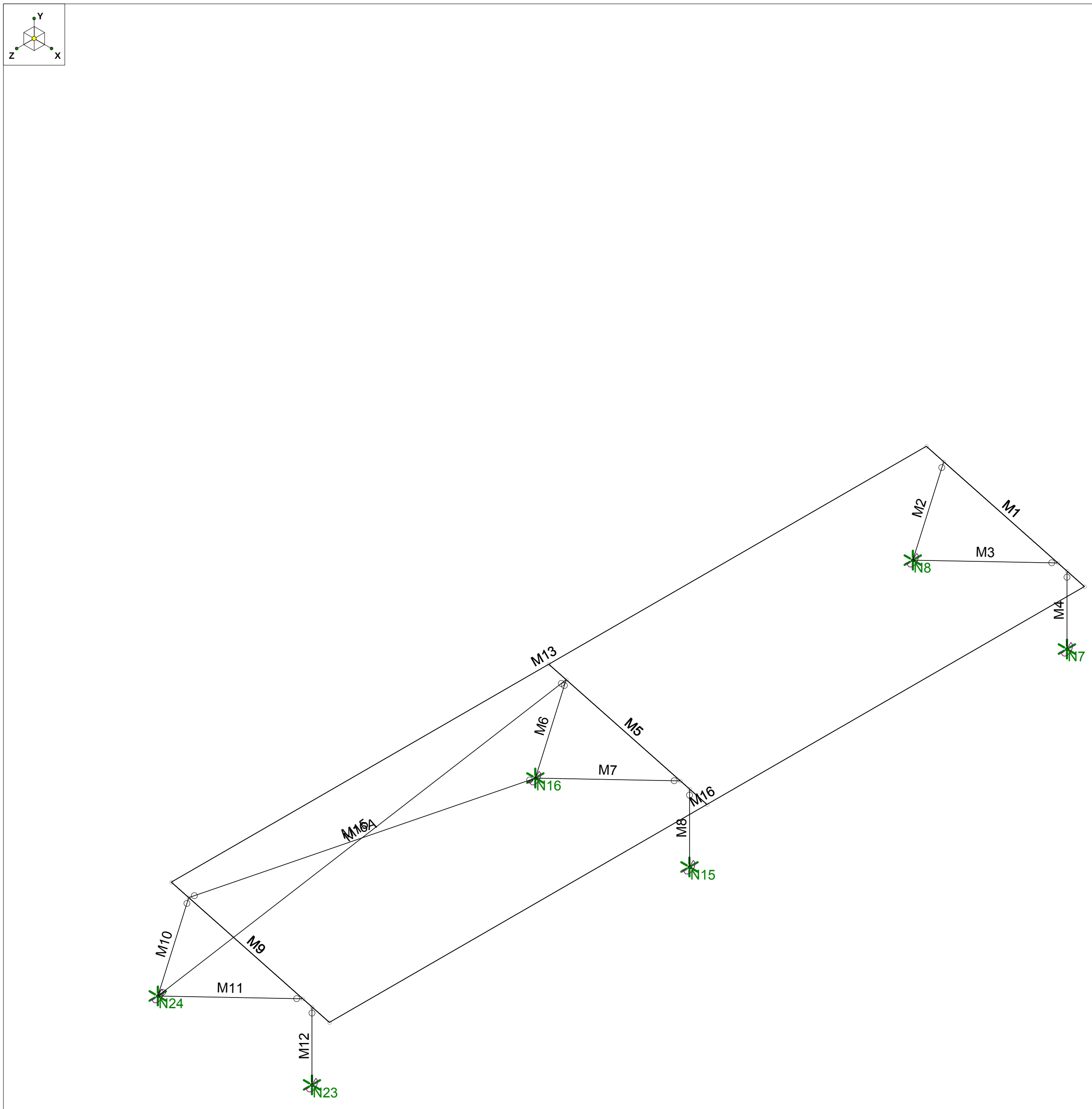


Schletter, Inc.		15° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-05	

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.

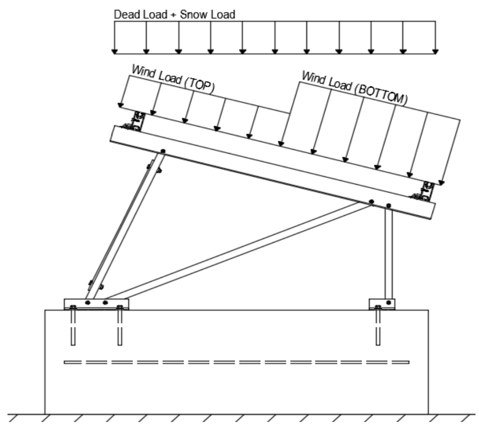
1.2 Construction

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	Height =	1550 mm
Width =	1050 mm	Width =	970 mm
Dead Load =	3.00 psf	Dead Load =	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
g_{MIN} = 1.75 psf

Self-weight of the PV modules.

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	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
Height ≤ 15 ft

Exposure Category = C
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	*(Pressure)*
$Cf-_{TOP}$	=	-2.04	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	*(Suction)*

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

S_S =	2.50	R =	1.25
S_{DS} =	1.67	C_S =	0.8
S_1 =	1.00	ρ =	1.3
S_{D1} =	1.00	Ω =	1.25
T_a =	0.04	C_d =	1.25

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

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

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

Allowable Stress Design, ASD

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

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

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location	Diagonal Struts	Location	Front Reactions	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer

Girders	Location	Rear Struts	Location	Rear Reactions	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	Outer

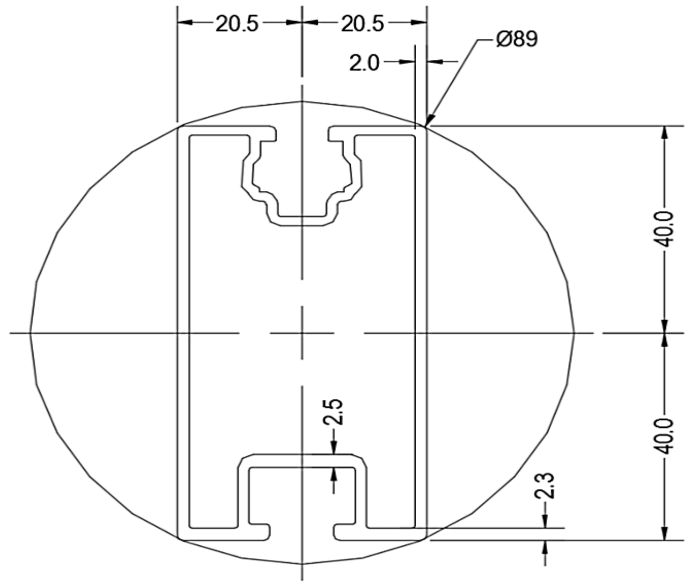
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

Aluminum purlins are used to transfer loads to the support structure. Purlins are designed as continous beams with cantilevers. These are considered beams with internal hinges that can be joined with splices at 25% of the support respective span. See Appendix A.1 for detailed member calculations. Section units are in (mm).

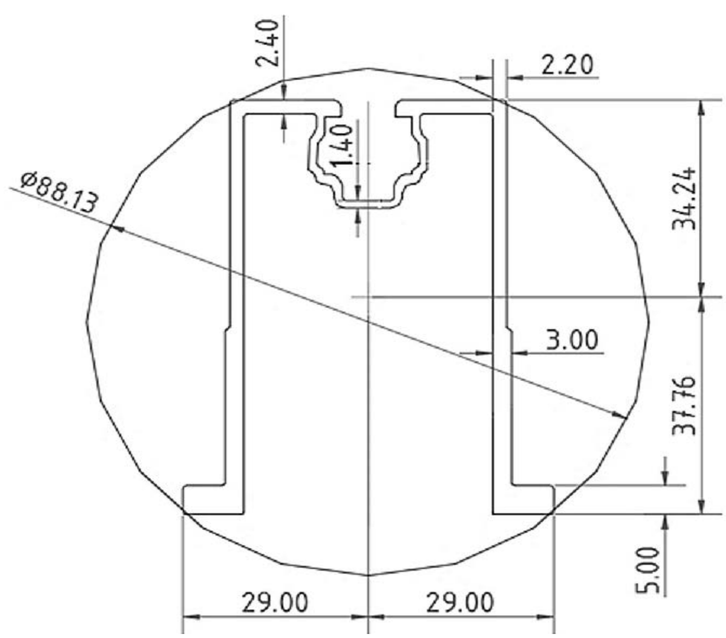
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	99	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.68	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.289	k-ft
M_z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

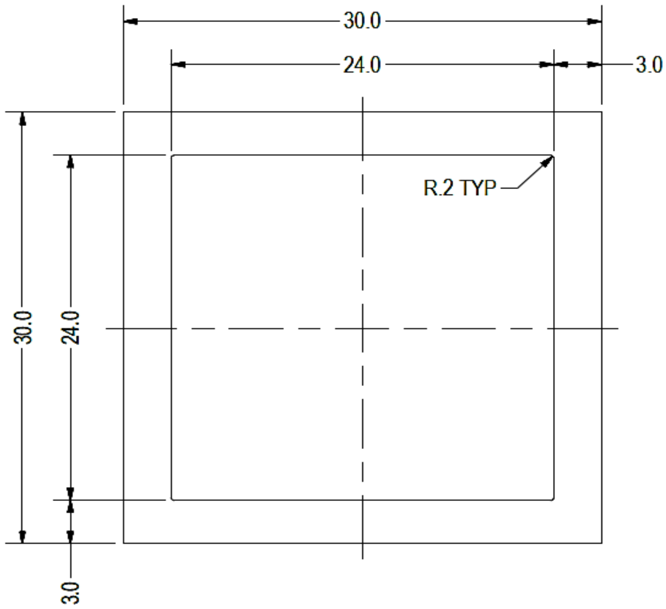
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
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).

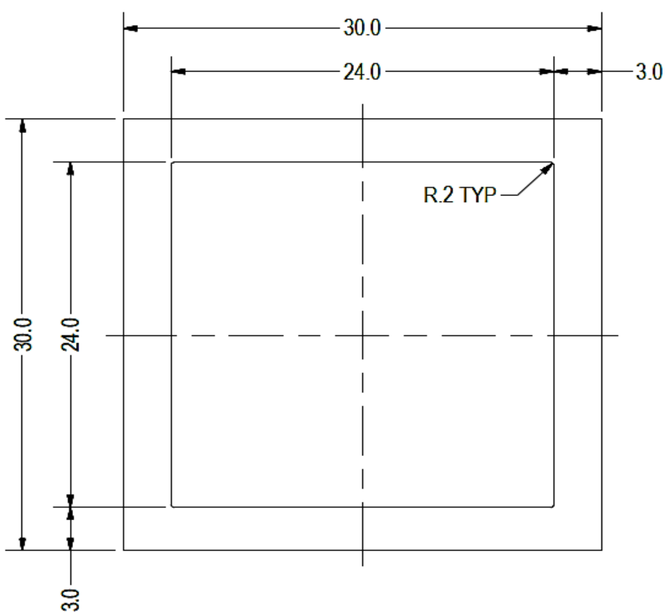
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.057	k-ft
P_n =	0.327	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	16%	



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).

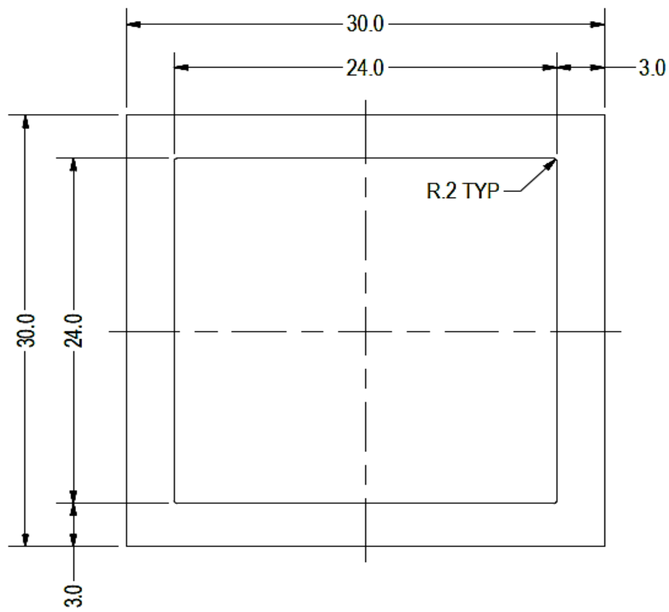
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.164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

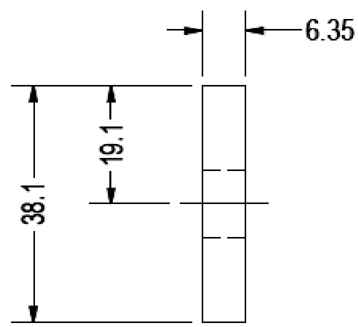
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.408	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 =	0.007	k-ft
P_n =	0.264	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	18%	



A cross brace kit is required every 11 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

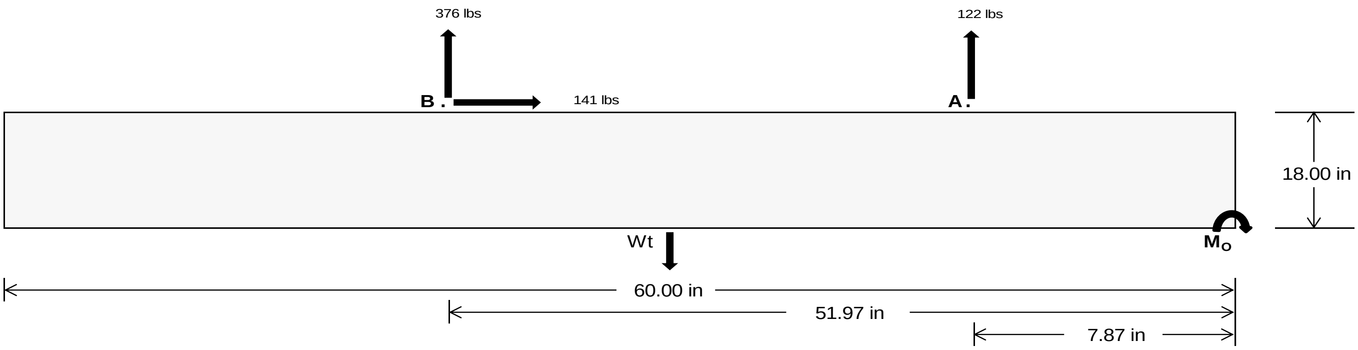
5.1 Helical Pile Foundations

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 =	46.05	588.58	k
Moment (Weak Axis) =	0.07	0.00	k

5.2 Design of Ballast Foundations

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



Concrete Properties

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

Footing Reinforcement

Use fiber reinforcing with (1) #5 rebar.

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

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

Sliding

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

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

Cohesion

Sliding Force =	141.44 lbs
Cohesion =	130 psf
Area =	9.58 ft^2
Resisting =	1042.19 lbs
Additional Weight Required =	0 lbs

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

Shear Key

Additional Force =	0 lbs
Lateral Bearing Pressure =	200 psf/ft
Required Depth =	0.00 ft
f'_c =	2500 psi
Length =	8 in

Shear key is not required.

Bearing Pressure

	Ballast Width			
	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

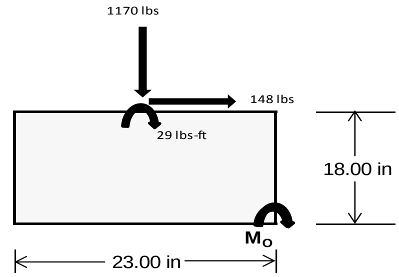
Use a 60in long x 23in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O = 870.8 ft-lbs
Resisting Force Required = 908.62 lbs
S.F. = 1.67
Weight Required = 1514.36 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	137 lbs	206 lbs	88 lbs	423 lbs	1170 lbs	384 lbs	73 lbs	25 lbs	28 lbs
F_V	24 lbs	195 lbs	25 lbs	16 lbs	148 lbs	19 lbs	24 lbs	195 lbs	25 lbs
P_{total}	2718 lbs	2787 lbs	2669 lbs	2879 lbs	3626 lbs	2841 lbs	828 lbs	780 lbs	782 lbs
M	70 lbs-ft	331 lbs-ft	75 lbs-ft	46 lbs-ft	251 lbs-ft	59 lbs-ft	72 lbs-ft	330 lbs-ft	74 lbs-ft
e	0.03 ft	0.12 ft	0.03 ft	0.02 ft	0.07 ft	0.02 ft	0.09 ft	0.42 ft	0.10 ft
L/6	0.32 ft	1.68 ft	1.86 ft	1.88 ft	1.78 ft	1.88 ft	1.74 ft	1.07 ft	1.73 ft
f_{min}	260.7 sqft	182.8 sqft	253.8 sqft	285.3 sqft	296.6 sqft	277.2 sqft	62.9 sqft	-26.5 sqft	57.3 sqft
f_{max}	306.6 psf	398.8 psf	303.1 psf	315.6 psf	460.3 psf	315.6 psf	109.8 psf	189.3 psf	105.9 psf

Maximum Bearing Pressure = 460 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.

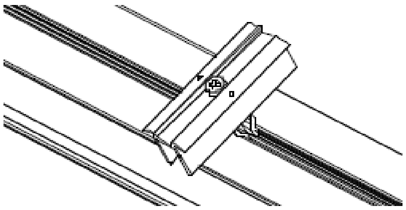
6. DESIGN OF JOINTS AND CONNECTIONS

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.

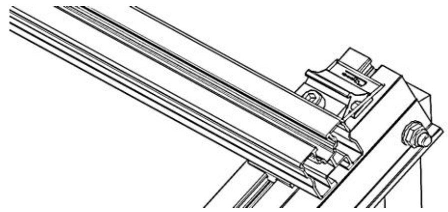
Fastening of Modules to Purlins

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

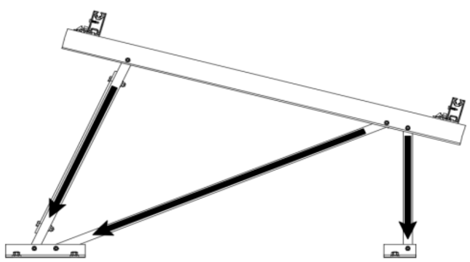
Maximum Axial Load =	1.408	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	25%	

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 =	0.264	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

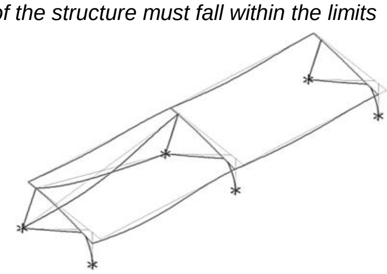
7.1 Seismic Drift

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} =	0.12	in

0.12 ≤ 0.568, OK.

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

$\varphi F_L St$= 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

$\varphi F_L Wk$= 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

<u>Compression</u>

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

φF_LSt= 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

φF_LWk= 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

$\lambda =$ 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

$\varphi cc =$ 0.83792

$\varphi F_L = \varphi cc(Bc\text{-}Dc^*\lambda)$

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

φF_LSt= 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

φF_LWk= 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

$\lambda =$ 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

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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

φF_LSt= 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

φF_LWk= 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

$\lambda =$ 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

$\varphi cc =$ 0.75985

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

$\varphi F_L =$ 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)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 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

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 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			.8			4		

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

Member Distributed Loads (BLC 6 : Seismic - Lateral)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Z	6.693	6.693	0	0
2	M16	Z	6.693	6.693	0	0
3	M13	Z	0	0	0	0
4	M16	Z	0	0	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.8W	Yes	Y		1	1.2	3	1.6	4	.8														
2	LRFD 1.2D + 1.6W + 0.5S	Yes	Y		1	1.2	3	.5	4	1.6														
3	LRFD 0.9D + 1.6W	Yes	Y		2	.9					5	1.6												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
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	-2.158	5	0	5	0	1	0	1
3	N7	max	0	5	587.369	1	-.117	12	0	12	0	1	0	1
4		min	-.192	1	-112.158	3	-35.01	4	-.057	4	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	-35.421	5	-.057	4	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	-256	4	0	5	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	-32.919	5	-.052	5	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	-3.446	5	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	-362.849	4						

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	.655	6	1.032	4	0	10	0	3	0	1
2			min	-368.07	3	.153	15	-.054	3	-.001	1	0	2	0	1
3		2	max	428.221	1	.617	6	.945	4	0	10	0	4	0	15
4			min	-367.998	3	.144	15	-.054	3	-.001	1	0	10	0	6
5		3	max	428.317	1	.579	6	.863	1	0	10	0	4	0	15
6			min	-367.925	3	.135	15	-.054	3	-.001	1	0	12	0	6
7		4	max	428.414	1	.541	6	.863	1	0	10	0	4	0	15
8			min	-367.853	3	.127	15	-.054	3	-.001	1	0	12	0	6
9		5	max	428.51	1	.503	6	.863	1	0	10	0	4	0	15
10			min	-367.781	3	.118	15	-.054	3	-.001	1	0	3	0	6
11		6	max	428.606	1	.465	6	.863	1	0	10	0	1	0	15
12			min	-367.708	3	.109	15	-.054	3	-.001	1	0	3	0	6
13		7	max	428.703	1	.428	6	.863	1	0	10	0	1	0	15
14			min	-367.636	3	.1	15	-.054	3	-.001	1	0	3	0	6
15		8	max	428.799	1	.39	6	.863	1	0	10	0	1	0	15
16			min	-367.564	3	.091	15	-.054	3	-.001	1	0	3	0	6
17		9	max	428.895	1	.352	6	.863	1	0	10	0	1	0	15
18			min	-367.492	3	.082	15	-.054	3	-.001	1	0	3	0	6
19		10	max	428.992	1	.314	6	.863	1	0	10	.001	1	0	15
20			min	-367.419	3	.073	15	-.054	3	-.001	1	0	3	0	6
21		11	max	429.088	1	.276	6	.863	1	0	10	.001	1	0	15
22			min	-367.347	3	.064	15	-.055	5	-.001	1	0	3	0	6
23		12	max	429.184	1	.239	6	.863	1	0	10	.001	1	0	15
24			min	-367.275	3	.055	15	-.142	5	-.001	1	0	3	0	6
25		13	max	429.281	1	.201	6	.863	1	0	10	.001	1	0	15
26			min	-367.202	3	.046	15	-.229	5	-.001	1	0	3	0	6
27		14	max	429.377	1	.163	6	.863	1	0	10	.002	1	0	15
28			min	-367.13	3	.038	15	-.317	5	-.001	1	0	3	0	6

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
29		15	max	429.474	1	.125	6	.863	1	0	10	.002	1	0	15
30			min	-367.058	3	.029	15	-.404	5	-.001	1	0	3	0	6
31		16	max	429.57	1	.087	6	.863	1	0	10	.002	1	0	15
32			min	-366.986	3	.02	15	-.491	5	-.001	1	0	3	0	6
33		17	max	429.666	1	.054	10	.863	1	0	10	.002	1	0	15
34			min	-366.913	3	0	1	-.579	5	-.001	1	0	3	0	6
35		18	max	429.763	1	.029	10	.863	1	0	10	.002	1	0	15
36			min	-366.841	3	-.03	1	-.666	5	-.001	1	0	3	0	6
37		19	max	429.859	1	.005	10	.863	1	0	10	.002	1	0	15
38			min	-366.769	3	-.059	1	-.753	5	-.001	1	0	3	0	6
39	M3	1	max	36.749	10	1.808	6	-.031	12	0	5	.002	1	0	6
40			min	-123.867	1	.424	15	-1.506	4	0	1	0	12	0	15
41		2	max	36.693	10	1.63	6	-.031	12	0	5	.002	1	0	6
42			min	-123.934	1	.383	15	-1.373	4	0	1	0	12	0	15
43		3	max	36.638	10	1.452	6	-.031	12	0	5	.002	1	0	10
44			min	-124.001	1	.341	15	-1.239	4	0	1	0	12	0	1
45		4	max	36.582	10	1.274	6	-.031	12	0	5	.002	1	0	15
46			min	-124.068	1	.299	15	-1.106	4	0	1	0	15	0	1
47		5	max	36.526	10	1.096	6	-.031	12	0	5	.001	1	0	15
48			min	-124.135	1	.257	15	-.972	4	0	1	0	5	0	4
49		6	max	36.47	10	.918	6	-.031	12	0	5	.001	1	0	15
50			min	-124.202	1	.215	15	-.838	4	0	1	0	5	0	4
51		7	max	36.414	10	.74	6	-.031	12	0	5	.001	1	0	15
52			min	-124.269	1	.173	15	-.738	1	0	1	0	5	0	4
53		8	max	36.358	10	.562	6	-.031	12	0	5	.001	1	0	15
54			min	-124.336	1	.132	15	-.738	1	0	1	0	5	0	4
55		9	max	36.302	10	.383	6	-.031	12	0	5	0	1	0	15
56			min	-124.404	1	.09	15	-.738	1	0	1	0	5	-.001	4
57		10	max	36.246	10	.205	6	-.031	12	0	5	0	1	0	15
58			min	-124.471	1	.048	15	-.738	1	0	1	0	5	-.001	4
59		11	max	36.19	10	.032	10	-.018	15	0	5	0	1	0	15
60			min	-124.538	1	-.004	1	-.738	1	0	1	0	5	-.001	4
61		12	max	36.134	10	-.036	15	.106	5	0	5	0	1	0	15
62			min	-124.605	1	-.151	4	-.738	1	0	1	0	5	-.001	4
63		13	max	36.078	10	-.078	15	.239	5	0	5	0	1	0	15
64			min	-124.672	1	-.329	4	-.738	1	0	1	0	5	-.001	4
65		14	max	36.022	10	-.12	15	.373	5	0	5	0	1	0	15
66			min	-124.739	1	-.507	4	-.738	1	0	1	0	5	-.001	4
67		15	max	35.967	10	-.161	15	.506	5	0	5	0	12	0	15
68			min	-124.806	1	-.685	4	-.738	1	0	1	0	4	0	4
69		16	max	35.911	10	-.203	15	.64	5	0	5	0	12	0	15
70			min	-124.873	1	-.863	4	-.738	1	0	1	0	4	0	4
71		17	max	35.855	10	-.245	15	.773	5	0	5	0	12	0	15
72			min	-124.94	1	-1.041	4	-.738	1	0	1	0	1	0	4
73		18	max	35.799	10	-.287	15	.907	5	0	5	0	12	0	15
74			min	-125.007	1	-1.219	4	-.738	1	0	1	0	1	0	4
75		19	max	35.743	10	-.329	15	1.04	5	0	5	0	5	0	1
76			min	-125.074	1	-1.397	4	-.738	1	0	1	0	1	0	1
77	M4	1	max	586.205	1	0	1	-.116	12	0	1	0	5	0	1
78			min	-113.031	3	0	1	-34.725	4	0	1	0	1	0	1
79		2	max	586.269	1	0	1	-.116	12	0	1	0	12	0	1
80			min	-112.983	3	0	1	-34.781	4	0	1	-.003	4	0	1
81		3	max	586.334	1	0	1	-.116	12	0	1	0	12	0	1
82			min	-112.934	3	0	1	-34.837	4	0	1	-.006	4	0	1
83		4	max	586.399	1	0	1	-.116	12	0	1	0	12	0	1
84			min	-112.886	3	0	1	-34.894	4	0	1	-.009	4	0	1
85		5	max	586.463	1	0	1	-.116	12	0	1	0	12	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
86			min	-112.837	3	0	1	-34.95	4	0	1	-.012	4	0	1
87		6	max	586.528	1	0	1	-.116	12	0	1	0	12	0	1
88			min	-112.789	3	0	1	-35.006	4	0	1	-.016	4	0	1
89		7	max	586.593	1	0	1	-.116	12	0	1	0	12	0	1
90			min	-112.74	3	0	1	-35.062	4	0	1	-.019	4	0	1
91		8	max	586.658	1	0	1	-.116	12	0	1	0	12	0	1
92			min	-112.692	3	0	1	-35.118	4	0	1	-.022	4	0	1
93		9	max	586.722	1	0	1	-.116	12	0	1	0	12	0	1
94			min	-112.643	3	0	1	-35.174	4	0	1	-.025	4	0	1
95		10	max	586.787	1	0	1	-.116	12	0	1	0	12	0	1
96			min	-112.594	3	0	1	-35.23	4	0	1	-.028	4	0	1
97		11	max	586.852	1	0	1	-.116	12	0	1	0	12	0	1
98			min	-112.546	3	0	1	-35.286	4	0	1	-.031	4	0	1
99		12	max	586.916	1	0	1	-.116	12	0	1	0	12	0	1
100			min	-112.497	3	0	1	-35.342	4	0	1	-.034	4	0	1
101		13	max	586.981	1	0	1	-.116	12	0	1	0	12	0	1
102			min	-112.449	3	0	1	-35.398	4	0	1	-.038	4	0	1
103		14	max	587.046	1	0	1	-.116	12	0	1	0	12	0	1
104			min	-112.4	3	0	1	-35.454	4	0	1	-.041	4	0	1
105		15	max	587.11	1	0	1	-.116	12	0	1	0	12	0	1
106			min	-112.352	3	0	1	-35.51	4	0	1	-.044	4	0	1
107		16	max	587.175	1	0	1	-.116	12	0	1	0	12	0	1
108			min	-112.303	3	0	1	-35.566	4	0	1	-.047	4	0	1
109		17	max	587.24	1	0	1	-.116	12	0	1	0	12	0	1
110			min	-112.255	3	0	1	-35.623	4	0	1	-.05	4	0	1
111		18	max	587.305	1	0	1	-.116	12	0	1	0	12	0	1
112			min	-112.206	3	0	1	-35.679	4	0	1	-.054	4	0	1
113		19	max	587.369	1	0	1	-.116	12	0	1	0	12	0	1
114			min	-112.158	3	0	1	-35.735	4	0	1	-.057	4	0	1
115	M6	1	max	1405.827	1	.633	6	.987	4	0	1	0	5	0	1
116			min	-1207.953	3	.148	15	-.12	3	0	5	0	1	0	1
117		2	max	1405.923	1	.595	6	.9	4	0	1	0	4	0	15
118			min	-1207.881	3	.139	15	-.12	3	0	5	0	2	0	6
119		3	max	1406.02	1	.557	6	.813	4	0	1	0	4	0	15
120			min	-1207.809	3	.13	15	-.12	3	0	5	0	12	0	6
121		4	max	1406.116	1	.519	6	.725	4	0	1	0	4	0	15
122			min	-1207.737	3	.121	15	-.12	3	0	5	0	3	0	6
123		5	max	1406.213	1	.482	6	.638	4	0	1	0	4	0	15
124			min	-1207.664	3	.112	15	-.12	3	0	5	0	3	0	6
125		6	max	1406.309	1	.444	6	.55	4	0	1	0	4	0	15
126			min	-1207.592	3	.103	15	-.12	3	0	5	0	3	0	6
127		7	max	1406.405	1	.406	6	.463	4	0	1	0	4	0	15
128			min	-1207.52	3	.094	15	-.12	3	0	5	0	3	0	6
129		8	max	1406.502	1	.368	6	.4	14	0	1	0	4	0	15
130			min	-1207.447	3	.086	15	-.12	3	0	5	0	3	0	6
131		9	max	1406.598	1	.33	6	.356	14	0	1	0	4	0	15
132			min	-1207.375	3	.077	15	-.12	3	0	5	0	3	0	6
133		10	max	1406.694	1	.292	6	.337	1	0	1	0	4	0	15
134			min	-1207.303	3	.068	15	-.12	3	0	5	0	3	0	6
135		11	max	1406.791	1	.255	6	.337	1	0	1	0	4	0	15
136			min	-1207.231	3	.059	15	-.12	3	0	5	0	3	0	6
137		12	max	1406.887	1	.217	6	.337	1	0	1	0	4	0	15
138			min	-1207.158	3	.05	15	-.12	3	0	5	0	3	0	6
139		13	max	1406.983	1	.183	2	.337	1	0	1	0	4	0	15
140			min	-1207.086	3	.041	15	-.174	5	0	5	0	3	0	6
141		14	max	1407.08	1	.154	2	.337	1	0	1	0	4	0	15
142			min	-1207.014	3	.032	15	-.262	5	0	5	0	3	0	6

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
143		15	max	1407.176	1	.124	2	.337	1	0	1	0	4	0	15
144			min	-1206.941	3	.008	9	-.349	5	0	5	0	3	0	6
145		16	max	1407.273	1	.097	10	.337	1	0	1	0	14	0	15
146			min	-1206.869	3	-.019	1	-.436	5	0	5	0	3	0	6
147		17	max	1407.369	1	.072	10	.337	1	0	1	0	14	0	15
148			min	-1206.797	3	-.048	1	-.524	5	0	5	0	3	0	6
149		18	max	1407.465	1	.048	10	.337	1	0	1	0	14	0	15
150			min	-1206.725	3	-.078	1	-.611	5	0	5	0	3	0	6
151		19	max	1407.562	1	.023	10	.337	1	0	1	0	14	0	15
152			min	-1206.652	3	-.107	1	-.698	5	0	5	0	3	0	6
153	M7	1	max	164.064	2	1.809	4	.015	1	0	2	0	4	0	4
154			min	-172.001	9	.43	15	-1.502	5	0	5	0	3	0	15
155		2	max	163.997	2	1.631	4	.015	1	0	2	0	4	0	2
156			min	-172.057	9	.388	15	-1.368	5	0	5	0	3	0	15
157		3	max	163.93	2	1.453	4	.015	1	0	2	0	4	0	2
158			min	-172.113	9	.346	15	-1.235	5	0	5	0	3	0	9
159		4	max	163.862	2	1.275	4	.015	1	0	2	0	14	0	10
160			min	-172.169	9	.304	15	-1.101	5	0	5	0	3	0	1
161		5	max	163.795	2	1.097	4	.015	1	0	2	0	2	0	15
162			min	-172.225	9	.262	15	-.968	5	0	5	0	5	0	1
163		6	max	163.728	2	.919	4	.015	1	0	2	0	2	0	15
164			min	-172.281	9	.22	15	-.834	5	0	5	0	5	0	6
165		7	max	163.661	2	.741	4	.015	1	0	2	0	2	0	15
166			min	-172.337	9	.179	15	-.701	5	0	5	0	5	0	6
167		8	max	163.594	2	.563	4	.015	1	0	2	0	2	0	15
168			min	-172.393	9	.137	15	-.567	5	0	5	0	5	0	6
169		9	max	163.527	2	.385	4	.015	1	0	2	0	2	0	15
170			min	-172.449	9	.095	15	-.434	5	0	5	0	5	-.001	6
171		10	max	163.46	2	.207	4	.015	1	0	2	0	2	0	15
172			min	-172.505	9	.053	15	-.3	5	0	5	0	5	-.001	6
173		11	max	163.393	2	.053	2	.015	1	0	2	0	2	0	15
174			min	-172.561	9	-.022	9	-.166	5	0	5	0	5	-.001	6
175		12	max	163.326	2	-.031	15	.015	1	0	2	0	2	0	15
176			min	-172.616	9	-.157	1	-.033	5	0	5	0	5	-.001	6
177		13	max	163.259	2	-.072	15	.103	4	0	2	0	2	0	15
178			min	-172.672	9	-.327	6	-.008	3	0	5	0	5	-.001	6
179		14	max	163.192	2	-.114	15	.237	4	0	2	0	2	0	15
180			min	-172.728	9	-.506	6	-.008	3	0	5	0	5	-.001	6
181		15	max	163.124	2	-.156	15	.37	4	0	2	0	2	0	15
182			min	-172.784	9	-.684	6	-.008	3	0	5	0	5	0	6
183		16	max	163.057	2	-.198	15	.504	4	0	2	0	2	0	15
184			min	-172.84	9	-.862	6	-.008	3	0	5	0	5	0	6
185		17	max	162.99	2	-.24	15	.637	4	0	2	0	2	0	15
186			min	-172.896	9	-1.04	6	-.008	3	0	5	0	5	0	6
187		18	max	162.923	2	-.282	15	.771	4	0	2	0	2	0	15
188			min	-172.952	9	-1.218	6	-.008	3	0	5	0	5	0	6
189		19	max	162.856	2	-.323	15	.904	4	0	2	0	2	0	1
190			min	-173.008	9	-1.396	6	-.008	3	0	5	0	5	0	1
191	M8	1	max	1751.006	1	0	1	.703	1	0	1	0	4	0	1
192			min	-394.232	3	0	1	-35.07	4	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	-35.126	4	0	1	-.003	4	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	-35.182	4	0	1	-.006	4	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	-35.238	4	0	1	-.009	4	0	1
199		5	max	1751.265	1	0	1	.703	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-394.037	3	0	1	-35.294	4	0	1	-.013	4	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	-35.351	4	0	1	-.016	4	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	-35.407	4	0	1	-.019	4	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	-35.463	4	0	1	-.022	4	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	-35.519	4	0	1	-.025	4	0	1
209		10	max	1751.588	1	0	1	.703	1	0	1	0	1	0	1
210			min	-393.795	3	0	1	-35.575	4	0	1	-.028	4	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	-35.631	4	0	1	-.032	4	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	-35.687	4	0	1	-.035	4	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	-35.743	4	0	1	-.038	4	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	-35.799	4	0	1	-.041	4	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	-35.855	4	0	1	-.044	4	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	-35.911	4	0	1	-.048	4	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	-35.967	4	0	1	-.051	4	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	-36.023	4	0	1	-.054	4	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	-36.08	4	0	1	-.057	4	0	1
229	M10	1	max	438.328	1	.68	4	1.238	4	.001	1	0	4	0	1
230			min	-358.622	3	.171	15	-.118	1	-.002	5	0	3	0	1
231		2	max	438.424	1	.643	4	1.15	4	.001	1	0	4	0	15
232			min	-358.55	3	.162	15	-.118	1	-.002	5	0	3	0	4
233		3	max	438.52	1	.605	4	1.063	4	.001	1	0	4	0	15
234			min	-358.477	3	.153	15	-.118	1	-.002	5	0	3	0	4
235		4	max	438.617	1	.567	4	.976	4	.001	1	0	4	0	15
236			min	-358.405	3	.144	15	-.118	1	-.002	5	0	3	0	4
237		5	max	438.713	1	.529	4	.888	4	.001	1	0	4	0	15
238			min	-358.333	3	.135	15	-.118	1	-.002	5	0	3	0	4
239		6	max	438.81	1	.491	4	.801	4	.001	1	0	4	0	15
240			min	-358.261	3	.126	15	-.118	1	-.002	5	0	1	0	4
241		7	max	438.906	1	.454	4	.714	4	.001	1	0	4	0	15
242			min	-358.188	3	.117	15	-.118	1	-.002	5	0	1	0	4
243		8	max	439.002	1	.416	4	.626	4	.001	1	.001	4	0	15
244			min	-358.116	3	.109	15	-.118	1	-.002	5	0	1	0	4
245		9	max	439.099	1	.378	4	.539	4	.001	1	.001	4	0	15
246			min	-358.044	3	.1	15	-.118	1	-.002	5	0	1	0	4
247		10	max	439.195	1	.34	4	.452	4	.001	1	.001	4	0	15
248			min	-357.972	3	.091	15	-.118	1	-.002	5	0	1	0	4
249		11	max	439.291	1	.302	4	.364	4	.001	1	.001	4	0	15
250			min	-357.899	3	.082	15	-.118	1	-.002	5	0	1	0	4
251		12	max	439.388	1	.264	4	.277	4	.001	1	.001	4	0	15
252			min	-357.827	3	.073	15	-.118	1	-.002	5	0	1	0	4
253		13	max	439.484	1	.227	4	.19	4	.001	1	.001	4	0	15
254			min	-357.755	3	.055	1	-.118	1	-.002	5	0	1	0	4
255		14	max	439.58	1	.189	4	.102	4	.001	1	.001	4	0	15
256			min	-357.682	3	.025	1	-.118	1	-.002	5	0	1	0	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
257		15	max	439.677	1	.151	4	.015	4	.001	1	.001	4	0	15
258			min	-357.61	3	-.004	1	-.118	1	-.002	5	0	1	0	4
259		16	max	439.773	1	.113	4	-.026	12	.001	1	.001	4	0	15
260			min	-357.538	3	-.034	1	-.118	1	-.002	5	0	1	0	4
261		17	max	439.87	1	.075	4	-.026	12	.001	1	.001	4	0	15
262			min	-357.466	3	-.063	1	-.172	5	-.002	5	0	1	0	4
263		18	max	439.966	1	.053	3	-.026	12	.001	1	.001	4	0	15
264			min	-357.393	3	-.093	1	-.26	5	-.002	5	0	1	0	4
265		19	max	440.062	1	.031	3	-.026	12	.001	1	.001	4	0	15
266			min	-357.321	3	-.122	1	-.347	5	-.002	5	0	1	0	4
267	M11	1	max	36.185	10	1.806	6	.874	1	.002	4	.002	5	0	6
268			min	-123.676	1	.423	15	-1.114	5	0	10	-.002	1	0	15
269		2	max	36.13	10	1.628	6	.874	1	.002	4	.001	5	0	2
270			min	-123.743	1	.382	15	-.981	5	0	10	-.002	1	0	15
271		3	max	36.074	10	1.45	6	.874	1	.002	4	.001	5	0	2
272			min	-123.81	1	.34	15	-.847	5	0	10	-.002	1	0	3
273		4	max	36.018	10	1.272	6	.874	1	.002	4	.001	5	0	15
274			min	-123.877	1	.298	15	-.714	5	0	10	-.002	1	0	4
275		5	max	35.962	10	1.094	6	.874	1	.002	4	0	5	0	15
276			min	-123.944	1	.256	15	-.58	5	0	10	-.001	1	0	4
277		6	max	35.906	10	.916	6	.874	1	.002	4	0	5	0	15
278			min	-124.012	1	.214	15	-.447	5	0	10	-.001	1	0	4
279		7	max	35.85	10	.738	6	.874	1	.002	4	0	5	0	15
280			min	-124.079	1	.172	15	-.313	5	0	10	0	1	0	4
281		8	max	35.794	10	.56	6	.874	1	.002	4	0	5	0	15
282			min	-124.146	1	.131	15	-.18	5	0	10	0	1	0	4
283		9	max	35.738	10	.382	6	.874	1	.002	4	0	5	0	15
284			min	-124.213	1	.089	15	-.046	5	0	10	0	1	-.001	4
285		10	max	35.682	10	.204	6	.874	1	.002	4	0	5	0	15
286			min	-124.28	1	.047	15	.02	12	0	10	0	1	-.001	4
287		11	max	35.626	10	.051	2	.874	1	.002	4	0	5	0	15
288			min	-124.347	1	.002	3	.02	12	0	10	0	1	-.001	4
289		12	max	35.57	10	-.037	15	.874	1	.002	4	0	5	0	15
290			min	-124.414	1	-.152	4	.02	12	0	10	0	2	-.001	4
291		13	max	35.514	10	-.079	15	.874	1	.002	4	0	4	0	15
292			min	-124.481	1	-.33	4	.02	12	0	10	0	2	-.001	4
293		14	max	35.459	10	-.121	15	.874	1	.002	4	0	4	0	15
294			min	-124.548	1	-.508	4	.02	12	0	10	0	10	-.001	4
295		15	max	35.403	10	-.162	15	.921	4	.002	4	.001	4	0	15
296			min	-124.615	1	-.686	4	.02	12	0	10	0	10	0	4
297		16	max	35.347	10	-.204	15	1.055	4	.002	4	.001	4	0	15
298			min	-124.682	1	-.864	4	.02	12	0	10	0	10	0	4
299		17	max	35.291	10	-.246	15	1.188	4	.002	4	.002	4	0	15
300			min	-124.75	1	-1.042	4	.02	12	0	10	0	10	0	4
301		18	max	35.235	10	-.288	15	1.322	4	.002	4	.002	4	0	15
302			min	-124.817	1	-1.22	4	.02	12	0	10	0	10	0	4
303		19	max	35.179	10	-.33	15	1.456	4	.002	4	.002	4	0	1
304			min	-124.884	1	-1.398	4	.02	12	0	10	0	10	0	1
305	M12	1	max	586.105	1	0	1	3.487	1	0	1	0	4	0	1
306			min	-112.627	3	0	1	-31.992	5	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	-32.048	5	0	1	-.003	5	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	-32.104	5	0	1	-.006	5	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	-32.161	5	0	1	-.009	5	0	1
313		5	max	586.364	1	0	1	3.487	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
314			min	-112.433	3	0	1	-32.217	5	0	1	-.011	5	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	-32.273	5	0	1	-.014	5	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	-32.329	5	0	1	-.017	5	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	-32.385	5	0	1	-.02	5	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	-32.441	5	0	1	-.023	5	0	1
323		10	max	586.688	1	0	1	3.487	1	0	1	.003	1	0	1
324			min	-112.19	3	0	1	-32.497	5	0	1	-.026	5	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	-32.553	5	0	1	-.029	5	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	-32.609	5	0	1	-.032	5	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	-32.665	5	0	1	-.035	5	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	-32.721	5	0	1	-.038	5	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	-32.777	5	0	1	-.041	5	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	-32.834	5	0	1	-.043	5	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	-32.89	5	0	1	-.046	5	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	-32.946	5	0	1	-.049	5	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	-33.002	5	0	1	-.052	5	0	1
343	M1	1	max	114.791	1	344.851	3	-2.428	12	0	1	.135	1	.015	1
344			min	3.824	12	-427.406	1	-68.456	1	0	3	.005	12	-.01	3
345		2	max	114.863	1	344.648	3	-2.428	12	0	1	.12	1	.108	1
346			min	3.86	12	-427.676	1	-68.456	1	0	3	.005	12	-.085	3
347		3	max	130.336	1	7.002	9	-2.462	12	0	5	.104	1	.199	1
348			min	-6.681	3	-23.433	3	-68.042	1	0	1	.004	12	-.158	3
349		4	max	130.409	1	6.777	9	-2.462	12	0	5	.089	1	.199	1
350			min	-6.627	3	-23.635	3	-68.042	1	0	1	.004	12	-.153	3
351		5	max	130.481	1	6.553	9	-2.462	12	0	5	.075	1	.199	1
352			min	-6.573	3	-23.838	3	-68.042	1	0	1	.003	12	-.148	3
353		6	max	130.553	1	6.328	9	-2.462	12	0	5	.06	1	.199	1
354			min	-6.519	3	-24.04	3	-68.042	1	0	1	.002	12	-.143	3
355		7	max	130.625	1	6.103	9	-2.462	12	0	5	.045	1	.199	1
356			min	-6.464	3	-24.242	3	-68.042	1	0	1	.002	12	-.137	3
357		8	max	130.698	1	5.878	9	-2.462	12	0	5	.03	1	.199	1
358			min	-6.41	3	-24.445	3	-68.042	1	0	1	.001	12	-.132	3
359		9	max	130.77	1	5.654	9	-2.462	12	0	5	.016	1	.199	1
360			min	-6.356	3	-24.647	3	-68.042	1	0	1	0	12	-.127	3
361		10	max	130.842	1	5.429	9	-2.462	12	0	5	.003	4	.199	1
362			min	-6.302	3	-24.849	3	-68.042	1	0	1	0	10	-.121	3
363		11	max	130.914	1	5.204	9	-2.462	12	0	5	0	15	.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	-2.462	12	0	5	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	-2.462	12	0	5	-.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	-2.462	12	0	5	-.002	12	.201	1
370			min	-6.085	3	-25.658	3	-68.042	1	0	1	-.058	1	-.1	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
371		15	max	131.204	1	4.305	9	-2.462	12	0	5	-.002	12	.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	-2.493	12	0	1	-.003	12	.203	1
374			min	-34.682	3	-85.41	1	-68.7	1	0	4	-.089	1	-.088	3
375		17	max	69.172	2	9.732	10	-2.493	12	0	1	-.003	12	.221	1
376			min	-34.627	3	-85.679	1	-68.7	1	0	4	-.104	1	-.077	3
377		18	max	-3.559	12	479.405	1	-2.61	12	0	5	-.004	12	.12	1
378			min	-114.403	1	-161.492	3	-70.297	1	0	1	-.119	1	-.042	3
379		19	max	-3.523	12	479.135	1	-2.61	12	0	5	-.005	12	.016	1
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	.049	4	.02	3
382			min	4.769	15	-1413.652	1	-29.891	4	0	5	0	10	-.03	1
383		2	max	251.96	1	1139.94	3	-.068	10	0	1	.042	4	.277	1
384			min	4.791	15	-1413.922	1	-29.649	4	0	5	-.002	3	-.227	3
385		3	max	301.193	1	10.416	9	2.628	3	0	3	.036	4	.578	1
386			min	-32.025	3	-77.11	3	-26.302	4	0	4	-.007	3	-.469	3
387		4	max	301.265	1	10.191	9	2.628	3	0	3	.03	4	.581	1
388			min	-31.97	3	-77.312	3	-26.06	4	0	4	-.007	3	-.452	3
389		5	max	301.337	1	9.966	9	2.628	3	0	3	.024	4	.584	1
390			min	-31.916	3	-77.514	3	-25.818	4	0	4	-.006	3	-.436	3
391		6	max	301.409	1	9.742	9	2.628	3	0	3	.019	4	.588	1
392			min	-31.862	3	-77.716	3	-25.576	4	0	4	-.005	3	-.419	3
393		7	max	301.482	1	9.517	9	2.628	3	0	3	.013	4	.591	1
394			min	-31.808	3	-77.919	3	-25.334	4	0	4	-.005	3	-.402	3
395		8	max	301.554	1	9.292	9	2.628	3	0	3	.008	4	.595	1
396			min	-31.754	3	-78.121	3	-25.092	4	0	4	-.004	3	-.385	3
397		9	max	301.626	1	9.067	9	2.628	3	0	3	.002	5	.598	1
398			min	-31.699	3	-78.323	3	-24.85	4	0	4	-.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	-24.608	4	0	4	-.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	-24.366	4	0	4	-.008	4	-.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	-24.124	4	0	4	-.014	4	-.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	-23.882	4	0	4	-.019	4	-.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	-23.64	4	0	4	-.024	4	-.283	3
409		15	max	302.06	1	7.719	9	2.628	3	0	3	0	10	.62	1
410			min	-31.374	3	-79.537	3	-23.398	4	0	4	-.029	4	-.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	-22.264	4	0	4	-.035	4	-.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	-22.022	4	0	4	-.039	4	-.215	3
415		18	max	-7.244	12	1580.313	1	2.392	3	0	4	.001	3	.311	1
416			min	-252.583	1	-532.2	3	-55.391	5	0	1	-.051	4	-.101	3
417		19	max	-7.208	12	1580.044	1	2.392	3	0	4	.002	3	.014	3
418			min	-252.511	1	-532.403	3	-55.149	5	0	1	-.063	4	-.031	1
419	M9	1	max	114.267	1	344.84	3	225.447	4	0	3	0	15	.015	1
420			min	1.564	15	-427.389	1	5.382	10	0	1	-.135	1	-.01	3
421		2	max	114.34	1	344.637	3	225.689	4	0	3	.046	5	.108	1
422			min	1.586	15	-427.659	1	5.382	10	0	1	-.115	1	-.085	3
423		3	max	130.41	1	6.982	9	64.15	1	0	1	.088	5	.198	1
424			min	-6.261	3	-23.378	3	-35.373	5	0	12	-.094	1	-.158	3
425		4	max	130.482	1	6.757	9	64.15	1	0	1	.081	5	.198	1
426			min	-6.207	3	-23.581	3	-35.131	5	0	12	-.08	1	-.153	3
427		5	max	130.555	1	6.532	9	64.15	1	0	1	.073	5	.198	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
428			min	-6.153	3	-23.783	3	-34.889	5	0	12	-.066	1	-.148	3
429		6	max	130.627	1	6.307	9	64.15	1	0	1	.066	5	.198	1
430			min	-6.099	3	-23.985	3	-34.647	5	0	12	-.052	1	-.143	3
431		7	max	130.699	1	6.083	9	64.15	1	0	1	.058	5	.199	1
432			min	-6.044	3	-24.188	3	-34.405	5	0	12	-.038	1	-.137	3
433		8	max	130.771	1	5.858	9	64.15	1	0	1	.051	5	.199	1
434			min	-5.99	3	-24.39	3	-34.163	5	0	12	-.025	1	-.132	3
435		9	max	130.844	1	5.633	9	64.15	1	0	1	.043	5	.199	1
436			min	-5.936	3	-24.592	3	-33.921	5	0	12	-.011	1	-.127	3
437		10	max	130.916	1	5.408	9	64.15	1	0	1	.036	4	.199	1
438			min	-5.882	3	-24.795	3	-33.679	5	0	12	0	2	-.121	3
439		11	max	130.988	1	5.184	9	64.15	1	0	1	.032	4	.2	1
440			min	-5.828	3	-24.997	3	-33.437	5	0	12	.001	10	-.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	-33.195	5	0	12	.002	10	-.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	-32.953	5	0	12	.003	12	-.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	-32.711	5	0	12	.003	12	-.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	-32.469	5	0	12	0	15	-.094	3
449		16	max	69.303	2	9.603	10	64.969	1	0	10	.088	1	.203	1
450			min	-34.75	3	-85.314	1	-30.945	5	0	4	-.004	5	-.088	3
451		17	max	69.376	2	9.378	10	64.969	1	0	10	.103	1	.221	1
452			min	-34.695	3	-85.584	1	-30.703	5	0	4	-.011	5	-.077	3
453		18	max	4.016	5	479.405	1	68.357	1	0	1	.117	1	.12	1
454			min	-114.177	1	-161.491	3	-62.357	5	0	3	-.024	5	-.042	3
455		19	max	4.05	5	479.135	1	68.357	1	0	1	.132	1	.016	1
456			min	-114.105	1	-161.693	3	-62.115	5	0	3	-.038	5	-.007	3
457	M13	1	max	225.454	4	426.817	1	-1.564	15	.015	1	.135	1	0	1
458			min	5.383	10	-344.83	3	-114.255	1	-.01	3	0	15	0	3
459		2	max	216.378	4	301.091	1	-.746	15	.015	1	.042	1	.269	3
460			min	5.383	10	-243.181	3	-87.536	1	-.01	3	-.002	5	-.334	1
461		3	max	207.301	4	175.365	1	.072	15	.015	1	.001	3	.446	3
462			min	5.383	10	-141.533	3	-60.817	1	-.01	3	-.026	1	-.552	1
463		4	max	198.225	4	49.638	1	1.266	5	.015	1	0	12	.529	3
464			min	5.383	10	-39.884	3	-34.097	1	-.01	3	-.069	1	-.655	1
465		5	max	189.148	4	61.765	3	2.531	5	.015	1	0	15	.519	3
466			min	5.383	10	-76.088	1	-7.378	1	-.01	3	-.088	1	-.643	1
467		6	max	180.072	4	163.413	3	19.341	1	.015	1	.003	5	.416	3
468			min	5.383	10	-201.814	1	.254	12	-.01	3	-.083	1	-.516	1
469		7	max	170.996	4	265.062	3	46.061	1	.015	1	.007	5	.219	3
470			min	5.383	10	-327.54	1	1.051	12	-.01	3	-.053	1	-.273	1
471		8	max	161.919	4	366.71	3	72.78	1	.015	1	.013	4	.085	1
472			min	5.383	10	-453.267	1	1.849	12	-.01	3	0	12	-.07	3
473		9	max	152.843	4	468.359	3	99.499	1	.015	1	.08	1	.558	1
474			min	5.383	10	-578.993	1	2.647	12	-.01	3	.002	12	-.453	3
475		10	max	143.766	4	570.008	3	126.219	1	.011	2	.184	1	1.146	1
476			min	5.383	10	-704.719	1	3.445	12	-.015	1	.005	12	-.929	3
477		11	max	104.908	4	578.993	1	2.565	5	.01	3	.077	1	.558	1
478			min	2.428	12	-468.359	3	-98.973	1	-.015	1	-.019	5	-.453	3
479		12	max	95.831	4	453.267	1	3.83	5	.01	3	0	2	.085	1
480			min	2.428	12	-366.71	3	-72.253	1	-.015	1	-.017	4	-.07	3
481		13	max	86.755	4	327.54	1	5.095	5	.01	3	-.003	12	.219	3
482			min	2.428	12	-265.062	3	-45.534	1	-.015	1	-.056	1	-.273	1
483		14	max	77.678	4	201.814	1	6.359	5	.01	3	-.003	12	.416	3
484			min	2.428	12	-163.413	3	-18.815	1	-.015	1	-.085	1	-.516	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
485		15	max	68.646	1	76.088	1	9.288	4	.01	3	0	15	.519	3
486			min	2.428	12	-61.765	3	.399	10	-.015	1	-.09	1	-.643	1
487		16	max	68.646	1	39.884	3	34.624	1	.01	3	.007	5	.529	3
488			min	2.428	12	-49.639	1	1.431	12	-.015	1	-.071	1	-.655	1
489		17	max	68.646	1	141.533	3	61.343	1	.01	3	.016	5	.446	3
490			min	2.428	12	-175.365	1	2.229	12	-.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	2.428	12	-301.091	1	3.026	12	-.015	1	.002	12	-.334	1
493		19	max	68.646	1	344.83	3	114.782	1	.01	3	.135	1	0	1
494			min	2.428	12	-426.818	1	3.824	12	-.015	1	.005	12	0	3
495	M16	1	max	62.102	5	479.74	1	4.05	5	.007	3	.132	1	0	1
496			min	-68.151	1	-161.709	3	-114.115	1	-.016	1	-.038	5	0	3
497		2	max	53.025	5	338.409	1	5.314	5	.007	3	.04	1	.126	3
498			min	-68.151	1	-114.158	3	-87.396	1	-.016	1	-.034	5	-.375	1
499		3	max	43.949	5	197.077	1	6.579	5	.007	3	0	12	.209	3
500			min	-68.151	1	-66.608	3	-60.676	1	-.016	1	-.034	4	-.62	1
501		4	max	34.872	5	55.745	1	7.844	5	.007	3	-.002	12	.249	3
502			min	-68.151	1	-19.057	3	-33.957	1	-.016	1	-.071	1	-.736	1
503		5	max	25.796	5	28.494	3	9.109	5	.007	3	-.003	12	.244	3
504			min	-68.151	1	-85.586	1	-7.238	1	-.016	1	-.09	1	-.723	1
505		6	max	16.719	5	76.044	3	19.482	1	.007	3	-.003	12	.196	3
506			min	-68.151	1	-226.918	1	.359	12	-.016	1	-.085	1	-.579	1
507		7	max	7.643	5	123.595	3	46.201	1	.007	3	.005	5	.105	3
508			min	-68.151	1	-368.25	1	1.157	12	-.016	1	-.055	1	-.307	1
509		8	max	-.898	15	171.145	3	72.92	1	.007	3	.017	4	.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	35.586	5	-17.102	15	126.359	1	.006	14	.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	26.509	5	650.913	1	2.621	5	.016	1	.079	1	.628	1
516			min	-70.115	1	-218.696	3	-99.413	1	-.007	3	-.018	5	-.209	3
517		12	max	17.433	5	509.581	1	3.886	5	.016	1	0	2	.096	1
518			min	-70.115	1	-171.145	3	-72.694	1	-.007	3	-.015	4	-.03	3
519		13	max	8.356	5	368.25	1	5.151	5	.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	-.391	15	226.918	1	6.415	5	.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	-2.61	12	85.586	1	9.315	4	.016	1	.001	5	.244	3
524			min	-70.115	1	-28.494	3	.331	12	-.007	3	-.089	1	-.723	1
525		16	max	-2.61	12	19.057	3	34.183	1	.016	1	.009	5	.249	3
526			min	-70.115	1	-55.745	1	1.129	12	-.007	3	-.07	1	-.736	1
527		17	max	-2.61	12	66.608	3	60.903	1	.016	1	.018	5	.209	3
528			min	-70.115	1	-197.077	1	1.927	12	-.007	3	-.027	1	-.62	1
529		18	max	-2.61	12	114.158	3	87.622	1	.016	1	.042	1	.126	3
530			min	-70.115	1	-338.409	1	2.725	12	-.007	3	.002	12	-.375	1
531		19	max	-2.61	12	161.709	3	114.341	1	.016	1	.134	1	0	1
532			min	-70.115	1	-479.74	1	3.523	12	-.007	3	.005	12	0	5
533	M15	1	max	.348	2	2.236	1	.023	3	0	1	0	1	0	1
534			min	-26.423	3	0	4	-.031	1	0	3	0	3	0	1
535		2	max	.276	2	1.988	1	.023	3	0	1	0	1	0	4
536			min	-26.477	3	0	4	-.031	1	0	3	0	3	-.001	1
537		3	max	.204	2	1.739	1	.023	3	0	1	0	1	0	4
538			min	-26.531	3	0	4	-.031	1	0	3	0	3	-.002	1
539		4	max	.132	2	1.491	1	.023	3	0	1	0	1	0	4
540			min	-26.585	3	0	4	-.031	1	0	3	0	3	-.003	1
541		5	max	.06	2	1.242	1	.023	3	0	1	0	1	0	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
542			min	-26.639	3	0	4	-.031	1	0	3	0	3	-.003	1
543		6	max	0	4	.994	1	.023	3	0	1	0	1	0	4
544			min	-26.693	3	0	4	-.031	1	0	3	0	3	-.004	1
545		7	max	0	4	.745	1	.023	3	0	1	0	3	0	4
546			min	-26.747	3	0	4	-.031	1	0	3	0	1	-.004	1
547		8	max	0	4	.497	1	.023	3	0	1	0	3	0	4
548			min	-26.801	3	0	4	-.031	1	0	3	0	1	-.005	1
549		9	max	0	4	.248	1	.023	3	0	1	0	3	0	4
550			min	-26.855	3	0	4	-.031	1	0	3	0	1	-.005	1
551		10	max	0	4	0	1	.023	3	0	1	0	3	0	4
552			min	-26.909	3	0	1	-.031	1	0	3	0	1	-.005	1
553		11	max	0	4	0	4	.023	3	0	1	0	3	0	4
554			min	-26.963	3	-.248	2	-.031	1	0	3	0	1	-.005	1
555		12	max	0	4	0	4	.023	3	0	1	0	3	0	4
556			min	-27.017	3	-.497	2	-.031	1	0	3	0	1	-.005	1
557		13	max	0	4	0	4	.023	3	0	1	0	3	0	4
558			min	-27.071	3	-.745	2	-.031	1	0	3	0	1	-.004	1
559		14	max	0	4	0	4	.023	3	0	1	0	3	0	4
560			min	-27.125	3	-.994	2	-.031	1	0	3	0	1	-.004	1
561		15	max	0	4	0	4	.023	3	0	1	0	3	0	4
562			min	-27.179	3	-1.242	2	-.031	1	0	3	0	1	-.003	1
563		16	max	0	4	0	4	.023	3	0	1	0	3	0	4
564			min	-27.233	3	-1.491	2	-.031	1	0	3	0	1	-.003	1
565		17	max	0	4	0	4	.023	3	0	1	0	3	0	4
566			min	-27.287	3	-1.739	2	-.031	1	0	3	0	1	-.002	1
567		18	max	0	4	0	4	.023	3	0	1	0	3	0	4
568			min	-27.341	3	-1.988	2	-.031	1	0	3	0	1	-.001	1
569		19	max	0	4	0	4	.023	3	0	1	0	3	0	1
570			min	-27.395	3	-2.236	2	-.031	1	0	3	0	1	0	1
571	M16A	1	max	-.747	10	3.429	4	.208	4	0	3	0	3	0	1
572			min	-262.206	4	1.051	15	-.009	3	0	1	0	4	0	1
573		2	max	-.687	10	3.048	4	.188	4	0	3	0	3	0	15
574			min	-262.328	4	.934	15	-.009	3	0	1	0	4	-.002	4
575		3	max	-.627	10	2.667	4	.168	4	0	3	0	3	0	15
576			min	-262.45	4	.817	15	-.009	3	0	1	0	4	-.003	4
577		4	max	-.567	10	2.286	4	.148	4	0	3	0	3	-.001	15
578			min	-262.572	4	.701	15	-.009	3	0	1	0	4	-.004	4
579		5	max	-.507	10	1.905	4	.129	4	0	3	0	3	-.002	15
580			min	-262.694	4	.584	15	-.009	3	0	1	0	1	-.005	4
581		6	max	-.447	10	1.524	4	.109	4	0	3	0	5	-.002	15
582			min	-262.816	4	.467	15	-.009	3	0	1	0	1	-.006	4
583		7	max	-.387	10	1.143	4	.089	4	0	3	0	5	-.002	15
584			min	-262.939	4	.35	15	-.009	3	0	1	0	1	-.007	4
585		8	max	-.327	10	.762	4	.069	4	0	3	0	5	-.002	15
586			min	-263.061	4	.234	15	-.009	3	0	1	0	1	-.007	4
587		9	max	-.267	10	.381	4	.049	4	0	3	0	5	-.002	15
588			min	-263.183	4	.117	15	-.009	3	0	1	0	1	-.007	4
589		10	max	-.207	10	0	1	.029	4	0	3	0	5	-.002	15
590			min	-263.305	4	0	1	-.009	3	0	1	0	1	-.007	4
591		11	max	-.147	10	-.117	15	.019	1	0	3	0	5	-.002	15
592			min	-263.427	4	-.381	4	-.009	3	0	1	0	1	-.007	4
593		12	max	-.087	10	-.234	15	.019	1	0	3	0	5	-.002	15
594			min	-263.549	4	-.762	4	-.014	5	0	1	0	1	-.007	4
595		13	max	-.027	10	-.35	15	.019	1	0	3	0	5	-.002	15
596			min	-263.671	4	-1.143	4	-.034	5	0	1	0	3	-.007	4
597		14	max	.033	10	-.467	15	.019	1	0	3	0	4	-.002	15
598			min	-263.794	4	-1.524	4	-.054	5	0	1	0	3	-.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
599		15	max	.093	10	-.584	15	.019	1	0	3	0	4	-.002	15
600			min	-263.916	4	-1.905	4	-.074	5	0	1	0	3	-.005	4
601		16	max	.153	10	-.701	15	.019	1	0	3	0	4	-.001	15
602			min	-264.038	4	-2.286	4	-.093	5	0	1	0	3	-.004	4
603		17	max	.213	10	-.817	15	.019	1	0	3	0	1	0	15
604			min	-264.16	4	-2.667	4	-.113	5	0	1	0	3	-.003	4
605		18	max	.273	10	-.934	15	.019	1	0	3	0	1	0	15
606			min	-264.282	4	-3.048	4	-.133	5	0	1	0	5	-.002	4
607		19	max	.333	10	-1.051	15	.019	1	0	3	0	1	0	1
608			min	-264.404	4	-3.429	4	-.153	5	0	1	0	5	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	1.938e-3	5	NC	3	NC	3
2			min	-.003	3	-.005	3	-.02	5	-9.817e-4	1	4821.366	2	2341.822	1
3		2	max	.003	1	.006	2	.012	1	1.965e-3	5	NC	3	NC	3
4			min	-.003	3	-.005	3	-.019	5	-9.431e-4	1	5217.292	2	2538.703	1
5		3	max	.003	1	.005	2	.011	1	1.993e-3	5	NC	3	NC	3
6			min	-.002	3	-.004	3	-.018	5	-9.046e-4	1	5680.783	2	2770.336	1
7		4	max	.003	1	.005	2	.01	1	2.02e-3	5	NC	3	NC	3
8			min	-.002	3	-.004	3	-.017	5	-8.66e-4	1	6226.975	2	3045.189	1
9		5	max	.002	1	.004	2	.009	1	2.048e-3	5	NC	3	NC	3
10			min	-.002	3	-.004	3	-.016	5	-8.274e-4	1	6875.726	2	3374.567	1
11		6	max	.002	1	.004	2	.008	1	2.075e-3	5	NC	1	NC	3
12			min	-.002	3	-.004	3	-.015	5	-7.888e-4	1	7653.504	2	3773.833	1
13		7	max	.002	1	.004	2	.007	1	2.103e-3	5	NC	1	NC	2
14			min	-.002	3	-.004	3	-.014	5	-7.502e-4	1	8596.252	2	4264.301	1
15		8	max	.002	1	.003	2	.006	1	2.13e-3	5	NC	1	NC	2
16			min	-.002	3	-.003	3	-.013	5	-7.116e-4	1	9753.844	2	4876.27	1
17		9	max	.002	1	.003	2	.005	1	2.158e-3	5	NC	1	NC	2
18			min	-.002	3	-.003	3	-.012	5	-6.73e-4	1	NC	1	5654.029	1
19		10	max	.002	1	.002	2	.005	1	2.185e-3	5	NC	1	NC	2
20			min	-.001	3	-.003	3	-.011	5	-6.344e-4	1	NC	1	6664.49	1
21		11	max	.001	1	.002	2	.004	1	2.213e-3	5	NC	1	NC	2
22			min	-.001	3	-.003	3	-.01	5	-5.958e-4	1	NC	1	8012.829	1
23		12	max	.001	1	.002	2	.003	1	2.24e-3	5	NC	1	NC	2
24			min	-.001	3	-.002	3	-.008	5	-5.572e-4	1	NC	1	9872.56	1
25		13	max	.001	1	.001	2	.002	1	2.268e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.007	5	-5.187e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.295e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.006	5	-4.801e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.323e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-4.415e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.35e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.004	5	-4.029e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.378e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.002	5	-3.643e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.406e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.257e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.433e-3	5	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	-1.108e-3	5	NC	1	NC	1
41		2	max	0	1	0	2	.006	5	1.662e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	-1.113e-3	5	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
43		3	max	0	1	0	2	.012	5	2.019e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	-1.119e-3	5	NC	1	8189.518	14
45		4	max	0	1	0	2	.018	5	2.375e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	-1.124e-3	5	NC	1	5354.205	14
47		5	max	0	1	0	2	.024	4	2.732e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	-1.13e-3	5	NC	1	3948.298	14
49		6	max	0	1	0	2	.03	4	3.089e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	-1.136e-3	5	NC	1	3112.949	14
51		7	max	0	1	0	2	.036	4	3.446e-4	1	NC	1	NC	1
52			min	0	10	-.004	3	0	1	-1.141e-3	5	NC	1	2562.042	14
53		8	max	0	1	.001	2	.042	4	3.802e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	-1.147e-3	5	NC	1	2173.066	14
55		9	max	0	1	.002	2	.048	4	4.159e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	2	-1.152e-3	5	NC	1	1884.843	14
57		10	max	0	1	.002	2	.054	4	4.516e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	10	-1.158e-3	5	NC	1	1663.438	14
59		11	max	0	1	.003	2	.06	4	4.872e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	10	-1.164e-3	5	NC	1	1488.529	14
61		12	max	0	1	.003	2	.065	4	5.229e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	12	-1.169e-3	5	NC	1	1347.211	14
63		13	max	0	1	.004	2	.071	4	5.586e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	12	-1.175e-3	5	NC	1	1230.898	14
65		14	max	.001	1	.005	2	.077	4	5.942e-4	1	NC	3	NC	1
66			min	0	10	-.007	3	0	12	-1.18e-3	5	9619.549	2	1133.664	14
67		15	max	.001	1	.006	2	.083	4	6.299e-4	1	NC	3	NC	1
68			min	0	10	-.007	3	0	12	-1.186e-3	5	8122.842	2	1051.282	14
69		16	max	.001	1	.007	2	.088	4	6.656e-4	1	NC	3	NC	2
70			min	0	10	-.007	3	0	12	-1.192e-3	5	6955.762	2	980.661	14
71		17	max	.001	1	.008	1	.094	4	7.012e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	12	-1.197e-3	5	6022.417	1	919.486	14
73		18	max	.001	1	.009	1	.099	4	7.369e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	12	-1.203e-3	5	5269.378	1	865.99	14
75		19	max	.001	1	.01	1	.105	4	7.726e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	12	-1.208e-3	5	4673.114	1	818.799	14
77	M4	1	max	.003	1	.007	2	0	12	4.558e-3	5	NC	1	NC	2
78			min	0	3	-.005	3	-.111	4	-8.691e-4	1	NC	1	174.436	4
79		2	max	.003	1	.007	2	0	12	4.558e-3	5	NC	1	NC	2
80			min	0	3	-.005	3	-.102	4	-8.691e-4	1	NC	1	190.164	4
81		3	max	.002	1	.007	2	0	12	4.558e-3	5	NC	1	NC	2
82			min	0	3	-.005	3	-.093	4	-8.691e-4	1	NC	1	208.884	4
83		4	max	.002	1	.006	2	0	12	4.558e-3	5	NC	1	NC	2
84			min	0	3	-.004	3	-.084	4	-8.691e-4	1	NC	1	231.384	4
85		5	max	.002	1	.006	2	0	12	4.558e-3	5	NC	1	NC	2
86			min	0	3	-.004	3	-.075	4	-8.691e-4	1	NC	1	258.74	4
87		6	max	.002	1	.005	2	0	12	4.558e-3	5	NC	1	NC	2
88			min	0	3	-.004	3	-.066	4	-8.691e-4	1	NC	1	292.443	4
89		7	max	.002	1	.005	2	0	12	4.558e-3	5	NC	1	NC	2
90			min	0	3	-.004	3	-.058	4	-8.691e-4	1	NC	1	334.622	4
91		8	max	.002	1	.004	2	0	12	4.558e-3	5	NC	1	NC	2
92			min	0	3	-.003	3	-.05	4	-8.691e-4	1	NC	1	388.391	4
93		9	max	.002	1	.004	2	0	12	4.558e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.042	4	-8.691e-4	1	NC	1	458.459	4
95		10	max	.001	1	.004	2	0	12	4.558e-3	5	NC	1	NC	1
96			min	0	3	-.003	3	-.035	4	-8.691e-4	1	NC	1	552.234	4
97		11	max	.001	1	.003	2	0	12	4.558e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.028	4	-8.691e-4	1	NC	1	681.911	4
99		12	max	.001	1	.003	2	0	12	4.558e-3	5	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
100			min	0	3	-.002	3	-.022	4	-8.691e-4	1	NC	1	868.765	4
101		13	max	0	1	.002	2	0	12	4.558e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.017	4	-8.691e-4	1	NC	1	1152.704	4
103		14	max	0	1	.002	2	0	12	4.558e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.012	4	-8.691e-4	1	NC	1	1616.046	4
105		15	max	0	1	.002	2	0	12	4.558e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.008	4	-8.691e-4	1	NC	1	2452.186	4
107		16	max	0	1	.001	2	0	12	4.558e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.005	4	-8.691e-4	1	NC	1	4210.92	4
109		17	max	0	1	0	2	0	12	4.558e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-8.691e-4	1	NC	1	9027.551	4
111		18	max	0	1	0	2	0	12	4.558e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-8.691e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	4.558e-3	5	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	2.134e-3	4	NC	3	NC	2
116			min	-.009	3	-.013	3	-.019	5	3.655e-6	10	1512.057	2	7788.748	1
117		2	max	.01	1	.019	2	.004	1	2.157e-3	4	NC	3	NC	2
118			min	-.008	3	-.013	3	-.019	5	2.936e-6	10	1612.272	2	8444.28	1
119		3	max	.009	1	.017	2	.003	1	2.18e-3	4	NC	3	NC	2
120			min	-.008	3	-.012	3	-.018	5	2.217e-6	10	1726.403	2	9222.607	1
121		4	max	.009	1	.016	2	.003	1	2.204e-3	4	NC	3	NC	1
122			min	-.007	3	-.011	3	-.017	5	1.499e-6	10	1857.222	2	NC	1
123		5	max	.008	1	.015	2	.003	1	2.227e-3	4	NC	3	NC	1
124			min	-.007	3	-.011	3	-.016	5	7.797e-7	10	2008.296	2	NC	1
125		6	max	.008	1	.014	2	.002	1	2.25e-3	4	NC	3	NC	1
126			min	-.006	3	-.01	3	-.015	5	6.092e-8	10	2184.293	2	NC	1
127		7	max	.007	1	.013	2	.002	1	2.274e-3	4	NC	3	NC	1
128			min	-.006	3	-.009	3	-.014	5	-6.579e-7	10	2391.44	2	NC	1
129		8	max	.006	1	.011	2	.002	1	2.297e-3	4	NC	3	NC	1
130			min	-.005	3	-.009	3	-.013	5	-1.377e-6	10	2638.23	2	NC	1
131		9	max	.006	1	.01	2	.002	1	2.32e-3	4	NC	3	NC	1
132			min	-.005	3	-.008	3	-.012	5	-3.484e-6	2	2936.554	2	NC	1
133		10	max	.005	1	.009	2	.001	1	2.344e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.011	5	-7.649e-6	2	3303.589	2	NC	1
135		11	max	.005	1	.008	2	.001	1	2.367e-3	4	NC	3	NC	1
136			min	-.004	3	-.007	3	-.01	5	-1.181e-5	2	3765.102	2	NC	1
137		12	max	.004	1	.007	2	0	1	2.39e-3	4	NC	3	NC	1
138			min	-.003	3	-.006	3	-.009	5	-1.598e-5	2	4361.577	2	NC	1
139		13	max	.003	1	.006	2	0	1	2.414e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.007	5	-2.015e-5	2	5160.487	2	NC	1
141		14	max	.003	1	.005	2	0	1	2.437e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.006	5	-2.431e-5	2	6283.278	2	NC	1
143		15	max	.002	1	.004	2	0	1	2.461e-3	4	NC	3	NC	1
144			min	-.002	3	-.003	3	-.005	5	-2.848e-5	2	7972.823	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.484e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.004	5	-3.264e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	2.507e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.003	5	-3.681e-5	2	NC	1	NC	1
149		18	max	0	1	0	2	0	1	2.531e-3	4	NC	1	NC	1
150			min	0	3	0	3	-.001	5	-4.097e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.554e-3	4	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	-1.163e-3	4	NC	1	NC	1
155		2	max	0	9	.001	2	.006	4	1.7e-5	2	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-1.148e-3	4	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
157		3	max	0	9	.003	2	.012	4	1.515e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	2	-1.133e-3	4	NC	1	NC	1
159		4	max	0	9	.004	2	.019	4	1.474e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	2	-1.118e-3	4	NC	1	NC	1
161		5	max	0	9	.005	1	.025	4	1.433e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	2	-1.104e-3	4	8974.265	1	NC	1
163		6	max	0	9	.006	1	.031	4	1.393e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	-1.089e-3	4	7105.389	1	NC	1
165		7	max	0	9	.008	1	.037	4	1.59e-5	3	NC	3	NC	1
166			min	0	2	-.008	3	0	1	-1.074e-3	4	5833.491	1	NC	1
167		8	max	0	9	.009	1	.044	4	2.497e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-1.059e-3	4	4907.464	1	NC	1
169		9	max	0	9	.011	1	.05	4	3.403e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-1.044e-3	4	4201.691	1	NC	1
171		10	max	0	9	.013	1	.056	4	4.31e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	0	1	-1.03e-3	4	3646.141	1	NC	1
173		11	max	.001	9	.014	1	.062	4	5.216e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-1.015e-3	4	3198.466	1	NC	1
175		12	max	.001	9	.016	1	.068	4	6.123e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-9.999e-4	4	2831.377	1	NC	1
177		13	max	.001	9	.018	1	.073	4	7.029e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-9.851e-4	4	2526.357	1	NC	1
179		14	max	.001	9	.02	1	.079	4	7.936e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.001	1	-9.704e-4	4	2270.306	1	NC	1
181		15	max	.002	9	.022	1	.085	4	8.843e-5	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-9.556e-4	4	2053.639	1	NC	1
183		16	max	.002	9	.025	1	.09	4	9.749e-5	3	NC	3	NC	1
184			min	-.002	2	-.018	3	-.002	1	-9.408e-4	4	1869.145	1	NC	1
185		17	max	.002	9	.027	1	.096	4	1.066e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-9.26e-4	4	1711.28	1	NC	1
187		18	max	.002	9	.029	1	.101	4	1.156e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-9.112e-4	4	1575.708	1	NC	1
189		19	max	.002	9	.032	1	.106	4	1.247e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-8.964e-4	4	1458.992	1	NC	1
191	M8	1	max	.008	1	.023	2	.002	1	4.294e-3	4	NC	1	NC	2
192			min	-.002	3	-.015	3	-.112	4	-1.004e-4	3	NC	1	172.764	4
193		2	max	.008	1	.022	2	.002	1	4.294e-3	4	NC	1	NC	2
194			min	-.002	3	-.014	3	-.103	4	-1.004e-4	3	NC	1	188.34	4
195		3	max	.007	1	.021	2	.002	1	4.294e-3	4	NC	1	NC	1
196			min	-.002	3	-.013	3	-.093	4	-1.004e-4	3	NC	1	206.88	4
197		4	max	.007	1	.019	2	.002	1	4.294e-3	4	NC	1	NC	1
198			min	-.002	3	-.012	3	-.084	4	-1.004e-4	3	NC	1	229.165	4
199		5	max	.006	1	.018	2	.001	1	4.294e-3	4	NC	1	NC	1
200			min	-.001	3	-.012	3	-.075	4	-1.004e-4	3	NC	1	256.257	4
201		6	max	.006	1	.017	2	.001	1	4.294e-3	4	NC	1	NC	1
202			min	-.001	3	-.011	3	-.067	4	-1.004e-4	3	NC	1	289.637	4
203		7	max	.006	1	.015	2	.001	1	4.294e-3	4	NC	1	NC	1
204			min	-.001	3	-.01	3	-.058	4	-1.004e-4	3	NC	1	331.41	4
205		8	max	.005	1	.014	2	0	1	4.294e-3	4	NC	1	NC	1
206			min	-.001	3	-.009	3	-.05	4	-1.004e-4	3	NC	1	384.662	4
207		9	max	.005	1	.013	2	0	1	4.294e-3	4	NC	1	NC	1
208			min	-.001	3	-.008	3	-.043	4	-1.004e-4	3	NC	1	454.058	4
209		10	max	.004	1	.012	2	0	1	4.294e-3	4	NC	1	NC	1
210			min	0	3	-.007	3	-.035	4	-1.004e-4	3	NC	1	546.932	4
211		11	max	.004	1	.01	2	0	1	4.294e-3	4	NC	1	NC	1
212			min	0	3	-.007	3	-.029	4	-1.004e-4	3	NC	1	675.363	4
213		12	max	.003	1	.009	2	0	1	4.294e-3	4	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
214			min	0	3	-.006	3	-.022	4	-1.004e-4	3	NC	1	860.423	4
215		13	max	.003	1	.008	2	0	1	4.294e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.017	4	-1.004e-4	3	NC	1	1141.636	4
217		14	max	.002	1	.006	2	0	1	4.294e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.012	4	-1.004e-4	3	NC	1	1600.528	4
219		15	max	.002	1	.005	2	0	1	4.294e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.008	4	-1.004e-4	3	NC	1	2428.64	4
221		16	max	.001	1	.004	2	0	1	4.294e-3	4	NC	1	NC	1
222			min	0	3	-.002	3	-.005	4	-1.004e-4	3	NC	1	4170.485	4
223		17	max	0	1	.003	2	0	1	4.294e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.004e-4	3	NC	1	8940.86	4
225		18	max	0	1	.001	2	0	1	4.294e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.004e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	4.294e-3	4	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	-.008	4	-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	-.008	4	-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	-.008	4	-1.494e-4	3	5657.237	2	NC	1
235		4	max	.003	1	.005	2	0	3	7.889e-4	4	NC	3	NC	1
236			min	-.002	3	-.004	3	-.008	4	-1.453e-4	3	6178.727	2	NC	1
237		5	max	.003	1	.004	2	0	3	8.577e-4	4	NC	3	NC	1
238			min	-.002	3	-.004	3	-.007	4	-1.412e-4	3	6794.173	2	NC	1
239		6	max	.002	1	.004	2	0	3	9.265e-4	4	NC	3	NC	1
240			min	-.002	3	-.004	3	-.007	4	-1.371e-4	3	7526.881	2	NC	1
241		7	max	.002	1	.004	2	0	3	9.953e-4	4	NC	1	NC	1
242			min	-.002	3	-.004	3	-.007	4	-1.331e-4	3	8408.249	2	NC	1
243		8	max	.002	1	.003	2	0	3	1.064e-3	4	NC	1	NC	1
244			min	-.002	3	-.004	3	-.007	4	-1.29e-4	3	9481.5	2	NC	1
245		9	max	.002	1	.003	2	0	3	1.133e-3	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.006	4	-1.249e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	1.202e-3	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.006	4	-1.208e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	1.271e-3	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.006	4	-1.168e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.339e-3	4	NC	1	NC	1
252			min	-.001	3	-.003	3	-.005	4	-1.127e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	1.408e-3	4	NC	1	NC	1
254			min	0	3	-.002	3	-.005	4	-1.086e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.477e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.004	4	-1.045e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.546e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.003	4	-1.004e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.615e-3	4	NC	1	NC	1
260			min	0	3	-.001	3	-.003	4	-9.637e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.683e-3	4	NC	1	NC	1
262			min	0	3	0	3	-.002	4	-9.229e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.752e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-8.822e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.821e-3	4	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	-8.304e-4	4	NC	1	NC	1
269		2	max	0	1	0	2	.004	4	2.762e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-9.361e-4	4	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
271		3	max	0	1	0	2	.009	4	1.689e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.042e-3	4	NC	1	5125.907	4
273		4	max	0	1	0	2	.014	4	6.154e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-1.147e-3	4	NC	1	3382.169	4
275		5	max	0	1	0	2	.018	4	-3.396e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	0	1	-1.253e-3	4	NC	1	2513.394	4
277		6	max	0	1	0	2	.023	4	-1.022e-5	12	NC	1	NC	1
278			min	0	10	-.004	3	-.002	1	-1.359e-3	4	NC	1	1994.17	4
279		7	max	0	1	.001	2	.028	4	-1.705e-5	12	NC	1	NC	1
280			min	0	10	-.004	3	-.002	1	-1.464e-3	4	NC	1	1649.387	4
281		8	max	0	1	.001	2	.033	5	-2.388e-5	12	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-1.57e-3	4	NC	1	1400.45	5
283		9	max	0	1	.002	2	.038	5	-3.071e-5	12	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-1.676e-3	4	NC	1	1214.609	5
285		10	max	0	1	.002	2	.043	5	-3.754e-5	12	NC	1	NC	2
286			min	0	10	-.006	3	-.005	1	-1.781e-3	4	NC	1	1070.739	5
287		11	max	0	1	.003	2	.048	5	-4.437e-5	12	NC	1	NC	2
288			min	0	10	-.006	3	-.006	1	-1.887e-3	4	NC	1	956.078	5
289		12	max	0	1	.003	2	.053	5	-4.868e-5	10	NC	1	NC	2
290			min	0	10	-.006	3	-.007	1	-1.993e-3	4	NC	1	862.517	5
291		13	max	0	1	.004	2	.059	5	-5.267e-5	10	NC	1	NC	2
292			min	0	10	-.007	3	-.008	1	-2.098e-3	4	NC	1	784.657	5
293		14	max	.001	1	.005	2	.064	5	-5.667e-5	10	NC	3	NC	2
294			min	0	10	-.007	3	-.009	1	-2.204e-3	4	9410.903	2	718.766	5
295		15	max	.001	1	.006	2	.07	5	-6.067e-5	10	NC	3	NC	2
296			min	0	10	-.007	3	-.01	1	-2.31e-3	4	8001.606	2	662.186	5
297		16	max	.001	1	.007	2	.075	5	-6.467e-5	10	NC	3	NC	2
298			min	0	10	-.007	3	-.011	1	-2.416e-3	4	6889.311	2	612.972	5
299		17	max	.001	1	.008	1	.081	5	-6.867e-5	10	NC	3	NC	2
300			min	0	10	-.007	3	-.012	1	-2.521e-3	4	5977.908	1	569.672	5
301		18	max	.001	1	.009	1	.087	5	-7.267e-5	10	NC	3	NC	2
302			min	0	10	-.007	3	-.013	1	-2.627e-3	4	5253.855	1	531.18	5
303		19	max	.001	1	.01	1	.093	5	-7.667e-5	10	NC	3	NC	3
304			min	0	10	-.007	3	-.013	1	-2.733e-3	4	4675.901	1	496.642	5
305	M12	1	max	.003	1	.007	2	.011	1	5.866e-3	4	NC	1	NC	3
306			min	0	3	-.005	3	-.102	5	6.793e-5	10	NC	1	189.221	5
307		2	max	.003	1	.007	2	.01	1	5.866e-3	4	NC	1	NC	3
308			min	0	3	-.005	3	-.094	5	6.793e-5	10	NC	1	206.277	5
309		3	max	.002	1	.007	2	.009	1	5.866e-3	4	NC	1	NC	3
310			min	0	3	-.005	3	-.085	5	6.793e-5	10	NC	1	226.579	5
311		4	max	.002	1	.006	2	.008	1	5.866e-3	4	NC	1	NC	3
312			min	0	3	-.004	3	-.077	5	6.793e-5	10	NC	1	250.981	5
313		5	max	.002	1	.006	2	.007	1	5.866e-3	4	NC	1	NC	3
314			min	0	3	-.004	3	-.069	5	6.793e-5	10	NC	1	280.648	5
315		6	max	.002	1	.005	2	.007	1	5.866e-3	4	NC	1	NC	3
316			min	0	3	-.004	3	-.061	5	6.793e-5	10	NC	1	317.199	5
317		7	max	.002	1	.005	2	.006	1	5.866e-3	4	NC	1	NC	3
318			min	0	3	-.004	3	-.053	5	6.793e-5	10	NC	1	362.94	5
319		8	max	.002	1	.004	2	.005	1	5.866e-3	4	NC	1	NC	2
320			min	0	3	-.003	3	-.046	5	6.793e-5	10	NC	1	421.25	5
321		9	max	.002	1	.004	2	.004	1	5.866e-3	4	NC	1	NC	2
322			min	0	3	-.003	3	-.039	5	6.793e-5	10	NC	1	497.236	5
323		10	max	.001	1	.004	2	.003	1	5.866e-3	4	NC	1	NC	2
324			min	0	3	-.003	3	-.032	5	6.793e-5	10	NC	1	598.928	5
325		11	max	.001	1	.003	2	.003	1	5.866e-3	4	NC	1	NC	2
326			min	0	3	-.002	3	-.026	5	6.793e-5	10	NC	1	739.552	5
327		12	max	.001	1	.003	2	.002	1	5.866e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.002	3	-.021	5	6.793e-5	10	NC	1	942.179	5
329		13	max	0	1	.002	2	.002	1	5.866e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.015	5	6.793e-5	10	NC	1	1250.081	5
331		14	max	0	1	.002	2	.001	1	5.866e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.011	5	6.793e-5	10	NC	1	1752.521	5
333		15	max	0	1	.002	2	0	1	5.866e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.007	5	6.793e-5	10	NC	1	2659.206	5
335		16	max	0	1	.001	2	0	1	5.866e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.004	5	6.793e-5	10	NC	1	4566.297	5
337		17	max	0	1	0	2	0	1	5.866e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	6.793e-5	10	NC	1	9789.155	5
339		18	max	0	1	0	2	0	1	5.866e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	6.793e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	5.866e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	6.793e-5	10	NC	1	NC	1
343	M1	1	max	.005	3	.022	3	.01	5	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	.015	5	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	.02	5	4.917e-4	5	NC	5	NC	2
348			min	-.006	2	-.003	1	-.013	1	-5.592e-4	1	1622.445	1	5056.738	5
349		4	max	.005	3	.009	1	.025	5	4.877e-4	5	NC	5	NC	2
350			min	-.006	2	-.006	3	-.015	1	-4.597e-4	1	1148.091	1	3212.898	5
351		5	max	.005	3	.019	1	.031	5	4.836e-4	5	NC	5	NC	2
352			min	-.006	2	-.012	3	-.015	1	-3.603e-4	1	920.188	1	2311.084	5
353		6	max	.005	3	.027	1	.037	5	4.795e-4	5	NC	5	NC	2
354			min	-.006	2	-.017	3	-.014	1	-2.609e-4	1	791.466	1	1782.797	5
355		7	max	.005	3	.033	1	.043	5	4.754e-4	5	NC	5	NC	2
356			min	-.006	2	-.021	3	-.013	1	-1.614e-4	1	713.631	1	1439.455	5
357		8	max	.005	3	.038	1	.049	5	4.713e-4	5	NC	5	NC	2
358			min	-.006	2	-.024	3	-.01	1	-6.198e-5	1	666.607	1	1200.619	5
359		9	max	.005	3	.041	1	.056	5	4.673e-4	5	NC	5	NC	1
360			min	-.006	2	-.025	3	-.007	1	3.633e-6	2	641.026	1	1018.272	4
361		10	max	.005	3	.041	1	.063	5	4.828e-4	4	NC	5	NC	1
362			min	-.006	2	-.025	3	-.004	1	1.38e-5	10	632.578	1	876.195	4
363		11	max	.005	3	.04	1	.07	4	5.e-4	4	NC	5	NC	1
364			min	-.006	2	-.024	3	-.001	1	2.135e-5	10	639.965	1	768.303	4
365		12	max	.005	3	.038	1	.077	4	5.171e-4	4	NC	5	NC	2
366			min	-.006	2	-.022	3	0	10	2.64e-5	12	664.369	1	684.558	4
367		13	max	.005	3	.033	1	.085	4	5.343e-4	4	NC	5	NC	2
368			min	-.006	2	-.019	3	0	12	2.811e-5	12	709.942	1	618.456	4
369		14	max	.005	3	.026	1	.092	4	5.515e-4	4	NC	5	NC	2
370			min	-.006	2	-.015	3	0	12	2.983e-5	12	785.773	1	565.634	4
371		15	max	.005	3	.018	1	.099	4	6.341e-4	1	NC	5	NC	2
372			min	-.007	2	-.011	3	0	12	3.155e-5	12	911.34	1	523.074	4
373		16	max	.005	3	.008	1	.105	4	9.196e-4	4	NC	5	NC	2
374			min	-.007	2	-.005	3	0	12	3.26e-5	12	1133.077	1	488.641	4
375		17	max	.005	3	.002	3	.111	4	9.215e-3	4	NC	5	NC	2
376			min	-.007	2	-.004	1	0	12	1.719e-5	10	1590.459	1	460.826	4
377		18	max	.005	3	.009	3	.116	4	1.124e-2	1	NC	4	NC	2
378			min	-.007	2	-.018	1	0	10	-3.802e-3	3	3065.63	1	438.47	4
379		19	max	.005	3	.017	3	.12	4	2.254e-2	1	NC	1	NC	1
380			min	-.007	2	-.034	1	-.003	1	-7.704e-3	3	NC	1	421.228	4
381	M5	1	max	.014	3	.066	3	.01	5	4.023e-6	4	NC	1	NC	1
382			min	-.02	2	-.094	1	-.005	1	5.36e-8	10	NC	1	NC	1
383		2	max	.014	3	.036	3	.014	5	2.324e-4	5	NC	5	NC	1
384			min	-.02	2	-.05	1	-.004	1	-9.344e-5	1	1059.765	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
385		3	max	.014	3	.008	3	.02	5	4.57e-4	5	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	.025	5	4.746e-4	5	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	.031	5	4.921e-4	5	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	.038	5	5.097e-4	5	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	.045	5	5.272e-4	5	NC	15	NC	1
394			min	-.02	2	-.06	3	-.002	1	-1.361e-4	1	238.358	1	NC	1
395		8	max	.014	3	.113	1	.052	5	5.448e-4	5	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	.059	5	5.623e-4	5	9703.887	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	.066	5	5.799e-4	5	9602.735	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	.073	4	5.974e-4	5	9740.717	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	.081	4	6.149e-4	5	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	.088	4	6.325e-4	5	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	.094	4	6.5e-4	5	NC	15	NC	1
408			min	-.021	2	-.044	3	-.002	1	-4.986e-5	1	260.38	1	9402.121	4
409		15	max	.014	3	.054	1	.101	4	6.676e-4	5	NC	15	NC	1
410			min	-.021	2	-.03	3	-.002	1	-3.755e-5	1	301.919	1	9256.147	4
411		16	max	.014	3	.023	1	.106	4	1.013e-3	5	NC	5	NC	1
412			min	-.021	2	-.013	3	-.002	1	-3.377e-5	2	375.599	1	9985.022	4
413		17	max	.014	3	.005	3	.112	4	9.254e-3	4	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	.117	4	4.748e-3	4	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	.12	4	1.503e-6	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	.008	5	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	.008	5	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	.008	4	4.547e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	9.014e-6	10	1622.897	1	6433.157	1
425		4	max	.005	3	.009	1	.01	4	1.231e-5	5	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	.013	4	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	.017	4	-4.499e-6	12	NC	5	NC	2
430			min	-.006	2	-.017	3	-.001	3	-2.023e-4	1	791.671	1	4387.832	4
431		7	max	.005	3	.033	1	.022	4	-1.011e-5	12	NC	5	NC	2
432			min	-.006	2	-.021	3	-.001	3	-2.849e-4	1	713.805	1	3018.463	4
433		8	max	.005	3	.038	1	.028	4	-1.572e-5	12	NC	5	NC	1
434			min	-.006	2	-.024	3	-.002	3	-3.675e-4	1	666.759	1	2216.336	4
435		9	max	.005	3	.041	1	.034	4	-2.133e-5	12	NC	5	NC	1
436			min	-.006	2	-.025	3	-.003	1	-4.501e-4	1	641.163	1	1706.314	4
437		10	max	.005	3	.041	1	.041	5	-2.695e-5	12	NC	5	NC	1
438			min	-.006	2	-.025	3	-.006	1	-5.327e-4	1	632.702	1	1361.737	4
439		11	max	.005	3	.04	1	.049	5	-3.256e-5	12	NC	5	NC	2
440			min	-.006	2	-.024	3	-.009	1	-6.153e-4	1	640.081	1	1117.848	4
441		12	max	.005	3	.038	1	.057	5	-3.817e-5	12	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.006	2	-.022	3	-.011	1	-6.979e-4	1	664.477	1	938.771	4
443		13	max	.005	3	.033	1	.066	5	-4.378e-5	12	NC	5	NC	2
444			min	-.006	2	-.019	3	-.013	1	-7.805e-4	1	710.046	1	803.329	4
445		14	max	.005	3	.026	1	.075	5	-4.939e-5	12	NC	5	NC	2
446			min	-.006	2	-.015	3	-.014	1	-8.631e-4	1	785.876	1	698.369	4
447		15	max	.005	3	.018	1	.084	5	-5.5e-5	12	NC	5	NC	2
448			min	-.006	2	-.011	3	-.014	1	-9.457e-4	1	911.446	1	615.368	4
449		16	max	.005	3	.008	1	.093	5	2.729e-5	5	NC	5	NC	2
450			min	-.007	2	-.005	3	-.013	1	-1.008e-3	1	1133.193	1	548.608	4
451		17	max	.005	3	.002	3	.102	5	8.869e-3	4	NC	5	NC	2
452			min	-.007	2	-.004	1	-.011	1	-5.829e-4	1	1590.612	1	494.011	4
453		18	max	.005	3	.009	3	.111	4	4.183e-3	5	NC	4	NC	2
454			min	-.007	2	-.018	1	-.007	1	-1.145e-2	1	3065.911	1	448.688	4
455		19	max	.005	3	.017	3	.12	4	7.704e-3	3	NC	1	NC	1
456			min	-.007	2	-.034	1	-.002	1	-2.254e-2	1	NC	1	411.078	4
457	M13	1	max	.006	1	.022	3	.005	3	3.926e-3	3	NC	1	NC	1
458			min	-.008	5	-.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	-.008	5	-.245	1	-.002	5	-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	-.008	5	-.419	1	-.005	5	-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	-.009	5	-.528	1	-.009	5	-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	-.009	5	-.56	1	-.013	5	-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	-.009	5	-.516	1	-.017	5	-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	-.009	5	-.412	1	-.019	5	-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	-.009	5	-.276	1	-.019	5	-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	-.01	5	-.151	1	-.013	5	-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	-.01	5	-.094	1	-.02	2	-1.651e-2	1	3165.212	1	NC	1
477		11	max	.005	1	.112	3	.017	4	1.052e-2	3	NC	5	NC	1
478			min	-.01	5	-.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	-.01	5	-.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	-.01	5	-.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	-.01	5	-.516	1	.008	10	-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	-.01	5	-.56	1	.002	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	-.01	5	-.528	1	-.005	5	-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	-.01	5	-.419	1	-.011	5	-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	-.01	5	-.244	1	-.01	5	-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	-.01	5	-.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	-.12	4	-.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	-.12	4	-.273	1	0	10	-3.539e-3	3	827.425	1	4125.696	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
499		3	max	.002	1	.166	3	.108	1	8.439e-3	1	NC	5	NC	3
500			min	-.12	4	-.469	1	.005	10	-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	-.12	4	-.591	1	.008	10	-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	-.12	4	-.627	1	.01	10	-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	-.12	4	-.578	1	.008	10	-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
508			min	-.12	4	-.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	-.12	4	-.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	-.12	4	-.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	-.12	4	-.103	1	-.021	2	-8.269e-3	3	2874.897	1	NC	1
515		11	max	.003	1	.069	3	.014	14	1.615e-2	1	NC	5	NC	1
516			min	-.12	4	-.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	-.12	4	-.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	-.12	4	-.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	-.12	4	-.578	1	.003	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	-.12	4	-.627	1	-.004	5	-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	-.12	4	-.591	1	-.012	5	-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	-.12	4	-.469	1	-.017	5	-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	-.12	4	-.273	1	-.014	5	-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	-.12	4	-.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	-4.619e-4	5	NC	1	NC	1
535		2	max	0	3	-.002	15	.012	4	7.844e-4	3	NC	5	NC	1
536			min	-.001	5	-.021	6	0	3	-8.648e-4	1	4943.736	6	8543.538	4
537		3	max	0	3	-.005	15	.026	4	1.286e-3	3	NC	5	NC	1
538			min	-.002	5	-.041	6	-.003	3	-1.639e-3	1	2515.698	6	4020.824	4
539		4	max	0	3	-.007	15	.039	4	1.788e-3	3	NC	15	NC	2
540			min	-.003	5	-.059	6	-.006	3	-2.412e-3	1	1725.916	6	2624.757	4
541		5	max	0	3	-.009	15	.052	4	2.289e-3	3	NC	15	NC	9
542			min	-.004	5	-.076	6	-.01	3	-3.186e-3	1	1346.75	6	1991.16	4
543		6	max	0	3	-.011	15	.062	4	2.791e-3	3	8861.397	15	NC	10
544			min	-.005	5	-.09	6	-.014	3	-3.96e-3	1	1133.432	6	1658.273	4
545		7	max	0	3	-.012	15	.07	4	3.292e-3	3	7858.461	15	8279.329	10
546			min	-.006	5	-.102	6	-.018	3	-4.734e-3	1	1005.15	6	1478.447	4
547		8	max	0	3	-.013	15	.074	4	3.794e-3	3	7256.548	15	6846.465	10
548			min	-.007	5	-.11	6	-.022	3	-5.508e-3	1	928.161	6	1393.688	4
549		9	max	0	3	-.013	15	.074	4	4.295e-3	3	6932.563	15	5906.678	10
550			min	-.008	5	-.115	6	-.026	3	-6.282e-3	1	886.721	6	1381.196	4
551		10	max	0	3	-.013	15	.071	4	4.797e-3	3	6830.069	15	5285.862	10
552			min	-.009	5	-.117	6	-.029	3	-7.056e-3	1	873.612	6	1437.338	4
553		11	max	0	3	-.013	15	.065	4	5.299e-3	3	6932.563	15	4892.446	10
554			min	-.01	5	-.115	1	-.032	3	-7.829e-3	1	886.721	6	1575.127	4
555		12	max	0	3	-.012	15	.056	4	5.8e-3	3	7256.548	15	4681.161	10

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
556			min	-.011	5	-.11	1	-.033	3	-8.603e-3	1	928.161	6	1782.922	1
557		13	max	0	3	-.011	15	.045	1	6.302e-3	3	7858.461	15	4639.419	10
558			min	-.012	5	-.102	1	-.033	3	-9.377e-3	1	1005.15	6	1762.667	1
559		14	max	0	3	-.009	15	.042	1	6.803e-3	3	8861.397	15	6457.852	15
560			min	-.014	5	-.091	1	-.03	3	-1.015e-2	1	1133.432	6	1815.33	1
561		15	max	0	3	-.007	15	.037	1	7.305e-3	3	NC	15	NC	15
562			min	-.015	5	-.078	1	-.026	3	-1.092e-2	1	1346.75	6	1968.773	1
563		16	max	0	3	-.005	15	.028	1	7.806e-3	3	NC	15	NC	4
564			min	-.016	5	-.062	1	-.02	3	-1.17e-2	1	1725.916	6	2299.117	1
565		17	max	0	3	-.002	15	.016	1	8.308e-3	3	NC	5	NC	4
566			min	-.017	5	-.044	1	-.011	3	-1.247e-2	1	2515.698	6	3045.541	1
567		18	max	0	3	0	15	.002	9	8.81e-3	3	NC	5	NC	4
568			min	-.018	5	-.025	1	-.005	5	-1.325e-2	1	4943.736	6	5418.397	1
569		19	max	0	3	.005	5	.016	3	9.311e-3	3	NC	1	NC	1
570			min	-.019	5	-.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	-.007	4	-.003	4	-.007	2	-4.427e-3	1	NC	1	NC	1
573		2	max	0	10	-.009	12	.006	1	3.002e-3	3	NC	12	NC	2
574			min	-.007	4	-.034	4	-.003	5	-4.209e-3	1	3362.676	4	9497.54	1
575		3	max	0	10	-.019	12	.014	1	2.858e-3	3	5583.262	15	NC	3
576			min	-.006	4	-.063	4	-.011	5	-3.991e-3	1	1711.151	4	5369.27	1
577		4	max	0	10	-.028	12	.021	1	2.713e-3	3	3830.444	15	NC	10
578			min	-.006	4	-.091	4	-.023	5	-3.772e-3	1	1173.95	4	4079.896	1
579		5	max	0	10	-.036	15	.025	1	2.568e-3	3	2988.934	15	NC	10
580			min	-.006	4	-.115	4	-.037	5	-3.554e-3	1	916.045	4	2863.918	5
581		6	max	0	10	-.042	15	.028	1	2.423e-3	3	2515.504	15	NC	10
582			min	-.005	4	-.136	4	-.052	5	-3.336e-3	1	770.948	4	2024.233	5
583		7	max	0	10	-.048	15	.028	1	2.279e-3	3	2230.798	15	NC	10
584			min	-.005	4	-.153	4	-.066	5	-3.118e-3	1	683.692	4	1583.197	5
585		8	max	0	10	-.051	15	.028	1	2.134e-3	3	2059.932	15	NC	10
586			min	-.004	4	-.166	4	-.078	5	-2.899e-3	1	631.325	4	1331.644	5
587		9	max	0	10	-.054	15	.026	1	1.989e-3	3	1967.962	15	NC	10
588			min	-.004	4	-.173	4	-.088	5	-2.681e-3	1	603.138	4	1185.956	5
589		10	max	0	10	-.054	15	.024	1	1.844e-3	3	1938.867	15	NC	10
590			min	-.004	4	-.176	4	-.094	5	-2.463e-3	1	594.221	4	1108.74	5
591		11	max	0	10	-.053	15	.021	1	1.699e-3	3	1967.962	15	NC	10
592			min	-.003	4	-.173	4	-.096	5	-2.245e-3	1	603.138	4	1083.452	5
593		12	max	0	10	-.051	15	.017	1	1.555e-3	3	2059.932	15	NC	3
594			min	-.003	4	-.165	4	-.094	5	-2.026e-3	1	631.325	4	1105.561	5
595		13	max	0	10	-.047	15	.014	1	1.41e-3	3	2230.798	15	NC	2
596			min	-.002	4	-.152	4	-.088	5	-1.808e-3	1	683.692	4	1180.602	5
597		14	max	0	10	-.042	15	.01	1	1.265e-3	3	2515.504	15	NC	2
598			min	-.002	4	-.135	4	-.078	5	-1.59e-3	1	770.948	4	1327.523	5
599		15	max	0	10	-.035	15	.007	1	1.12e-3	3	2988.934	15	NC	1
600			min	-.002	4	-.114	4	-.065	5	-1.372e-3	1	916.045	4	1591.383	5
601		16	max	0	10	-.027	15	.004	1	9.757e-4	3	3830.444	15	NC	1
602			min	-.001	4	-.089	4	-.05	5	-1.153e-3	1	1173.95	4	2084.481	5
603		17	max	0	10	-.019	15	.001	1	8.31e-4	3	5583.262	15	NC	1
604			min	0	4	-.061	4	-.033	5	-9.351e-4	1	1711.151	4	3154.048	5
605		18	max	0	10	-.01	15	0	9	7.283e-4	5	NC	12	NC	1
606			min	0	4	-.031	4	-.016	5	-7.169e-4	1	3362.676	4	6563.311	5
607		19	max	0	1	0	1	0	1	8.098e-4	4	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

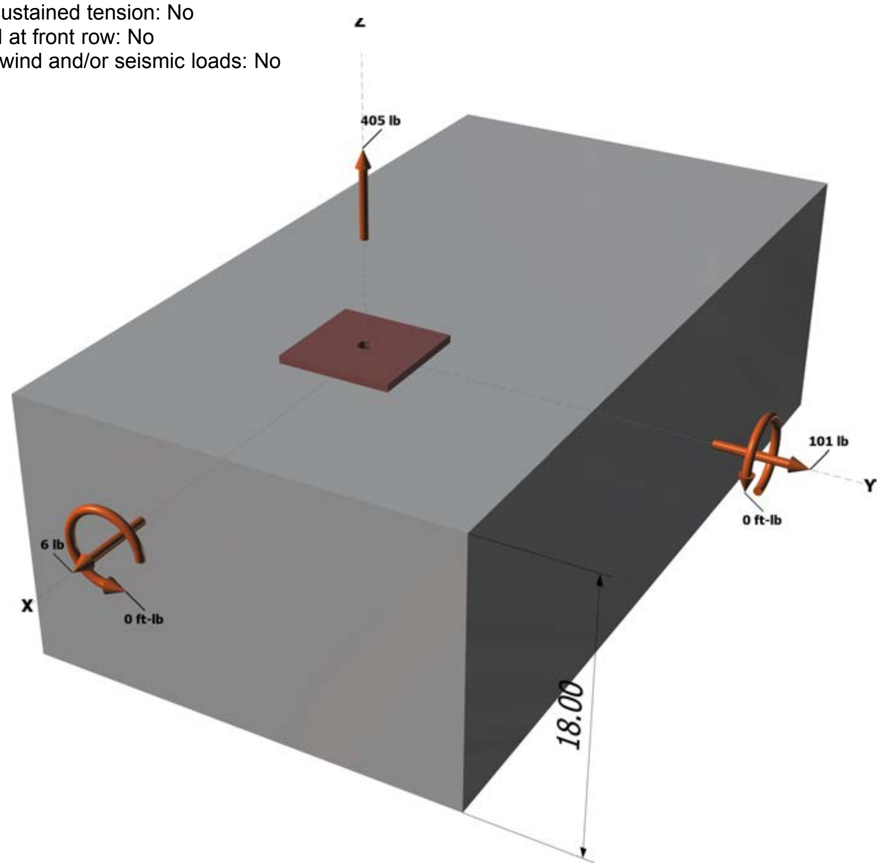
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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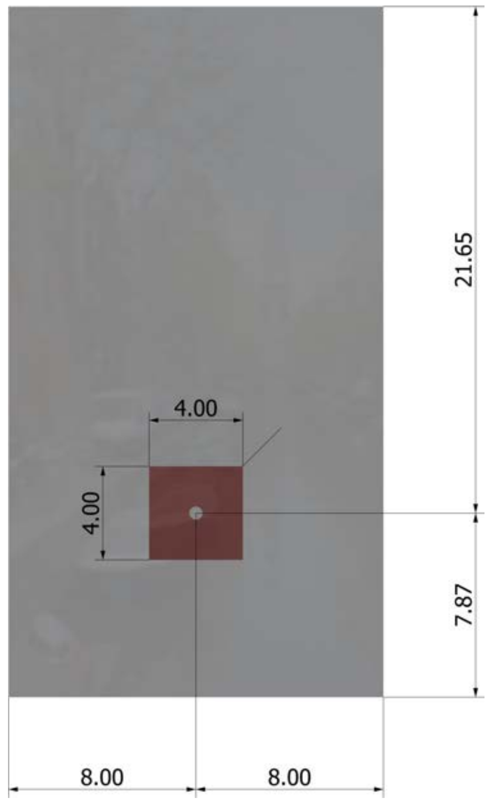


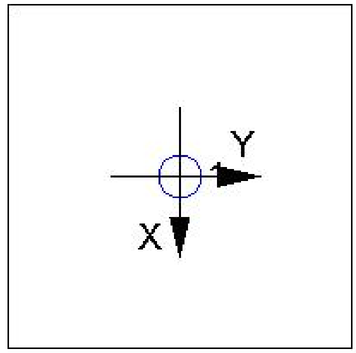
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

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

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

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

Shear perpendicular to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	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, $øN_n$ (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, $øV_n$ (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

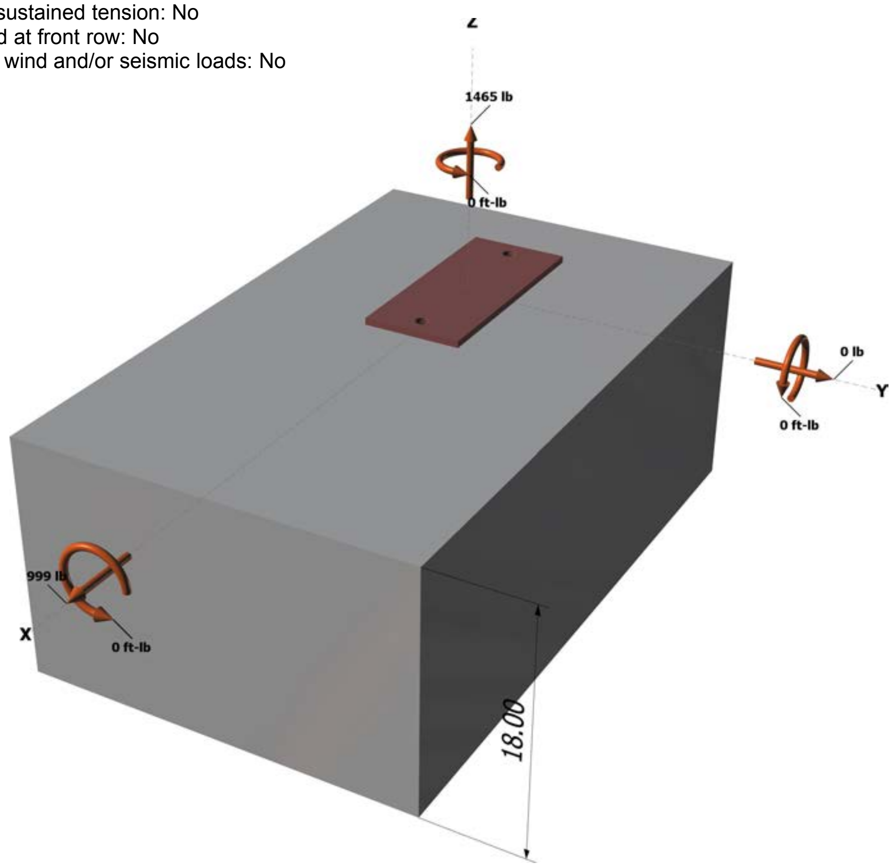
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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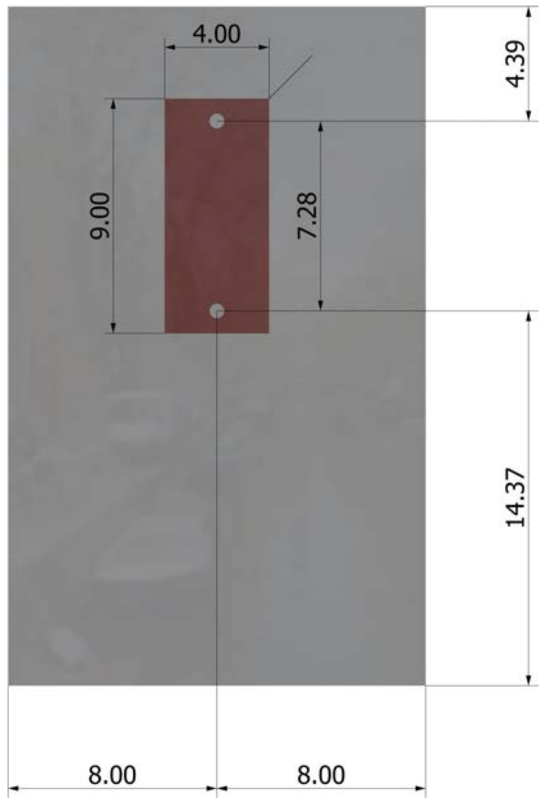


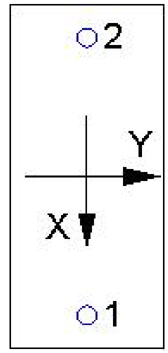
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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	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

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

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
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

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

A_{Na} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
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.