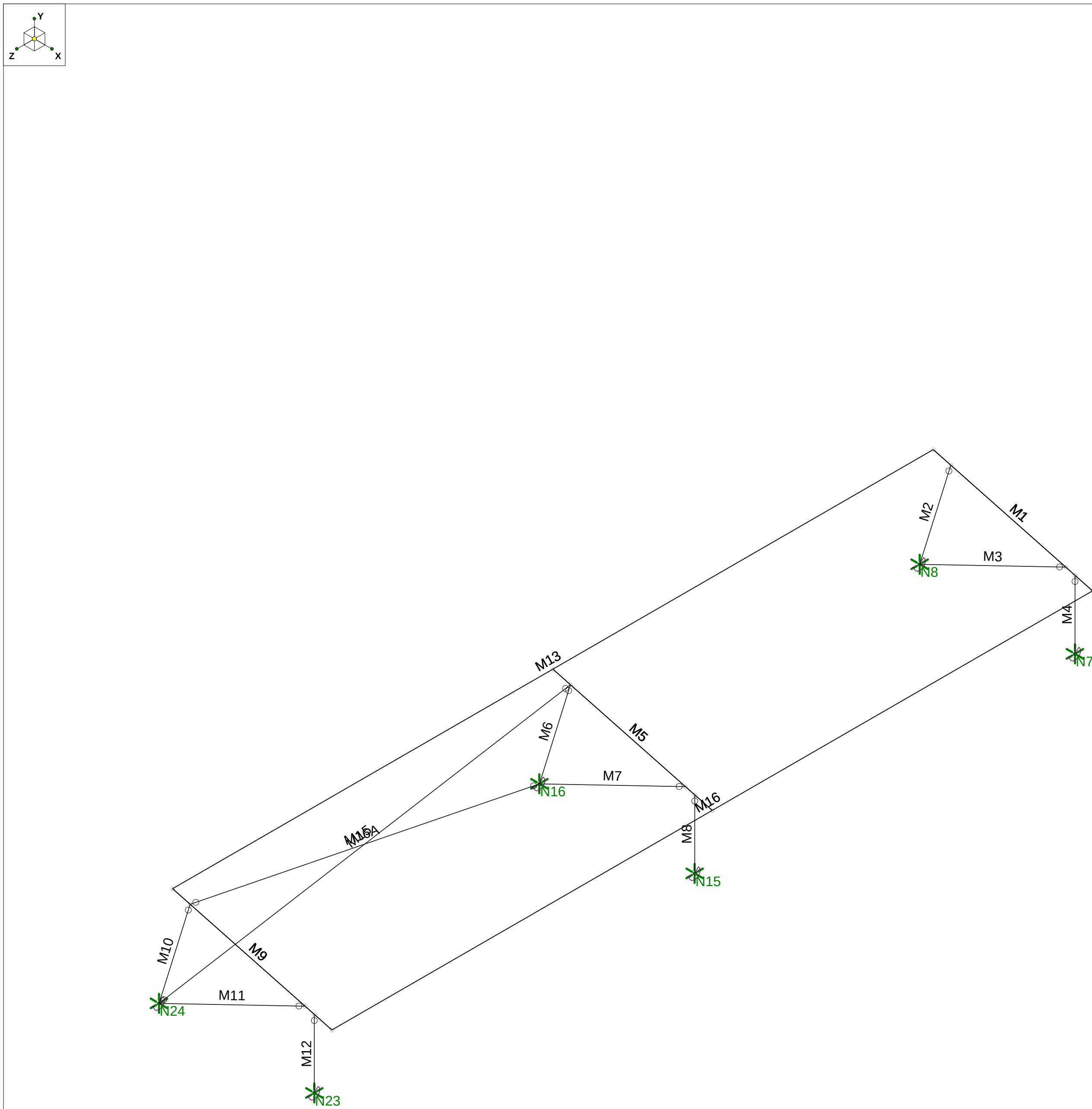


Schletter, Inc.		15ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

1.1 Project Description

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

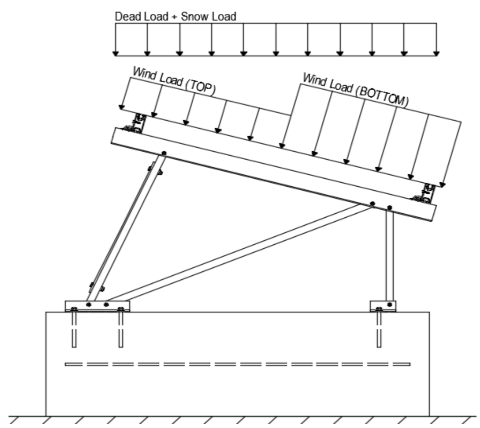
1.2 Construction

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

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 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 1.00
C_e = 0.90
C_t = 1.20

2.3 Wind Loads

Design Wind Speed, V = 115 mph
Height ≤ 15 ft

Exposure Category = C
Importance Category = II

Peak Velocity Pressure, q_z = 20.76 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

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

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [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 + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [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.

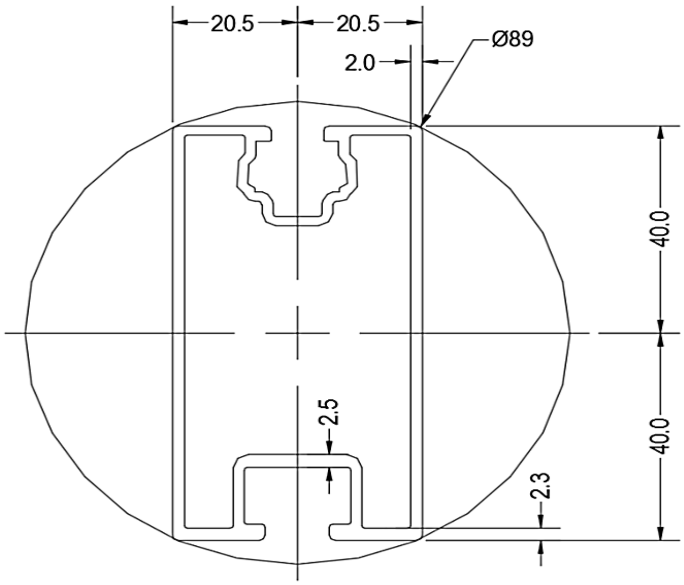
Purlins	Location	**Diagonal Struts**	Location	**Front Reactions**	Location
M13	Top	M3	Outer	N7	Outer
M16	Bottom	M7	Inner	N15	Inner
		M11	Outer	N23	Outer
Girders	Location	**Rear Struts**	Location	**Rear Reactions**	Location
M1	Outer	M2	Outer	N8	Outer
M5	Inner	M6	Inner	N16	Inner
M9	Outer	M10	Outer	N24	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).

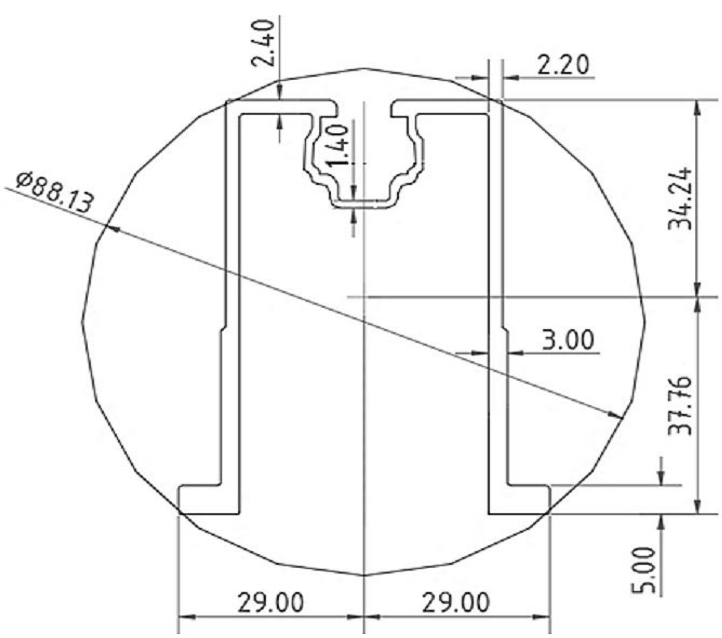
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.218	k-ft
M_z =	0.172	k-ft
$M_{y\ allowable}$ =	1.787	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	89%	



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).

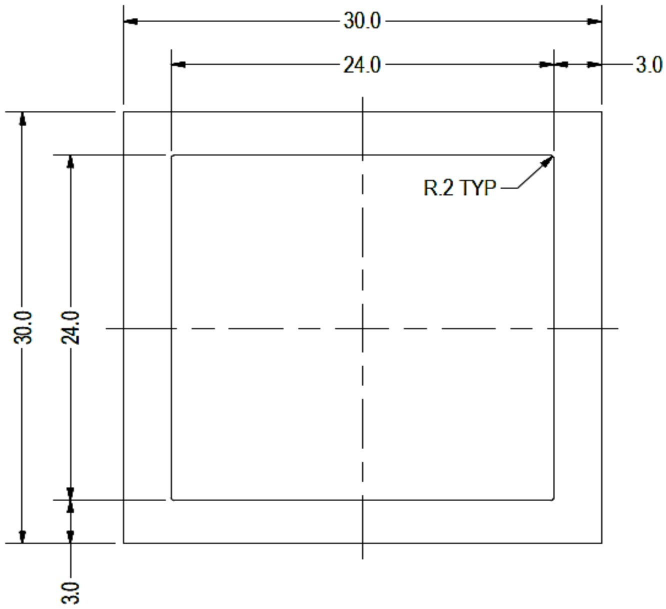
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.631	k-ft
M_z =	0.000	k-ft
P_n =	0.198	k
$M_{y\ allowable}$ =	1.455	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	45%	



4.3 Front Strut Design

The front aluminum strut connects a portion of the girder to the foundation. Vertical girder forces are then transferred down through the strut into the foundation. The strut is attached with single M8 bolts at each end. See Appendix A.3 for detailed member calculations. Section units are in (mm).

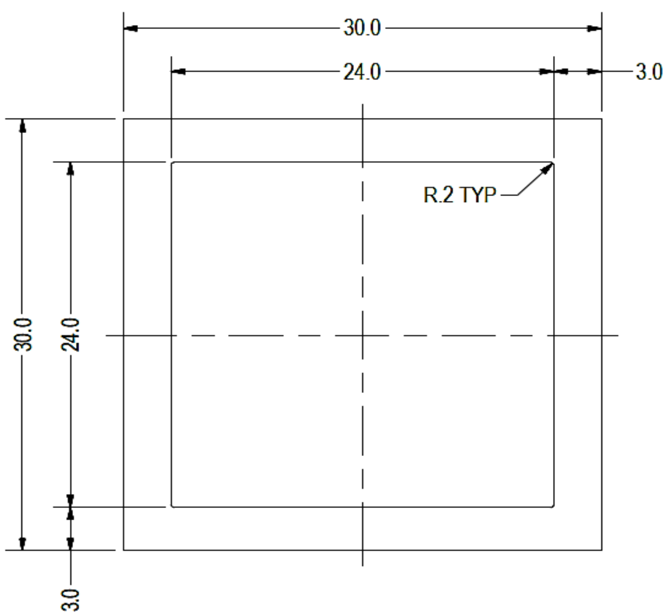
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.708	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	14%	



4.4 Diagonal Strut Design

A diagonal aluminum strut braces the support structure. It connects at a front portion of the girder and transfers horizontal forces to the rear foundation connection. The strut is attached with single M8 bolts at each end. See Appendix A.4 for detailed member calculations. Section units are in (mm).

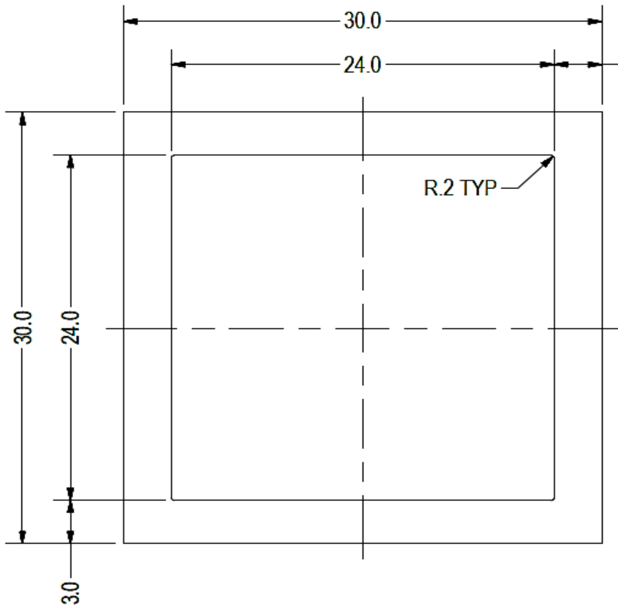
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.164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



4.5 Rear Strut Design

An aluminum strut connects the rear portion of the girder to the rear foundation connection. Both vertical and horizontal forces are transferred from the girder. The strut is attached with single M8 bolts at each end. See Appendix A.5 for detailed member calculations. Section units are in (mm).

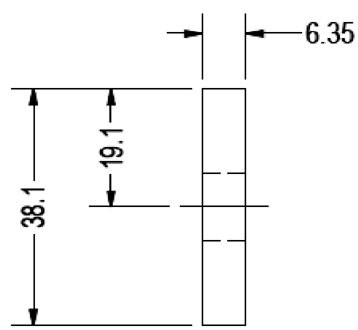
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.369	k
$M_{y\ allowable}$ =	0.413	k-ft
$M_{z\ allowable}$ =	0.413	k-ft
$P_{n\ allowable}$ =	8.089	k
Utilization =	17%	



4.6 Cross Brace Design

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

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



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

5. FOUNDATION DESIGN CALCULATIONS

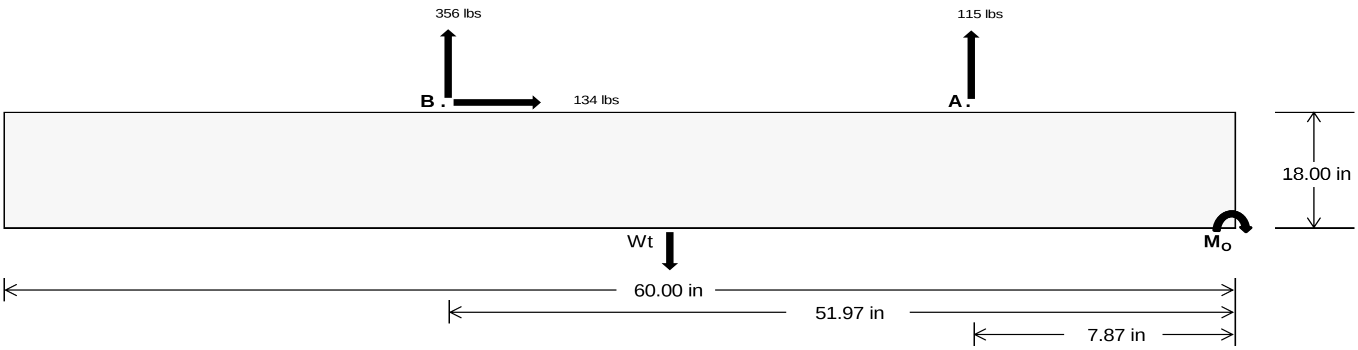
5.1 Helical Pile Foundations

The following LRFD loads include a safety factor of 1.3, and are to be used in conjunction with a Schletter, Inc. Geotechnical Investigation Report. The forces below should fall within the guidelines provided in the Geotechnical Investigation Report. If a Geotechnical Investigation Report is not present, please proceed to Section 5.2 for a concrete foundation design.

Maximum	Front	Rear	
Tensile Load =	507.41	1550.73	k
Compressive Load =	2220.11	1626.70	k
Lateral Load =	3.84	582.19	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



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 =	21838.0 in-lbs
Resisting Force Required =	727.93 lbs
S.F. =	1.67
Weight Required =	1213.22 lbs
Minimum Width =	21 in in
Weight Provided =	1903.13 lbs

A minimum 60in long x 21in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	134.26 lbs
Friction =	0.4
Weight Required =	335.64 lbs
Resisting Weight =	1903.13 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 21in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	134.26 lbs
Cohesion =	130 psf
Area =	8.75 ft^2
Resisting =	951.56 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 21in 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			
	21 in	22 in	23 in	24 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.75 ft) =	1903 lbs	1994 lbs	2084 lbs	2175 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in	21 in	22 in	23 in	24 in
F_A	834 lbs	834 lbs	834 lbs	834 lbs	618 lbs	618 lbs	618 lbs	618 lbs	1032 lbs	1032 lbs	1032 lbs	1032 lbs	-230 lbs	-230 lbs	-230 lbs	-230 lbs
F_B	613 lbs	613 lbs	613 lbs	613 lbs	452 lbs	452 lbs	452 lbs	452 lbs	755 lbs	755 lbs	755 lbs	755 lbs	-713 lbs	-713 lbs	-713 lbs	-713 lbs
F_V	58 lbs	58 lbs	58 lbs	58 lbs	240 lbs	240 lbs	240 lbs	240 lbs	219 lbs	219 lbs	219 lbs	219 lbs	-269 lbs	-269 lbs	-269 lbs	-269 lbs
P_{total}	3350 lbs	3440 lbs	3531 lbs	3622 lbs	2973 lbs	3064 lbs	3154 lbs	3245 lbs	3690 lbs	3781 lbs	3872 lbs	3962 lbs	199 lbs	254 lbs	308 lbs	362 lbs
M	502 lbs-ft	502 lbs-ft	502 lbs-ft	502 lbs-ft	672 lbs-ft	672 lbs-ft	672 lbs-ft	672 lbs-ft	849 lbs-ft	849 lbs-ft	849 lbs-ft	849 lbs-ft	478 lbs-ft	478 lbs-ft	478 lbs-ft	478 lbs-ft
e	0.15 ft	0.15 ft	0.14 ft	0.14 ft	0.23 ft	0.22 ft	0.21 ft	0.21 ft	0.23 ft	0.22 ft	0.22 ft	0.21 ft	2.40 ft	1.88 ft	1.55 ft	1.32 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}	314.1 psf	309.7 psf	305.7 psf	302.0 psf	247.6 psf	246.2 psf	245.0 psf	243.8 psf	305.3 psf	301.3 psf	297.7 psf	294.3 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	451.6 psf	441.0 psf	431.3 psf	422.4 psf	431.9 psf	422.2 psf	413.3 psf	405.1 psf	538.2 psf	523.6 psf	510.3 psf	498.1 psf	736.5 psf	149.6 psf	112.9 psf	102.2 psf

Maximum Bearing Pressure = 737 psf
Allowable Bearing Pressure = 1500 psf

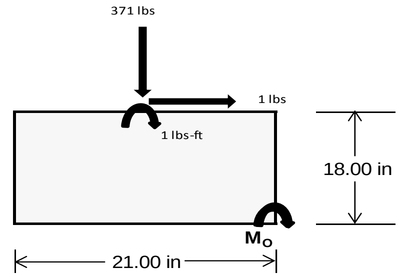
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 322.5 ft-lbs
Resisting Force Required = 368.58 lbs
S.F. = 1.67
Weight Required = 614.30 lbs
Minimum Width = 21 in in
Weight Provided = 1903.13 lbs

A minimum 60in long x 21in 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	21 in			21 in			21 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	88 lbs	248 lbs	84 lbs	376 lbs	1171 lbs	371 lbs	26 lbs	73 lbs	24 lbs
F_V	3 lbs	3 lbs	0 lbs	15 lbs	14 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2444 lbs	2604 lbs	2440 lbs	2619 lbs	3414 lbs	2614 lbs	715 lbs	761 lbs	713 lbs
M	4 lbs-ft	4 lbs-ft	0 lbs-ft	26 lbs-ft	22 lbs-ft	2 lbs-ft	1 lbs-ft	1 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.75 ft	1.75 ft	1.73 ft	1.74 ft	1.75 ft	1.75 ft	1.75 ft	1.75 ft
f_{min}	277.6 sqft	296.0 sqft	278.7 sqft	289.2 sqft	381.7 sqft	297.9 sqft	81.2 sqft	86.6 sqft	81.5 sqft
f_{max}	281.1 psf	299.2 psf	278.9 psf	309.4 psf	398.6 psf	299.6 psf	82.2 psf	87.5 psf	81.6 psf

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

Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 21in 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.

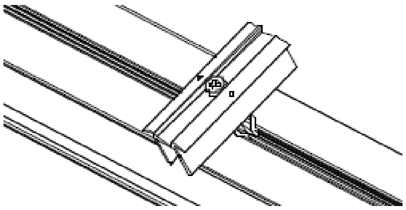
6. DESIGN OF JOINTS AND CONNECTIONS

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.

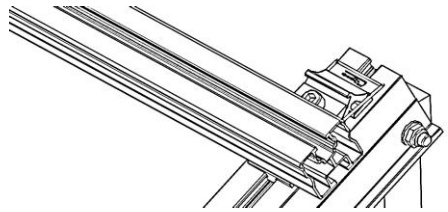
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.392 k
Allowable Uplift =	1.214 k
Utilization =	32%



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.096 k
Allowable Uplift =	1.116 k
Utilization =	98%



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 =	1.708 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	30%

Rear Strut

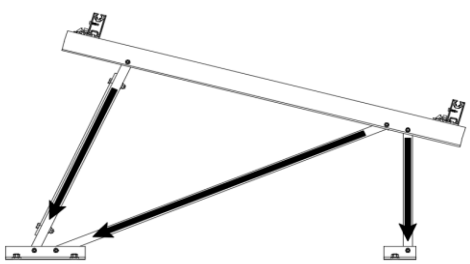
Maximum Axial Load =	1.369 k
M8 Bolt Capacity =	5.692 k
Strut Bearing Capacity =	7.952 k
Utilization =	24%

Diagonal Strut

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

Bracing

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



Bolt and bearing capacities are accounting for double shear (ASCE 8-02, Eq. 5.3.4-1). Struts under compression are shown to demonstrate the load transfer from the girder. Single M8 bolts are located at each end of the strut and are subjected to double shear.

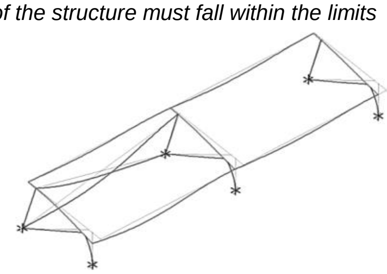
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	28.39 in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$ 0.568 in
Max Drift, Δ_{MAX} =	0.042 in
N/A	

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 96.00 in

J = 0.427

200.222

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

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= 28.8 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 = 96.00 in

J = 0.427

217.57

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.6

3.4.16

b/t = 37.95

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

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

$\varphi F_L St$= 28.8 ksi

Ix = 498305 mm^4

1.197 in^4

y = 40.784 mm

Sx = 0.746 in^3

$M_{max}St$ = 1.787 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

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

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

φF_L= φcc(Bc-Dc*λ)

φF_L= 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

φF_L= φyFcy

φF_L= 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

φF_L= φyFcy

φF_L= 33.25 ksi

φF_L= 24.52 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

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

λ = 1.28467

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.75985

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

φF_L = 16.1143 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

φF_L = 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

φF_L = 33.25 ksi

φF_L = 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-63.248	-63.248	0	0
2	M16	Y	-63.248	-63.248	0	0

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-57.906	-57.906	0	0
2	M16	y	-92.65	-92.65	0	0

Member Distributed Loads (BLC 5 : Wind Load - Suction)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	118.129	118.129	0	0
2	M16	y	57.906	57.906	0	0

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	Yes	Y		1	1.2	3	1.6	4	.5														
2	LRFD 1.2D + 1.0W + 0.5S	Yes	Y		1	1.2	3	.5	4	1														
3	LRFD 0.9D + 1.0W	Yes	Y		2	.9					5	1												
4	LATERAL - LRFD 1.54D + 1.3E ...	Yes	Y		1	1.54	3	.2			6	1.3												
5	LATERAL - LRFD 0.56D + 1.3E	Yes	Y		1	.56					6	1.3												
6	LATERAL - LRFD 1.54D + 1.25...	Yes	Y		1	1.54	3	.2			6	1.25												
7	LATERAL - LRFD 0.56D + 1.25E	Yes	Y		1	.56					6	1.25												
8																								
9	ASD 1.0D + 1.0S	Yes	Y		1	1	3	1																
10	ASD 1.0D + 0.6W	Yes	Y		1	1			4	.6														
11	ASD 1.0D + 0.75L + 0.45W + 0....	Yes	Y		1	1	3	.75	4	.45														
12	ASD 0.6D + 0.6W	Yes	Y		2	.6					5	.6												
13	LATERAL - ASD 1.238D + 0.875E	Yes	Y		1	1.2...					6	.875												
14	LATERAL - ASD 1.1785D + 0.65...	Yes	Y		1	1.1...	3	.75			6	.656												
15	LATERAL - ASD 0.362D + 0.875E	Yes	Y		1	.362					6	.875												

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	101.643	2	349.892	1	.031	2	0	1	0	1	0	1
2		min	-140.361	3	-362.743	3	-.108	3	0	3	0	1	0	1
3	N7	max	0	15	572.28	1	-.047	15	0	15	0	1	0	1
4		min	-.184	1	-111.371	3	-1.295	1	-.002	1	0	1	0	1
5	N15	max	0	15	1707.776	1	.493	1	.001	1	0	1	0	1
6		min	-1.935	1	-390.312	3	-.233	3	0	3	0	1	0	1
7	N16	max	421.679	2	1251.305	1	-.164	10	0	1	0	1	0	1
8		min	-447.839	3	-1192.873	3	-26.235	3	0	3	0	1	0	1
9	N23	max	0	15	572.176	1	2.956	1	.005	1	0	1	0	1
10		min	-.184	1	-110.974	3	.099	15	0	15	0	1	0	1
11	N24	max	102.042	2	355.229	1	26.461	3	.002	1	0	1	0	1
12		min	-140.421	3	-359.862	3	.034	10	0	3	0	1	0	1
13	Totals:	max	623.468	2	4808.658	1	0	1						
14		min	-728.979	3	-2528.135	3	0	2						

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	416.972	1	.661	4	.813	1	0	15	0	3	0	1
2			min	-364.692	3	.157	15	-.057	3	0	1	0	2	0	1
3		2	max	417.068	1	.623	4	.813	1	0	15	0	1	0	15
4			min	-364.62	3	.148	15	-.057	3	0	1	0	10	0	4
5		3	max	417.164	1	.585	4	.813	1	0	15	0	1	0	15
6			min	-364.547	3	.139	15	-.057	3	0	1	0	15	0	4
7		4	max	417.261	1	.547	4	.813	1	0	15	0	1	0	15
8			min	-364.475	3	.13	15	-.057	3	0	1	0	12	0	4
9		5	max	417.357	1	.509	4	.813	1	0	15	0	1	0	15
10			min	-364.403	3	.121	15	-.057	3	0	1	0	3	0	4
11		6	max	417.453	1	.471	4	.813	1	0	15	0	1	0	15
12			min	-364.331	3	.113	15	-.057	3	0	1	0	3	0	4
13		7	max	417.55	1	.434	4	.813	1	0	15	0	1	0	15
14			min	-364.258	3	.104	15	-.057	3	0	1	0	3	0	4
15		8	max	417.646	1	.396	4	.813	1	0	15	0	1	0	15
16			min	-364.186	3	.095	15	-.057	3	0	1	0	3	0	4
17		9	max	417.742	1	.358	4	.813	1	0	15	0	1	0	15
18			min	-364.114	3	.086	15	-.057	3	0	1	0	3	0	4
19		10	max	417.839	1	.32	4	.813	1	0	15	.001	1	0	15
20			min	-364.041	3	.077	15	-.057	3	0	1	0	3	0	4
21		11	max	417.935	1	.282	4	.813	1	0	15	.001	1	0	15
22			min	-363.969	3	.068	15	-.057	3	0	1	0	3	0	4
23		12	max	418.032	1	.244	4	.813	1	0	15	.001	1	0	15
24			min	-363.897	3	.059	15	-.057	3	0	1	0	3	0	4
25		13	max	418.128	1	.207	4	.813	1	0	15	.001	1	0	15
26			min	-363.825	3	.05	15	-.057	3	0	1	0	3	0	4
27		14	max	418.224	1	.169	4	.813	1	0	15	.001	1	0	15
28			min	-363.752	3	.041	15	-.057	3	0	1	0	3	0	4
29		15	max	418.321	1	.131	4	.813	1	0	15	.002	1	0	15
30			min	-363.68	3	.032	15	-.057	3	0	1	0	3	0	4
31		16	max	418.417	1	.093	4	.813	1	0	15	.002	1	0	15
32			min	-363.608	3	.024	15	-.057	3	0	1	0	3	0	4
33		17	max	418.513	1	.055	4	.813	1	0	15	.002	1	0	15
34			min	-363.536	3	.002	1	-.057	3	0	1	0	3	0	4
35		18	max	418.61	1	.029	10	.813	1	0	15	.002	1	0	15
36			min	-363.463	3	-.028	1	-.057	3	0	1	0	3	0	4
37		19	max	418.706	1	.004	10	.813	1	0	15	.002	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-363.391	3	-.057	1	-.057	3	0	1	0	3	0	4
39	M3	1	max	34.712	10	1.811	4	-.021	15	0	15	.002	1	0	4
40			min	-118.878	1	.427	15	-.688	1	0	1	0	15	0	15
41		2	max	34.656	10	1.633	4	-.021	15	0	15	.002	1	0	4
42			min	-118.945	1	.385	15	-.688	1	0	1	0	15	0	15
43		3	max	34.6	10	1.455	4	-.021	15	0	15	.002	1	0	10
44			min	-119.013	1	.343	15	-.688	1	0	1	0	15	0	1
45		4	max	34.544	10	1.277	4	-.021	15	0	15	.002	1	0	15
46			min	-119.08	1	.301	15	-.688	1	0	1	0	15	0	1
47		5	max	34.488	10	1.099	4	-.021	15	0	15	.001	1	0	15
48			min	-119.147	1	.26	15	-.688	1	0	1	0	15	0	4
49		6	max	34.432	10	.921	4	-.021	15	0	15	.001	1	0	15
50			min	-119.214	1	.218	15	-.688	1	0	1	0	15	0	4
51		7	max	34.377	10	.743	4	-.021	15	0	15	.001	1	0	15
52			min	-119.281	1	.176	15	-.688	1	0	1	0	15	0	4
53		8	max	34.321	10	.565	4	-.021	15	0	15	0	1	0	15
54			min	-119.348	1	.134	15	-.688	1	0	1	0	15	0	4
55		9	max	34.265	10	.387	4	-.021	15	0	15	0	1	0	15
56			min	-119.415	1	.092	15	-.688	1	0	1	0	15	-.001	4
57		10	max	34.209	10	.209	4	-.021	15	0	15	0	1	0	15
58			min	-119.482	1	.05	15	-.688	1	0	1	0	15	-.001	4
59		11	max	34.153	10	.032	10	-.021	15	0	15	0	1	0	15
60			min	-119.549	1	-.003	1	-.688	1	0	1	0	15	-.001	4
61		12	max	34.097	10	-.033	15	-.021	15	0	15	0	1	0	15
62			min	-119.616	1	-.147	4	-.688	1	0	1	0	12	-.001	4
63		13	max	34.041	10	-.075	15	-.021	15	0	15	0	1	0	15
64			min	-119.683	1	-.325	4	-.688	1	0	1	0	12	-.001	4
65		14	max	33.985	10	-.117	15	-.021	15	0	15	0	1	0	15
66			min	-119.751	1	-.503	4	-.688	1	0	1	0	3	-.001	4
67		15	max	33.929	10	-.159	15	-.021	15	0	15	0	15	0	15
68			min	-119.818	1	-.681	4	-.688	1	0	1	0	1	0	4
69		16	max	33.873	10	-.201	15	-.021	15	0	15	0	15	0	15
70			min	-119.885	1	-.859	4	-.688	1	0	1	0	1	0	4
71		17	max	33.817	10	-.243	15	-.021	15	0	15	0	15	0	15
72			min	-119.952	1	-1.037	4	-.688	1	0	1	0	1	0	4
73		18	max	33.762	10	-.284	15	-.021	15	0	15	0	15	0	15
74			min	-120.019	1	-1.215	4	-.688	1	0	1	0	1	0	4
75		19	max	33.706	10	-.326	15	-.021	15	0	15	0	15	0	1
76			min	-120.086	1	-1.393	4	-.688	1	0	1	0	1	0	1
77	M4	1	max	571.115	1	0	1	-.047	15	0	1	0	3	0	1
78			min	-112.245	3	0	1	-1.432	1	0	1	0	1	0	1
79		2	max	571.18	1	0	1	-.047	15	0	1	0	12	0	1
80			min	-112.196	3	0	1	-1.432	1	0	1	0	1	0	1
81		3	max	571.244	1	0	1	-.047	15	0	1	0	15	0	1
82			min	-112.148	3	0	1	-1.432	1	0	1	0	1	0	1
83		4	max	571.309	1	0	1	-.047	15	0	1	0	15	0	1
84			min	-112.099	3	0	1	-1.432	1	0	1	0	1	0	1
85		5	max	571.374	1	0	1	-.047	15	0	1	0	15	0	1
86			min	-112.051	3	0	1	-1.432	1	0	1	0	1	0	1
87		6	max	571.438	1	0	1	-.047	15	0	1	0	15	0	1
88			min	-112.002	3	0	1	-1.432	1	0	1	0	1	0	1
89		7	max	571.503	1	0	1	-.047	15	0	1	0	15	0	1
90			min	-111.954	3	0	1	-1.432	1	0	1	0	1	0	1
91		8	max	571.568	1	0	1	-.047	15	0	1	0	15	0	1
92			min	-111.905	3	0	1	-1.432	1	0	1	0	1	0	1
93		9	max	571.633	1	0	1	-.047	15	0	1	0	15	0	1
94			min	-111.857	3	0	1	-1.432	1	0	1	-.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	571.697	1	0	1	-.047	15	0	1	0	15	0	1
96			min	-111.808	3	0	1	-1.432	1	0	1	-.001	1	0	1
97		11	max	571.762	1	0	1	-.047	15	0	1	0	15	0	1
98			min	-111.759	3	0	1	-1.432	1	0	1	-.001	1	0	1
99		12	max	571.827	1	0	1	-.047	15	0	1	0	15	0	1
100			min	-111.711	3	0	1	-1.432	1	0	1	-.001	1	0	1
101		13	max	571.891	1	0	1	-.047	15	0	1	0	15	0	1
102			min	-111.662	3	0	1	-1.432	1	0	1	-.002	1	0	1
103		14	max	571.956	1	0	1	-.047	15	0	1	0	15	0	1
104			min	-111.614	3	0	1	-1.432	1	0	1	-.002	1	0	1
105		15	max	572.021	1	0	1	-.047	15	0	1	0	15	0	1
106			min	-111.565	3	0	1	-1.432	1	0	1	-.002	1	0	1
107		16	max	572.086	1	0	1	-.047	15	0	1	0	15	0	1
108			min	-111.517	3	0	1	-1.432	1	0	1	-.002	1	0	1
109		17	max	572.15	1	0	1	-.047	15	0	1	0	15	0	1
110			min	-111.468	3	0	1	-1.432	1	0	1	-.002	1	0	1
111		18	max	572.215	1	0	1	-.047	15	0	1	0	15	0	1
112			min	-111.42	3	0	1	-1.432	1	0	1	-.002	1	0	1
113		19	max	572.28	1	0	1	-.047	15	0	1	0	15	0	1
114			min	-111.371	3	0	1	-1.432	1	0	1	-.002	1	0	1
115	M6	1	max	1367.566	1	.643	4	.326	1	0	1	0	3	0	1
116			min	-1195.381	3	.155	15	-.124	3	0	15	0	1	0	1
117		2	max	1367.662	1	.605	4	.326	1	0	1	0	3	0	15
118			min	-1195.309	3	.146	15	-.124	3	0	15	0	1	0	4
119		3	max	1367.759	1	.568	4	.326	1	0	1	0	2	0	15
120			min	-1195.236	3	.137	15	-.124	3	0	15	0	15	0	4
121		4	max	1367.855	1	.53	4	.326	1	0	1	0	1	0	15
122			min	-1195.164	3	.128	15	-.124	3	0	15	0	3	0	4
123		5	max	1367.951	1	.492	4	.326	1	0	1	0	1	0	15
124			min	-1195.092	3	.119	15	-.124	3	0	15	0	3	0	4
125		6	max	1368.048	1	.454	4	.326	1	0	1	0	1	0	15
126			min	-1195.019	3	.11	15	-.124	3	0	15	0	3	0	4
127		7	max	1368.144	1	.416	4	.326	1	0	1	0	1	0	15
128			min	-1194.947	3	.101	15	-.124	3	0	15	0	3	0	4
129		8	max	1368.24	1	.378	4	.326	1	0	1	0	1	0	15
130			min	-1194.875	3	.092	15	-.124	3	0	15	0	3	0	4
131		9	max	1368.337	1	.341	4	.326	1	0	1	0	1	0	15
132			min	-1194.803	3	.084	15	-.124	3	0	15	0	3	0	4
133		10	max	1368.433	1	.303	4	.326	1	0	1	0	1	0	15
134			min	-1194.73	3	.075	15	-.124	3	0	15	0	3	0	4
135		11	max	1368.53	1	.265	4	.326	1	0	1	0	1	0	15
136			min	-1194.658	3	.066	15	-.124	3	0	15	0	3	0	4
137		12	max	1368.626	1	.227	4	.326	1	0	1	0	1	0	15
138			min	-1194.586	3	.057	15	-.124	3	0	15	0	3	0	4
139		13	max	1368.722	1	.189	4	.326	1	0	1	0	1	0	15
140			min	-1194.514	3	.048	15	-.124	3	0	15	0	3	0	4
141		14	max	1368.819	1	.154	2	.326	1	0	1	0	1	0	15
142			min	-1194.441	3	.035	9	-.124	3	0	15	0	3	0	4
143		15	max	1368.915	1	.125	2	.326	1	0	1	0	1	0	15
144			min	-1194.369	3	.01	9	-.124	3	0	15	0	3	0	4
145		16	max	1369.011	1	.095	2	.326	1	0	1	0	1	0	15
146			min	-1194.297	3	-.016	1	-.124	3	0	15	0	3	0	4
147		17	max	1369.108	1	.071	10	.326	1	0	1	0	1	0	15
148			min	-1194.224	3	-.045	1	-.124	3	0	15	0	3	0	4
149		18	max	1369.204	1	.046	10	.326	1	0	1	0	1	0	15
150			min	-1194.152	3	-.074	1	-.124	3	0	15	0	3	0	4
151		19	max	1369.3	1	.022	10	.326	1	0	1	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1194.08	3	-.104	1	-.124	3	0	15	0	3	0	4
153	M7	1	max	163.702	2	1.804	4	.014	1	0	2	0	2	0	4
154			min	-167.322	9	.426	15	-.007	3	0	3	0	3	0	15
155		2	max	163.635	2	1.626	4	.014	1	0	2	0	2	0	2
156			min	-167.378	9	.384	15	-.007	3	0	3	0	3	0	15
157		3	max	163.568	2	1.448	4	.014	1	0	2	0	2	0	2
158			min	-167.433	9	.342	15	-.007	3	0	3	0	3	0	9
159		4	max	163.501	2	1.27	4	.014	1	0	2	0	2	0	10
160			min	-167.489	9	.3	15	-.007	3	0	3	0	3	0	1
161		5	max	163.434	2	1.092	4	.014	1	0	2	0	2	0	15
162			min	-167.545	9	.259	15	-.007	3	0	3	0	3	0	1
163		6	max	163.367	2	.914	4	.014	1	0	2	0	2	0	15
164			min	-167.601	9	.217	15	-.007	3	0	3	0	3	0	4
165		7	max	163.3	2	.736	4	.014	1	0	2	0	2	0	15
166			min	-167.657	9	.175	15	-.007	3	0	3	0	3	0	4
167		8	max	163.233	2	.558	4	.014	1	0	2	0	2	0	15
168			min	-167.713	9	.133	15	-.007	3	0	3	0	3	0	4
169		9	max	163.166	2	.38	4	.014	1	0	2	0	2	0	15
170			min	-167.769	9	.091	15	-.007	3	0	3	0	3	-.001	4
171		10	max	163.099	2	.202	4	.014	1	0	2	0	2	0	15
172			min	-167.825	9	.049	15	-.007	3	0	3	0	3	-.001	4
173		11	max	163.031	2	.053	2	.014	1	0	2	0	2	0	15
174			min	-167.881	9	-.02	9	-.007	3	0	3	0	3	-.001	4
175		12	max	162.964	2	-.034	15	.014	1	0	2	0	2	0	15
176			min	-167.937	9	-.155	1	-.007	3	0	3	0	3	-.001	4
177		13	max	162.897	2	-.076	15	.014	1	0	2	0	2	0	15
178			min	-167.993	9	-.332	4	-.007	3	0	3	0	3	-.001	4
179		14	max	162.83	2	-.118	15	.014	1	0	2	0	2	0	15
180			min	-168.049	9	-.51	4	-.007	3	0	3	0	3	-.001	4
181		15	max	162.763	2	-.16	15	.014	1	0	2	0	2	0	15
182			min	-168.104	9	-.688	4	-.007	3	0	3	0	3	0	4
183		16	max	162.696	2	-.202	15	.014	1	0	2	0	2	0	15
184			min	-168.16	9	-.866	4	-.007	3	0	3	0	3	0	4
185		17	max	162.629	2	-.244	15	.014	1	0	2	0	2	0	15
186			min	-168.216	9	-1.044	4	-.007	3	0	3	0	3	0	4
187		18	max	162.562	2	-.285	15	.014	1	0	2	0	2	0	15
188			min	-168.272	9	-1.222	4	-.007	3	0	3	0	3	0	4
189		19	max	162.495	2	-.327	15	.014	1	0	2	0	2	0	1
190			min	-168.328	9	-1.4	4	-.007	3	0	3	0	3	0	1
191	M8	1	max	1706.612	1	0	1	.683	1	0	1	0	15	0	1
192			min	-391.186	3	0	1	-.219	3	0	1	0	1	0	1
193		2	max	1706.676	1	0	1	.683	1	0	1	0	1	0	1
194			min	-391.137	3	0	1	-.219	3	0	1	0	3	0	1
195		3	max	1706.741	1	0	1	.683	1	0	1	0	1	0	1
196			min	-391.089	3	0	1	-.219	3	0	1	0	3	0	1
197		4	max	1706.806	1	0	1	.683	1	0	1	0	1	0	1
198			min	-391.04	3	0	1	-.219	3	0	1	0	3	0	1
199		5	max	1706.87	1	0	1	.683	1	0	1	0	1	0	1
200			min	-390.992	3	0	1	-.219	3	0	1	0	3	0	1
201		6	max	1706.935	1	0	1	.683	1	0	1	0	1	0	1
202			min	-390.943	3	0	1	-.219	3	0	1	0	3	0	1
203		7	max	1707	1	0	1	.683	1	0	1	0	1	0	1
204			min	-390.895	3	0	1	-.219	3	0	1	0	3	0	1
205		8	max	1707.065	1	0	1	.683	1	0	1	0	1	0	1
206			min	-390.846	3	0	1	-.219	3	0	1	0	3	0	1
207		9	max	1707.129	1	0	1	.683	1	0	1	0	1	0	1
208			min	-390.798	3	0	1	-.219	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	1707.194	1	0	1	.683	1	0	1	0	1	0	1
210			min	-390.749	3	0	1	-.219	3	0	1	0	3	0	1
211		11	max	1707.259	1	0	1	.683	1	0	1	0	1	0	1
212			min	-390.701	3	0	1	-.219	3	0	1	0	3	0	1
213		12	max	1707.323	1	0	1	.683	1	0	1	0	1	0	1
214			min	-390.652	3	0	1	-.219	3	0	1	0	3	0	1
215		13	max	1707.388	1	0	1	.683	1	0	1	0	1	0	1
216			min	-390.603	3	0	1	-.219	3	0	1	0	3	0	1
217		14	max	1707.453	1	0	1	.683	1	0	1	0	1	0	1
218			min	-390.555	3	0	1	-.219	3	0	1	0	3	0	1
219		15	max	1707.517	1	0	1	.683	1	0	1	0	1	0	1
220			min	-390.506	3	0	1	-.219	3	0	1	0	3	0	1
221		16	max	1707.582	1	0	1	.683	1	0	1	0	1	0	1
222			min	-390.458	3	0	1	-.219	3	0	1	0	3	0	1
223		17	max	1707.647	1	0	1	.683	1	0	1	0	1	0	1
224			min	-390.409	3	0	1	-.219	3	0	1	0	3	0	1
225		18	max	1707.712	1	0	1	.683	1	0	1	.001	1	0	1
226			min	-390.361	3	0	1	-.219	3	0	1	0	3	0	1
227		19	max	1707.776	1	0	1	.683	1	0	1	.001	1	0	1
228			min	-390.312	3	0	1	-.219	3	0	1	0	3	0	1
229	M10	1	max	426.375	1	.648	4	-.004	15	.001	1	0	2	0	1
230			min	-354.828	3	.155	15	-.108	1	0	3	0	3	0	1
231		2	max	426.472	1	.61	4	-.004	15	.001	1	0	2	0	15
232			min	-354.755	3	.146	15	-.108	1	0	3	0	3	0	4
233		3	max	426.568	1	.572	4	-.004	15	.001	1	0	2	0	15
234			min	-354.683	3	.137	15	-.108	1	0	3	0	3	0	4
235		4	max	426.664	1	.535	4	-.004	15	.001	1	0	10	0	15
236			min	-354.611	3	.129	15	-.108	1	0	3	0	3	0	4
237		5	max	426.761	1	.497	4	-.004	15	.001	1	0	10	0	15
238			min	-354.539	3	.12	15	-.108	1	0	3	0	3	0	4
239		6	max	426.857	1	.459	4	-.004	15	.001	1	0	15	0	15
240			min	-354.466	3	.111	15	-.108	1	0	3	0	3	0	4
241		7	max	426.953	1	.421	4	-.004	15	.001	1	0	15	0	15
242			min	-354.394	3	.102	15	-.108	1	0	3	0	1	0	4
243		8	max	427.05	1	.383	4	-.004	15	.001	1	0	15	0	15
244			min	-354.322	3	.093	15	-.108	1	0	3	0	1	0	4
245		9	max	427.146	1	.345	4	-.004	15	.001	1	0	15	0	15
246			min	-354.249	3	.084	15	-.108	1	0	3	0	1	0	4
247		10	max	427.242	1	.308	4	-.004	15	.001	1	0	15	0	15
248			min	-354.177	3	.075	15	-.108	1	0	3	0	1	0	4
249		11	max	427.339	1	.27	4	-.004	15	.001	1	0	15	0	15
250			min	-354.105	3	.066	15	-.108	1	0	3	0	1	0	4
251		12	max	427.435	1	.232	4	-.004	15	.001	1	0	15	0	15
252			min	-354.033	3	.057	15	-.108	1	0	3	0	1	0	4
253		13	max	427.532	1	.194	4	-.004	15	.001	1	0	15	0	15
254			min	-353.96	3	.049	15	-.108	1	0	3	0	1	0	4
255		14	max	427.628	1	.156	4	-.004	15	.001	1	0	15	0	15
256			min	-353.888	3	.028	1	-.108	1	0	3	0	1	0	4
257		15	max	427.724	1	.119	3	-.004	15	.001	1	0	15	0	15
258			min	-353.816	3	-.002	1	-.108	1	0	3	0	1	0	4
259		16	max	427.821	1	.097	3	-.004	15	.001	1	0	15	0	15
260			min	-353.744	3	-.031	1	-.108	1	0	3	0	1	0	4
261		17	max	427.917	1	.075	3	-.004	15	.001	1	0	15	0	15
262			min	-353.671	3	-.061	1	-.108	1	0	3	0	1	0	4
263		18	max	428.013	1	.053	3	-.004	15	.001	1	0	15	0	15
264			min	-353.599	3	-.09	1	-.108	1	0	3	0	1	0	4
265		19	max	428.11	1	.031	3	-.004	15	.001	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-353.527	3	-.12	1	-.108	1	0	3	0	1	0	4
267	M11	1	max	34.161	10	1.816	4	.818	1	.001	1	0	3	0	4
268			min	-118.68	1	.428	15	.018	12	0	15	-.002	1	0	15
269		2	max	34.105	10	1.638	4	.818	1	.001	1	0	3	0	4
270			min	-118.747	1	.386	15	.018	12	0	15	-.002	1	0	15
271		3	max	34.049	10	1.46	4	.818	1	.001	1	0	3	0	4
272			min	-118.814	1	.344	15	.018	12	0	15	-.002	1	0	3
273		4	max	33.994	10	1.282	4	.818	1	.001	1	0	3	0	15
274			min	-118.882	1	.302	15	.018	12	0	15	-.001	1	0	4
275		5	max	33.938	10	1.104	4	.818	1	.001	1	0	3	0	15
276			min	-118.949	1	.26	15	.018	12	0	15	-.001	1	0	4
277		6	max	33.882	10	.926	4	.818	1	.001	1	0	3	0	15
278			min	-119.016	1	.218	15	.018	12	0	15	-.001	1	0	4
279		7	max	33.826	10	.748	4	.818	1	.001	1	0	3	0	15
280			min	-119.083	1	.176	15	.018	12	0	15	0	1	0	4
281		8	max	33.77	10	.57	4	.818	1	.001	1	0	3	0	15
282			min	-119.15	1	.135	15	.018	12	0	15	0	1	0	4
283		9	max	33.714	10	.392	4	.818	1	.001	1	0	3	0	15
284			min	-119.217	1	.093	15	.018	12	0	15	0	1	-.001	4
285		10	max	33.658	10	.214	4	.818	1	.001	1	0	3	0	15
286			min	-119.284	1	.051	15	.018	12	0	15	0	1	-.001	4
287		11	max	33.602	10	.036	4	.818	1	.001	1	0	3	0	15
288			min	-119.351	1	.002	3	.018	12	0	15	0	1	-.001	4
289		12	max	33.546	10	-.033	15	.818	1	.001	1	0	3	0	15
290			min	-119.418	1	-.142	4	.018	12	0	15	0	1	-.001	4
291		13	max	33.49	10	-.075	15	.818	1	.001	1	0	3	0	15
292			min	-119.485	1	-.32	4	.018	12	0	15	0	10	-.001	4
293		14	max	33.434	10	-.116	15	.818	1	.001	1	0	1	0	15
294			min	-119.552	1	-.498	4	.018	12	0	15	0	15	-.001	4
295		15	max	33.379	10	-.158	15	.818	1	.001	1	0	1	0	15
296			min	-119.62	1	-.676	4	.018	12	0	15	0	15	0	4
297		16	max	33.323	10	-.2	15	.818	1	.001	1	0	1	0	15
298			min	-119.687	1	-.854	4	.018	12	0	15	0	15	0	4
299		17	max	33.267	10	-.242	15	.818	1	.001	1	0	1	0	15
300			min	-119.754	1	-1.032	4	.018	12	0	15	0	15	0	4
301		18	max	33.211	10	-.284	15	.818	1	.001	1	0	1	0	15
302			min	-119.821	1	-1.21	4	.018	12	0	15	0	15	0	4
303		19	max	33.155	10	-.326	15	.818	1	.001	1	.001	1	0	1
304			min	-119.888	1	-1.388	4	.018	12	0	15	0	15	0	1
305	M12	1	max	571.012	1	0	1	3.264	1	0	1	0	1	0	1
306			min	-111.847	3	0	1	.099	15	0	1	0	3	0	1
307		2	max	571.076	1	0	1	3.264	1	0	1	0	1	0	1
308			min	-111.799	3	0	1	.099	15	0	1	0	15	0	1
309		3	max	571.141	1	0	1	3.264	1	0	1	0	1	0	1
310			min	-111.75	3	0	1	.099	15	0	1	0	15	0	1
311		4	max	571.206	1	0	1	3.264	1	0	1	0	1	0	1
312			min	-111.702	3	0	1	.099	15	0	1	0	15	0	1
313		5	max	571.27	1	0	1	3.264	1	0	1	.001	1	0	1
314			min	-111.653	3	0	1	.099	15	0	1	0	15	0	1
315		6	max	571.335	1	0	1	3.264	1	0	1	.001	1	0	1
316			min	-111.605	3	0	1	.099	15	0	1	0	15	0	1
317		7	max	571.4	1	0	1	3.264	1	0	1	.002	1	0	1
318			min	-111.556	3	0	1	.099	15	0	1	0	15	0	1
319		8	max	571.464	1	0	1	3.264	1	0	1	.002	1	0	1
320			min	-111.508	3	0	1	.099	15	0	1	0	15	0	1
321		9	max	571.529	1	0	1	3.264	1	0	1	.002	1	0	1
322			min	-111.459	3	0	1	.099	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	571.594	1	0	1	3.264	1	0	1	.003	1	0	1
324			min	-111.411	3	0	1	.099	15	0	1	0	15	0	1
325		11	max	571.659	1	0	1	3.264	1	0	1	.003	1	0	1
326			min	-111.362	3	0	1	.099	15	0	1	0	15	0	1
327		12	max	571.723	1	0	1	3.264	1	0	1	.003	1	0	1
328			min	-111.314	3	0	1	.099	15	0	1	0	15	0	1
329		13	max	571.788	1	0	1	3.264	1	0	1	.004	1	0	1
330			min	-111.265	3	0	1	.099	15	0	1	0	15	0	1
331		14	max	571.853	1	0	1	3.264	1	0	1	.004	1	0	1
332			min	-111.217	3	0	1	.099	15	0	1	0	15	0	1
333		15	max	571.917	1	0	1	3.264	1	0	1	.004	1	0	1
334			min	-111.168	3	0	1	.099	15	0	1	0	15	0	1
335		16	max	571.982	1	0	1	3.264	1	0	1	.004	1	0	1
336			min	-111.119	3	0	1	.099	15	0	1	0	15	0	1
337		17	max	572.047	1	0	1	3.264	1	0	1	.005	1	0	1
338			min	-111.071	3	0	1	.099	15	0	1	0	15	0	1
339		18	max	572.112	1	0	1	3.264	1	0	1	.005	1	0	1
340			min	-111.022	3	0	1	.099	15	0	1	0	15	0	1
341		19	max	572.176	1	0	1	3.264	1	0	1	.005	1	0	1
342			min	-110.974	3	0	1	.099	15	0	1	0	15	0	1
343	M1	1	max	111.122	1	341.698	3	-1.981	15	0	1	.126	1	.015	1
344			min	3.409	15	-416.413	1	-63.948	1	0	3	.004	15	-.01	3
345		2	max	111.194	1	341.496	3	-1.981	15	0	1	.112	1	.105	1
346			min	3.431	15	-416.683	1	-63.948	1	0	3	.003	15	-.084	3
347		3	max	126.281	1	6.829	9	-1.957	15	0	12	.097	1	.194	1
348			min	-6.675	3	-23.209	3	-63.543	1	0	1	.003	15	-.157	3
349		4	max	126.353	1	6.604	9	-1.957	15	0	12	.083	1	.194	1
350			min	-6.621	3	-23.411	3	-63.543	1	0	1	.003	15	-.152	3
351		5	max	126.425	1	6.379	9	-1.957	15	0	12	.07	1	.194	1
352			min	-6.567	3	-23.614	3	-63.543	1	0	1	.002	15	-.147	3
353		6	max	126.497	1	6.155	9	-1.957	15	0	12	.056	1	.194	1
354			min	-6.512	3	-23.816	3	-63.543	1	0	1	.002	15	-.142	3
355		7	max	126.57	1	5.93	9	-1.957	15	0	12	.042	1	.194	1
356			min	-6.458	3	-24.018	3	-63.543	1	0	1	.001	15	-.136	3
357		8	max	126.642	1	5.705	9	-1.957	15	0	12	.028	1	.194	1
358			min	-6.404	3	-24.22	3	-63.543	1	0	1	0	15	-.131	3
359		9	max	126.714	1	5.48	9	-1.957	15	0	12	.015	1	.195	1
360			min	-6.35	3	-24.423	3	-63.543	1	0	1	0	15	-.126	3
361		10	max	126.786	1	5.255	9	-1.957	15	0	12	0	1	.195	1
362			min	-6.296	3	-24.625	3	-63.543	1	0	1	0	15	-.121	3
363		11	max	126.859	1	5.031	9	-1.957	15	0	12	0	12	.195	1
364			min	-6.241	3	-24.827	3	-63.543	1	0	1	-.013	1	-.115	3
365		12	max	126.931	1	4.806	9	-1.957	15	0	12	0	12	.196	1
366			min	-6.187	3	-25.03	3	-63.543	1	0	1	-.027	1	-.11	3
367		13	max	127.003	1	4.581	9	-1.957	15	0	12	-.001	12	.196	1
368			min	-6.133	3	-25.232	3	-63.543	1	0	1	-.041	1	-.104	3
369		14	max	127.076	1	4.356	9	-1.957	15	0	12	-.002	15	.197	1
370			min	-6.079	3	-25.434	3	-63.543	1	0	1	-.054	1	-.099	3
371		15	max	127.148	1	4.132	9	-1.957	15	0	12	-.002	15	.197	1
372			min	-6.025	3	-25.636	3	-63.543	1	0	1	-.068	1	-.093	3
373		16	max	68.478	2	9.191	10	-1.978	15	0	1	-.003	15	.199	1
374			min	-34.329	3	-82.339	1	-64.158	1	0	12	-.083	1	-.088	3
375		17	max	68.55	2	8.966	10	-1.978	15	0	1	-.003	15	.217	1
376			min	-34.275	3	-82.609	1	-64.158	1	0	12	-.097	1	-.076	3
377		18	max	-3.416	15	467.941	1	-2.025	15	0	3	-.003	15	.117	1
378			min	-110.772	1	-160.21	3	-65.638	1	0	1	-.111	1	-.042	3
379		19	max	-3.394	15	467.672	1	-2.025	15	0	3	-.004	15	.016	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
380			min	-110.7	1	-160.412	3	-65.638	1	0	1	-.125	1	-.007	3
381	M5	1	max	244.633	1	1128.874	3	-.06	10	0	1	.004	1	.021	3
382			min	6.558	12	-1376.046	1	-23.576	3	0	3	0	10	-.03	1
383		2	max	244.706	1	1128.672	3	-.06	10	0	1	0	2	.269	1
384			min	6.594	12	-1376.316	1	-23.576	3	0	3	-.002	3	-.224	3
385		3	max	292.65	1	10.164	9	2.697	3	0	3	0	2	.562	1
386			min	-32.018	3	-76.233	3	-.348	2	0	1	-.007	3	-.464	3
387		4	max	292.723	1	9.939	9	2.697	3	0	3	0	2	.565	1
388			min	-31.964	3	-76.435	3	-.348	2	0	1	-.007	3	-.447	3
389		5	max	292.795	1	9.715	9	2.697	3	0	3	0	2	.568	1
390			min	-31.909	3	-76.638	3	-.348	2	0	1	-.006	3	-.431	3
391		6	max	292.867	1	9.49	9	2.697	3	0	3	0	2	.572	1
392			min	-31.855	3	-76.84	3	-.348	2	0	1	-.006	3	-.414	3
393		7	max	292.939	1	9.265	9	2.697	3	0	3	0	2	.575	1
394			min	-31.801	3	-77.042	3	-.348	2	0	1	-.005	3	-.398	3
395		8	max	293.012	1	9.04	9	2.697	3	0	3	0	2	.578	1
396			min	-31.747	3	-77.245	3	-.348	2	0	1	-.004	3	-.381	3
397		9	max	293.084	1	8.816	9	2.697	3	0	3	0	2	.582	1
398			min	-31.693	3	-77.447	3	-.348	2	0	1	-.004	3	-.364	3
399		10	max	293.156	1	8.591	9	2.697	3	0	3	0	10	.586	1
400			min	-31.638	3	-77.649	3	-.348	2	0	1	-.003	3	-.347	3
401		11	max	293.229	1	8.366	9	2.697	3	0	3	0	10	.589	1
402			min	-31.584	3	-77.851	3	-.348	2	0	1	-.003	3	-.33	3
403		12	max	293.301	1	8.141	9	2.697	3	0	3	0	10	.593	1
404			min	-31.53	3	-78.054	3	-.348	2	0	1	-.002	1	-.313	3
405		13	max	293.373	1	7.916	9	2.697	3	0	3	0	10	.597	1
406			min	-31.476	3	-78.256	3	-.348	2	0	1	-.002	1	-.296	3
407		14	max	293.445	1	7.692	9	2.697	3	0	3	0	10	.6	1
408			min	-31.422	3	-78.458	3	-.348	2	0	1	-.002	1	-.279	3
409		15	max	293.518	1	7.467	9	2.697	3	0	3	0	15	.604	1
410			min	-31.367	3	-78.661	3	-.348	2	0	1	-.001	1	-.262	3
411		16	max	252.528	2	51.607	2	2.675	3	0	1	0	3	.609	1
412			min	-111.537	3	-148.354	3	-.347	2	0	15	-.001	1	-.245	3
413		17	max	252.6	2	51.338	2	2.675	3	0	1	0	3	.631	1
414			min	-111.483	3	-148.556	3	-.347	2	0	15	0	1	-.213	3
415		18	max	-7.016	12	1541.307	1	2.454	3	0	3	.001	3	.303	1
416			min	-245.279	1	-527.4	3	-.082	2	0	1	0	2	-.1	3
417		19	max	-6.98	12	1541.037	1	2.454	3	0	3	.002	3	.015	3
418			min	-245.207	1	-527.602	3	-.082	2	0	1	0	2	-.032	1
419	M9	1	max	110.618	1	341.687	3	83.116	1	0	3	-.004	15	.015	1
420			min	3.392	15	-416.398	1	2.672	15	0	1	-.126	1	-.01	3
421		2	max	110.69	1	341.485	3	83.116	1	0	3	-.002	12	.105	1
422			min	3.414	15	-416.668	1	2.672	15	0	1	-.107	1	-.084	3
423		3	max	126.356	1	6.808	9	60.033	1	0	1	.002	3	.194	1
424			min	-6.276	3	-23.154	3	.787	12	0	15	-.088	1	-.157	3
425		4	max	126.428	1	6.583	9	60.033	1	0	1	.003	3	.194	1
426			min	-6.222	3	-23.357	3	.787	12	0	15	-.075	1	-.152	3
427		5	max	126.5	1	6.359	9	60.033	1	0	1	.003	3	.194	1
428			min	-6.168	3	-23.559	3	.787	12	0	15	-.062	1	-.147	3
429		6	max	126.572	1	6.134	9	60.033	1	0	1	.003	3	.194	1
430			min	-6.114	3	-23.761	3	.787	12	0	15	-.049	1	-.142	3
431		7	max	126.645	1	5.909	9	60.033	1	0	1	.003	3	.194	1
432			min	-6.06	3	-23.963	3	.787	12	0	15	-.036	1	-.136	3
433		8	max	126.717	1	5.684	9	60.033	1	0	1	.003	3	.194	1
434			min	-6.005	3	-24.166	3	.787	12	0	15	-.023	1	-.131	3
435		9	max	126.789	1	5.459	9	60.033	1	0	1	.004	3	.194	1
436			min	-5.951	3	-24.368	3	.787	12	0	15	-.01	1	-.126	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	126.861	1	5.235	9	60.033	1	0	1	.004	3	.195	1
438			min	-5.897	3	-24.57	3	.787	12	0	15	0	2	-.121	3
439		11	max	126.934	1	5.01	9	60.033	1	0	1	.016	1	.195	1
440			min	-5.843	3	-24.773	3	.787	12	0	15	0	15	-.115	3
441		12	max	127.006	1	4.785	9	60.033	1	0	1	.029	1	.196	1
442			min	-5.789	3	-24.975	3	.787	12	0	15	0	15	-.11	3
443		13	max	127.078	1	4.56	9	60.033	1	0	1	.042	1	.196	1
444			min	-5.734	3	-25.177	3	.787	12	0	15	.001	15	-.104	3
445		14	max	127.151	1	4.336	9	60.033	1	0	1	.055	1	.197	1
446			min	-5.68	3	-25.379	3	.787	12	0	15	.002	15	-.099	3
447		15	max	127.223	1	4.111	9	60.033	1	0	1	.068	1	.197	1
448			min	-5.626	3	-25.582	3	.787	12	0	15	.002	15	-.093	3
449		16	max	68.69	2	8.845	10	60.802	1	0	15	.082	1	.199	1
450			min	-34.411	3	-82.24	1	.808	12	0	1	.003	15	-.088	3
451		17	max	68.762	2	8.621	10	60.802	1	0	15	.096	1	.217	1
452			min	-34.356	3	-82.51	1	.808	12	0	1	.003	15	-.076	3
453		18	max	-3.409	15	467.942	1	63.973	1	0	1	.11	1	.117	1
454			min	-110.538	1	-160.208	3	.99	12	0	3	.003	15	-.042	3
455		19	max	-3.387	15	467.672	1	63.973	1	0	1	.123	1	.016	1
456			min	-110.466	1	-160.411	3	.99	12	0	3	.004	15	-.007	3
457	M13	1	max	83.272	1	415.856	1	-3.392	15	.015	1	.126	1	0	1
458			min	2.673	15	-341.678	3	-110.607	1	-.01	3	.004	15	0	3
459		2	max	83.272	1	293.423	1	-2.599	15	.015	1	.039	1	.259	3
460			min	2.673	15	-241.006	3	-84.697	1	-.01	3	.001	15	-.315	1
461		3	max	83.272	1	170.991	1	-1.807	15	.015	1	.001	3	.428	3
462			min	2.673	15	-140.333	3	-58.787	1	-.01	3	-.025	1	-.522	1
463		4	max	83.272	1	48.559	1	-1.014	15	.015	1	0	12	.508	3
464			min	2.673	15	-39.66	3	-32.878	1	-.01	3	-.066	1	-.619	1
465		5	max	83.272	1	61.013	3	-.221	15	.015	1	-.002	12	.499	3
466			min	2.673	15	-73.873	1	-6.968	1	-.01	3	-.084	1	-.608	1
467		6	max	83.272	1	161.685	3	18.942	1	.015	1	-.002	12	.4	3
468			min	2.673	15	-196.305	1	.229	12	-.01	3	-.078	1	-.488	1
469		7	max	83.272	1	262.358	3	44.851	1	.015	1	-.001	12	.211	3
470			min	2.673	15	-318.737	1	1.003	12	-.01	3	-.05	1	-.259	1
471		8	max	83.272	1	363.031	3	70.761	1	.015	1	.002	1	.079	1
472			min	2.673	15	-441.17	1	1.776	12	-.01	3	0	15	-.066	3
473		9	max	83.272	1	463.703	3	96.671	1	.015	1	.076	1	.525	1
474			min	2.673	15	-563.602	1	2.55	12	-.01	3	.002	12	-.434	3
475		10	max	83.272	1	564.376	3	122.58	1	.011	2	.173	1	1.081	1
476			min	2.673	15	-686.034	1	3.323	12	-.015	1	.005	12	-.891	3
477		11	max	64.12	1	563.602	1	-2.459	12	.01	3	.073	1	.525	1
478			min	1.981	15	-463.703	3	-96.164	1	-.015	1	0	3	-.434	3
479		12	max	64.12	1	441.169	1	-1.685	12	.01	3	0	2	.079	1
480			min	1.981	15	-363.031	3	-70.255	1	-.015	1	-.002	3	-.066	3
481		13	max	64.12	1	318.737	1	-.912	12	.01	3	-.002	15	.211	3
482			min	1.981	15	-262.358	3	-44.345	1	-.015	1	-.052	1	-.259	1
483		14	max	64.12	1	196.305	1	-.138	12	.01	3	-.002	15	.4	3
484			min	1.981	15	-161.685	3	-18.435	1	-.015	1	-.08	1	-.488	1
485		15	max	64.12	1	73.873	1	7.474	1	.01	3	-.003	15	.499	3
486			min	1.981	15	-61.013	3	.238	15	-.015	1	-.085	1	-.608	1
487		16	max	64.12	1	39.66	3	33.384	1	.01	3	-.002	12	.508	3
488			min	1.981	15	-48.559	1	1.03	15	-.015	1	-.067	1	-.619	1
489		17	max	64.12	1	140.333	3	59.294	1	.01	3	0	12	.428	3
490			min	1.981	15	-170.991	1	1.823	15	-.015	1	-.026	1	-.522	1
491		18	max	64.12	1	241.006	3	85.203	1	.01	3	.039	1	.259	3
492			min	1.981	15	-293.424	1	2.616	15	-.015	1	.001	15	-.315	1
493		19	max	64.12	1	341.678	3	111.113	1	.01	3	.126	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	1.981	15	-415.856	1	3.409	15	-.015	1	.004	15	0	3
495	M16	1	max	-.989	12	468.245	1	-3.387	15	.007	3	.123	1	0	1
496			min	-63.787	1	-160.426	3	-110.475	1	-.016	1	.004	15	0	3
497		2	max	-.989	12	330.371	1	-2.594	15	.007	3	.037	1	.122	3
498			min	-63.787	1	-113.285	3	-84.565	1	-.016	1	.001	15	-.355	1
499		3	max	-.989	12	192.498	1	-1.801	15	.007	3	0	12	.201	3
500			min	-63.787	1	-66.143	3	-58.656	1	-.016	1	-.027	1	-.587	1
501		4	max	-.989	12	54.624	1	-1.009	15	.007	3	-.002	15	.239	3
502			min	-63.787	1	-19.002	3	-32.746	1	-.016	1	-.068	1	-.697	1
503		5	max	-.989	12	28.139	3	-.216	15	.007	3	-.003	15	.235	3
504			min	-63.787	1	-83.25	1	-6.836	1	-.016	1	-.085	1	-.684	1
505		6	max	-.989	12	75.28	3	19.073	1	.007	3	-.002	15	.189	3
506			min	-63.787	1	-221.124	1	.34	12	-.016	1	-.08	1	-.549	1
507		7	max	-.989	12	122.421	3	44.983	1	.007	3	-.002	15	.101	3
508			min	-63.787	1	-358.998	1	1.114	12	-.016	1	-.051	1	-.291	1
509		8	max	-.989	12	169.562	3	70.892	1	.007	3	.001	2	.089	1
510			min	-63.787	1	-496.872	1	1.888	12	-.016	1	-.002	3	-.028	3
511		9	max	-.989	12	216.703	3	96.802	1	.007	3	.075	1	.592	1
512			min	-63.787	1	-634.746	1	2.661	12	-.016	1	.001	12	-.2	3
513		10	max	-2.025	15	-16.582	15	122.712	1	0	15	.172	1	1.218	1
514			min	-65.474	1	-772.62	1	-5.3	3	-.016	1	.005	12	-.414	3
515		11	max	-2.025	15	634.746	1	-2.771	12	.016	1	.075	1	.592	1
516			min	-65.474	1	-216.703	3	-96.568	1	-.007	3	.002	12	-.2	3
517		12	max	-2.025	15	496.872	1	-1.998	12	.016	1	0	2	.089	1
518			min	-65.474	1	-169.562	3	-70.658	1	-.007	3	0	3	-.028	3
519		13	max	-2.025	15	358.998	1	-1.224	12	.016	1	-.002	12	.101	3
520			min	-65.474	1	-122.421	3	-44.748	1	-.007	3	-.051	1	-.291	1
521		14	max	-2.025	15	221.124	1	-.45	12	.016	1	-.002	12	.189	3
522			min	-65.474	1	-75.28	3	-18.839	1	-.007	3	-.079	1	-.549	1
523		15	max	-2.025	15	83.25	1	7.071	1	.016	1	-.002	12	.235	3
524			min	-65.474	1	-28.139	3	.223	15	-.007	3	-.084	1	-.684	1
525		16	max	-2.025	15	19.002	3	32.981	1	.016	1	-.002	12	.239	3
526			min	-65.474	1	-54.624	1	1.016	15	-.007	3	-.066	1	-.697	1
527		17	max	-2.025	15	66.143	3	58.89	1	.016	1	0	12	.201	3
528			min	-65.474	1	-192.498	1	1.809	15	-.007	3	-.026	1	-.587	1
529		18	max	-2.025	15	113.285	3	84.8	1	.016	1	.038	1	.122	3
530			min	-65.474	1	-330.372	1	2.601	15	-.007	3	.001	15	-.355	1
531		19	max	-2.025	15	160.426	3	110.71	1	.016	1	.125	1	0	1
532			min	-65.474	1	-468.246	1	3.394	15	-.007	3	.004	15	0	3
533	M15	1	max	0	2	2.784	4	.024	3	0	1	0	1	0	1
534			min	-27.258	3	0	2	-.033	1	0	3	0	3	0	1
535		2	max	0	2	2.474	4	.024	3	0	1	0	1	0	2
536			min	-27.312	3	0	2	-.033	1	0	3	0	3	-.001	4
537		3	max	0	2	2.165	4	.024	3	0	1	0	1	0	2
538			min	-27.366	3	0	2	-.033	1	0	3	0	3	-.002	4
539		4	max	0	2	1.856	4	.024	3	0	1	0	1	0	2
540			min	-27.42	3	0	2	-.033	1	0	3	0	3	-.003	4
541		5	max	0	2	1.546	4	.024	3	0	1	0	1	0	2
542			min	-27.474	3	0	2	-.033	1	0	3	0	3	-.004	4
543		6	max	0	2	1.237	4	.024	3	0	1	0	1	0	2
544			min	-27.528	3	0	2	-.033	1	0	3	0	3	-.005	4
545		7	max	0	2	.928	4	.024	3	0	1	0	3	0	2
546			min	-27.582	3	0	2	-.033	1	0	3	0	1	-.005	4
547		8	max	0	2	.619	4	.024	3	0	1	0	3	0	2
548			min	-27.636	3	0	2	-.033	1	0	3	0	1	-.006	4
549		9	max	0	2	.309	4	.024	3	0	1	0	3	0	2
550			min	-27.69	3	0	2	-.033	1	0	3	0	1	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.024	3	0	1	0	3	0	2
552			min	-27.744	3	0	1	-.033	1	0	3	0	1	-.006	4
553		11	max	0	2	0	2	.024	3	0	1	0	3	0	2
554			min	-27.798	3	-.309	4	-.033	1	0	3	0	1	-.006	4
555		12	max	0	2	0	2	.024	3	0	1	0	3	0	2
556			min	-27.852	3	-.619	4	-.033	1	0	3	0	1	-.006	4
557		13	max	0	2	0	2	.024	3	0	1	0	3	0	2
558			min	-27.906	3	-.928	4	-.033	1	0	3	0	1	-.005	4
559		14	max	0	2	0	2	.024	3	0	1	0	3	0	2
560			min	-27.96	3	-1.237	4	-.033	1	0	3	0	1	-.005	4
561		15	max	0	2	0	2	.024	3	0	1	0	3	0	2
562			min	-28.014	3	-1.546	4	-.033	1	0	3	0	1	-.004	4
563		16	max	0	2	0	2	.024	3	0	1	0	3	0	2
564			min	-28.068	3	-1.856	4	-.033	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.024	3	0	1	0	3	0	2
566			min	-28.122	3	-2.165	4	-.033	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.024	3	0	1	0	3	0	2
568			min	-28.176	3	-2.474	4	-.033	1	0	3	0	1	-.001	4
569		19	max	0	2	0	2	.024	3	0	1	0	3	0	1
570			min	-28.23	3	-2.784	4	-.033	1	0	3	0	1	0	1
571	M16A	1	max	-.722	10	2.784	4	.02	1	0	3	0	3	0	1
572			min	-27.756	3	.654	15	-.01	3	0	1	0	1	0	1
573		2	max	-.663	10	2.474	4	.02	1	0	3	0	3	0	15
574			min	-27.702	3	.582	15	-.01	3	0	1	0	1	-.001	4
575		3	max	-.603	10	2.165	4	.02	1	0	3	0	3	0	15
576			min	-27.648	3	.509	15	-.01	3	0	1	0	1	-.002	4
577		4	max	-.543	10	1.856	4	.02	1	0	3	0	3	0	15
578			min	-27.594	3	.436	15	-.01	3	0	1	0	1	-.003	4
579		5	max	-.483	10	1.546	4	.02	1	0	3	0	3	0	15
580			min	-27.54	3	.364	15	-.01	3	0	1	0	1	-.004	4
581		6	max	-.423	10	1.237	4	.02	1	0	3	0	3	-.001	15
582			min	-27.486	3	.291	15	-.01	3	0	1	0	1	-.005	4
583		7	max	-.363	10	.928	4	.02	1	0	3	0	3	-.001	15
584			min	-27.432	3	.218	15	-.01	3	0	1	0	1	-.005	4
585		8	max	-.303	10	.619	4	.02	1	0	3	0	3	-.001	15
586			min	-27.378	3	.145	15	-.01	3	0	1	0	1	-.006	4
587		9	max	-.243	10	.309	4	.02	1	0	3	0	3	-.001	15
588			min	-27.324	3	.073	15	-.01	3	0	1	0	1	-.006	4
589		10	max	-.183	10	0	1	.02	1	0	3	0	3	-.001	15
590			min	-27.27	3	0	1	-.01	3	0	1	0	1	-.006	4
591		11	max	-.123	10	-.073	15	.02	1	0	3	0	3	-.001	15
592			min	-27.216	3	-.309	4	-.01	3	0	1	0	1	-.006	4
593		12	max	-.063	10	-.145	15	.02	1	0	3	0	3	-.001	15
594			min	-27.162	3	-.619	4	-.01	3	0	1	0	1	-.006	4
595		13	max	-.003	10	-.218	15	.02	1	0	3	0	1	-.001	15
596			min	-27.108	3	-.928	4	-.01	3	0	1	0	4	-.005	4
597		14	max	.057	10	-.291	15	.02	1	0	3	0	1	-.001	15
598			min	-27.054	3	-1.237	4	-.01	3	0	1	0	3	-.005	4
599		15	max	.117	10	-.364	15	.02	1	0	3	0	1	0	15
600			min	-27	3	-1.546	4	-.01	3	0	1	0	3	-.004	4
601		16	max	.177	10	-.436	15	.02	1	0	3	0	1	0	15
602			min	-26.946	3	-1.856	4	-.01	3	0	1	0	3	-.003	4
603		17	max	.237	10	-.509	15	.02	1	0	3	0	1	0	15
604			min	-26.892	3	-2.165	4	-.01	3	0	1	0	3	-.002	4
605		18	max	.297	10	-.582	15	.02	1	0	3	0	1	0	15
606			min	-26.838	3	-2.474	4	-.01	3	0	1	0	3	-.001	4
607		19	max	.357	10	-.654	15	.02	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-26.784	3	-2.784	4	-.01	3	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.006	2	.012	1	-2.82e-5	15	NC	3	NC	3
2			min	-.003	3	-.005	3	0	3	-9.135e-4	1	4867.067	2	2486.431	1
3		2	max	.003	1	.006	2	.011	1	-2.709e-5	15	NC	3	NC	3
4			min	-.003	3	-.005	3	0	3	-8.777e-4	1	5268.035	2	2695.562	1
5		3	max	.003	1	.005	2	.01	1	-2.597e-5	15	NC	3	NC	3
6			min	-.002	3	-.004	3	0	3	-8.419e-4	1	5737.65	2	2941.623	1
7		4	max	.003	1	.005	2	.009	1	-2.485e-5	15	NC	3	NC	3
8			min	-.002	3	-.004	3	0	3	-8.061e-4	1	6291.34	2	3233.617	1
9		5	max	.002	1	.004	2	.008	1	-2.374e-5	15	NC	3	NC	3
10			min	-.002	3	-.004	3	0	3	-7.703e-4	1	6949.351	2	3583.563	1
11		6	max	.002	1	.004	2	.008	1	-2.262e-5	15	NC	1	NC	2
12			min	-.002	3	-.004	3	0	3	-7.345e-4	1	7738.689	2	4007.795	1
13		7	max	.002	1	.003	2	.007	1	-2.15e-5	15	NC	1	NC	2
14			min	-.002	3	-.004	3	0	3	-6.987e-4	1	8696.047	2	4528.984	1
15		8	max	.002	1	.003	2	.006	1	-2.039e-5	15	NC	1	NC	2
16			min	-.002	3	-.003	3	0	3	-6.628e-4	1	9872.378	2	5179.356	1
17		9	max	.002	1	.003	2	.005	1	-1.927e-5	15	NC	1	NC	2
18			min	-.002	3	-.003	3	0	3	-6.27e-4	1	NC	1	6006.024	1
19		10	max	.002	1	.002	2	.004	1	-1.815e-5	15	NC	1	NC	2
20			min	-.001	3	-.003	3	0	3	-5.912e-4	1	NC	1	7080.181	1
21		11	max	.001	1	.002	2	.004	1	-1.703e-5	15	NC	1	NC	2
22			min	-.001	3	-.003	3	0	3	-5.554e-4	1	NC	1	8513.757	1
23		12	max	.001	1	.002	2	.003	1	-1.592e-5	15	NC	1	NC	1
24			min	-.001	3	-.002	3	0	3	-5.196e-4	1	NC	1	NC	1
25		13	max	.001	1	.001	2	.002	1	-1.48e-5	15	NC	1	NC	1
26			min	0	3	-.002	3	0	3	-4.838e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-1.368e-5	15	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-4.48e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	-1.257e-5	15	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-4.122e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.145e-5	15	NC	1	NC	1
32			min	0	3	-.001	3	0	3	-3.764e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.033e-5	15	NC	1	NC	1
34			min	0	3	0	3	0	3	-3.406e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-9.217e-6	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.048e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-6.598e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.689e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.223e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	3.104e-6	12	NC	1	NC	1
41		2	max	0	1	0	2	0	12	1.554e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	4.714e-6	15	NC	1	NC	1
43		3	max	0	1	0	2	0	12	1.886e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	5.746e-6	15	NC	1	NC	1
45		4	max	0	1	0	2	0	12	2.218e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	6.778e-6	15	NC	1	NC	1
47		5	max	0	1	0	2	0	3	2.55e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	7.809e-6	15	NC	1	NC	1
49		6	max	0	1	0	2	0	3	2.882e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	8.841e-6	15	NC	1	NC	1
51		7	max	0	1	0	2	0	3	3.214e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	10	-.004	3	0	1	9.872e-6	15	NC	1	NC	1
53		8	max	0	1	.001	2	0	3	3.546e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	1.09e-5	15	NC	1	NC	1
55		9	max	0	1	.002	2	0	3	3.878e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	1	1.194e-5	15	NC	1	NC	1
57		10	max	0	1	.002	2	0	1	4.21e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	15	1.297e-5	15	NC	1	NC	1
59		11	max	0	1	.003	2	.001	1	4.542e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	15	1.4e-5	15	NC	1	NC	1
61		12	max	0	1	.003	2	.002	1	4.874e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	15	1.503e-5	15	NC	1	NC	1
63		13	max	0	1	.004	2	.002	1	5.206e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	15	1.606e-5	15	NC	1	NC	1
65		14	max	0	1	.005	2	.003	1	5.538e-4	1	NC	1	NC	1
66			min	0	10	-.007	3	0	15	1.709e-5	15	9790.049	2	NC	1
67		15	max	.001	1	.006	2	.004	1	5.87e-4	1	NC	3	NC	1
68			min	0	10	-.007	3	0	15	1.813e-5	15	8254.389	2	NC	1
69		16	max	.001	1	.007	2	.004	1	6.201e-4	1	NC	3	NC	1
70			min	0	10	-.007	3	0	15	1.916e-5	15	7059.582	2	NC	1
71		17	max	.001	1	.008	2	.005	1	6.533e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	15	2.019e-5	15	6120.811	2	9188.924	1
73		18	max	.001	1	.009	2	.006	1	6.865e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	15	2.122e-5	15	5376.907	2	8183.234	1
75		19	max	.001	1	.01	1	.006	1	7.197e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	15	2.225e-5	15	4763.986	1	7439.947	1
77	M4	1	max	.003	1	.007	2	0	15	-2.481e-5	15	NC	1	NC	2
78			min	0	3	-.005	3	-.005	1	-8.114e-4	1	NC	1	4183.906	1
79		2	max	.003	1	.007	2	0	15	-2.481e-5	15	NC	1	NC	2
80			min	0	3	-.005	3	-.004	1	-8.114e-4	1	NC	1	4564.301	1
81		3	max	.002	1	.006	2	0	15	-2.481e-5	15	NC	1	NC	2
82			min	0	3	-.005	3	-.004	1	-8.114e-4	1	NC	1	5017.029	1
83		4	max	.002	1	.006	2	0	15	-2.481e-5	15	NC	1	NC	2
84			min	0	3	-.004	3	-.003	1	-8.114e-4	1	NC	1	5561.171	1
85		5	max	.002	1	.006	2	0	15	-2.481e-5	15	NC	1	NC	2
86			min	0	3	-.004	3	-.003	1	-8.114e-4	1	NC	1	6222.72	1
87		6	max	.002	1	.005	2	0	15	-2.481e-5	15	NC	1	NC	2
88			min	0	3	-.004	3	-.003	1	-8.114e-4	1	NC	1	7037.826	1
89		7	max	.002	1	.005	2	0	15	-2.481e-5	15	NC	1	NC	2
90			min	0	3	-.003	3	-.002	1	-8.114e-4	1	NC	1	8057.988	1
91		8	max	.002	1	.004	2	0	15	-2.481e-5	15	NC	1	NC	2
92			min	0	3	-.003	3	-.002	1	-8.114e-4	1	NC	1	9358.62	1
93		9	max	.002	1	.004	2	0	15	-2.481e-5	15	NC	1	NC	1
94			min	0	3	-.003	3	-.002	1	-8.114e-4	1	NC	1	NC	1
95		10	max	.001	1	.004	2	0	15	-2.481e-5	15	NC	1	NC	1
96			min	0	3	-.003	3	-.001	1	-8.114e-4	1	NC	1	NC	1
97		11	max	.001	1	.003	2	0	15	-2.481e-5	15	NC	1	NC	1
98			min	0	3	-.002	3	-.001	1	-8.114e-4	1	NC	1	NC	1
99		12	max	.001	1	.003	2	0	15	-2.481e-5	15	NC	1	NC	1
100			min	0	3	-.002	3	0	1	-8.114e-4	1	NC	1	NC	1
101		13	max	0	1	.002	2	0	15	-2.481e-5	15	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-8.114e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	15	-2.481e-5	15	NC	1	NC	1
104			min	0	3	-.001	3	0	1	-8.114e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-2.481e-5	15	NC	1	NC	1
106			min	0	3	-.001	3	0	1	-8.114e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	15	-2.481e-5	15	NC	1	NC	1
108			min	0	3	0	3	0	1	-8.114e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	0	2	0	15	-2.481e-5	15	NC	1	NC	1
110			min	0	3	0	3	0	1	-8.114e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-2.481e-5	15	NC	1	NC	1
112			min	0	3	0	3	0	1	-8.114e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-2.481e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-8.114e-4	1	NC	1	NC	1
115	M6	1	max	.01	1	.02	2	.004	1	1.832e-4	1	NC	3	NC	2
116			min	-.009	3	-.013	3	-.002	3	3.139e-6	10	1537.557	2	7981.469	1
117		2	max	.01	1	.018	2	.003	1	1.707e-4	1	NC	3	NC	2
118			min	-.008	3	-.013	3	-.002	3	2.48e-6	10	1639.671	2	8648.546	1
119		3	max	.009	1	.017	2	.003	1	1.583e-4	1	NC	3	NC	2
120			min	-.008	3	-.012	3	-.002	3	1.822e-6	10	1755.99	2	9440.039	1
121		4	max	.008	1	.016	2	.003	1	1.458e-4	1	NC	3	NC	1
122			min	-.007	3	-.011	3	-.002	3	1.163e-6	10	1889.347	2	NC	1
123		5	max	.008	1	.015	2	.003	1	1.371e-4	3	NC	3	NC	1
124			min	-.007	3	-.011	3	-.001	3	5.041e-7	10	2043.384	2	NC	1
125		6	max	.007	1	.014	2	.002	1	1.335e-4	3	NC	3	NC	1
126			min	-.006	3	-.01	3	-.001	3	-1.547e-7	10	2222.869	2	NC	1
127		7	max	.007	1	.012	2	.002	1	1.3e-4	3	NC	3	NC	1
128			min	-.006	3	-.009	3	-.001	3	-8.134e-7	10	2434.164	2	NC	1
129		8	max	.006	1	.011	2	.002	1	1.264e-4	3	NC	3	NC	1
130			min	-.005	3	-.009	3	-.001	3	-2.064e-6	2	2685.941	2	NC	1
131		9	max	.006	1	.01	2	.002	1	1.228e-4	3	NC	3	NC	1
132			min	-.005	3	-.008	3	0	3	-5.805e-6	2	2990.35	2	NC	1
133		10	max	.005	1	.009	2	.001	1	1.192e-4	3	NC	3	NC	1
134			min	-.004	3	-.007	3	0	3	-9.546e-6	2	3364.935	2	NC	1
135		11	max	.005	1	.008	2	.001	1	1.157e-4	3	NC	3	NC	1
136			min	-.004	3	-.007	3	0	3	-1.329e-5	2	3836.016	2	NC	1
137		12	max	.004	1	.007	2	0	1	1.121e-4	3	NC	3	NC	1
138			min	-.003	3	-.006	3	0	3	-1.703e-5	2	4444.95	2	NC	1
139		13	max	.003	1	.006	2	0	1	1.085e-4	3	NC	3	NC	1
140			min	-.003	3	-.005	3	0	3	-2.077e-5	2	5260.662	2	NC	1
141		14	max	.003	1	.005	2	0	1	1.049e-4	3	NC	3	NC	1
142			min	-.002	3	-.004	3	0	3	-2.451e-5	2	6407.207	2	NC	1
143		15	max	.002	1	.004	2	0	1	1.014e-4	3	NC	3	NC	1
144			min	-.002	3	-.003	3	0	3	-2.825e-5	2	8132.687	2	NC	1
145		16	max	.002	1	.003	2	0	1	9.779e-5	3	NC	1	NC	1
146			min	-.001	3	-.003	3	0	3	-3.199e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	9.421e-5	3	NC	1	NC	1
148			min	0	3	-.002	3	0	3	-3.573e-5	2	NC	1	NC	1
149		18	max	0	1	0	2	0	1	9.064e-5	3	NC	1	NC	1
150			min	0	3	0	3	0	3	-3.947e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	8.706e-5	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-4.322e-5	2	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.941e-5	2	NC	1	NC	1
154			min	0	1	0	1	0	1	-3.943e-5	3	NC	1	NC	1
155		2	max	0	9	.001	2	0	3	1.716e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-3.019e-5	3	NC	1	NC	1
157		3	max	0	9	.003	2	0	3	1.614e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-2.095e-5	3	NC	1	NC	1
159		4	max	0	9	.004	2	0	3	1.511e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-1.171e-5	3	NC	1	NC	1
161		5	max	0	9	.005	2	0	3	1.409e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	1	-2.473e-6	3	9201.506	2	NC	1
163		6	max	0	9	.006	1	0	3	1.306e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	3.299e-7	15	7350.17	1	NC	1
165		7	max	0	9	.008	1	0	3	1.601e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	0	2	-.008	3	0	1	3.433e-7	15	6032.798	1	NC	1
167		8	max	0	9	.009	1	.001	3	2.525e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-2.291e-6	2	5073.038	1	NC	1
169		9	max	0	9	.011	1	.001	3	3.449e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-5.391e-6	2	4341.194	1	NC	1
171		10	max	0	9	.012	1	.001	3	4.372e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	-.001	1	-8.492e-6	2	3764.944	1	NC	1
173		11	max	.001	9	.014	1	.001	3	5.296e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-1.159e-5	2	3300.538	1	NC	1
175		12	max	.001	9	.016	1	.001	3	6.22e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-1.469e-5	2	2919.757	1	NC	1
177		13	max	.001	9	.018	1	.001	3	7.144e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-1.779e-5	2	2603.434	1	NC	1
179		14	max	.001	9	.02	1	.001	3	8.068e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.001	1	-2.089e-5	2	2337.996	1	NC	1
181		15	max	.001	9	.022	1	.001	3	8.992e-5	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-2.399e-5	2	2113.496	1	NC	1
183		16	max	.002	9	.024	1	.001	3	9.916e-5	3	NC	3	NC	1
184			min	-.002	2	-.017	3	-.002	1	-2.709e-5	2	1922.443	1	NC	1
185		17	max	.002	9	.026	1	.001	3	1.084e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-3.019e-5	2	1759.074	1	NC	1
187		18	max	.002	9	.028	1	.001	3	1.176e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-3.33e-5	2	1618.877	1	NC	1
189		19	max	.002	9	.031	1	.001	3	1.269e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-3.64e-5	2	1498.275	1	NC	1
191	M8	1	max	.008	1	.023	2	.002	1	-4.195e-7	10	NC	1	NC	2
192			min	-.002	3	-.015	3	0	3	-1.02e-4	3	NC	1	8967.953	1
193		2	max	.008	1	.022	2	.002	1	-4.195e-7	10	NC	1	NC	2
194			min	-.002	3	-.014	3	0	3	-1.02e-4	3	NC	1	9777.538	1
195		3	max	.007	1	.02	2	.002	1	-4.195e-7	10	NC	1	NC	1
196			min	-.002	3	-.013	3	0	3	-1.02e-4	3	NC	1	NC	1
197		4	max	.007	1	.019	2	.002	1	-4.195e-7	10	NC	1	NC	1
198			min	-.002	3	-.012	3	0	3	-1.02e-4	3	NC	1	NC	1
199		5	max	.006	1	.018	2	.001	1	-4.195e-7	10	NC	1	NC	1
200			min	-.001	3	-.011	3	0	3	-1.02e-4	3	NC	1	NC	1
201		6	max	.006	1	.016	2	.001	1	-4.195e-7	10	NC	1	NC	1
202			min	-.001	3	-.011	3	0	3	-1.02e-4	3	NC	1	NC	1
203		7	max	.005	1	.015	2	.001	1	-4.195e-7	10	NC	1	NC	1
204			min	-.001	3	-.01	3	0	3	-1.02e-4	3	NC	1	NC	1
205		8	max	.005	1	.014	2	0	1	-4.195e-7	10	NC	1	NC	1
206			min	-.001	3	-.009	3	0	3	-1.02e-4	3	NC	1	NC	1
207		9	max	.005	1	.013	2	0	1	-4.195e-7	10	NC	1	NC	1
208			min	-.001	3	-.008	3	0	3	-1.02e-4	3	NC	1	NC	1
209		10	max	.004	1	.011	2	0	1	-4.195e-7	10	NC	1	NC	1
210			min	0	3	-.007	3	0	3	-1.02e-4	3	NC	1	NC	1
211		11	max	.004	1	.01	2	0	1	-4.195e-7	10	NC	1	NC	1
212			min	0	3	-.007	3	0	3	-1.02e-4	3	NC	1	NC	1
213		12	max	.003	1	.009	2	0	1	-4.195e-7	10	NC	1	NC	1
214			min	0	3	-.006	3	0	3	-1.02e-4	3	NC	1	NC	1
215		13	max	.003	1	.008	2	0	1	-4.195e-7	10	NC	1	NC	1
216			min	0	3	-.005	3	0	3	-1.02e-4	3	NC	1	NC	1
217		14	max	.002	1	.006	2	0	1	-4.195e-7	10	NC	1	NC	1
218			min	0	3	-.004	3	0	3	-1.02e-4	3	NC	1	NC	1
219		15	max	.002	1	.005	2	0	1	-4.195e-7	10	NC	1	NC	1
220			min	0	3	-.003	3	0	3	-1.02e-4	3	NC	1	NC	1
221		16	max	.001	1	.004	2	0	1	-4.195e-7	10	NC	1	NC	1
222			min	0	3	-.002	3	0	3	-1.02e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.003	2	0	1	-4.195e-7	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.02e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	1	-4.195e-7	10	NC	1	NC	1
226			min	0	3	0	3	0	3	-1.02e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-4.195e-7	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.02e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.006	2	0	3	8.342e-4	1	NC	3	NC	1
230			min	-.003	3	-.005	3	-.002	1	-1.649e-4	3	4876.81	2	NC	1
231		2	max	.003	1	.006	2	0	3	7.913e-4	1	NC	3	NC	1
232			min	-.002	3	-.005	3	-.002	1	-1.606e-4	3	5278.756	2	NC	1
233		3	max	.003	1	.005	2	0	3	7.485e-4	1	NC	3	NC	1
234			min	-.002	3	-.004	3	-.001	1	-1.562e-4	3	5749.547	2	NC	1
235		4	max	.003	1	.005	2	0	3	7.057e-4	1	NC	3	NC	1
236			min	-.002	3	-.004	3	-.001	1	-1.519e-4	3	6304.659	2	NC	1
237		5	max	.002	1	.004	2	0	3	6.629e-4	1	NC	3	NC	1
238			min	-.002	3	-.004	3	-.001	1	-1.475e-4	3	6964.406	2	NC	1
239		6	max	.002	1	.004	2	0	3	6.201e-4	1	NC	1	NC	1
240			min	-.002	3	-.004	3	-.001	1	-1.432e-4	3	7755.885	2	NC	1
241		7	max	.002	1	.003	2	0	3	5.772e-4	1	NC	1	NC	1
242			min	-.002	3	-.004	3	0	1	-1.389e-4	3	8715.915	2	NC	1
243		8	max	.002	1	.003	2	0	3	5.344e-4	1	NC	1	NC	1
244			min	-.002	3	-.004	3	0	1	-1.345e-4	3	9895.631	2	NC	1
245		9	max	.002	1	.003	2	0	3	4.916e-4	1	NC	1	NC	1
246			min	-.001	3	-.003	3	0	1	-1.302e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	4.488e-4	1	NC	1	NC	1
248			min	-.001	3	-.003	3	0	1	-1.258e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	4.06e-4	1	NC	1	NC	1
250			min	-.001	3	-.003	3	0	1	-1.215e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	3.631e-4	1	NC	1	NC	1
252			min	-.001	3	-.003	3	0	1	-1.172e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	3.203e-4	1	NC	1	NC	1
254			min	0	3	-.002	3	0	1	-1.128e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	2.775e-4	1	NC	1	NC	1
256			min	0	3	-.002	3	0	1	-1.085e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.347e-4	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-1.041e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.918e-4	1	NC	1	NC	1
260			min	0	3	-.001	3	0	1	-9.979e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.49e-4	1	NC	1	NC	1
262			min	0	3	0	3	0	1	-9.545e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.062e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-9.11e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	6.339e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-8.676e-5	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	3.955e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.016e-5	1	NC	1	NC	1
269		2	max	0	1	0	2	0	1	2.88e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-8.765e-5	1	NC	1	NC	1
271		3	max	0	1	0	2	0	10	1.805e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.451e-4	1	NC	1	NC	1
273		4	max	0	1	0	2	0	10	7.307e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-2.026e-4	1	NC	1	NC	1
275		5	max	0	1	0	2	0	10	-2.855e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	0	1	-2.601e-4	1	NC	1	NC	1
277		6	max	0	1	0	2	0	15	-9.482e-6	12	NC	1	NC	1
278			min	0	10	-.004	3	-.001	1	-3.176e-4	1	NC	1	NC	1
279		7	max	0	1	0	2	0	15	-1.152e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	10	-.004	3	-.002	1	-3.751e-4	1	NC	1	NC	1
281		8	max	0	1	.001	2	0	15	-1.332e-5	15	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-4.326e-4	1	NC	1	NC	1
283		9	max	0	1	.002	2	0	15	-1.513e-5	15	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-4.9e-4	1	NC	1	NC	1
285		10	max	0	1	.002	2	0	15	-1.693e-5	15	NC	1	NC	2
286			min	0	10	-.006	3	-.005	1	-5.475e-4	1	NC	1	9957.519	1
287		11	max	0	1	.003	2	0	15	-1.874e-5	15	NC	1	NC	2
288			min	0	10	-.006	3	-.006	1	-6.05e-4	1	NC	1	8255.251	1
289		12	max	0	1	.003	2	0	15	-2.054e-5	15	NC	1	NC	2
290			min	0	10	-.006	3	-.007	1	-6.625e-4	1	NC	1	7025.216	1
291		13	max	0	1	.004	2	0	15	-2.234e-5	15	NC	1	NC	2
292			min	0	10	-.007	3	-.008	1	-7.2e-4	1	NC	1	6109.839	1
293		14	max	0	1	.005	2	0	15	-2.415e-5	15	NC	3	NC	2
294			min	0	10	-.007	3	-.009	1	-7.775e-4	1	9806.303	2	5413.337	1
295		15	max	.001	1	.006	1	0	15	-2.595e-5	15	NC	3	NC	2
296			min	0	10	-.007	3	-.009	1	-8.35e-4	1	8256.754	1	4874.825	1
297		16	max	.001	1	.007	1	0	15	-2.775e-5	15	NC	3	NC	2
298			min	0	10	-.007	3	-.01	1	-8.924e-4	1	7052.175	1	4454.222	1
299		17	max	.001	1	.008	1	0	15	-2.956e-5	15	NC	3	NC	2
300			min	0	10	-.007	3	-.011	1	-9.499e-4	1	6108.055	1	4124.456	1
301		18	max	.001	1	.009	1	0	15	-3.136e-5	15	NC	3	NC	2
302			min	0	10	-.007	3	-.012	1	-1.007e-3	1	5361.354	1	3866.951	1
303		19	max	.001	1	.01	1	0	15	-3.316e-5	15	NC	3	NC	2
304			min	0	10	-.007	3	-.013	1	-1.065e-3	1	4766.589	1	3668.942	1
305	M12	1	max	.003	1	.007	2	.01	1	9.043e-4	1	NC	1	NC	3
306			min	0	3	-.005	3	0	15	2.857e-5	15	NC	1	1857.748	1
307		2	max	.003	1	.007	2	.01	1	9.043e-4	1	NC	1	NC	3
308			min	0	3	-.005	3	0	15	2.857e-5	15	NC	1	2026.001	1
309		3	max	.002	1	.006	2	.009	1	9.043e-4	1	NC	1	NC	3
310			min	0	3	-.005	3	0	15	2.857e-5	15	NC	1	2226.28	1
311		4	max	.002	1	.006	2	.008	1	9.043e-4	1	NC	1	NC	3
312			min	0	3	-.004	3	0	15	2.857e-5	15	NC	1	2467.025	1
313		5	max	.002	1	.006	2	.007	1	9.043e-4	1	NC	1	NC	3
314			min	0	3	-.004	3	0	15	2.857e-5	15	NC	1	2759.736	1
315		6	max	.002	1	.005	2	.006	1	9.043e-4	1	NC	1	NC	3
316			min	0	3	-.004	3	0	15	2.857e-5	15	NC	1	3120.409	1
317		7	max	.002	1	.005	2	.005	1	9.043e-4	1	NC	1	NC	3
318			min	0	3	-.003	3	0	15	2.857e-5	15	NC	1	3571.826	1
319		8	max	.002	1	.004	2	.005	1	9.043e-4	1	NC	1	NC	2
320			min	0	3	-.003	3	0	15	2.857e-5	15	NC	1	4147.351	1
321		9	max	.002	1	.004	2	.004	1	9.043e-4	1	NC	1	NC	2
322			min	0	3	-.003	3	0	15	2.857e-5	15	NC	1	4897.452	1
323		10	max	.001	1	.004	2	.003	1	9.043e-4	1	NC	1	NC	2
324			min	0	3	-.003	3	0	15	2.857e-5	15	NC	1	5901.472	1
325		11	max	.001	1	.003	2	.003	1	9.043e-4	1	NC	1	NC	2
326			min	0	3	-.002	3	0	15	2.857e-5	15	NC	1	7290.106	1
327		12	max	.001	1	.003	2	.002	1	9.043e-4	1	NC	1	NC	2
328			min	0	3	-.002	3	0	15	2.857e-5	15	NC	1	9291.348	1
329		13	max	0	1	.002	2	.002	1	9.043e-4	1	NC	1	NC	1
330			min	0	3	-.002	3	0	15	2.857e-5	15	NC	1	NC	1
331		14	max	0	1	.002	2	.001	1	9.043e-4	1	NC	1	NC	1
332			min	0	3	-.001	3	0	15	2.857e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	9.043e-4	1	NC	1	NC	1
334			min	0	3	-.001	3	0	15	2.857e-5	15	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	9.043e-4	1	NC	1	NC	1
336			min	0	3	0	3	0	15	2.857e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	0	2	0	1	9.043e-4	1	NC	1	NC	1
338			min	0	3	0	3	0	15	2.857e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	9.043e-4	1	NC	1	NC	1
340			min	0	3	0	3	0	15	2.857e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	9.043e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	2.857e-5	15	NC	1	NC	1
343	M1	1	max	.005	3	.022	3	.001	3	1.846e-2	1	NC	1	NC	1
344			min	-.006	2	-.031	1	-.004	1	-1.508e-2	3	NC	1	NC	1
345		2	max	.005	3	.012	3	0	3	8.877e-3	1	NC	4	NC	2
346			min	-.006	2	-.016	1	-.009	1	-7.457e-3	3	3209.582	1	9498.549	1
347		3	max	.005	3	.002	3	0	3	2.15e-5	3	NC	5	NC	2
348			min	-.006	2	-.003	1	-.012	1	-5.273e-4	1	1660.183	1	5758.813	1
349		4	max	.005	3	.009	1	0	3	2.361e-5	3	NC	5	NC	2
350			min	-.006	2	-.005	3	-.014	1	-4.342e-4	1	1174.729	1	4763.709	1
351		5	max	.005	3	.019	1	0	3	2.573e-5	3	NC	5	NC	2
352			min	-.006	2	-.012	3	-.014	1	-3.41e-4	1	941.478	1	4571.914	1
353		6	max	.005	3	.027	1	0	3	2.785e-5	3	NC	5	NC	2
354			min	-.006	2	-.017	3	-.013	1	-2.479e-4	1	809.723	1	4888.103	1
355		7	max	.005	3	.033	1	0	3	2.997e-5	3	NC	5	NC	2
356			min	-.006	2	-.021	3	-.012	1	-1.547e-4	1	730.041	1	5812.401	1
357		8	max	.005	3	.037	1	0	3	3.209e-5	3	NC	5	NC	2
358			min	-.006	2	-.023	3	-.01	1	-6.16e-5	1	681.886	1	7957.696	1
359		9	max	.005	3	.04	1	0	3	3.421e-5	3	NC	5	NC	1
360			min	-.006	2	-.025	3	-.007	1	1.217e-6	15	655.672	1	NC	1
361		10	max	.005	3	.041	1	0	3	1.247e-4	1	NC	5	NC	1
362			min	-.006	2	-.025	3	-.004	1	4.071e-6	15	646.984	1	NC	1
363		11	max	.005	3	.04	1	0	3	2.178e-4	1	NC	5	NC	1
364			min	-.006	2	-.024	3	-.001	1	6.924e-6	15	654.492	1	NC	1
365		12	max	.005	3	.037	1	.002	1	3.11e-4	1	NC	5	NC	2
366			min	-.006	2	-.022	3	0	15	9.778e-6	15	679.4	1	9289.016	1
367		13	max	.005	3	.032	1	.004	1	4.041e-4	1	NC	5	NC	2
368			min	-.006	2	-.019	3	0	15	1.263e-5	15	725.953	1	6440.913	1
369		14	max	.005	3	.026	1	.006	1	4.972e-4	1	NC	5	NC	2
370			min	-.006	2	-.015	3	0	15	1.548e-5	15	803.442	1	5277.025	1
371		15	max	.005	3	.018	1	.006	1	5.904e-4	1	NC	5	NC	2
372			min	-.006	2	-.01	3	0	15	1.834e-5	15	931.777	1	4857.934	1
373		16	max	.005	3	.008	1	.006	1	6.59e-4	1	NC	5	NC	2
374			min	-.006	2	-.005	3	0	15	2.045e-5	15	1158.436	1	5004.42	1
375		17	max	.005	3	.002	3	.005	1	1.45e-4	1	NC	5	NC	2
376			min	-.006	2	-.004	1	0	15	5.032e-6	15	1626.08	1	6001.732	1
377		18	max	.005	3	.009	3	.002	1	1.035e-2	1	NC	4	NC	2
378			min	-.006	2	-.018	1	0	15	-3.564e-3	3	3134.139	1	9845.137	1
379		19	max	.005	3	.017	3	0	3	2.076e-2	1	NC	1	NC	1
380			min	-.006	2	-.033	1	-.003	1	-7.224e-3	3	NC	1	NC	1
381	M5	1	max	.014	3	.065	3	.001	3	4.519e-7	3	NC	1	NC	1
382			min	-.02	2	-.091	1	-.005	1	3.495e-8	15	NC	1	NC	1
383		2	max	.014	3	.036	3	.002	3	3.89e-5	3	NC	5	NC	1
384			min	-.02	2	-.049	1	-.004	1	-9.028e-5	1	1089.425	1	NC	1
385		3	max	.014	3	.008	3	.002	3	7.663e-5	3	NC	5	NC	1
386			min	-.02	2	-.009	1	-.004	1	-1.79e-4	1	560.991	1	NC	1
387		4	max	.014	3	.025	1	.002	3	7.602e-5	3	NC	5	NC	1
388			min	-.02	2	-.015	3	-.003	1	-1.674e-4	1	396.131	1	NC	1
389		5	max	.014	3	.055	1	.003	3	7.541e-5	3	NC	15	NC	1
390			min	-.02	2	-.034	3	-.003	1	-1.558e-4	1	316.908	1	NC	1
391		6	max	.014	3	.078	1	.003	3	7.48e-5	3	NC	15	NC	1
392			min	-.02	2	-.049	3	-.003	1	-1.442e-4	1	272.109	1	NC	1
393		7	max	.014	3	.097	1	.003	3	7.419e-5	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.02	2	-.06	3	-.002	1	-1.327e-4	1	244.952	1	NC	1
395		8	max	.014	3	.11	1	.003	3	7.358e-5	3	NC	15	NC	1
396			min	-.02	2	-.067	3	-.002	1	-1.211e-4	1	228.461	1	NC	1
397		9	max	.014	3	.118	1	.003	3	7.297e-5	3	NC	15	NC	1
398			min	-.02	2	-.071	3	-.002	1	-1.095e-4	1	219.377	1	NC	1
399		10	max	.014	3	.121	1	.003	3	7.236e-5	3	NC	15	NC	1
400			min	-.02	2	-.072	3	-.002	1	-9.786e-5	1	216.193	1	NC	1
401		11	max	.014	3	.118	1	.002	3	7.175e-5	3	NC	15	NC	1
402			min	-.02	2	-.069	3	-.002	1	-8.627e-5	1	218.444	1	NC	1
403		12	max	.014	3	.11	1	.002	3	7.114e-5	3	NC	15	NC	1
404			min	-.02	2	-.063	3	-.002	1	-7.467e-5	1	226.52	1	NC	1
405		13	max	.014	3	.097	1	.002	3	7.053e-5	3	NC	15	NC	1
406			min	-.02	2	-.055	3	-.002	1	-6.308e-5	1	241.83	1	NC	1
407		14	max	.014	3	.078	1	.002	3	6.993e-5	3	NC	15	NC	1
408			min	-.02	2	-.043	3	-.002	1	-5.148e-5	1	267.475	1	NC	1
409		15	max	.014	3	.053	1	.001	3	6.932e-5	3	NC	15	NC	1
410			min	-.02	2	-.03	3	-.002	1	-3.988e-5	1	310.13	1	NC	1
411		16	max	.014	3	.023	1	0	3	6.706e-5	3	NC	5	NC	1
412			min	-.02	2	-.013	3	-.002	1	-3.459e-5	1	385.796	1	NC	1
413		17	max	.014	3	.005	3	0	3	2.566e-5	3	NC	5	NC	1
414			min	-.02	2	-.013	1	-.002	1	-1.792e-4	1	543.265	1	NC	1
415		18	max	.014	3	.026	3	0	3	1.252e-5	3	NC	5	NC	1
416			min	-.02	2	-.055	1	-.002	1	-9.182e-5	1	1052.304	1	NC	1
417		19	max	.014	3	.047	3	0	3	0	5	NC	1	NC	1
418			min	-.02	2	-.1	1	-.002	1	-8.761e-8	3	NC	1	NC	1
419	M9	1	max	.005	3	.022	3	0	3	1.508e-2	3	NC	1	NC	1
420			min	-.006	2	-.031	1	-.006	1	-1.846e-2	1	NC	1	NC	1
421		2	max	.005	3	.012	3	0	3	7.478e-3	3	NC	4	NC	1
422			min	-.006	2	-.016	1	-.001	1	-9.122e-3	1	3210.464	1	NC	1
423		3	max	.005	3	.002	3	.002	1	4.147e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	1.502e-6	15	1660.653	1	6815.474	1
425		4	max	.005	3	.009	1	.003	1	1.091e-5	3	NC	5	NC	2
426			min	-.006	2	-.006	3	0	3	-3.544e-5	1	1175.063	1	5770.757	1
427		5	max	.005	3	.019	1	.003	1	2.334e-6	3	NC	5	NC	2
428			min	-.006	2	-.012	3	0	3	-1.123e-4	1	941.737	1	5712.276	1
429		6	max	.005	3	.026	1	.003	1	-4.287e-6	12	NC	5	NC	2
430			min	-.006	2	-.017	3	-.001	3	-1.893e-4	1	809.935	1	6397.466	1
431		7	max	.005	3	.033	1	.001	1	-8.037e-6	15	NC	5	NC	2
432			min	-.006	2	-.021	3	-.001	3	-2.662e-4	1	730.222	1	8240.264	1
433		8	max	.005	3	.037	1	0	2	-1.042e-5	15	NC	5	NC	1
434			min	-.006	2	-.024	3	-.002	3	-3.431e-4	1	682.044	1	NC	1
435		9	max	.005	3	.04	1	0	10	-1.281e-5	15	NC	5	NC	1
436			min	-.006	2	-.025	3	-.003	1	-4.2e-4	1	655.813	1	NC	1
437		10	max	.005	3	.04	1	0	15	-1.519e-5	15	NC	5	NC	1
438			min	-.006	2	-.025	3	-.005	1	-4.969e-4	1	647.112	1	NC	1
439		11	max	.005	3	.04	1	0	15	-1.758e-5	15	NC	5	NC	1
440			min	-.006	2	-.024	3	-.008	1	-5.738e-4	1	654.611	1	NC	1
441		12	max	.005	3	.037	1	0	15	-1.996e-5	15	NC	5	NC	2
442			min	-.006	2	-.022	3	-.01	1	-6.507e-4	1	679.512	1	6822.421	1
443		13	max	.005	3	.032	1	0	15	-2.234e-5	15	NC	5	NC	2
444			min	-.006	2	-.019	3	-.012	1	-7.276e-4	1	726.061	1	5296.6	1
445		14	max	.005	3	.026	1	0	15	-2.473e-5	15	NC	5	NC	2
446			min	-.006	2	-.015	3	-.013	1	-8.045e-4	1	803.547	1	4603.182	1
447		15	max	.005	3	.018	1	0	15	-2.711e-5	15	NC	5	NC	2
448			min	-.006	2	-.01	3	-.013	1	-8.814e-4	1	931.885	1	4393.418	1
449		16	max	.005	3	.008	1	0	15	-2.89e-5	15	NC	5	NC	2
450			min	-.006	2	-.005	3	-.012	1	-9.394e-4	1	1158.555	1	4636.326	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.005	3	.002	3	0	15	-1.635e-5	15	NC	5	NC	2
452			min	-.006	2	-.004	1	-.01	1	-5.482e-4	1	1626.236	1	5656.228	1
453		18	max	.005	3	.009	3	0	15	3.566e-3	3	NC	4	NC	2
454			min	-.006	2	-.018	1	-.007	1	-1.056e-2	1	3134.426	1	9396.317	1
455		19	max	.005	3	.017	3	0	3	7.224e-3	3	NC	1	NC	1
456			min	-.006	2	-.033	1	-.002	1	-2.077e-2	1	NC	1	NC	1
457	M13	1	max	.006	1	.022	3	.005	3	3.898e-3	3	NC	1	NC	1
458			min	0	3	-.031	1	-.006	2	-5.513e-3	1	NC	1	NC	1
459		2	max	.006	1	.177	3	.036	1	4.712e-3	3	NC	5	NC	2
460			min	0	3	-.221	1	0	10	-6.684e-3	1	1010.115	1	4763.947	1
461		3	max	.005	1	.304	3	.091	1	5.526e-3	3	NC	5	NC	3
462			min	0	3	-.376	1	.003	15	-7.856e-3	1	555.447	1	2000.214	1
463		4	max	.005	1	.384	3	.138	1	6.34e-3	3	NC	5	NC	3
464			min	0	3	-.474	1	.004	15	-9.027e-3	1	432.901	1	1343.47	1
465		5	max	.005	1	.407	3	.161	1	7.153e-3	3	NC	5	NC	3
466			min	0	3	-.503	1	.005	15	-1.02e-2	1	406.229	1	1159.088	1
467		6	max	.005	1	.374	3	.153	1	7.967e-3	3	NC	5	NC	3
468			min	0	3	-.465	1	.005	15	-1.137e-2	1	442.094	1	1219.157	1
469		7	max	.005	1	.298	3	.116	1	8.781e-3	3	NC	5	NC	3
470			min	0	3	-.373	1	.003	10	-1.254e-2	1	561.377	1	1594.106	1
471		8	max	.005	1	.198	3	.061	1	9.595e-3	3	NC	5	NC	2
472			min	0	3	-.252	1	-.003	10	-1.371e-2	1	866.479	1	2942.225	1
473		9	max	.005	1	.107	3	.013	3	1.041e-2	3	NC	5	NC	1
474			min	-.001	3	-.142	1	-.01	2	-1.488e-2	1	1728.906	1	NC	1
475		10	max	.005	1	.065	3	.014	3	1.122e-2	3	NC	4	NC	1
476			min	-.001	3	-.091	1	-.02	2	-1.606e-2	1	3161.948	1	NC	1
477		11	max	.005	1	.107	3	.016	3	1.041e-2	3	NC	5	NC	1
478			min	-.001	3	-.142	1	-.009	2	-1.488e-2	1	1728.906	1	NC	1
479		12	max	.005	1	.198	3	.066	1	9.595e-3	3	NC	5	NC	2
480			min	-.001	3	-.252	1	-.003	10	-1.371e-2	1	866.48	1	2722.441	1
481		13	max	.005	1	.298	3	.122	1	8.782e-3	3	NC	5	NC	3
482			min	-.001	3	-.373	1	.003	10	-1.254e-2	1	561.377	1	1515.32	1
483		14	max	.004	1	.374	3	.159	1	7.968e-3	3	NC	5	NC	3
484			min	-.001	3	-.465	1	.005	15	-1.137e-2	1	442.095	1	1171.618	1
485		15	max	.004	1	.407	3	.167	1	7.155e-3	3	NC	5	NC	3
486			min	-.001	3	-.503	1	.005	15	-1.02e-2	1	406.229	1	1119.733	1
487		16	max	.004	1	.384	3	.143	1	6.341e-3	3	NC	5	NC	3
488			min	-.001	3	-.474	1	.005	15	-9.027e-3	1	432.901	1	1300.442	1
489		17	max	.004	1	.304	3	.095	1	5.528e-3	3	NC	5	NC	3
490			min	-.001	3	-.376	1	.003	15	-7.855e-3	1	555.447	1	1934.122	1
491		18	max	.004	1	.177	3	.037	1	4.714e-3	3	NC	5	NC	2
492			min	-.001	3	-.221	1	0	10	-6.684e-3	1	1010.116	1	4576.891	1
493		19	max	.004	1	.022	3	.005	3	3.901e-3	3	NC	1	NC	1
494			min	-.001	3	-.031	1	-.006	2	-5.512e-3	1	NC	1	NC	1
495	M16	1	max	.002	1	.017	3	.005	3	5.742e-3	1	NC	1	NC	1
496			min	0	3	-.033	1	-.006	2	-2.929e-3	3	NC	1	NC	1
497		2	max	.002	1	.091	3	.038	1	6.99e-3	1	NC	5	NC	2
498			min	0	3	-.247	1	0	10	-3.512e-3	3	897.996	1	4487.668	1
499		3	max	.002	1	.152	3	.095	1	8.238e-3	1	NC	5	NC	3
500			min	0	3	-.422	1	.003	15	-4.095e-3	3	493.842	1	1915.981	1
501		4	max	.002	1	.191	3	.143	1	9.486e-3	1	NC	5	NC	3
502			min	0	3	-.532	1	.005	15	-4.678e-3	3	384.957	1	1295.771	1
503		5	max	.002	1	.203	3	.166	1	1.073e-2	1	NC	5	NC	3
504			min	0	3	-.564	1	.005	15	-5.261e-3	3	361.347	1	1120.87	1
505		6	max	.002	1	.189	3	.158	1	1.198e-2	1	NC	5	NC	3
506			min	0	3	-.521	1	.005	15	-5.844e-3	3	393.456	1	1178.554	1
507		7	max	.002	1	.155	3	.12	1	1.323e-2	1	NC	5	NC	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.417	1	.002	10	-6.427e-3	3	500.114	1	1534.995	1
509		8	max	.002	1	.109	3	.063	1	1.448e-2	1	NC	5	NC	2
510			min	0	3	-.281	1	-.003	10	-7.011e-3	3	773.641	1	2799.378	1
511		9	max	.002	1	.067	3	.016	3	1.573e-2	1	NC	5	NC	1
512			min	0	3	-.157	1	-.01	2	-7.594e-3	3	1553.041	1	NC	1
513		10	max	.002	1	.047	3	.014	3	1.697e-2	1	NC	4	NC	1
514			min	0	3	-.1	1	-.02	2	-8.177e-3	3	2868.949	1	NC	1
515		11	max	.002	1	.067	3	.014	3	1.573e-2	1	NC	5	NC	1
516			min	0	3	-.157	1	-.01	2	-7.593e-3	3	1553.041	1	NC	1
517		12	max	.003	1	.109	3	.062	1	1.448e-2	1	NC	5	NC	2
518			min	0	3	-.281	1	-.003	10	-7.01e-3	3	773.641	1	2875.936	1
519		13	max	.003	1	.155	3	.117	1	1.323e-2	1	NC	5	NC	3
520			min	0	3	-.417	1	.002	10	-6.427e-3	3	500.114	1	1567.379	1
521		14	max	.003	1	.189	3	.155	1	1.198e-2	1	NC	5	NC	3
522			min	0	3	-.521	1	.005	15	-5.843e-3	3	393.456	1	1201.676	1
523		15	max	.003	1	.203	3	.163	1	1.074e-2	1	NC	5	NC	3
524			min	0	3	-.564	1	.005	15	-5.26e-3	3	361.348	1	1143.554	1
525		16	max	.003	1	.191	3	.14	1	9.488e-3	1	NC	5	NC	3
526			min	0	3	-.532	1	.004	15	-4.676e-3	3	384.957	1	1325.24	1
527		17	max	.003	1	.152	3	.092	1	8.24e-3	1	NC	5	NC	3
528			min	0	3	-.422	1	.003	15	-4.093e-3	3	493.843	1	1969.982	1
529		18	max	.003	1	.091	3	.036	1	6.992e-3	1	NC	5	NC	2
530			min	0	3	-.247	1	0	10	-3.51e-3	3	897.997	1	4670.516	1
531		19	max	.003	1	.017	3	.005	3	5.744e-3	1	NC	1	NC	1
532			min	0	3	-.033	1	-.006	2	-2.926e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	2.827e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-8.889e-5	1	NC	1	NC	1
535		2	max	0	3	-.005	15	.001	1	7.77e-4	3	NC	5	NC	1
536			min	0	10	-.023	4	0	3	-8.394e-4	1	4381.654	4	NC	1
537		3	max	0	3	-.011	15	.004	1	1.271e-3	3	9485.355	15	NC	1
538			min	0	10	-.045	4	-.003	3	-1.59e-3	1	2229.674	4	NC	1
539		4	max	0	3	-.015	15	.008	1	1.766e-3	3	6507.507	15	NC	2
540			min	0	10	-.066	4	-.006	3	-2.341e-3	1	1529.687	4	8751.482	1
541		5	max	0	3	-.02	15	.013	1	2.26e-3	3	5077.874	15	NC	4
542			min	0	10	-.085	4	-.009	3	-3.091e-3	1	1193.63	4	5691.161	1
543		6	max	0	3	-.024	15	.019	1	2.754e-3	3	4273.568	15	NC	4
544			min	0	10	-.101	4	-.014	3	-3.842e-3	1	1004.566	4	4117.78	1
545		7	max	0	3	-.027	15	.025	1	3.249e-3	3	3789.884	15	NC	4
546			min	0	10	-.113	4	-.018	3	-4.592e-3	1	890.869	4	3204.2	1
547		8	max	0	3	-.029	15	.03	1	3.743e-3	3	3499.6	15	NC	4
548			min	0	10	-.123	4	-.022	3	-5.343e-3	1	822.633	4	2632.662	1
549		9	max	0	3	-.03	15	.036	1	4.238e-3	3	3343.353	15	NC	4
550			min	0	10	-.129	4	-.026	3	-6.093e-3	1	785.905	4	2259.793	1
551		10	max	0	3	-.031	15	.04	1	4.732e-3	3	3293.923	15	NC	4
552			min	0	10	-.131	4	-.029	3	-6.844e-3	1	774.286	4	2014.002	1
553		11	max	0	3	-.03	15	.043	1	5.226e-3	3	3343.353	15	NC	4
554			min	0	10	-.129	4	-.031	3	-7.594e-3	1	785.905	4	1857.805	1
555		12	max	0	3	-.029	15	.045	1	5.721e-3	3	3499.6	15	NC	5
556			min	0	10	-.123	4	-.033	3	-8.345e-3	1	822.633	4	1772.532	1
557		13	max	0	3	-.027	15	.044	1	6.215e-3	3	3789.884	15	NC	5
558			min	0	10	-.114	4	-.032	3	-9.095e-3	1	890.869	4	1752.484	1
559		14	max	0	3	-.024	15	.041	1	6.709e-3	3	4273.568	15	NC	5
560			min	0	10	-.101	4	-.03	3	-9.846e-3	1	1004.566	4	1804.921	1
561		15	max	0	3	-.02	15	.036	1	7.204e-3	3	5077.874	15	NC	4
562			min	0	10	-.085	4	-.026	3	-1.06e-2	1	1193.63	4	1957.558	1
563		16	max	0	3	-.016	15	.027	1	7.698e-3	3	6507.507	15	NC	4
564			min	0	10	-.067	4	-.02	3	-1.135e-2	1	1529.687	4	2286.097	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	0	3	-.011	15	.015	1	8.192e-3	3	9485.355	15	NC	4
566			min	0	10	-.046	4	-.011	3	-1.21e-2	1	2229.674	4	3028.382	1
567		18	max	0	3	-.006	15	.002	9	8.687e-3	3	NC	5	NC	4
568			min	0	10	-.024	4	-.005	2	-1.285e-2	1	4381.654	4	5388.01	1
569		19	max	0	3	.005	3	.015	3	9.181e-3	3	NC	1	NC	1
570			min	0	10	-.005	1	-.021	2	-1.36e-2	1	NC	1	NC	1
571	M16A	1	max	0	10	0	3	.005	3	3.112e-3	3	NC	1	NC	1
572			min	0	3	-.002	1	-.007	2	-4.314e-3	1	NC	1	NC	1
573		2	max	0	10	-.005	15	.005	1	2.969e-3	3	NC	5	NC	2
574			min	0	3	-.024	4	0	10	-4.102e-3	1	4381.654	4	9679.475	1
575		3	max	0	10	-.011	15	.013	1	2.826e-3	3	9485.355	15	NC	3
576			min	0	3	-.046	4	-.004	3	-3.889e-3	1	2229.674	4	5471.243	1
577		4	max	0	10	-.016	15	.02	1	2.683e-3	3	6507.507	15	NC	4
578			min	0	3	-.066	4	-.008	3	-3.676e-3	1	1529.687	4	4156.62	1
579		5	max	0	10	-.02	15	.024	1	2.54e-3	3	5077.874	15	NC	4
580			min	0	3	-.085	4	-.01	3	-3.463e-3	1	1193.63	4	3585.22	1
581		6	max	0	10	-.024	15	.026	1	2.397e-3	3	4273.568	15	NC	4
582			min	0	3	-.101	4	-.011	3	-3.25e-3	1	1004.566	4	3333.389	1
583		7	max	0	10	-.027	15	.027	1	2.254e-3	3	3789.884	15	NC	4
584			min	0	3	-.113	4	-.012	3	-3.037e-3	1	890.869	4	3268.089	1
585		8	max	0	10	-.029	15	.027	1	2.11e-3	3	3499.6	15	NC	4
586			min	0	3	-.123	4	-.012	3	-2.825e-3	1	822.633	4	3343.384	1
587		9	max	0	10	-.03	15	.025	1	1.967e-3	3	3343.353	15	NC	4
588			min	0	3	-.128	4	-.011	3	-2.612e-3	1	785.905	4	3552.212	1
589		10	max	0	10	-.031	15	.023	1	1.824e-3	3	3293.923	15	NC	4
590			min	0	3	-.13	4	-.01	3	-2.399e-3	1	774.286	4	3914.943	1
591		11	max	0	10	-.03	15	.02	1	1.681e-3	3	3343.353	15	NC	4
592			min	0	3	-.128	4	-.009	3	-2.186e-3	1	785.905	4	4483.472	1
593		12	max	0	10	-.029	15	.017	1	1.538e-3	3	3499.6	15	NC	3
594			min	0	3	-.123	4	-.007	3	-1.973e-3	1	822.633	4	5360.864	1
595		13	max	0	10	-.027	15	.013	1	1.395e-3	3	3789.884	15	NC	2
596			min	0	3	-.113	4	-.006	3	-1.761e-3	1	890.869	4	6751.679	1
597		14	max	0	10	-.024	15	.01	1	1.252e-3	3	4273.568	15	NC	2
598			min	0	3	-.1	4	-.004	3	-1.548e-3	1	1004.566	4	9094.48	1
599		15	max	0	10	-.02	15	.006	1	1.109e-3	3	5077.874	15	NC	1
600			min	0	3	-.084	4	-.003	3	-1.335e-3	1	1193.63	4	NC	1
601		16	max	0	10	-.015	15	.003	1	9.658e-4	3	6507.507	15	NC	1
602			min	0	3	-.066	4	-.001	3	-1.122e-3	1	1529.687	4	NC	1
603		17	max	0	10	-.011	15	.001	1	8.227e-4	3	9485.355	15	NC	1
604			min	0	3	-.045	4	0	3	-9.092e-4	1	2229.674	4	NC	1
605		18	max	0	10	-.005	15	0	4	6.796e-4	3	NC	5	NC	1
606			min	0	3	-.023	4	0	2	-6.964e-4	1	4381.654	4	NC	1
607		19	max	0	1	0	1	0	1	5.365e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.071e-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

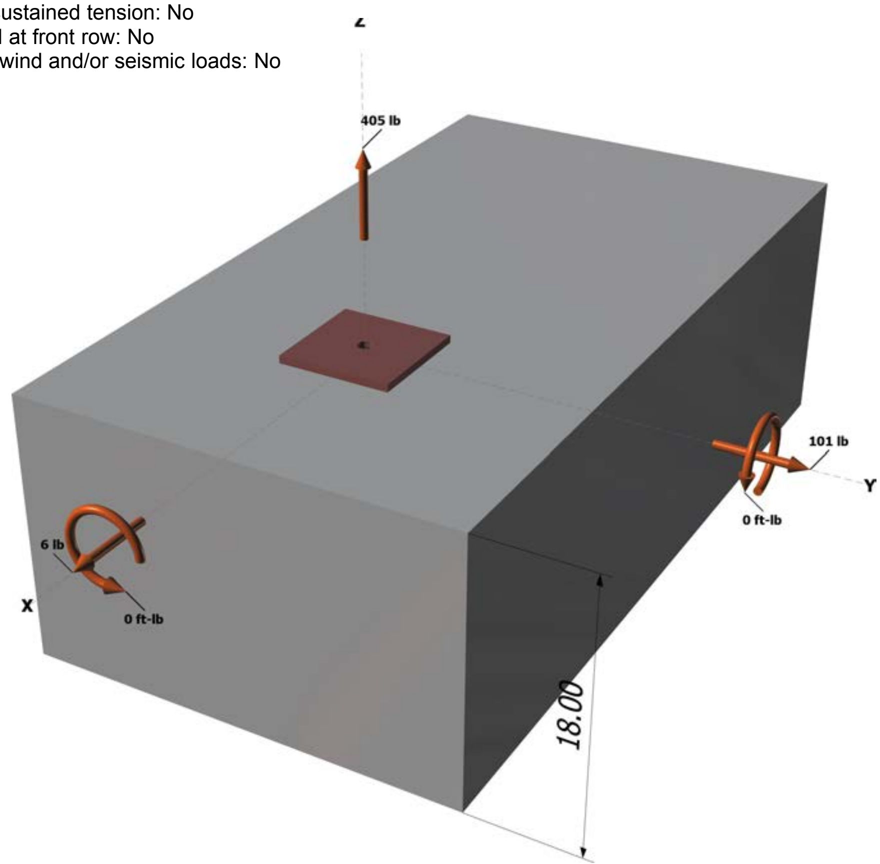
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

<Figure 1>



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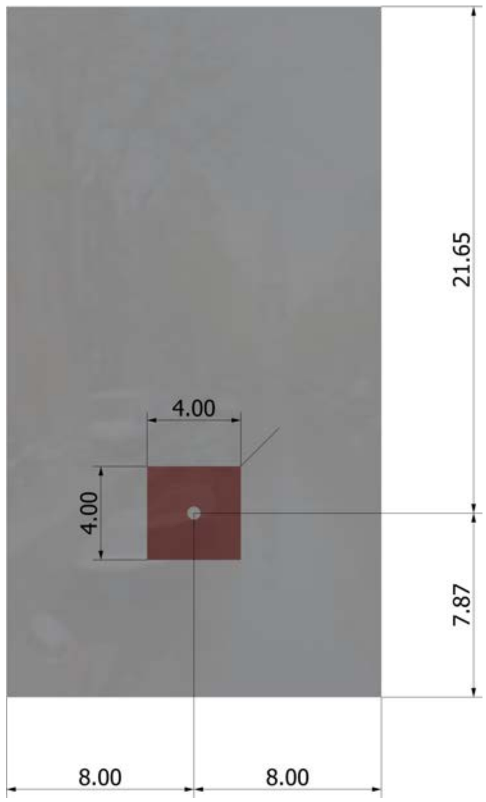


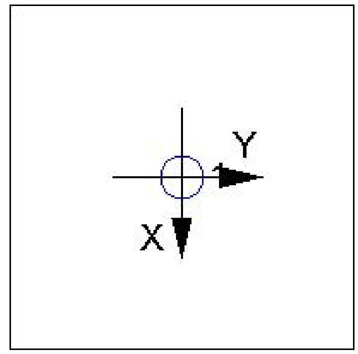
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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

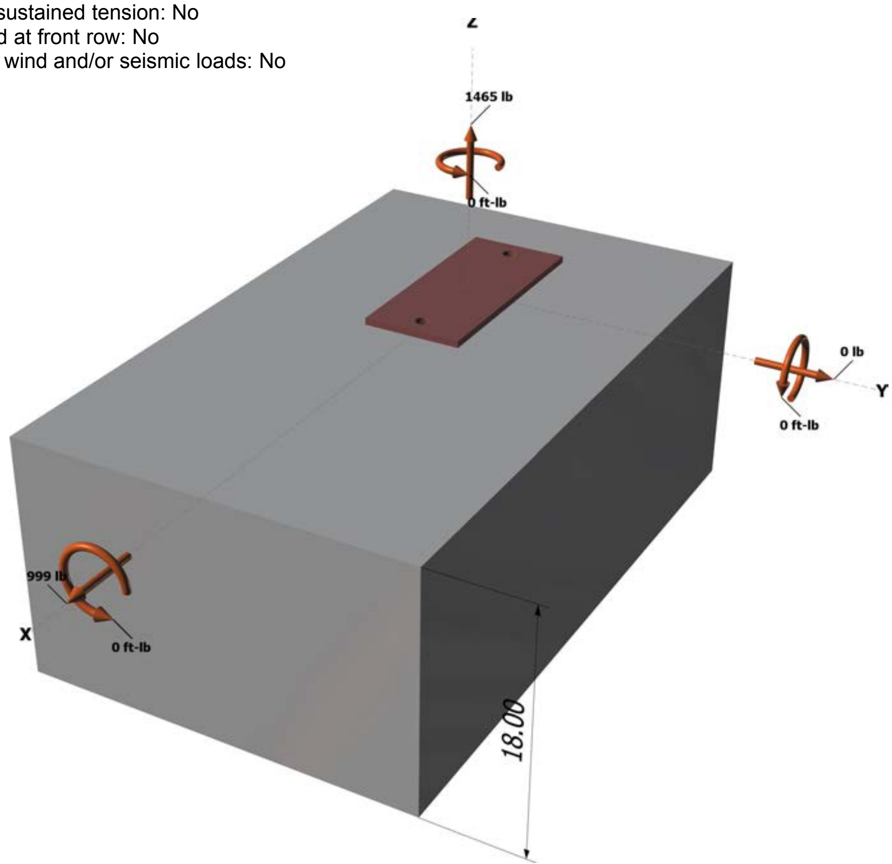
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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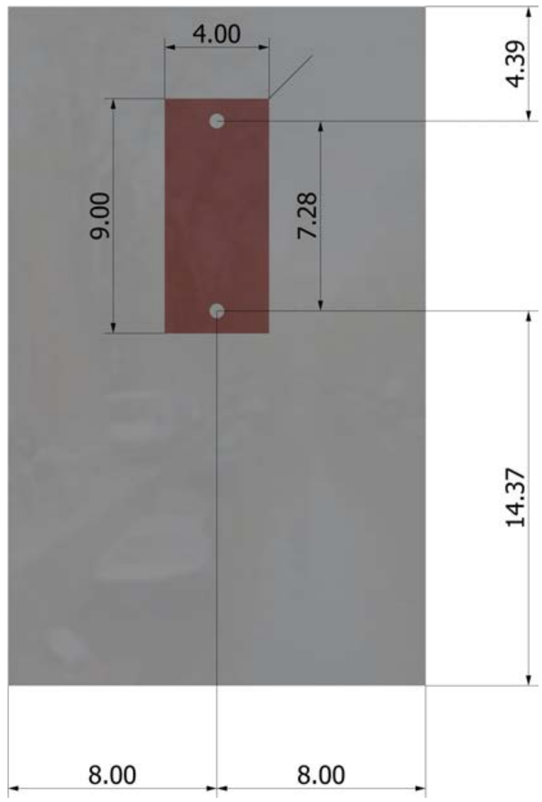


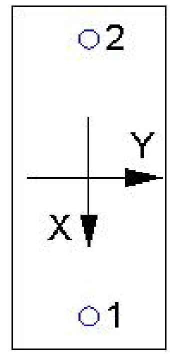
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
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} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
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, ϕN_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, ϕV_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.