922e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.871e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.305e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	3.255e-6	12	NC	1	NC	1
41		2	max	0	1	0	2	0	12	1.662e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	5.021e-6	12	NC	1	NC	1
43		3	max	0	1	0	2	0	12	2.019e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	6.144e-6	15	NC	1	NC	1
45		4	max	0	1	0	2	0	12	2.375e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	7.252e-6	15	NC	1	NC	1
47		5	max	0	1	0	2	0	12	2.732e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	8.359e-6	15	NC	1	NC	1
49		6	max	0	1	0	2	0	3	3.089e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	9.467e-6	15	NC	1	NC	1
51		7	max	0	1	0	2	0	3	3.446e-4	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
52			min	0	10	-.004	3	0	1	1.057e-5	15	NC	1	NC	1
53		8	max	0	1	.001	2	0	3	3.802e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	1.168e-5	15	NC	1	NC	1
55		9	max	0	1	.002	2	0	3	4.159e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	1.279e-5	15	NC	1	NC	1
57		10	max	0	1	.002	2	0	1	4.516e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	15	1.39e-5	15	NC	1	NC	1
59		11	max	0	1	.003	2	.001	1	4.872e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	15	1.5e-5	15	NC	1	NC	1
61		12	max	0	1	.003	2	.002	1	5.229e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	15	1.611e-5	15	NC	1	NC	1
63		13	max	0	1	.004	2	.002	1	5.586e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	15	1.722e-5	15	NC	1	NC	1
65		14	max	.001	1	.005	2	.003	1	5.942e-4	1	NC	3	NC	1
66			min	0	10	-.007	3	0	15	1.833e-5	15	9619.549	2	NC	1
67		15	max	.001	1	.006	2	.004	1	6.299e-4	1	NC	3	NC	1
68			min	0	10	-.007	3	0	15	1.943e-5	15	8122.842	2	NC	1
69		16	max	.001	1	.007	2	.005	1	6.656e-4	1	NC	3	NC	2
70			min	0	10	-.007	3	0	15	2.054e-5	15	6955.762	2	9802.038	1
71		17	max	.001	1	.008	1	.005	1	7.012e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	15	2.165e-5	15	6022.417	1	8527.117	1
73		18	max	.001	1	.009	1	.006	1	7.369e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	15	2.276e-5	15	5269.378	1	7597.681	1
75		19	max	.001	1	.01	1	.007	1	7.726e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	15	2.386e-5	15	4673.114	1	6910.295	1
77	M4	1	max	.003	1	.007	2	0	15	-2.655e-5	15	NC	1	NC	2
78			min	0	3	-.005	3	-.005	1	-8.691e-4	1	NC	1	3880.919	1
79		2	max	.003	1	.007	2	0	15	-2.655e-5	15	NC	1	NC	2
80			min	0	3	-.005	3	-.005	1	-8.691e-4	1	NC	1	4233.78	1
81		3	max	.002	1	.007	2	0	15	-2.655e-5	15	NC	1	NC	2
82			min	0	3	-.005	3	-.004	1	-8.691e-4	1	NC	1	4653.74	1
83		4	max	.002	1	.006	2	0	15	-2.655e-5	15	NC	1	NC	2
84			min	0	3	-.004	3	-.004	1	-8.691e-4	1	NC	1	5158.496	1
85		5	max	.002	1	.006	2	0	15	-2.655e-5	15	NC	1	NC	2
86			min	0	3	-.004	3	-.003	1	-8.691e-4	1	NC	1	5772.159	1
87		6	max	.002	1	.005	2	0	15	-2.655e-5	15	NC	1	NC	2
88			min	0	3	-.004	3	-.003	1	-8.691e-4	1	NC	1	6528.266	1
89		7	max	.002	1	.005	2	0	15	-2.655e-5	15	NC	1	NC	2
90			min	0	3	-.004	3	-.003	1	-8.691e-4	1	NC	1	7474.585	1
91		8	max	.002	1	.004	2	0	15	-2.655e-5	15	NC	1	NC	2
92			min	0	3	-.003	3	-.002	1	-8.691e-4	1	NC	1	8681.072	1
93		9	max	.002	1	.004	2	0	15	-2.655e-5	15	NC	1	NC	1
94			min	0	3	-.003	3	-.002	1	-8.691e-4	1	NC	1	NC	1
95		10	max	.001	1	.004	2	0	15	-2.655e-5	15	NC	1	NC	1
96			min	0	3	-.003	3	-.002	1	-8.691e-4	1	NC	1	NC	1
97		11	max	.001	1	.003	2	0	15	-2.655e-5	15	NC	1	NC	1
98			min	0	3	-.002	3	-.001	1	-8.691e-4	1	NC	1	NC	1
99		12	max	.001	1	.003	2	0	15	-2.655e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	0	1	-8.691e-4	1	NC	1	NC	1
101		13	max	0	1	.002	2	0	15	-2.655e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-8.691e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-2.655e-5	15	NC	1	NC	1
104			min	0	3	-.001	3	0	1	-8.691e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-2.655e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-8.691e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-2.655e-5	15	NC	1	NC	1
108			min	0	3	0	3	0	1	-8.691e-4	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
109		17	max	0	1	0	2	0	15	-2.655e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-8.691e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-2.655e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-8.691e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-2.655e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-8.691e-4	1	NC	1	NC	1
115	M6	1	max	.01	1	.02	2	.004	1	2.067e-4	1	NC	3	NC	2
116			min	-.009	3	-.013	3	-.002	3	3.655e-6	10	1512.057	2	7788.748	1
117		2	max	.01	1	.019	2	.004	1	1.932e-4	1	NC	3	NC	2
118			min	-.008	3	-.013	3	-.002	3	2.936e-6	10	1612.272	2	8444.28	1
119		3	max	.009	1	.017	2	.003	1	1.797e-4	1	NC	3	NC	2
120			min	-.008	3	-.012	3	-.002	3	2.217e-6	10	1726.403	2	9222.607	1
121		4	max	.009	1	.016	2	.003	1	1.662e-4	1	NC	3	NC	1
122			min	-.007	3	-.011	3	-.002	3	1.499e-6	10	1857.222	2	NC	1
123		5	max	.008	1	.015	2	.003	1	1.527e-4	1	NC	3	NC	1
124			min	-.007	3	-.011	3	-.001	3	7.797e-7	10	2008.296	2	NC	1
125		6	max	.008	1	.014	2	.002	1	1.392e-4	1	NC	3	NC	1
126			min	-.006	3	-.01	3	-.001	3	6.092e-8	10	2184.293	2	NC	1
127		7	max	.007	1	.013	2	.002	1	1.274e-4	3	NC	3	NC	1
128			min	-.006	3	-.009	3	-.001	3	-6.579e-7	10	2391.44	2	NC	1
129		8	max	.006	1	.011	2	.002	1	1.239e-4	3	NC	3	NC	1
130			min	-.005	3	-.009	3	-.001	3	-1.377e-6	10	2638.23	2	NC	1
131		9	max	.006	1	.01	2	.002	1	1.203e-4	3	NC	3	NC	1
132			min	-.005	3	-.008	3	0	3	-3.484e-6	2	2936.554	2	NC	1
133		10	max	.005	1	.009	2	.001	1	1.168e-4	3	NC	3	NC	1
134			min	-.004	3	-.007	3	0	3	-7.649e-6	2	3303.589	2	NC	1
135		11	max	.005	1	.008	2	.001	1	1.133e-4	3	NC	3	NC	1
136			min	-.004	3	-.007	3	0	3	-1.181e-5	2	3765.102	2	NC	1
137		12	max	.004	1	.007	2	0	1	1.097e-4	3	NC	3	NC	1
138			min	-.003	3	-.006	3	0	3	-1.598e-5	2	4361.577	2	NC	1
139		13	max	.003	1	.006	2	0	1	1.062e-4	3	NC	3	NC	1
140			min	-.003	3	-.005	3	0	3	-2.015e-5	2	5160.487	2	NC	1
141		14	max	.003	1	.005	2	0	1	1.027e-4	3	NC	3	NC	1
142			min	-.002	3	-.004	3	0	3	-2.431e-5	2	6283.278	2	NC	1
143		15	max	.002	1	.004	2	0	1	9.913e-5	3	NC	3	NC	1
144			min	-.002	3	-.003	3	0	3	-2.848e-5	2	7972.823	2	NC	1
145		16	max	.002	1	.003	2	0	1	9.559e-5	3	NC	1	NC	1
146			min	-.001	3	-.003	3	0	3	-3.264e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	9.205e-5	3	NC	1	NC	1
148			min	0	3	-.002	3	0	3	-3.681e-5	2	NC	1	NC	1
149		18	max	0	1	0	2	0	1	8.852e-5	3	NC	1	NC	1
150			min	0	3	0	3	0	3	-4.097e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	8.498e-5	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.514e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.025e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-3.849e-5	3	NC	1	NC	1
155		2	max	0	9	.001	2	0	3	1.7e-5	2	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-2.943e-5	3	NC	1	NC	1
157		3	max	0	9	.003	2	0	3	1.515e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-2.036e-5	3	NC	1	NC	1
159		4	max	0	9	.004	2	0	3	1.474e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	2	-1.129e-5	3	NC	1	NC	1
161		5	max	0	9	.005	1	0	3	1.433e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	2	-2.229e-6	3	8974.265	1	NC	1
163		6	max	0	9	.006	1	0	3	1.393e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	3.552e-7	15	7105.389	1	NC	1
165		7	max	0	9	.008	1	0	3	1.59e-5	3	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
166			min	0	2	-.008	3	0	1	3.864e-7	15	5833.491	1	NC	1
167		8	max	0	9	.009	1	.001	3	2.497e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-2.524e-6	2	4907.464	1	NC	1
169		9	max	0	9	.011	1	.001	3	3.403e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-5.778e-6	2	4201.691	1	NC	1
171		10	max	0	9	.013	1	.001	3	4.31e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	0	1	-9.031e-6	2	3646.141	1	NC	1
173		11	max	.001	9	.014	1	.001	3	5.216e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-1.228e-5	2	3198.466	1	NC	1
175		12	max	.001	9	.016	1	.001	3	6.123e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-1.554e-5	2	2831.377	1	NC	1
177		13	max	.001	9	.018	1	.001	3	7.029e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-1.879e-5	2	2526.357	1	NC	1
179		14	max	.001	9	.02	1	.001	3	7.936e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.001	1	-2.205e-5	2	2270.306	1	NC	1
181		15	max	.002	9	.022	1	.001	3	8.843e-5	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-2.53e-5	2	2053.639	1	NC	1
183		16	max	.002	9	.025	1	.001	3	9.749e-5	3	NC	3	NC	1
184			min	-.002	2	-.018	3	-.002	1	-2.855e-5	2	1869.145	1	NC	1
185		17	max	.002	9	.027	1	.001	3	1.066e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-3.181e-5	2	1711.28	1	NC	1
187		18	max	.002	9	.029	1	.001	3	1.156e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-3.506e-5	2	1575.708	1	NC	1
189		19	max	.002	9	.032	1	0	3	1.247e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-3.831e-5	2	1458.992	1	NC	1
191	M8	1	max	.008	1	.023	2	.002	1	-3.858e-7	10	NC	1	NC	2
192			min	-.002	3	-.015	3	0	3	-1.004e-4	3	NC	1	8711.121	1
193		2	max	.008	1	.022	2	.002	1	-3.858e-7	10	NC	1	NC	2
194			min	-.002	3	-.014	3	0	3	-1.004e-4	3	NC	1	9497.512	1
195		3	max	.007	1	.021	2	.002	1	-3.858e-7	10	NC	1	NC	1
196			min	-.002	3	-.013	3	0	3	-1.004e-4	3	NC	1	NC	1
197		4	max	.007	1	.019	2	.002	1	-3.858e-7	10	NC	1	NC	1
198			min	-.002	3	-.012	3	0	3	-1.004e-4	3	NC	1	NC	1
199		5	max	.006	1	.018	2	.001	1	-3.858e-7	10	NC	1	NC	1
200			min	-.001	3	-.012	3	0	3	-1.004e-4	3	NC	1	NC	1
201		6	max	.006	1	.017	2	.001	1	-3.858e-7	10	NC	1	NC	1
202			min	-.001	3	-.011	3	0	3	-1.004e-4	3	NC	1	NC	1
203		7	max	.006	1	.015	2	.001	1	-3.858e-7	10	NC	1	NC	1
204			min	-.001	3	-.01	3	0	3	-1.004e-4	3	NC	1	NC	1
205		8	max	.005	1	.014	2	0	1	-3.858e-7	10	NC	1	NC	1
206			min	-.001	3	-.009	3	0	3	-1.004e-4	3	NC	1	NC	1
207		9	max	.005	1	.013	2	0	1	-3.858e-7	10	NC	1	NC	1
208			min	-.001	3	-.008	3	0	3	-1.004e-4	3	NC	1	NC	1
209		10	max	.004	1	.012	2	0	1	-3.858e-7	10	NC	1	NC	1
210			min	0	3	-.007	3	0	3	-1.004e-4	3	NC	1	NC	1
211		11	max	.004	1	.01	2	0	1	-3.858e-7	10	NC	1	NC	1
212			min	0	3	-.007	3	0	3	-1.004e-4	3	NC	1	NC	1
213		12	max	.003	1	.009	2	0	1	-3.858e-7	10	NC	1	NC	1
214			min	0	3	-.006	3	0	3	-1.004e-4	3	NC	1	NC	1
215		13	max	.003	1	.008	2	0	1	-3.858e-7	10	NC	1	NC	1
216			min	0	3	-.005	3	0	3	-1.004e-4	3	NC	1	NC	1
217		14	max	.002	1	.006	2	0	1	-3.858e-7	10	NC	1	NC	1
218			min	0	3	-.004	3	0	3	-1.004e-4	3	NC	1	NC	1
219		15	max	.002	1	.005	2	0	1	-3.858e-7	10	NC	1	NC	1
220			min	0	3	-.003	3	0	3	-1.004e-4	3	NC	1	NC	1
221		16	max	.001	1	.004	2	0	1	-3.858e-7	10	NC	1	NC	1
222			min	0	3	-.002	3	0	3	-1.004e-4	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
223		17	max	0	1	.003	2	0	1	-3.858e-7	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.004e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	-3.858e-7	10	NC	1	NC	1
226			min	0	3	0	3	0	3	-1.004e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-3.858e-7	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.004e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.006	2	0	3	8.804e-4	1	NC	3	NC	1
230			min	-.003	3	-.005	3	-.002	1	-1.575e-4	3	4829.734	2	NC	1
231		2	max	.003	1	.006	2	0	3	8.349e-4	1	NC	3	NC	1
232			min	-.003	3	-.005	3	-.002	1	-1.534e-4	3	5212.083	2	NC	1
233		3	max	.003	1	.005	2	0	3	7.893e-4	1	NC	3	NC	1
234			min	-.002	3	-.005	3	-.002	1	-1.494e-4	3	5657.237	2	NC	1
235		4	max	.003	1	.005	2	0	3	7.438e-4	1	NC	3	NC	1
236			min	-.002	3	-.004	3	-.001	1	-1.453e-4	3	6178.727	2	NC	1
237		5	max	.003	1	.004	2	0	3	6.983e-4	1	NC	3	NC	1
238			min	-.002	3	-.004	3	-.001	1	-1.412e-4	3	6794.173	2	NC	1
239		6	max	.002	1	.004	2	0	3	6.528e-4	1	NC	3	NC	1
240			min	-.002	3	-.004	3	-.001	1	-1.371e-4	3	7526.881	2	NC	1
241		7	max	.002	1	.004	2	0	3	6.073e-4	1	NC	1	NC	1
242			min	-.002	3	-.004	3	-.001	1	-1.331e-4	3	8408.249	2	NC	1
243		8	max	.002	1	.003	2	0	3	5.618e-4	1	NC	1	NC	1
244			min	-.002	3	-.004	3	0	1	-1.29e-4	3	9481.5	2	NC	1
245		9	max	.002	1	.003	2	0	3	5.163e-4	1	NC	1	NC	1
246			min	-.001	3	-.003	3	0	1	-1.249e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	4.708e-4	1	NC	1	NC	1
248			min	-.001	3	-.003	3	0	1	-1.208e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	4.253e-4	1	NC	1	NC	1
250			min	-.001	3	-.003	3	0	1	-1.168e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	3.798e-4	1	NC	1	NC	1
252			min	-.001	3	-.003	3	0	1	-1.127e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	3.343e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	-1.086e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	2.888e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-1.045e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.433e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.004e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.978e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	-9.637e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.523e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	-9.229e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.068e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-8.822e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.127e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-8.414e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	3.835e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-2.928e-5	1	NC	1	NC	1
269		2	max	0	1	0	2	0	2	2.762e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-9.14e-5	1	NC	1	NC	1
271		3	max	0	1	0	2	0	2	1.689e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.535e-4	1	NC	1	NC	1
273		4	max	0	1	0	2	0	2	6.154e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-2.156e-4	1	NC	1	NC	1
275		5	max	0	1	0	2	0	10	-3.396e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	0	1	-2.778e-4	1	NC	1	NC	1
277		6	max	0	1	0	2	0	15	-1.022e-5	12	NC	1	NC	1
278			min	0	10	-.004	3	-.002	1	-3.399e-4	1	NC	1	NC	1
279		7	max	0	1	.001	2	0	15	-1.235e-5	15	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
280			min	0	10	-.004	3	-.002	1	-4.02e-4	1	NC	1	NC	1
281		8	max	0	1	.001	2	0	15	-1.429e-5	15	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-4.641e-4	1	NC	1	NC	1
283		9	max	0	1	.002	2	0	15	-1.624e-5	15	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-5.262e-4	1	NC	1	NC	1
285		10	max	0	1	.002	2	0	15	-1.818e-5	15	NC	1	NC	2
286			min	0	10	-.006	3	-.005	1	-5.883e-4	1	NC	1	9177.134	1
287		11	max	0	1	.003	2	0	15	-2.013e-5	15	NC	1	NC	2
288			min	0	10	-.006	3	-.006	1	-6.505e-4	1	NC	1	7627.109	1
289		12	max	0	1	.003	2	0	15	-2.207e-5	15	NC	1	NC	2
290			min	0	10	-.006	3	-.007	1	-7.126e-4	1	NC	1	6503.696	1
291		13	max	0	1	.004	2	0	15	-2.402e-5	15	NC	1	NC	2
292			min	0	10	-.007	3	-.008	1	-7.747e-4	1	NC	1	5665.773	1
293		14	max	.001	1	.005	2	0	15	-2.596e-5	15	NC	3	NC	2
294			min	0	10	-.007	3	-.009	1	-8.368e-4	1	9410.903	2	5027.148	1
295		15	max	.001	1	.006	2	0	15	-2.791e-5	15	NC	3	NC	2
296			min	0	10	-.007	3	-.01	1	-8.989e-4	1	8001.606	2	4532.827	1
297		16	max	.001	1	.007	2	0	15	-2.985e-5	15	NC	3	NC	2
298			min	0	10	-.007	3	-.011	1	-9.611e-4	1	6889.311	2	4146.507	1
299		17	max	.001	1	.008	1	0	15	-3.179e-5	15	NC	3	NC	2
300			min	0	10	-.007	3	-.012	1	-1.023e-3	1	5977.908	1	3843.62	1
301		18	max	.001	1	.009	1	0	15	-3.374e-5	15	NC	3	NC	2
302			min	0	10	-.007	3	-.013	1	-1.085e-3	1	5253.855	1	3607.293	1
303		19	max	.001	1	.01	1	0	15	-3.568e-5	15	NC	3	NC	3
304			min	0	10	-.007	3	-.013	1	-1.147e-3	1	4675.901	1	3425.94	1
305	M12	1	max	.003	1	.007	2	.011	1	9.781e-4	1	NC	1	NC	3
306			min	0	3	-.005	3	0	15	3.083e-5	15	NC	1	1738.462	1
307		2	max	.003	1	.007	2	.01	1	9.781e-4	1	NC	1	NC	3
308			min	0	3	-.005	3	0	15	3.083e-5	15	NC	1	1895.919	1
309		3	max	.002	1	.007	2	.009	1	9.781e-4	1	NC	1	NC	3
310			min	0	3	-.005	3	0	15	3.083e-5	15	NC	1	2083.347	1
311		4	max	.002	1	.006	2	.008	1	9.781e-4	1	NC	1	NC	3
312			min	0	3	-.004	3	0	15	3.083e-5	15	NC	1	2308.643	1
313		5	max	.002	1	.006	2	.007	1	9.781e-4	1	NC	1	NC	3
314			min	0	3	-.004	3	0	15	3.083e-5	15	NC	1	2582.572	1
315		6	max	.002	1	.005	2	.007	1	9.781e-4	1	NC	1	NC	3
316			min	0	3	-.004	3	0	15	3.083e-5	15	NC	1	2920.1	1
317		7	max	.002	1	.005	2	.006	1	9.781e-4	1	NC	1	NC	3
318			min	0	3	-.004	3	0	15	3.083e-5	15	NC	1	3342.549	1
319		8	max	.002	1	.004	2	.005	1	9.781e-4	1	NC	1	NC	2
320			min	0	3	-.003	3	0	15	3.083e-5	15	NC	1	3881.143	1
321		9	max	.002	1	.004	2	.004	1	9.781e-4	1	NC	1	NC	2
322			min	0	3	-.003	3	0	15	3.083e-5	15	NC	1	4583.109	1
323		10	max	.001	1	.004	2	.003	1	9.781e-4	1	NC	1	NC	2
324			min	0	3	-.003	3	0	15	3.083e-5	15	NC	1	5522.702	1
325		11	max	.001	1	.003	2	.003	1	9.781e-4	1	NC	1	NC	2
326			min	0	3	-.002	3	0	15	3.083e-5	15	NC	1	6822.227	1
327		12	max	.001	1	.003	2	.002	1	9.781e-4	1	NC	1	NC	2
328			min	0	3	-.002	3	0	15	3.083e-5	15	NC	1	8695.052	1
329		13	max	0	1	.002	2	.002	1	9.781e-4	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	3.083e-5	15	NC	1	NC	1
331		14	max	0	1	.002	2	.001	1	9.781e-4	1	NC	1	NC	1
332			min	0	3	-.001	3	0	15	3.083e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	9.781e-4	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	3.083e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	9.781e-4	1	NC	1	NC	1
336			min	0	3	0	3	0	15	3.083e-5	15	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
337		17	max	0	1	0	2	0	1	9.781e-4	1	NC	1	NC	1
338			min	0	3	0	3	0	15	3.083e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	9.781e-4	1	NC	1	NC	1
340			min	0	3	0	3	0	15	3.083e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	9.781e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	3.083e-5	15	NC	1	NC	1
343	M1	1	max	.005	3	.022	3	.001	3	2.007e-2	1	NC	1	NC	1
344			min	-.006	2	-.031	1	-.004	1	-1.612e-2	3	NC	1	NC	1
345		2	max	.005	3	.012	3	0	3	9.657e-3	1	NC	4	NC	2
346			min	-.006	2	-.017	1	-.01	1	-7.977e-3	3	3136.687	1	8863.661	1
347		3	max	.005	3	.002	3	0	3	1.915e-5	3	NC	5	NC	2
348			min	-.006	2	-.003	1	-.013	1	-5.592e-4	1	1622.445	1	5373.33	1
349		4	max	.005	3	.009	1	0	3	2.159e-5	3	NC	5	NC	2
350			min	-.006	2	-.006	3	-.015	1	-4.597e-4	1	1148.091	1	4444.232	1
351		5	max	.005	3	.019	1	0	3	2.404e-5	3	NC	5	NC	2
352			min	-.006	2	-.012	3	-.015	1	-3.603e-4	1	920.188	1	4264.484	1
353		6	max	.005	3	.027	1	0	3	2.649e-5	3	NC	5	NC	2
354			min	-.006	2	-.017	3	-.014	1	-2.609e-4	1	791.466	1	4558.115	1
355		7	max	.005	3	.033	1	0	3	2.894e-5	3	NC	5	NC	2
356			min	-.006	2	-.021	3	-.013	1	-1.614e-4	1	713.631	1	5417.491	1
357		8	max	.005	3	.038	1	0	3	3.138e-5	3	NC	5	NC	2
358			min	-.006	2	-.024	3	-.01	1	-6.198e-5	1	666.607	1	7410.372	1
359		9	max	.005	3	.041	1	0	3	3.746e-5	1	NC	5	NC	1
360			min	-.006	2	-.025	3	-.007	1	1.397e-6	15	641.026	1	NC	1
361		10	max	.005	3	.041	1	0	3	1.369e-4	1	NC	5	NC	1
362			min	-.006	2	-.025	3	-.004	1	4.443e-6	15	632.578	1	NC	1
363		11	max	.005	3	.04	1	0	3	2.363e-4	1	NC	5	NC	1
364			min	-.006	2	-.024	3	-.001	1	7.49e-6	15	639.965	1	NC	1
365		12	max	.005	3	.038	1	.002	1	3.358e-4	1	NC	5	NC	2
366			min	-.006	2	-.022	3	0	15	1.054e-5	15	664.369	1	8703.524	1
367		13	max	.005	3	.033	1	.004	1	4.352e-4	1	NC	5	NC	2
368			min	-.006	2	-.019	3	0	15	1.358e-5	15	709.942	1	6027.885	1
369		14	max	.005	3	.026	1	.006	1	5.347e-4	1	NC	5	NC	2
370			min	-.006	2	-.015	3	0	15	1.663e-5	15	785.773	1	4935.858	1
371		15	max	.005	3	.018	1	.007	1	6.341e-4	1	NC	5	NC	2
372			min	-.007	2	-.011	3	0	15	1.967e-5	15	911.34	1	4542.356	1
373		16	max	.005	3	.008	1	.007	1	7.074e-4	1	NC	5	NC	2
374			min	-.007	2	-.005	3	0	15	2.193e-5	15	1133.077	1	4678.293	1
375		17	max	.005	3	.002	3	.005	1	1.577e-4	1	NC	5	NC	2
376			min	-.007	2	-.004	1	0	15	5.452e-6	15	1590.459	1	5609.728	1
377		18	max	.005	3	.009	3	.002	1	1.124e-2	1	NC	4	NC	2
378			min	-.007	2	-.018	1	0	15	-3.802e-3	3	3065.63	1	9201.002	1
379		19	max	.005	3	.017	3	0	3	2.254e-2	1	NC	1	NC	1
380			min	-.007	2	-.034	1	-.003	1	-7.704e-3	3	NC	1	NC	1
381	M5	1	max	.014	3	.066	3	.001	3	4.193e-7	3	NC	1	NC	1
382			min	-.02	2	-.094	1	-.005	1	3.545e-8	15	NC	1	NC	1
383		2	max	.014	3	.036	3	.002	3	3.79e-5	3	NC	5	NC	1
384			min	-.02	2	-.05	1	-.004	1	-9.344e-5	1	1059.765	1	NC	1
385		3	max	.014	3	.008	3	.002	3	7.468e-5	3	NC	5	NC	1
386			min	-.02	2	-.009	1	-.004	1	-1.853e-4	1	545.755	1	NC	1
387		4	max	.014	3	.026	1	.002	3	7.414e-5	3	NC	5	NC	1
388			min	-.02	2	-.015	3	-.003	1	-1.73e-4	1	385.397	1	NC	1
389		5	max	.014	3	.056	1	.003	3	7.36e-5	3	NC	15	NC	1
390			min	-.02	2	-.034	3	-.003	1	-1.607e-4	1	308.339	1	NC	1
391		6	max	.014	3	.081	1	.003	3	7.305e-5	3	NC	15	NC	1
392			min	-.02	2	-.049	3	-.003	1	-1.484e-4	1	264.767	1	NC	1
393		7	max	.014	3	.1	1	.003	3	7.251e-5	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.02	2	-.06	3	-.002	1	-1.361e-4	1	238.358	1	NC	1
395		8	max	.014	3	.113	1	.003	3	7.197e-5	3	NC	15	NC	1
396			min	-.02	2	-.068	3	-.002	1	-1.237e-4	1	222.324	1	NC	1
397		9	max	.014	3	.122	1	.003	3	7.142e-5	3	9797.938	15	NC	1
398			min	-.02	2	-.072	3	-.002	1	-1.114e-4	1	213.496	1	NC	1
399		10	max	.014	3	.124	1	.003	3	7.088e-5	3	9698.065	15	NC	1
400			min	-.02	2	-.072	3	-.002	1	-9.911e-5	1	210.41	1	NC	1
401		11	max	.014	3	.122	1	.002	3	7.033e-5	3	9839.523	15	NC	1
402			min	-.02	2	-.07	3	-.002	1	-8.68e-5	1	212.614	1	NC	1
403		12	max	.014	3	.113	1	.002	3	6.979e-5	3	NC	15	NC	1
404			min	-.02	2	-.064	3	-.002	1	-7.449e-5	1	220.487	1	NC	1
405		13	max	.014	3	.099	1	.002	3	6.925e-5	3	NC	15	NC	1
406			min	-.021	2	-.055	3	-.002	1	-6.217e-5	1	235.402	1	NC	1
407		14	max	.014	3	.08	1	.002	3	6.87e-5	3	NC	15	NC	1
408			min	-.021	2	-.044	3	-.002	1	-4.986e-5	1	260.38	1	NC	1
409		15	max	.014	3	.054	1	.001	3	6.816e-5	3	NC	15	NC	1
410			min	-.021	2	-.03	3	-.002	1	-3.755e-5	1	301.919	1	NC	1
411		16	max	.014	3	.023	1	0	3	6.598e-5	3	NC	5	NC	1
412			min	-.021	2	-.013	3	-.002	1	-3.377e-5	2	375.599	1	NC	1
413		17	max	.014	3	.005	3	0	3	2.478e-5	3	NC	5	NC	1
414			min	-.021	2	-.013	1	-.002	1	-1.868e-4	1	528.915	1	NC	1
415		18	max	.014	3	.026	3	0	3	1.208e-5	3	NC	5	NC	1
416			min	-.021	2	-.056	1	-.002	1	-9.577e-5	1	1024.479	1	NC	1
417		19	max	.014	3	.048	3	0	3	0	5	NC	1	NC	1
418			min	-.021	2	-.103	1	-.002	1	-8.372e-8	3	NC	1	NC	1
419	M9	1	max	.005	3	.022	3	0	3	1.612e-2	3	NC	1	NC	1
420			min	-.006	2	-.031	1	-.006	1	-2.007e-2	1	NC	1	NC	1
421		2	max	.005	3	.012	3	0	3	7.997e-3	3	NC	4	NC	1
422			min	-.006	2	-.017	1	-.001	1	-9.916e-3	1	3137.535	1	NC	1
423		3	max	.005	3	.002	3	.002	1	4.547e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	1.619e-6	15	1622.897	1	6433.157	1
425		4	max	.005	3	.009	1	.003	1	1.084e-5	3	NC	5	NC	2
426			min	-.006	2	-.006	3	0	3	-3.712e-5	1	1148.412	1	5457.094	1
427		5	max	.005	3	.019	1	.004	1	2.113e-6	3	NC	5	NC	2
428			min	-.006	2	-.012	3	0	3	-1.197e-4	1	920.437	1	5415.619	1
429		6	max	.005	3	.027	1	.003	1	-4.499e-6	12	NC	5	NC	2
430			min	-.006	2	-.017	3	-.001	3	-2.023e-4	1	791.671	1	6089.689	1
431		7	max	.005	3	.033	1	.001	1	-8.612e-6	15	NC	5	NC	2
432			min	-.006	2	-.021	3	-.001	3	-2.849e-4	1	713.805	1	7902.439	1
433		8	max	.005	3	.038	1	0	2	-1.117e-5	15	NC	5	NC	1
434			min	-.006	2	-.024	3	-.002	3	-3.675e-4	1	666.759	1	NC	1
435		9	max	.005	3	.041	1	0	10	-1.373e-5	15	NC	5	NC	1
436			min	-.006	2	-.025	3	-.003	1	-4.501e-4	1	641.163	1	NC	1
437		10	max	.005	3	.041	1	0	15	-1.629e-5	15	NC	5	NC	1
438			min	-.006	2	-.025	3	-.006	1	-5.327e-4	1	632.702	1	NC	1
439		11	max	.005	3	.04	1	0	15	-1.884e-5	15	NC	5	NC	2
440			min	-.006	2	-.024	3	-.009	1	-6.153e-4	1	640.081	1	9536.03	1
441		12	max	.005	3	.038	1	0	15	-2.14e-5	15	NC	5	NC	2
442			min	-.006	2	-.022	3	-.011	1	-6.979e-4	1	664.477	1	6249.606	1
443		13	max	.005	3	.033	1	0	15	-2.396e-5	15	NC	5	NC	2
444			min	-.006	2	-.019	3	-.013	1	-7.805e-4	1	710.046	1	4880.063	1
445		14	max	.005	3	.026	1	0	15	-2.652e-5	15	NC	5	NC	2
446			min	-.006	2	-.015	3	-.014	1	-8.631e-4	1	785.876	1	4255.262	1
447		15	max	.005	3	.018	1	0	15	-2.907e-5	15	NC	5	NC	2
448			min	-.006	2	-.011	3	-.014	1	-9.457e-4	1	911.446	1	4070.084	1
449		16	max	.005	3	.008	1	0	15	-3.098e-5	15	NC	5	NC	2
450			min	-.007	2	-.005	3	-.013	1	-1.008e-3	1	1133.193	1	4301.575	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
451		17	max	.005	3	.002	3	0	15	-1.737e-5	15	NC	5	NC	2
452			min	-.007	2	-.004	1	-.011	1	-5.829e-4	1	1590.612	1	5253.662	1
453		18	max	.005	3	.009	3	0	15	3.803e-3	3	NC	4	NC	2
454			min	-.007	2	-.018	1	-.007	1	-1.145e-2	1	3065.911	1	8735.048	1
455		19	max	.005	3	.017	3	0	3	7.704e-3	3	NC	1	NC	1
456			min	-.007	2	-.034	1	-.002	1	-2.254e-2	1	NC	1	NC	1
457	M13	1	max	.006	1	.022	3	.005	3	3.926e-3	3	NC	1	NC	1
458			min	0	3	-.031	1	-.006	2	-5.641e-3	1	NC	1	NC	1
459		2	max	.006	1	.193	3	.04	1	4.751e-3	3	NC	5	NC	2
460			min	0	3	-.245	1	0	10	-6.849e-3	1	929.194	1	4398.509	1
461		3	max	.006	1	.333	3	.103	1	5.576e-3	3	NC	5	NC	3
462			min	0	3	-.419	1	.003	15	-8.056e-3	1	511.151	1	1837.188	1
463		4	max	.006	1	.421	3	.156	1	6.4e-3	3	NC	5	NC	3
464			min	0	3	-.528	1	.005	15	-9.264e-3	1	398.665	1	1230.63	1
465		5	max	.006	1	.445	3	.182	1	7.225e-3	3	NC	5	NC	3
466			min	0	3	-.56	1	.006	15	-1.047e-2	1	374.559	1	1059.638	1
467		6	max	.005	1	.409	3	.173	1	8.05e-3	3	NC	5	NC	3
468			min	0	3	-.516	1	.005	15	-1.168e-2	1	408.493	1	1112.312	1
469		7	max	.005	1	.324	3	.132	1	8.875e-3	3	NC	5	NC	3
470			min	0	3	-.412	1	.004	10	-1.289e-2	1	520.814	1	1449.962	1
471		8	max	.005	1	.213	3	.07	1	9.7e-3	3	NC	5	NC	3
472			min	0	3	-.276	1	-.003	10	-1.409e-2	1	811.185	1	2655.209	1
473		9	max	.005	1	.112	3	.013	3	1.052e-2	3	NC	5	NC	1
474			min	0	3	-.151	1	-.009	2	-1.53e-2	1	1659.393	1	NC	1
475		10	max	.005	1	.066	3	.014	3	1.135e-2	3	NC	4	NC	1
476			min	-.001	3	-.094	1	-.02	2	-1.651e-2	1	3165.212	1	NC	1
477		11	max	.005	1	.112	3	.016	3	1.052e-2	3	NC	5	NC	1
478			min	-.001	3	-.151	1	-.008	2	-1.53e-2	1	1659.393	1	NC	1
479		12	max	.005	1	.213	3	.076	1	9.7e-3	3	NC	5	NC	3
480			min	-.001	3	-.276	1	-.002	10	-1.409e-2	1	811.185	1	2450.171	1
481		13	max	.005	1	.324	3	.139	1	8.876e-3	3	NC	5	NC	3
482			min	-.001	3	-.412	1	.004	10	-1.289e-2	1	520.814	1	1375.045	1
483		14	max	.005	1	.409	3	.181	1	8.051e-3	3	NC	5	NC	3
484			min	-.001	3	-.516	1	.006	15	-1.168e-2	1	408.493	1	1066.659	1
485		15	max	.005	1	.446	3	.189	1	7.227e-3	3	NC	5	NC	3
486			min	-.001	3	-.56	1	.006	15	-1.047e-2	1	374.559	1	1021.53	1
487		16	max	.005	1	.421	3	.162	1	6.402e-3	3	NC	5	NC	3
488			min	-.001	3	-.528	1	.005	15	-9.264e-3	1	398.666	1	1188.594	1
489		17	max	.004	1	.333	3	.107	1	5.577e-3	3	NC	5	NC	3
490			min	-.001	3	-.419	1	.003	15	-8.056e-3	1	511.152	1	1771.883	1
491		18	max	.004	1	.193	3	.042	1	4.753e-3	3	NC	5	NC	2
492			min	-.001	3	-.244	1	0	10	-6.848e-3	1	929.195	1	4210.453	1
493		19	max	.004	1	.022	3	.005	3	3.928e-3	3	NC	1	NC	1
494			min	-.001	3	-.031	1	-.006	2	-5.641e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.017	3	.005	3	5.868e-3	1	NC	1	NC	1
496			min	0	3	-.034	1	-.007	2	-2.948e-3	3	NC	1	NC	1
497		2	max	.002	1	.099	3	.043	1	7.153e-3	1	NC	5	NC	2
498			min	0	3	-.273	1	0	10	-3.539e-3	3	827.425	1	4125.696	1
499		3	max	.002	1	.166	3	.108	1	8.439e-3	1	NC	5	NC	3
500			min	0	3	-.469	1	.003	15	-4.13e-3	3	455.207	1	1754.66	1
501		4	max	.002	1	.208	3	.162	1	9.724e-3	1	NC	5	NC	3
502			min	0	3	-.591	1	.005	15	-4.721e-3	3	355.089	1	1184.055	1
503		5	max	.002	1	.221	3	.188	1	1.101e-2	1	NC	15	NC	3
504			min	0	3	-.627	1	.006	15	-5.313e-3	3	333.707	1	1022.388	1
505		6	max	.002	1	.206	3	.179	1	1.229e-2	1	NC	5	NC	3
506			min	0	3	-.578	1	.006	15	-5.904e-3	3	364.112	1	1072.786	1
507		7	max	.002	1	.167	3	.137	1	1.358e-2	1	NC	5	NC	3

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
508			min	0	3	-.46	1	.003	10	-6.495e-3	3	464.647	1	1392.529	1
509		8	max	.002	1	.116	3	.073	1	1.486e-2	1	NC	5	NC	3
510			min	0	3	-.307	1	-.003	10	-7.086e-3	3	725.179	1	2517.45	1
511		9	max	.002	1	.069	3	.016	3	1.615e-2	1	NC	5	NC	1
512			min	0	3	-.167	1	-.009	2	-7.678e-3	3	1491.98	1	NC	1
513		10	max	.002	1	.048	3	.014	3	1.743e-2	1	NC	4	NC	1
514			min	0	3	-.103	1	-.021	2	-8.269e-3	3	2874.897	1	NC	1
515		11	max	.003	1	.069	3	.014	3	1.615e-2	1	NC	5	NC	1
516			min	0	3	-.167	1	-.009	2	-7.677e-3	3	1491.98	1	NC	1
517		12	max	.003	1	.116	3	.071	1	1.486e-2	1	NC	5	NC	3
518			min	0	3	-.307	1	-.003	10	-7.086e-3	3	725.179	1	2590.847	1
519		13	max	.003	1	.167	3	.134	1	1.358e-2	1	NC	5	NC	3
520			min	0	3	-.46	1	.003	10	-6.494e-3	3	464.648	1	1423.725	1
521		14	max	.003	1	.206	3	.176	1	1.23e-2	1	NC	5	NC	3
522			min	0	3	-.578	1	.006	15	-5.903e-3	3	364.112	1	1094.977	1
523		15	max	.003	1	.221	3	.184	1	1.101e-2	1	NC	15	NC	3
524			min	0	3	-.627	1	.006	15	-5.311e-3	3	333.707	1	1044.055	1
525		16	max	.003	1	.208	3	.158	1	9.725e-3	1	NC	5	NC	3
526			min	0	3	-.591	1	.005	15	-4.72e-3	3	355.089	1	1212.092	1
527		17	max	.003	1	.166	3	.104	1	8.441e-3	1	NC	5	NC	3
528			min	0	3	-.469	1	.003	15	-4.128e-3	3	455.208	1	1805.929	1
529		18	max	.003	1	.099	3	.041	1	7.156e-3	1	NC	5	NC	2
530			min	0	3	-.273	1	0	10	-3.536e-3	3	827.426	1	4299.687	1
531		19	max	.003	1	.017	3	.005	3	5.871e-3	1	NC	1	NC	1
532			min	0	3	-.034	1	-.007	2	-2.945e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.829e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-1.117e-4	2	NC	1	NC	1
535		2	max	0	3	-.006	15	.001	1	7.844e-4	3	NC	5	NC	1
536			min	0	10	-.026	4	0	3	-8.648e-4	1	4017.73	4	NC	1
537		3	max	0	3	-.012	15	.004	1	1.286e-3	3	8697.535	15	NC	1
538			min	0	10	-.051	4	-.003	3	-1.639e-3	1	2044.486	4	NC	1
539		4	max	0	3	-.017	15	.008	1	1.788e-3	3	5967.017	15	NC	2
540			min	0	10	-.074	4	-.006	3	-2.412e-3	1	1402.637	4	8813.945	1
541		5	max	0	3	-.022	15	.013	1	2.289e-3	3	4656.124	15	NC	4
542			min	0	10	-.095	4	-.01	3	-3.186e-3	1	1094.492	4	5729.66	1
543		6	max	0	3	-.026	15	.019	1	2.791e-3	3	3918.621	15	NC	4
544			min	0	10	-.113	4	-.014	3	-3.96e-3	1	921.13	4	4144.594	1
545		7	max	0	3	-.03	15	.025	1	3.292e-3	3	3475.109	15	NC	4
546			min	0	10	-.127	4	-.018	3	-4.734e-3	1	816.876	4	3224.478	1
547		8	max	0	3	-.032	15	.031	1	3.794e-3	3	3208.936	15	NC	4
548			min	0	10	-.138	4	-.022	3	-5.508e-3	1	754.308	4	2648.958	1
549		9	max	0	3	-.034	15	.036	1	4.295e-3	3	3065.666	15	NC	4
550			min	0	10	-.144	4	-.026	3	-6.282e-3	1	720.631	4	2273.536	1
551		10	max	0	3	-.034	15	.041	1	4.797e-3	3	3020.342	15	NC	4
552			min	0	10	-.146	4	-.029	3	-7.056e-3	1	709.977	4	2026.073	1
553		11	max	0	3	-.034	15	.044	1	5.299e-3	3	3065.666	15	NC	4
554			min	0	10	-.144	4	-.032	3	-7.829e-3	1	720.631	4	1868.807	1
555		12	max	0	3	-.032	15	.045	1	5.8e-3	3	3208.936	15	NC	5
556			min	0	10	-.138	4	-.033	3	-8.603e-3	1	754.308	4	1782.922	1
557		13	max	0	3	-.03	15	.045	1	6.302e-3	3	3475.109	15	NC	5
558			min	0	10	-.128	4	-.033	3	-9.377e-3	1	816.876	4	1762.667	1
559		14	max	0	3	-.027	15	.042	1	6.803e-3	3	3918.621	15	NC	5
560			min	0	10	-.113	4	-.03	3	-1.015e-2	1	921.13	4	1815.33	1
561		15	max	0	3	-.022	15	.037	1	7.305e-3	3	4656.124	15	NC	4
562			min	0	10	-.096	4	-.026	3	-1.092e-2	1	1094.492	4	1968.773	1
563		16	max	0	3	-.018	15	.028	1	7.806e-3	3	5967.017	15	NC	4
564			min	0	10	-.075	4	-.02	3	-1.17e-2	1	1402.637	4	2299.117	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
565		17	max	0	3	-.012	15	.016	1	8.308e-3	3	8697.535	15	NC	4
566			min	0	10	-.052	4	-.011	3	-1.247e-2	1	2044.486	4	3045.541	1
567		18	max	0	3	-.006	15	.002	9	8.81e-3	3	NC	5	NC	4
568			min	0	10	-.027	4	-.005	2	-1.325e-2	1	4017.73	4	5418.397	1
569		19	max	0	3	.005	3	.016	3	9.311e-3	3	NC	1	NC	1
570			min	0	10	-.005	1	-.021	2	-1.402e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	3.147e-3	3	NC	1	NC	1
572			min	0	1	-.002	1	-.007	2	-4.427e-3	1	NC	1	NC	1
573		2	max	0	10	-.006	15	.006	1	3.002e-3	3	NC	5	NC	2
574			min	0	1	-.026	4	0	10	-4.209e-3	1	4017.73	4	9497.54	1
575		3	max	0	10	-.012	15	.014	1	2.858e-3	3	8697.535	15	NC	3
576			min	0	1	-.051	4	-.004	3	-3.991e-3	1	2044.486	4	5369.27	1
577		4	max	0	10	-.017	15	.021	1	2.713e-3	3	5967.017	15	NC	4
578			min	0	1	-.074	4	-.008	3	-3.772e-3	1	1402.637	4	4079.896	1
579		5	max	0	10	-.022	15	.025	1	2.568e-3	3	4656.124	15	NC	4
580			min	0	1	-.095	4	-.01	3	-3.554e-3	1	1094.492	4	3519.782	1
581		6	max	0	10	-.026	15	.028	1	2.423e-3	3	3918.621	15	NC	4
582			min	0	1	-.113	4	-.011	3	-3.336e-3	1	921.13	4	3273.344	1
583		7	max	0	10	-.03	15	.028	1	2.279e-3	3	3475.109	15	NC	4
584			min	0	1	-.127	4	-.012	3	-3.118e-3	1	816.876	4	3210.136	1
585		8	max	0	10	-.032	15	.028	1	2.134e-3	3	3208.936	15	NC	4
586			min	0	1	-.138	4	-.012	3	-2.899e-3	1	754.308	4	3285.21	1
587		9	max	0	10	-.034	15	.026	1	1.989e-3	3	3065.666	15	NC	4
588			min	0	1	-.144	4	-.011	3	-2.681e-3	1	720.631	4	3491.835	1
589		10	max	0	10	-.034	15	.024	1	1.844e-3	3	3020.342	15	NC	4
590			min	0	1	-.146	4	-.01	3	-2.463e-3	1	709.977	4	3850.344	1
591		11	max	0	10	-.034	15	.021	1	1.699e-3	3	3065.666	15	NC	4
592			min	0	1	-.144	4	-.009	3	-2.245e-3	1	720.631	4	4412.303	1
593		12	max	0	10	-.032	15	.017	1	1.555e-3	3	3208.936	15	NC	3
594			min	0	1	-.137	4	-.007	3	-2.026e-3	1	754.308	4	5280.151	1
595		13	max	0	10	-.03	15	.014	1	1.41e-3	3	3475.109	15	NC	2
596			min	0	1	-.127	4	-.006	3	-1.808e-3	1	816.876	4	6657.523	1
597		14	max	0	10	-.026	15	.01	1	1.265e-3	3	3918.621	15	NC	2
598			min	0	1	-.113	4	-.004	3	-1.59e-3	1	921.13	4	8982.152	1
599		15	max	0	10	-.022	15	.007	1	1.12e-3	3	4656.124	15	NC	1
600			min	0	1	-.095	4	-.003	3	-1.372e-3	1	1094.492	4	NC	1
601		16	max	0	10	-.017	15	.004	1	9.757e-4	3	5967.017	15	NC	1
602			min	0	1	-.074	4	-.001	3	-1.153e-3	1	1402.637	4	NC	1
603		17	max	0	10	-.012	15	.001	1	8.31e-4	3	8697.535	15	NC	1
604			min	0	1	-.051	4	0	3	-9.351e-4	1	2044.486	4	NC	1
605		18	max	0	10	-.006	15	0	4	6.862e-4	3	NC	5	NC	1
606			min	0	1	-.026	4	0	10	-7.169e-4	1	4017.73	4	NC	1
607		19	max	0	1	0	1	0	1	5.415e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.193e-4	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

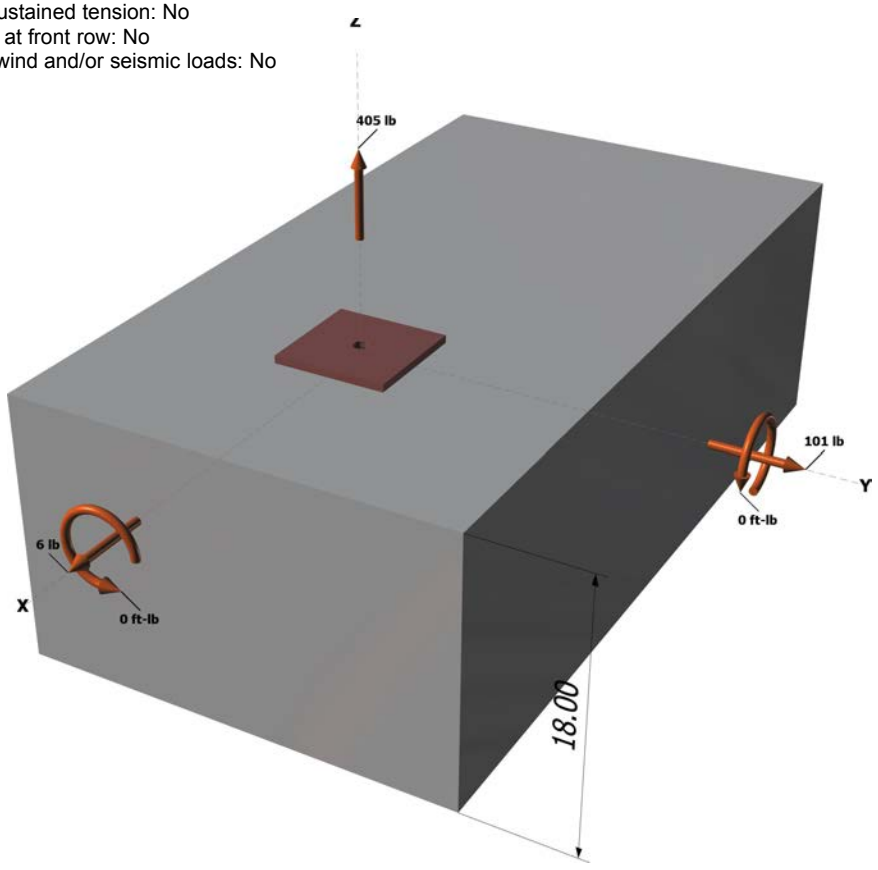
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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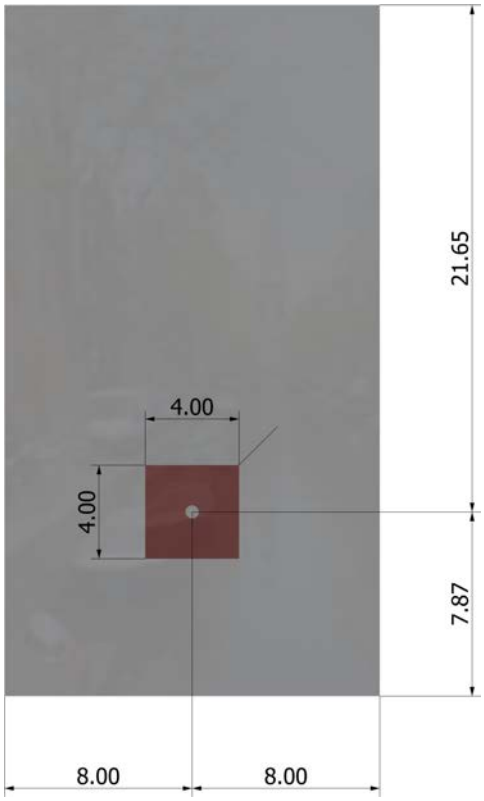


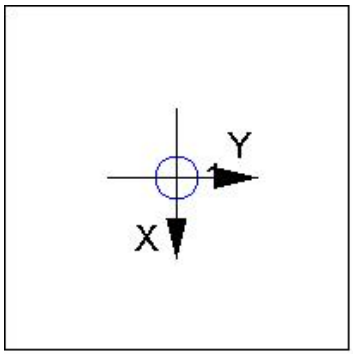
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
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	5.333	10469

$\phi N_{cb} = \phi \, (A_{Nc} / A_{Nco}) \, \Psi_{ed,N} \, \Psi_{c,N} \, \Psi_{cp,N} N_b$ (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)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

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	8.00	8488

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

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)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

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	8.00	8488

$\phi V_{cbx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (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)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

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)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

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)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

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	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	**101**	**3156**	**0.03**	**Pass (Governs)**
T Concrete breakout y+	101	4411	0.02	Pass
T Concrete breakout x+	6	3549	0.00	Pass
|| Concrete breakout y+	6	9838	0.00	Pass
|| Concrete breakout x+	101	7858	0.01	Pass
Concrete breakout, combined	-	-	0.02	Pass
Pryout	101	13657	0.01	Pass

Interaction check	$N_{ua}/\phi N_n$	$V_{ua}/\phi V_n$	Combined Ratio	Permissible	Status
Sec. D.7.1	0.08	0.00	7.5 %	1.0	Pass

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

12. Warnings

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

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

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

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

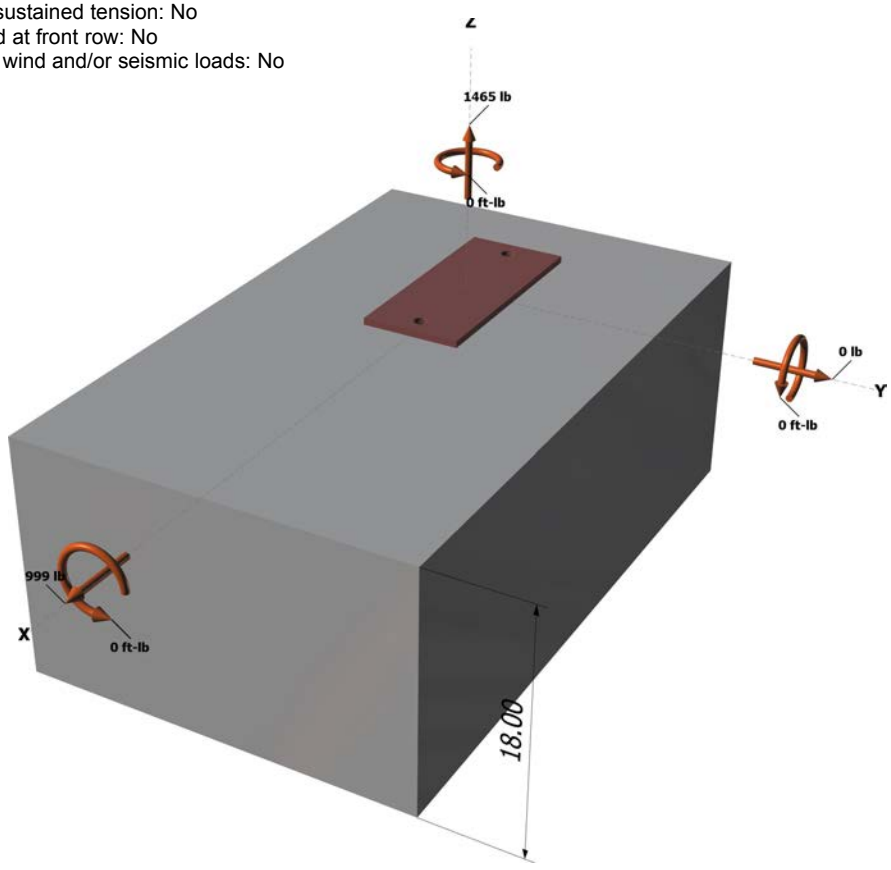
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

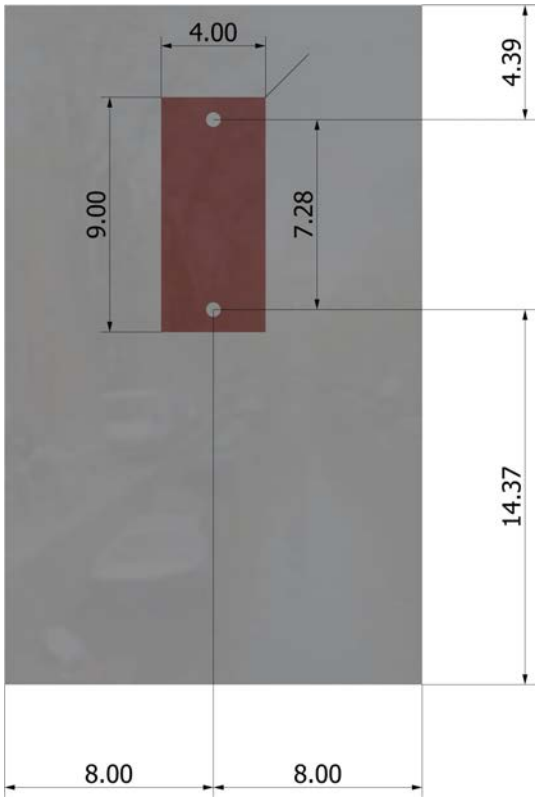
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

Base Plate
Length x Width x Thickness (inch): 9.00 x 4.00 x 0.28

<Figure 1>



<Figure 2>



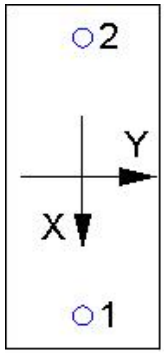
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
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	5.333	10469

$\phi N_{cbg} = \phi \left(A_{Nc} / A_{Nco}\right) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b$ (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)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

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

$\phi N_{ag} = \phi \left(A_{Na} / A_{Na0}\right) \Psi_{ed,Na} \Psi_{g,Na} \Psi_{ec,Na} \Psi_{p,Na} N_{a0}$ (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)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

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

$\phi V_{cbx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{bx}$ (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)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

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	8.00	8488

$\phi V_{cbgx} = \phi\,(2)(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-22)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
284.04	288.00	1.000	1.000	1.000	1.000	8488	0.70	11720

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	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

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
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, øN_n (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	500	3156	0.16	Pass
T Concrete breakout x+	**999**	**4043**	**0.25**	**Pass (Governs)**
|| Concrete breakout y-	**999**	**11720**	**0.09**	**Pass (Governs)**
Pryout	999	15580	0.06	Pass

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

Sec. D.7.3	0.20	0.25	45.0 %	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.