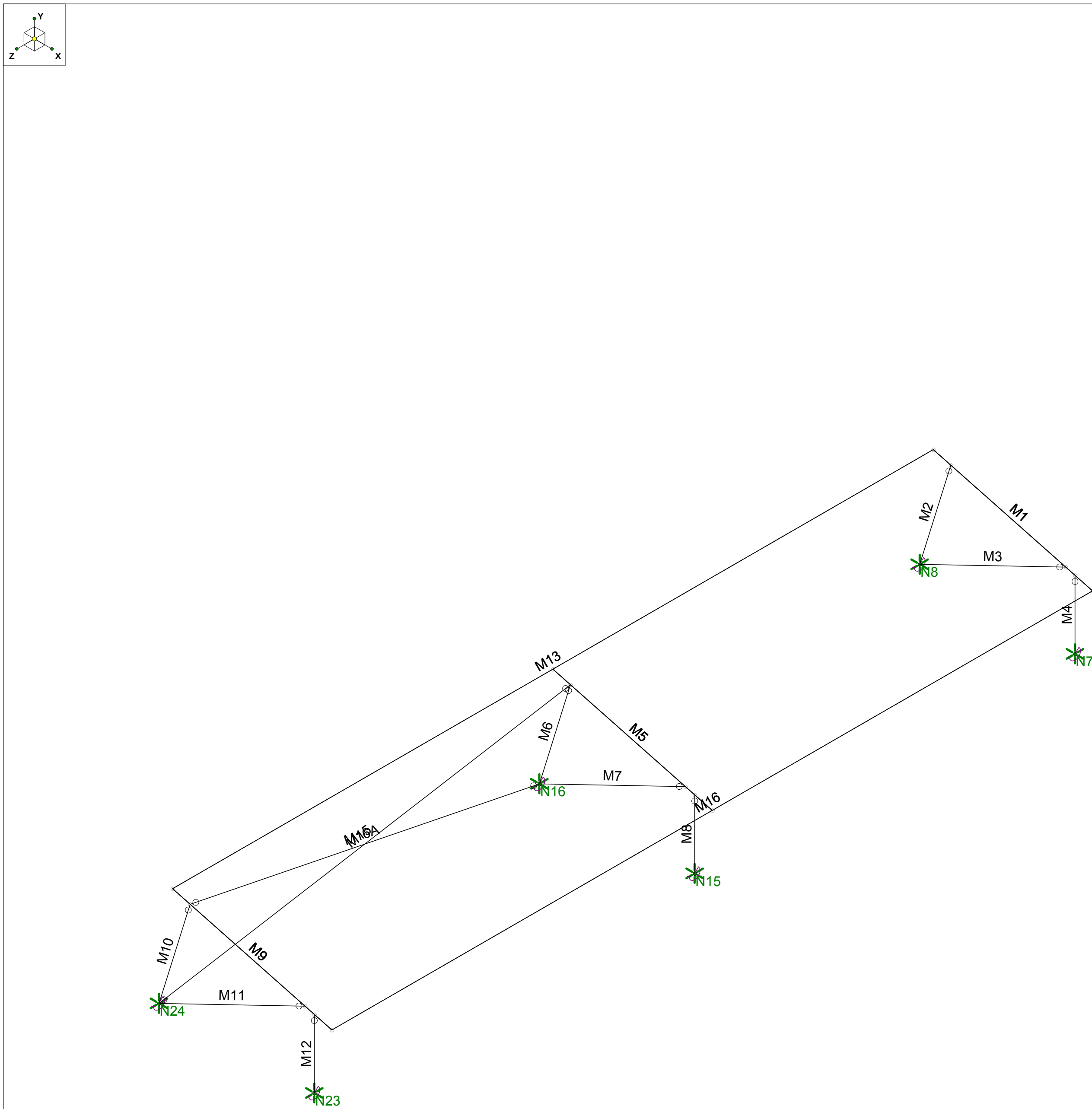


Schletter, Inc.		15° Tilt w/ Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

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.

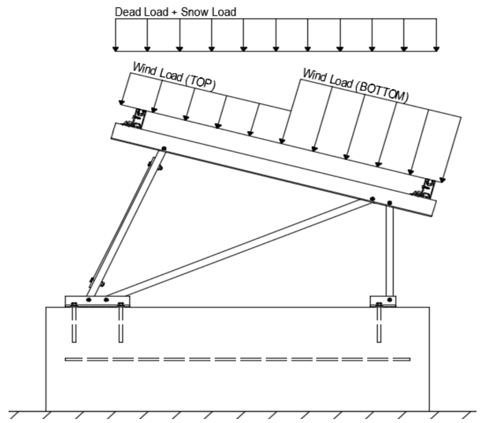
1.2 Construction

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 — Exposure Category = C
Height ≤ 15 ft — Importance Category = II

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

Pressure Coefficients

$Cf+_{TOP}$	=	1	*(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

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
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

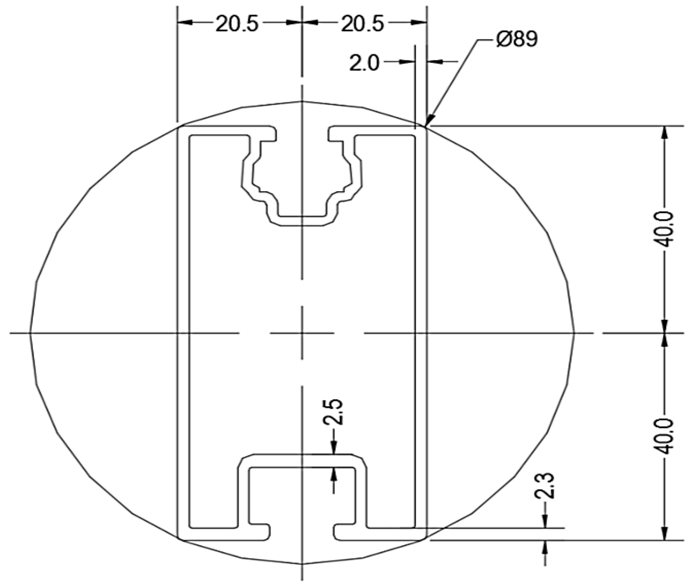
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

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).

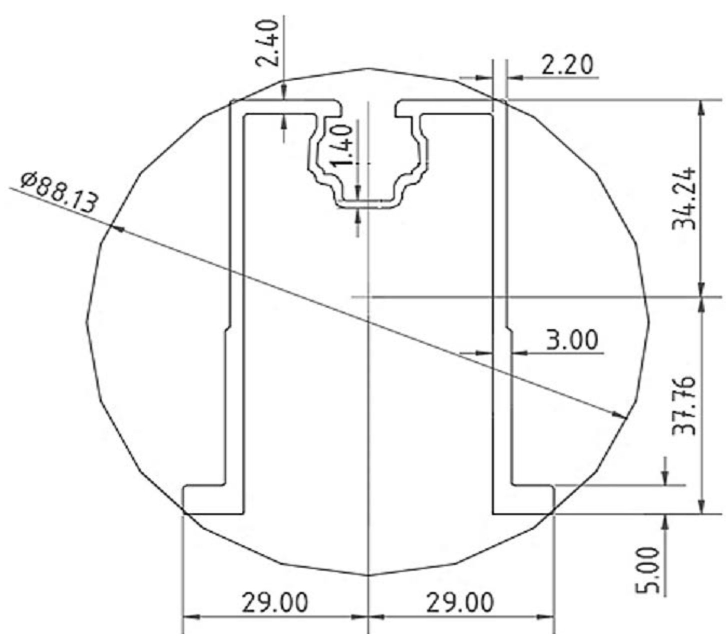
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	96	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.76	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	1.218	k-ft
M_z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

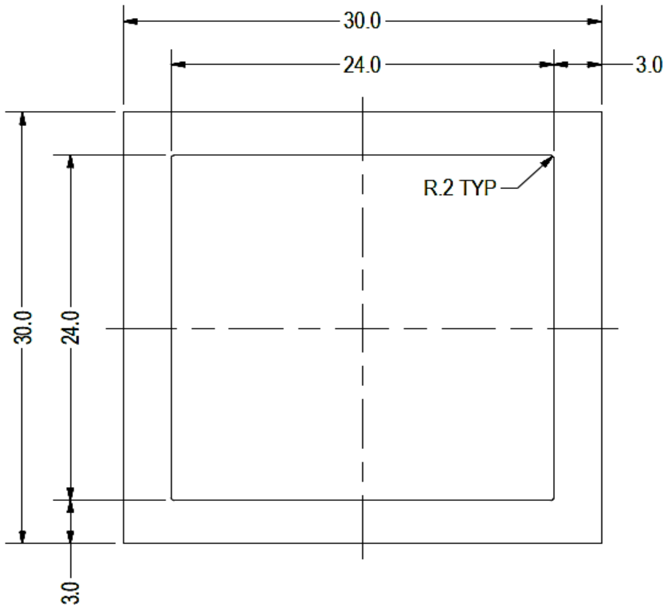
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.66	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2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

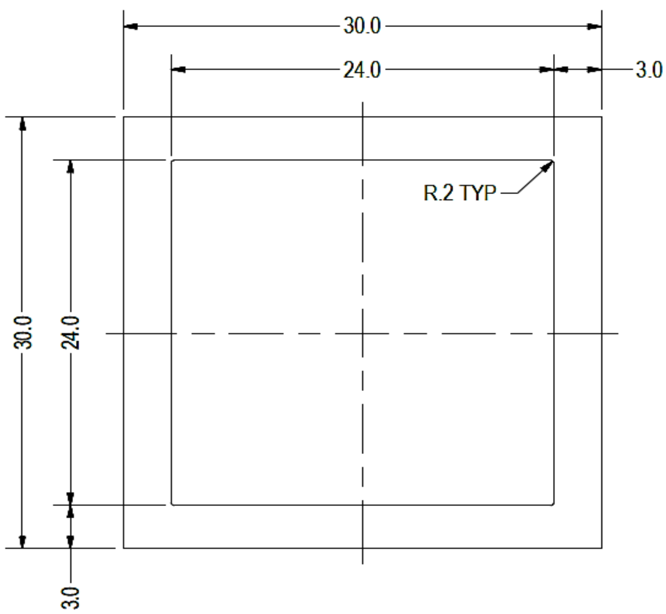
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	-0.055	k-ft
P_n =	0.317	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	16%	



4.4 Diagonal Strut Design

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

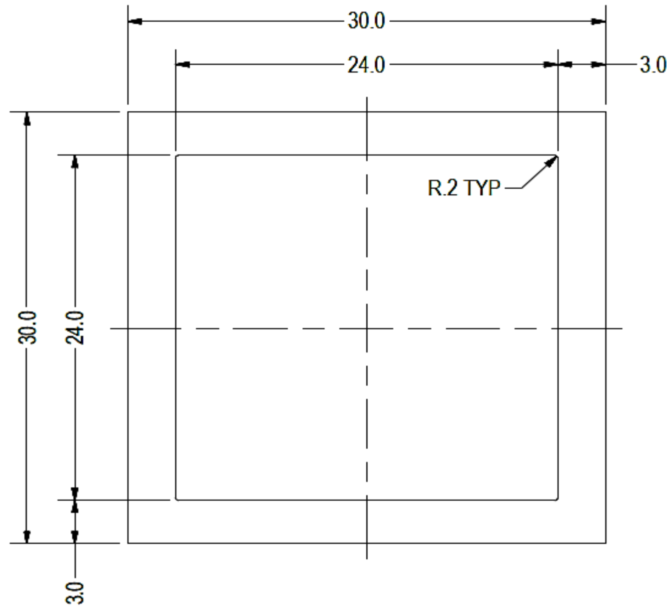
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.164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



4.5 Rear Strut Design

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

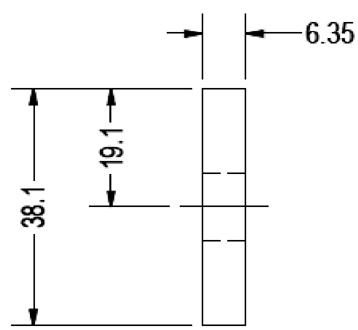
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	29.96	in
$\Phi F_{ty\ AXIAL}$ =	16.11	ksi
$\Phi F_{ty\ BENDING}$ =	30.52	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	1.369	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 =	0.007	k-ft
P_n =	0.258	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	18%	



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

5. FOUNDATION DESIGN CALCULATIONS

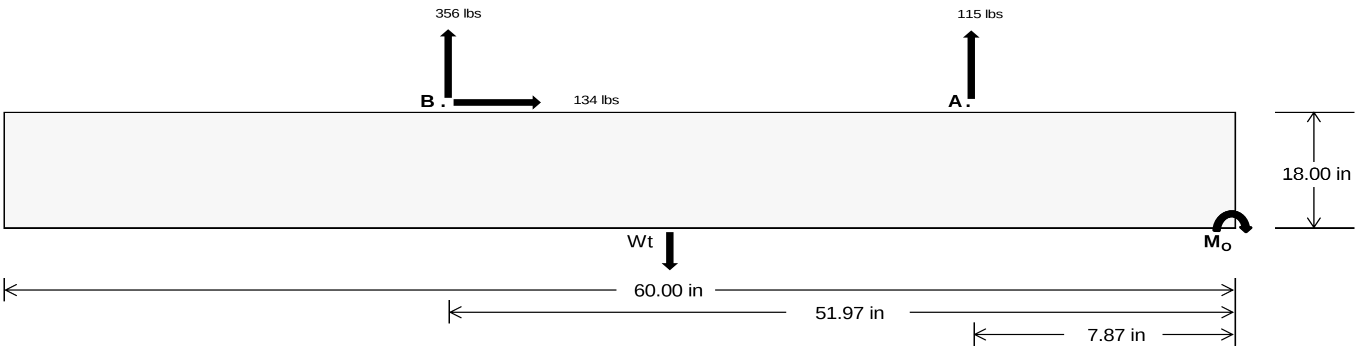
5.1 Helical Pile Foundations

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

Maximum	Front	Rear	
Tensile Load =	507.41	1550.73	k
Compressive Load =	2220.11	1626.70	k
Lateral Load =	44.43	582.19	k
Moment (Weak Axis) =	0.07	0.00	k

5.2 Design of Ballast Foundations

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

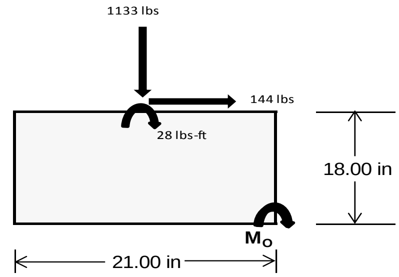
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Seismic Design

Overturning Check

M_O =	748.1 ft-lbs
Resisting Force Required =	854.98 lbs
S.F. =	1.67
Weight Required =	1424.97 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	135 lbs	198 lbs	86 lbs	411 lbs	1133 lbs	373 lbs	73 lbs	23 lbs	27 lbs
F_V	23 lbs	190 lbs	24 lbs	16 lbs	144 lbs	19 lbs	24 lbs	190 lbs	24 lbs
P_{total}	2491 lbs	2555 lbs	2442 lbs	2654 lbs	3376 lbs	2616 lbs	762 lbs	712 lbs	716 lbs
M	68 lbs-ft	322 lbs-ft	72 lbs-ft	46 lbs-ft	244 lbs-ft	57 lbs-ft	70 lbs-ft	322 lbs-ft	72 lbs-ft
e	0.03 ft	0.13 ft	0.03 ft	0.02 ft	0.07 ft	0.02 ft	0.09 ft	0.45 ft	0.10 ft
L/6	0.29 ft	1.50 ft	1.69 ft	1.72 ft	1.61 ft	1.71 ft	1.57 ft	0.85 ft	1.55 ft
f_{min}	258.1 sqft	165.8 sqft	250.8 sqft	285.5 sqft	290.4 sqft	276.7 sqft	59.8 sqft	-44.6 sqft	53.6 sqft
f_{max}	311.4 psf	418.1 psf	307.4 psf	321.2 psf	481.3 psf	321.2 psf	114.3 psf	207.4 psf	110.1 psf

Maximum Bearing Pressure = 481 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

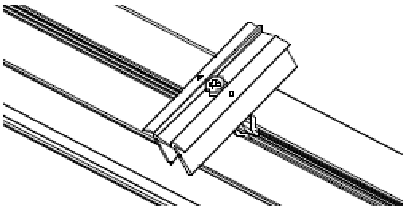
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

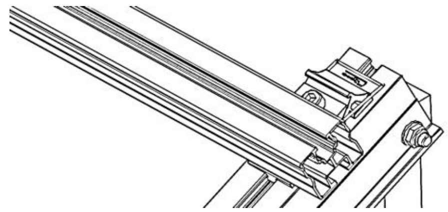
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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

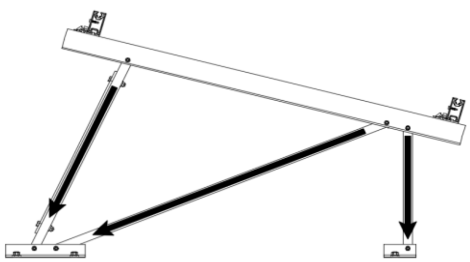
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are 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 =	0.258	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	3%	



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

7. SEISMIC DESIGN

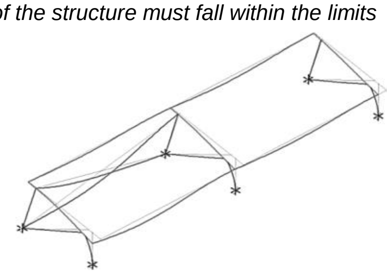
7.1 Seismic Drift

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

Mean Height, h_{sx} =	28.39	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.568	in
Max Drift, Δ_{MAX} =	0.116	in

0.116 ≤ 0.568, OK.

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 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

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

21.9891

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

N/A for Strong Direction

3.4.16

b/t = 4.29

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16

N/A for Strong Direction

Weak Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.25

24.5845

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.7 ksi

3.4.15

b/t = 24.46

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

S1 = 3.8

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

S2 = 14.7

F_{UT}= (φbk2*√(BpE))/(5.1b/t)

F_{UT}= 9.4 ksi

3.4.16

N/A for Weak Direction

3.4.16

b/t = 24.46

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

S1 = 12.2

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

S2 = 46.7

F_{ST}= φb[Bp-1.6Dp*b/t]

F_{ST}= 28.2 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.16.1

N/A for Weak Direction

3.4.16.2

N/A for Strong Direction

3.4.16.2

b/t = 24.46

t = 2.6

ds = 6.05

rs = 3.49

S = 21.70

ρst = 0.22

F_{UT}= 9.37

F_{ST}= 28.24

φF_L= Fut + (Fst - Fut)ρst < Fst

φF_L= 13.5 ksi

3.4.18

h/t = 24.46

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

S1 = 34.4

m = 0.70

C_0 = 34.23

Cc = 37.77

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

S2 = 72.1

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.7 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.455 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

b/t = 24.46
t = 2.6
ds = 6.05
rs = 3.49
S = 21.70
ρst = 0.22
F_{UT}= 10.43
F_{ST}= 28.24
φF_L= Fut + (Fst - Fut)ρst < Fst
φF_L= 14.3 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 14.29 ksi
A = 576.21 mm^2
0.89 in^2
P_{max} = 12.76 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

φcc = 0.83792

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

$\varphi F_L =$ 24.5226 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 24.52 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 12.31 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 29.8 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.404 k-ft

Weak Axis:

3.4.14

L_b = 46.38 in

J = 0.16

121.663

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 29.8

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 33.3 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.450 k-ft

Compression

3.4.7

λ = 1.98863

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.85841

φF_L= (φccFcy)/(λ²)

φF_L= 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

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= 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

φF_L= (φccFcy)/(λ²)

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)

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= 16.11 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 8.09 kips

APPENDIX B

B.1

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

Basic Load Cases

	BLC Description	Category	X Gravity	Y Gravity	Z Gravity	Joint	Point	Distribut...	Area(Me...	Surface(...
1	Dead Load, Max	DL		-1				2		
2	Dead Load, Min	DL		-1				2		
3	Snow Load	SL						2		
4	Wind Load - Pressure	WL						2		
5	Wind Load - Suction	WL						2		
6	Seismic - Lateral	EL			.8			4		

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

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

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

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	y	-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

Member Distributed Loads (BLC 6 : Seismic - Lateral)

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

Load Combinations

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
1	LRFD 1.2D + 1.6S + 0.5W	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																

Load Combinations (Continued)

	Description	S...	P...	S...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...	B...	Fa...
10	ASD 1.0D + 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	-2.154	5	0	5	0	1	0	1
3	N7	max	0	5	572.28	1	-.112	12	0	12	0	1	0	1
4		min	-.184	1	-111.371	3	-33.747	4	-.055	4	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	-34.174	5	-.055	4	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	-249.453	4	0	5	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	-31.755	5	-.05	5	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	-3.416	5	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	-352.723	4						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	416.972	1	.655	6	1.019	4	0	10	0	3	0	1
2			min	-364.692	3	.153	15	-.057	3	0	1	0	2	0	1
3		2	max	417.068	1	.617	6	.932	4	0	10	0	4	0	15
4			min	-364.62	3	.144	15	-.057	3	0	1	0	10	0	6
5		3	max	417.164	1	.579	6	.845	4	0	10	0	4	0	15
6			min	-364.547	3	.135	15	-.057	3	0	1	0	12	0	6
7		4	max	417.261	1	.542	6	.813	1	0	10	0	4	0	15
8			min	-364.475	3	.127	15	-.057	3	0	1	0	12	0	6
9		5	max	417.357	1	.504	6	.813	1	0	10	0	4	0	15
10			min	-364.403	3	.118	15	-.057	3	0	1	0	3	0	6
11		6	max	417.453	1	.466	6	.813	1	0	10	0	4	0	15
12			min	-364.331	3	.109	15	-.057	3	0	1	0	3	0	6
13		7	max	417.55	1	.428	6	.813	1	0	10	0	1	0	15
14			min	-364.258	3	.1	15	-.057	3	0	1	0	3	0	6
15		8	max	417.646	1	.39	6	.813	1	0	10	0	1	0	15
16			min	-364.186	3	.091	15	-.057	3	0	1	0	3	0	6
17		9	max	417.742	1	.352	6	.813	1	0	10	0	1	0	15
18			min	-364.114	3	.082	15	-.057	3	0	1	0	3	0	6
19		10	max	417.839	1	.315	6	.813	1	0	10	.001	1	0	15
20			min	-364.041	3	.073	15	-.057	3	0	1	0	3	0	6
21		11	max	417.935	1	.277	6	.813	1	0	10	.001	1	0	15
22			min	-363.969	3	.064	15	-.057	3	0	1	0	3	0	6
23		12	max	418.032	1	.239	6	.813	1	0	10	.001	1	0	15
24			min	-363.897	3	.055	15	-.14	5	0	1	0	3	0	6
25		13	max	418.128	1	.201	6	.813	1	0	10	.001	1	0	15
26			min	-363.825	3	.047	15	-.228	5	0	1	0	3	0	6
27		14	max	418.224	1	.163	6	.813	1	0	10	.001	1	0	15
28			min	-363.752	3	.038	15	-.315	5	0	1	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
29		15	max	418.321	1	.125	6	.813	1	0	10	.002	1	0	15
30			min	-363.68	3	.029	15	-.402	5	0	1	0	3	0	6
31		16	max	418.417	1	.088	6	.813	1	0	10	.002	1	0	15
32			min	-363.608	3	.02	15	-.49	5	0	1	0	3	0	6
33		17	max	418.513	1	.053	10	.813	1	0	10	.002	1	0	15
34			min	-363.536	3	.002	1	-.577	5	0	1	0	3	0	6
35		18	max	418.61	1	.029	10	.813	1	0	10	.002	1	0	15
36			min	-363.463	3	-.028	1	-.664	5	0	1	0	3	0	6
37		19	max	418.706	1	.004	10	.813	1	0	10	.002	1	0	15
38			min	-363.391	3	-.057	1	-.752	5	0	1	0	3	0	6
39	M3	1	max	34.712	10	1.808	6	-.029	12	0	5	.002	1	0	6
40			min	-118.878	1	.424	15	-1.495	4	0	1	0	12	0	15
41		2	max	34.656	10	1.63	6	-.029	12	0	5	.002	1	0	6
42			min	-118.945	1	.383	15	-1.361	4	0	1	0	12	0	15
43		3	max	34.6	10	1.452	6	-.029	12	0	5	.002	1	0	10
44			min	-119.013	1	.341	15	-1.228	4	0	1	0	12	0	1
45		4	max	34.544	10	1.274	6	-.029	12	0	5	.002	1	0	15
46			min	-119.08	1	.299	15	-1.094	4	0	1	0	15	0	1
47		5	max	34.488	10	1.096	6	-.029	12	0	5	.001	1	0	15
48			min	-119.147	1	.257	15	-.961	4	0	1	0	5	0	4
49		6	max	34.432	10	.918	6	-.029	12	0	5	.001	1	0	15
50			min	-119.214	1	.215	15	-.827	4	0	1	0	5	0	4
51		7	max	34.377	10	.74	6	-.029	12	0	5	.001	1	0	15
52			min	-119.281	1	.173	15	-.694	4	0	1	0	5	0	4
53		8	max	34.321	10	.562	6	-.029	12	0	5	0	1	0	15
54			min	-119.348	1	.132	15	-.688	1	0	1	0	5	0	4
55		9	max	34.265	10	.384	6	-.029	12	0	5	0	1	0	15
56			min	-119.415	1	.09	15	-.688	1	0	1	0	5	-.001	4
57		10	max	34.209	10	.206	6	-.029	12	0	5	0	1	0	15
58			min	-119.482	1	.048	15	-.688	1	0	1	0	5	-.001	4
59		11	max	34.153	10	.032	10	-.017	15	0	5	0	1	0	15
60			min	-119.549	1	-.003	1	-.688	1	0	1	0	5	-.001	4
61		12	max	34.097	10	-.036	15	.107	5	0	5	0	1	0	15
62			min	-119.616	1	-.15	4	-.688	1	0	1	0	5	-.001	4
63		13	max	34.041	10	-.078	15	.241	5	0	5	0	1	0	15
64			min	-119.683	1	-.328	4	-.688	1	0	1	0	5	-.001	4
65		14	max	33.985	10	-.12	15	.375	5	0	5	0	1	0	15
66			min	-119.751	1	-.506	4	-.688	1	0	1	0	5	-.001	4
67		15	max	33.929	10	-.161	15	.508	5	0	5	0	12	0	15
68			min	-119.818	1	-.684	4	-.688	1	0	1	0	4	0	4
69		16	max	33.873	10	-.203	15	.642	5	0	5	0	12	0	15
70			min	-119.885	1	-.862	4	-.688	1	0	1	0	4	0	4
71		17	max	33.817	10	-.245	15	.775	5	0	5	0	12	0	15
72			min	-119.952	1	-1.041	4	-.688	1	0	1	0	1	0	4
73		18	max	33.762	10	-.287	15	.909	5	0	5	0	12	0	15
74			min	-120.019	1	-1.219	4	-.688	1	0	1	0	1	0	4
75		19	max	33.706	10	-.329	15	1.042	5	0	5	0	5	0	1
76			min	-120.086	1	-1.397	4	-.688	1	0	1	0	1	0	1
77	M4	1	max	571.115	1	0	1	-.111	12	0	1	0	5	0	1
78			min	-112.245	3	0	1	-33.418	4	0	1	0	1	0	1
79		2	max	571.18	1	0	1	-.111	12	0	1	0	12	0	1
80			min	-112.196	3	0	1	-33.474	4	0	1	-.003	4	0	1
81		3	max	571.244	1	0	1	-.111	12	0	1	0	12	0	1
82			min	-112.148	3	0	1	-33.53	4	0	1	-.006	4	0	1
83		4	max	571.309	1	0	1	-.111	12	0	1	0	12	0	1
84			min	-112.099	3	0	1	-33.586	4	0	1	-.009	4	0	1
85		5	max	571.374	1	0	1	-.111	12	0	1	0	12	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
86			min	-112.051	3	0	1	-33.642	4	0	1	-.012	4	0	1
87		6	max	571.438	1	0	1	-.111	12	0	1	0	12	0	1
88			min	-112.002	3	0	1	-33.698	4	0	1	-.015	4	0	1
89		7	max	571.503	1	0	1	-.111	12	0	1	0	12	0	1
90			min	-111.954	3	0	1	-33.754	4	0	1	-.018	4	0	1
91		8	max	571.568	1	0	1	-.111	12	0	1	0	12	0	1
92			min	-111.905	3	0	1	-33.81	4	0	1	-.021	4	0	1
93		9	max	571.633	1	0	1	-.111	12	0	1	0	12	0	1
94			min	-111.857	3	0	1	-33.866	4	0	1	-.024	4	0	1
95		10	max	571.697	1	0	1	-.111	12	0	1	0	12	0	1
96			min	-111.808	3	0	1	-33.922	4	0	1	-.027	4	0	1
97		11	max	571.762	1	0	1	-.111	12	0	1	0	12	0	1
98			min	-111.759	3	0	1	-33.978	4	0	1	-.03	4	0	1
99		12	max	571.827	1	0	1	-.111	12	0	1	0	12	0	1
100			min	-111.711	3	0	1	-34.035	4	0	1	-.033	4	0	1
101		13	max	571.891	1	0	1	-.111	12	0	1	0	12	0	1
102			min	-111.662	3	0	1	-34.091	4	0	1	-.036	4	0	1
103		14	max	571.956	1	0	1	-.111	12	0	1	0	12	0	1
104			min	-111.614	3	0	1	-34.147	4	0	1	-.039	4	0	1
105		15	max	572.021	1	0	1	-.111	12	0	1	0	12	0	1
106			min	-111.565	3	0	1	-34.203	4	0	1	-.042	4	0	1
107		16	max	572.086	1	0	1	-.111	12	0	1	0	12	0	1
108			min	-111.517	3	0	1	-34.259	4	0	1	-.045	4	0	1
109		17	max	572.15	1	0	1	-.111	12	0	1	0	12	0	1
110			min	-111.468	3	0	1	-34.315	4	0	1	-.048	4	0	1
111		18	max	572.215	1	0	1	-.111	12	0	1	0	12	0	1
112			min	-111.42	3	0	1	-34.371	4	0	1	-.052	4	0	1
113		19	max	572.28	1	0	1	-.111	12	0	1	0	12	0	1
114			min	-111.371	3	0	1	-34.427	4	0	1	-.055	4	0	1
115	M6	1	max	1367.566	1	.634	6	.979	4	0	1	0	5	0	1
116			min	-1195.381	3	.148	15	-.124	3	0	5	0	1	0	1
117		2	max	1367.662	1	.596	6	.891	4	0	1	0	4	0	15
118			min	-1195.309	3	.139	15	-.124	3	0	5	0	1	0	6
119		3	max	1367.759	1	.558	6	.804	4	0	1	0	4	0	15
120			min	-1195.236	3	.13	15	-.124	3	0	5	0	12	0	6
121		4	max	1367.855	1	.52	6	.717	4	0	1	0	4	0	15
122			min	-1195.164	3	.121	15	-.124	3	0	5	0	3	0	6
123		5	max	1367.951	1	.483	6	.629	4	0	1	0	4	0	15
124			min	-1195.092	3	.112	15	-.124	3	0	5	0	3	0	6
125		6	max	1368.048	1	.445	6	.542	4	0	1	0	4	0	15
126			min	-1195.019	3	.103	15	-.124	3	0	5	0	3	0	6
127		7	max	1368.144	1	.407	6	.455	4	0	1	0	4	0	15
128			min	-1194.947	3	.095	15	-.124	3	0	5	0	3	0	6
129		8	max	1368.24	1	.369	6	.38	14	0	1	0	4	0	15
130			min	-1194.875	3	.086	15	-.124	3	0	5	0	3	0	6
131		9	max	1368.337	1	.331	6	.336	14	0	1	0	4	0	15
132			min	-1194.803	3	.077	15	-.124	3	0	5	0	3	0	6
133		10	max	1368.433	1	.293	6	.326	1	0	1	0	4	0	15
134			min	-1194.73	3	.068	15	-.124	3	0	5	0	3	0	6
135		11	max	1368.53	1	.256	6	.326	1	0	1	0	4	0	15
136			min	-1194.658	3	.059	15	-.124	3	0	5	0	3	0	6
137		12	max	1368.626	1	.218	6	.326	1	0	1	0	4	0	15
138			min	-1194.586	3	.05	15	-.124	3	0	5	0	3	0	6
139		13	max	1368.722	1	.184	2	.326	1	0	1	0	4	0	15
140			min	-1194.514	3	.041	15	-.175	5	0	5	0	3	0	6
141		14	max	1368.819	1	.154	2	.326	1	0	1	0	4	0	15
142			min	-1194.441	3	.032	15	-.262	5	0	5	0	3	0	6

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
143		15	max	1368.915	1	.125	2	.326	1	0	1	0	4	0	15
144			min	-1194.369	3	.01	9	-.349	5	0	5	0	3	0	6
145		16	max	1369.011	1	.095	2	.326	1	0	1	0	14	0	15
146			min	-1194.297	3	-.016	1	-.437	5	0	5	0	3	0	6
147		17	max	1369.108	1	.071	10	.326	1	0	1	0	14	0	15
148			min	-1194.224	3	-.045	1	-.524	5	0	5	0	3	0	6
149		18	max	1369.204	1	.046	10	.326	1	0	1	0	14	0	15
150			min	-1194.152	3	-.074	1	-.611	5	0	5	0	3	0	6
151		19	max	1369.3	1	.022	10	.326	1	0	1	0	14	0	15
152			min	-1194.08	3	-.104	1	-.699	5	0	5	0	3	0	6
153	M7	1	max	163.702	2	1.81	4	.014	1	0	2	0	4	0	4
154			min	-167.322	9	.43	15	-1.499	5	0	5	0	3	0	15
155		2	max	163.635	2	1.632	4	.014	1	0	2	0	4	0	2
156			min	-167.378	9	.388	15	-1.365	5	0	5	0	3	0	15
157		3	max	163.568	2	1.453	4	.014	1	0	2	0	4	0	2
158			min	-167.433	9	.346	15	-1.232	5	0	5	0	3	0	9
159		4	max	163.501	2	1.275	4	.014	1	0	2	0	14	0	10
160			min	-167.489	9	.304	15	-1.098	5	0	5	0	3	0	1
161		5	max	163.434	2	1.097	4	.014	1	0	2	0	2	0	15
162			min	-167.545	9	.262	15	-.965	5	0	5	0	5	0	1
163		6	max	163.367	2	.919	4	.014	1	0	2	0	2	0	15
164			min	-167.601	9	.221	15	-.831	5	0	5	0	5	0	6
165		7	max	163.3	2	.741	4	.014	1	0	2	0	2	0	15
166			min	-167.657	9	.179	15	-.698	5	0	5	0	5	0	6
167		8	max	163.233	2	.563	4	.014	1	0	2	0	2	0	15
168			min	-167.713	9	.137	15	-.564	5	0	5	0	5	0	6
169		9	max	163.166	2	.385	4	.014	1	0	2	0	2	0	15
170			min	-167.769	9	.095	15	-.431	5	0	5	0	5	-.001	6
171		10	max	163.099	2	.207	4	.014	1	0	2	0	2	0	15
172			min	-167.825	9	.053	15	-.297	5	0	5	0	5	-.001	6
173		11	max	163.031	2	.053	2	.014	1	0	2	0	2	0	15
174			min	-167.881	9	-.02	9	-.164	5	0	5	0	5	-.001	6
175		12	max	162.964	2	-.031	15	.014	1	0	2	0	2	0	15
176			min	-167.937	9	-.155	1	-.03	5	0	5	0	5	-.001	6
177		13	max	162.897	2	-.072	15	.106	4	0	2	0	2	0	15
178			min	-167.993	9	-.327	6	-.007	3	0	5	0	5	-.001	6
179		14	max	162.83	2	-.114	15	.239	4	0	2	0	2	0	15
180			min	-168.049	9	-.505	6	-.007	3	0	5	0	5	-.001	6
181		15	max	162.763	2	-.156	15	.373	4	0	2	0	2	0	15
182			min	-168.104	9	-.683	6	-.007	3	0	5	0	5	0	6
183		16	max	162.696	2	-.198	15	.506	4	0	2	0	2	0	15
184			min	-168.16	9	-.861	6	-.007	3	0	5	0	5	0	6
185		17	max	162.629	2	-.24	15	.64	4	0	2	0	2	0	15
186			min	-168.216	9	-1.039	6	-.007	3	0	5	0	5	0	6
187		18	max	162.562	2	-.282	15	.773	4	0	2	0	2	0	15
188			min	-168.272	9	-1.217	6	-.007	3	0	5	0	5	0	6
189		19	max	162.495	2	-.323	15	.907	4	0	2	0	2	0	1
190			min	-168.328	9	-1.395	6	-.007	3	0	5	0	5	0	1
191	M8	1	max	1706.612	1	0	1	.683	1	0	1	0	4	0	1
192			min	-391.186	3	0	1	-33.777	4	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	-33.833	4	0	1	-.003	4	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	-33.889	4	0	1	-.006	4	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	-33.945	4	0	1	-.009	4	0	1
199		5	max	1706.87	1	0	1	.683	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
200			min	-390.992	3	0	1	-34.001	4	0	1	-.012	4	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	-34.057	4	0	1	-.015	4	0	1
203		7	max	1707	1	0	1	.683	1	0	1	0	1	0	1
204			min	-390.895	3	0	1	-34.113	4	0	1	-.018	4	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	-34.169	4	0	1	-.021	4	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	-34.225	4	0	1	-.024	4	0	1
209		10	max	1707.194	1	0	1	.683	1	0	1	0	1	0	1
210			min	-390.749	3	0	1	-34.281	4	0	1	-.027	4	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	-34.337	4	0	1	-.03	4	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	-34.394	4	0	1	-.034	4	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	-34.45	4	0	1	-.037	4	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	-34.506	4	0	1	-.04	4	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	-34.562	4	0	1	-.043	4	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	-34.618	4	0	1	-.046	4	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	-34.674	4	0	1	-.049	4	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	-34.73	4	0	1	-.052	4	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	-34.786	4	0	1	-.055	4	0	1
229	M10	1	max	426.375	1	.681	4	1.221	4	.001	1	0	4	0	1
230			min	-354.828	3	.171	15	-.108	1	-.002	5	0	3	0	1
231		2	max	426.472	1	.643	4	1.134	4	.001	1	0	4	0	15
232			min	-354.755	3	.162	15	-.108	1	-.002	5	0	3	0	4
233		3	max	426.568	1	.605	4	1.047	4	.001	1	0	4	0	15
234			min	-354.683	3	.153	15	-.108	1	-.002	5	0	3	0	4
235		4	max	426.664	1	.568	4	.959	4	.001	1	0	4	0	15
236			min	-354.611	3	.144	15	-.108	1	-.002	5	0	3	0	4
237		5	max	426.761	1	.53	4	.872	4	.001	1	0	4	0	15
238			min	-354.539	3	.135	15	-.108	1	-.002	5	0	3	0	4
239		6	max	426.857	1	.492	4	.784	4	.001	1	0	4	0	15
240			min	-354.466	3	.126	15	-.108	1	-.002	5	0	3	0	4
241		7	max	426.953	1	.454	4	.697	4	.001	1	0	4	0	15
242			min	-354.394	3	.118	15	-.108	1	-.002	5	0	1	0	4
243		8	max	427.05	1	.416	4	.61	4	.001	1	.001	4	0	15
244			min	-354.322	3	.109	15	-.108	1	-.002	5	0	1	0	4
245		9	max	427.146	1	.378	4	.522	4	.001	1	.001	4	0	15
246			min	-354.249	3	.1	15	-.108	1	-.002	5	0	1	0	4
247		10	max	427.242	1	.341	4	.435	4	.001	1	.001	4	0	15
248			min	-354.177	3	.091	15	-.108	1	-.002	5	0	1	0	4
249		11	max	427.339	1	.303	4	.348	4	.001	1	.001	4	0	15
250			min	-354.105	3	.082	15	-.108	1	-.002	5	0	1	0	4
251		12	max	427.435	1	.265	4	.26	4	.001	1	.001	4	0	15
252			min	-354.033	3	.073	15	-.108	1	-.002	5	0	1	0	4
253		13	max	427.532	1	.227	4	.173	4	.001	1	.001	4	0	15
254			min	-353.96	3	.057	1	-.108	1	-.002	5	0	1	0	4
255		14	max	427.628	1	.189	4	.086	4	.001	1	.001	4	0	15
256			min	-353.888	3	.028	1	-.108	1	-.002	5	0	1	0	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
257		15	max	427.724	1	.152	4	0	14	.001	1	.001	4	0	15
258			min	-353.816	3	-.002	1	-.108	1	-.002	5	0	1	0	4
259		16	max	427.821	1	.114	4	-.026	12	.001	1	.001	4	0	15
260			min	-353.744	3	-.031	1	-.108	1	-.002	5	0	1	0	4
261		17	max	427.917	1	.076	4	-.026	12	.001	1	.001	4	0	15
262			min	-353.671	3	-.061	1	-.187	5	-.002	5	0	1	0	4
263		18	max	428.013	1	.053	3	-.026	12	.001	1	.001	4	0	15
264			min	-353.599	3	-.09	1	-.274	5	-.002	5	0	1	0	4
265		19	max	428.11	1	.031	3	-.026	12	.001	1	.001	4	0	15
266			min	-353.527	3	-.12	1	-.361	5	-.002	5	0	1	0	4
267	M11	1	max	34.161	10	1.807	6	.818	1	.002	4	.002	5	0	6
268			min	-118.68	1	.424	15	-1.125	5	0	10	-.002	1	0	15
269		2	max	34.105	10	1.629	6	.818	1	.002	4	.001	5	0	6
270			min	-118.747	1	.382	15	-.992	5	0	10	-.002	1	0	15
271		3	max	34.049	10	1.451	6	.818	1	.002	4	.001	5	0	10
272			min	-118.814	1	.34	15	-.858	5	0	10	-.002	1	0	3
273		4	max	33.994	10	1.272	6	.818	1	.002	4	0	5	0	15
274			min	-118.882	1	.298	15	-.725	5	0	10	-.001	1	0	4
275		5	max	33.938	10	1.094	6	.818	1	.002	4	0	5	0	15
276			min	-118.949	1	.256	15	-.591	5	0	10	-.001	1	0	4
277		6	max	33.882	10	.916	6	.818	1	.002	4	0	5	0	15
278			min	-119.016	1	.214	15	-.458	5	0	10	-.001	1	0	4
279		7	max	33.826	10	.738	6	.818	1	.002	4	0	5	0	15
280			min	-119.083	1	.172	15	-.324	5	0	10	0	1	0	4
281		8	max	33.77	10	.56	6	.818	1	.002	4	0	5	0	15
282			min	-119.15	1	.131	15	-.19	5	0	10	0	1	0	4
283		9	max	33.714	10	.382	6	.818	1	.002	4	0	5	0	15
284			min	-119.217	1	.089	15	-.057	5	0	10	0	1	-.001	4
285		10	max	33.658	10	.204	6	.818	1	.002	4	0	5	0	15
286			min	-119.284	1	.047	15	.018	12	0	10	0	1	-.001	4
287		11	max	33.602	10	.032	10	.818	1	.002	4	0	5	0	15
288			min	-119.351	1	.002	3	.018	12	0	10	0	1	-.001	4
289		12	max	33.546	10	-.037	15	.818	1	.002	4	0	5	0	15
290			min	-119.418	1	-.152	4	.018	12	0	10	0	1	-.001	4
291		13	max	33.49	10	-.079	15	.818	1	.002	4	0	4	0	15
292			min	-119.485	1	-.33	4	.018	12	0	10	0	10	-.001	4
293		14	max	33.434	10	-.12	15	.818	1	.002	4	0	4	0	15
294			min	-119.552	1	-.508	4	.018	12	0	10	0	10	-.001	4
295		15	max	33.379	10	-.162	15	.899	4	.002	4	.001	4	0	15
296			min	-119.62	1	-.686	4	.018	12	0	10	0	10	0	4
297		16	max	33.323	10	-.204	15	1.033	4	.002	4	.001	4	0	15
298			min	-119.687	1	-.864	4	.018	12	0	10	0	10	0	4
299		17	max	33.267	10	-.246	15	1.166	4	.002	4	.002	4	0	15
300			min	-119.754	1	-1.042	4	.018	12	0	10	0	10	0	4
301		18	max	33.211	10	-.288	15	1.3	4	.002	4	.002	4	0	15
302			min	-119.821	1	-1.22	4	.018	12	0	10	0	10	0	4
303		19	max	33.155	10	-.33	15	1.434	4	.002	4	.002	4	0	1
304			min	-119.888	1	-1.398	4	.018	12	0	10	0	10	0	1
305	M12	1	max	571.012	1	0	1	3.264	1	0	1	0	4	0	1
306			min	-111.847	3	0	1	-30.821	5	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	-30.877	5	0	1	-.003	5	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	-30.933	5	0	1	-.005	5	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	-30.989	5	0	1	-.008	5	0	1
313		5	max	571.27	1	0	1	3.264	1	0	1	.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
314			min	-111.653	3	0	1	-31.046	5	0	1	-.011	5	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	-31.102	5	0	1	-.014	5	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	-31.158	5	0	1	-.017	5	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	-31.214	5	0	1	-.019	5	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	-31.27	5	0	1	-.022	5	0	1
323		10	max	571.594	1	0	1	3.264	1	0	1	.003	1	0	1
324			min	-111.411	3	0	1	-31.326	5	0	1	-.025	5	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	-31.382	5	0	1	-.028	5	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	-31.438	5	0	1	-.031	5	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	-31.494	5	0	1	-.033	5	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	-31.55	5	0	1	-.036	5	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	-31.606	5	0	1	-.039	5	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	-31.662	5	0	1	-.042	5	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	-31.718	5	0	1	-.045	5	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	-31.775	5	0	1	-.048	5	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	-31.831	5	0	1	-.05	5	0	1
343	M1	1	max	111.122	1	341.698	3	-2.296	12	0	1	.126	1	.015	1
344			min	3.73	12	-416.413	1	-63.948	1	0	3	.005	12	-.01	3
345		2	max	111.194	1	341.496	3	-2.296	12	0	1	.112	1	.105	1
346			min	3.766	12	-416.683	1	-63.948	1	0	3	.004	12	-.084	3
347		3	max	126.281	1	6.829	9	-2.329	12	0	5	.097	1	.194	1
348			min	-6.675	3	-23.209	3	-63.543	1	0	1	.004	12	-.157	3
349		4	max	126.353	1	6.604	9	-2.329	12	0	5	.083	1	.194	1
350			min	-6.621	3	-23.411	3	-63.543	1	0	1	.003	12	-.152	3
351		5	max	126.425	1	6.379	9	-2.329	12	0	5	.07	1	.194	1
352			min	-6.567	3	-23.614	3	-63.543	1	0	1	.003	12	-.147	3
353		6	max	126.497	1	6.155	9	-2.329	12	0	5	.056	1	.194	1
354			min	-6.512	3	-23.816	3	-63.543	1	0	1	.002	12	-.142	3
355		7	max	126.57	1	5.93	9	-2.329	12	0	5	.042	1	.194	1
356			min	-6.458	3	-24.018	3	-63.543	1	0	1	.002	12	-.136	3
357		8	max	126.642	1	5.705	9	-2.329	12	0	5	.028	1	.194	1
358			min	-6.404	3	-24.22	3	-63.543	1	0	1	.001	12	-.131	3
359		9	max	126.714	1	5.48	9	-2.329	12	0	5	.015	1	.195	1
360			min	-6.35	3	-24.423	3	-63.543	1	0	1	0	12	-.126	3
361		10	max	126.786	1	5.255	9	-2.329	12	0	5	.003	4	.195	1
362			min	-6.296	3	-24.625	3	-63.543	1	0	1	0	10	-.121	3
363		11	max	126.859	1	5.031	9	-2.329	12	0	5	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	-2.329	12	0	5	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	-2.329	12	0	5	-.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	-2.329	12	0	5	-.002	12	.197	1
370			min	-6.079	3	-25.434	3	-63.543	1	0	1	-.054	1	-.099	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
371		15	max	127.148	1	4.132	9	-2.329	12	0	5	-.002	12	.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	-2.359	12	0	1	-.003	12	.199	1
374			min	-34.329	3	-82.339	1	-64.158	1	0	4	-.083	1	-.088	3
375		17	max	68.55	2	8.966	10	-2.359	12	0	1	-.003	12	.217	1
376			min	-34.275	3	-82.609	1	-64.158	1	0	4	-.097	1	-.076	3
377		18	max	-3.454	12	467.941	1	-2.471	12	0	5	-.004	12	.117	1
378			min	-110.772	1	-160.21	3	-65.638	1	0	1	-.111	1	-.042	3
379		19	max	-3.418	12	467.672	1	-2.471	12	0	5	-.004	12	.016	1
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	.048	4	.021	3
382			min	4.468	15	-1376.046	1	-29.407	4	0	5	0	10	-.03	1
383		2	max	244.706	1	1128.672	3	-.06	10	0	1	.042	4	.269	1
384			min	4.49	15	-1376.316	1	-29.165	4	0	5	-.002	3	-.224	3
385		3	max	292.65	1	10.164	9	2.697	3	0	3	.035	4	.562	1
386			min	-32.018	3	-76.233	3	-25.89	4	0	4	-.007	3	-.464	3
387		4	max	292.723	1	9.939	9	2.697	3	0	3	.029	4	.565	1
388			min	-31.964	3	-76.435	3	-25.648	4	0	4	-.007	3	-.447	3
389		5	max	292.795	1	9.715	9	2.697	3	0	3	.024	4	.568	1
390			min	-31.909	3	-76.638	3	-25.406	4	0	4	-.006	3	-.431	3
391		6	max	292.867	1	9.49	9	2.697	3	0	3	.018	4	.572	1
392			min	-31.855	3	-76.84	3	-25.164	4	0	4	-.006	3	-.414	3
393		7	max	292.939	1	9.265	9	2.697	3	0	3	.013	4	.575	1
394			min	-31.801	3	-77.042	3	-24.922	4	0	4	-.005	3	-.398	3
395		8	max	293.012	1	9.04	9	2.697	3	0	3	.007	4	.578	1
396			min	-31.747	3	-77.245	3	-24.68	4	0	4	-.004	3	-.381	3
397		9	max	293.084	1	8.816	9	2.697	3	0	3	.002	5	.582	1
398			min	-31.693	3	-77.447	3	-24.438	4	0	4	-.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	-24.196	4	0	4	-.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	-23.954	4	0	4	-.008	4	-.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	-23.712	4	0	4	-.014	4	-.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	-23.47	4	0	4	-.019	4	-.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	-23.228	4	0	4	-.024	4	-.279	3
409		15	max	293.518	1	7.467	9	2.697	3	0	3	0	10	.604	1
410			min	-31.367	3	-78.661	3	-22.986	4	0	4	-.029	4	-.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	-21.848	4	0	4	-.034	4	-.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	-21.606	4	0	4	-.039	4	-.213	3
415		18	max	-7.016	12	1541.307	1	2.454	3	0	4	.001	3	.303	1
416			min	-245.279	1	-527.4	3	-53.778	5	0	1	-.05	4	-.1	3
417		19	max	-6.98	12	1541.037	1	2.454	3	0	4	.002	3	.015	3
418			min	-245.207	1	-527.602	3	-53.536	5	0	1	-.062	4	-.032	1
419	M9	1	max	110.618	1	341.687	3	218.802	4	0	3	0	15	.015	1
420			min	1.446	15	-416.398	1	4.988	10	0	1	-.126	1	-.01	3
421		2	max	110.69	1	341.485	3	219.044	4	0	3	.044	5	.105	1
422			min	1.468	15	-416.668	1	4.988	10	0	1	-.107	1	-.084	3
423		3	max	126.356	1	6.808	9	60.033	1	0	1	.086	5	.194	1
424			min	-6.276	3	-23.154	3	-34.759	5	0	12	-.088	1	-.157	3
425		4	max	126.428	1	6.583	9	60.033	1	0	1	.079	5	.194	1
426			min	-6.222	3	-23.357	3	-34.517	5	0	12	-.075	1	-.152	3
427		5	max	126.5	1	6.359	9	60.033	1	0	1	.071	5	.194	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
428			min	-6.168	3	-23.559	3	-34.275	5	0	12	-.062	1	-.147	3
429		6	max	126.572	1	6.134	9	60.033	1	0	1	.064	5	.194	1
430			min	-6.114	3	-23.761	3	-34.033	5	0	12	-.049	1	-.142	3
431		7	max	126.645	1	5.909	9	60.033	1	0	1	.056	5	.194	1
432			min	-6.06	3	-23.963	3	-33.791	5	0	12	-.036	1	-.136	3
433		8	max	126.717	1	5.684	9	60.033	1	0	1	.049	5	.194	1
434			min	-6.005	3	-24.166	3	-33.549	5	0	12	-.023	1	-.131	3
435		9	max	126.789	1	5.459	9	60.033	1	0	1	.042	5	.194	1
436			min	-5.951	3	-24.368	3	-33.307	5	0	12	-.01	1	-.126	3
437		10	max	126.861	1	5.235	9	60.033	1	0	1	.035	4	.195	1
438			min	-5.897	3	-24.57	3	-33.065	5	0	12	0	2	-.121	3
439		11	max	126.934	1	5.01	9	60.033	1	0	1	.03	4	.195	1
440			min	-5.843	3	-24.773	3	-32.823	5	0	12	.001	10	-.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	-32.581	5	0	12	.002	10	-.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	-32.339	5	0	12	.003	12	-.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	-32.097	5	0	12	.003	12	-.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	-31.855	5	0	12	0	5	-.093	3
449		16	max	68.69	2	8.845	10	60.802	1	0	10	.082	1	.199	1
450			min	-34.411	3	-82.24	1	-30.341	5	0	4	-.005	5	-.088	3
451		17	max	68.762	2	8.621	10	60.802	1	0	10	.096	1	.217	1
452			min	-34.356	3	-82.51	1	-30.099	5	0	4	-.011	5	-.076	3
453		18	max	4.318	5	467.942	1	63.973	1	0	1	.11	1	.117	1
454			min	-110.538	1	-160.208	3	-60.59	5	0	3	-.024	5	-.042	3
455		19	max	4.352	5	467.672	1	63.973	1	0	1	.123	1	.016	1
456			min	-110.466	1	-160.411	3	-60.348	5	0	3	-.038	5	-.007	3
457	M13	1	max	218.808	4	415.856	1	-1.446	15	.015	1	.126	1	0	1
458			min	4.989	10	-341.678	3	-110.607	1	-.01	3	0	15	0	3
459		2	max	210.006	4	293.423	1	-.653	15	.015	1	.039	1	.259	3
460			min	4.989	10	-241.006	3	-84.697	1	-.01	3	-.001	5	-.315	1
461		3	max	201.205	4	170.991	1	.14	15	.015	1	.001	3	.428	3
462			min	4.989	10	-140.333	3	-58.787	1	-.01	3	-.025	1	-.522	1
463		4	max	192.404	4	48.559	1	1.332	5	.015	1	0	15	.508	3
464			min	4.989	10	-39.66	3	-32.878	1	-.01	3	-.066	1	-.619	1
465		5	max	183.602	4	61.013	3	2.559	5	.015	1	0	5	.499	3
466			min	4.989	10	-73.873	1	-6.968	1	-.01	3	-.084	1	-.608	1
467		6	max	174.801	4	161.685	3	18.942	1	.015	1	.003	5	.4	3
468			min	4.989	10	-196.305	1	.229	12	-.01	3	-.078	1	-.488	1
469		7	max	165.999	4	262.358	3	44.851	1	.015	1	.007	5	.211	3
470			min	4.989	10	-318.737	1	1.003	12	-.01	3	-.05	1	-.259	1
471		8	max	157.198	4	363.031	3	70.761	1	.015	1	.013	4	.079	1
472			min	4.989	10	-441.17	1	1.776	12	-.01	3	0	12	-.066	3
473		9	max	148.396	4	463.703	3	96.671	1	.015	1	.076	1	.525	1
474			min	4.989	10	-563.602	1	2.55	12	-.01	3	.002	12	-.434	3
475		10	max	139.595	4	564.376	3	122.58	1	.011	2	.173	1	1.081	1
476			min	4.989	10	-686.034	1	3.323	12	-.015	1	.005	12	-.891	3
477		11	max	101.487	4	563.602	1	2.824	5	.01	3	.073	1	.525	1
478			min	2.296	12	-463.703	3	-96.164	1	-.015	1	-.019	5	-.434	3
479		12	max	92.686	4	441.169	1	4.05	5	.01	3	0	2	.079	1
480			min	2.296	12	-363.031	3	-70.255	1	-.015	1	-.017	4	-.066	3
481		13	max	83.885	4	318.737	1	5.277	5	.01	3	-.003	12	.211	3
482			min	2.296	12	-262.358	3	-44.345	1	-.015	1	-.052	1	-.259	1
483		14	max	75.083	4	196.305	1	6.503	5	.01	3	-.003	12	.4	3
484			min	2.296	12	-161.685	3	-18.435	1	-.015	1	-.08	1	-.488	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
485		15	max	66.282	4	73.873	1	9.313	4	.01	3	0	15	.499	3
486			min	2.296	12	-61.013	3	.356	10	-.015	1	-.085	1	-.608	1
487		16	max	64.12	1	39.66	3	33.384	1	.01	3	.007	5	.508	3
488			min	2.296	12	-48.559	1	1.409	12	-.015	1	-.067	1	-.619	1
489		17	max	64.12	1	140.333	3	59.294	1	.01	3	.015	5	.428	3
490			min	2.296	12	-170.991	1	2.183	12	-.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	2.296	12	-293.424	1	2.956	12	-.015	1	.002	12	-.315	1
493		19	max	64.12	1	341.678	3	111.113	1	.01	3	.126	1	0	1
494			min	2.296	12	-415.856	1	3.73	12	-.015	1	.005	12	0	3
495	M16	1	max	60.334	5	468.245	1	4.352	5	.007	3	.123	1	0	1
496			min	-63.787	1	-160.426	3	-110.475	1	-.016	1	-.038	5	0	3
497		2	max	51.533	5	330.371	1	5.579	5	.007	3	.037	1	.122	3
498			min	-63.787	1	-113.285	3	-84.565	1	-.016	1	-.033	5	-.355	1
499		3	max	42.731	5	192.498	1	6.805	5	.007	3	0	12	.201	3
500			min	-63.787	1	-66.143	3	-58.656	1	-.016	1	-.033	4	-.587	1
501		4	max	33.93	5	54.624	1	8.032	5	.007	3	-.002	12	.239	3
502			min	-63.787	1	-19.002	3	-32.746	1	-.016	1	-.068	1	-.697	1
503		5	max	25.128	5	28.139	3	9.258	5	.007	3	-.003	12	.235	3
504			min	-63.787	1	-83.25	1	-6.836	1	-.016	1	-.085	1	-.684	1
505		6	max	16.327	5	75.28	3	19.073	1	.007	3	-.003	12	.189	3
506			min	-63.787	1	-221.124	1	.34	12	-.016	1	-.08	1	-.549	1
507		7	max	7.526	5	122.421	3	44.983	1	.007	3	.005	5	.101	3
508			min	-63.787	1	-358.998	1	1.114	12	-.016	1	-.051	1	-.291	1
509		8	max	-.797	15	169.562	3	70.892	1	.007	3	.016	4	.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	34.678	5	-16.578	15	122.712	1	.006	14	.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	25.877	5	634.746	1	2.843	5	.016	1	.075	1	.592	1
516			min	-65.474	1	-216.703	3	-96.568	1	-.007	3	-.017	5	-.2	3
517		12	max	17.075	5	496.872	1	4.07	5	.016	1	0	2	.089	1
518			min	-65.474	1	-169.562	3	-70.658	1	-.007	3	-.015	4	-.028	3
519		13	max	8.274	5	358.998	1	5.296	5	.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	-.268	15	221.124	1	6.523	5	.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	-2.471	12	83.25	1	9.304	4	.016	1	.002	5	.235	3
524			min	-65.474	1	-28.139	3	.323	12	-.007	3	-.084	1	-.684	1
525		16	max	-2.471	12	19.002	3	32.981	1	.016	1	.009	5	.239	3
526			min	-65.474	1	-54.624	1	1.097	12	-.007	3	-.066	1	-.697	1
527		17	max	-2.471	12	66.143	3	58.89	1	.016	1	.017	5	.201	3
528			min	-65.474	1	-192.498	1	1.871	12	-.007	3	-.026	1	-.587	1
529		18	max	-2.471	12	113.285	3	84.8	1	.016	1	.038	1	.122	3
530			min	-65.474	1	-330.372	1	2.644	12	-.007	3	.002	12	-.355	1
531		19	max	-2.471	12	160.426	3	110.71	1	.016	1	.125	1	0	1
532			min	-65.474	1	-468.246	1	3.418	12	-.007	3	.004	12	0	5
533	M15	1	max	0	2	2.169	1	.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	1.928	1	.024	3	0	1	0	1	0	2
536			min	-27.312	3	0	2	-.033	1	0	3	0	3	0	1
537		3	max	0	2	1.687	1	.024	3	0	1	0	1	0	2
538			min	-27.366	3	0	2	-.033	1	0	3	0	3	-.002	1
539		4	max	0	2	1.446	1	.024	3	0	1	0	1	0	2
540			min	-27.42	3	0	2	-.033	1	0	3	0	3	-.003	1
541		5	max	0	2	1.205	1	.024	3	0	1	0	1	0	2

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
542			min	-27.474	3	0	2	-.033	1	0	3	0	3	-.003	1
543		6	max	0	2	.964	1	.024	3	0	1	0	1	0	2
544			min	-27.528	3	0	2	-.033	1	0	3	0	3	-.004	1
545		7	max	0	2	.723	1	.024	3	0	1	0	3	0	2
546			min	-27.582	3	0	2	-.033	1	0	3	0	1	-.004	1
547		8	max	0	2	.482	1	.024	3	0	1	0	3	0	2
548			min	-27.636	3	0	2	-.033	1	0	3	0	1	-.004	1
549		9	max	0	2	.241	1	.024	3	0	1	0	3	0	2
550			min	-27.69	3	0	2	-.033	1	0	3	0	1	-.004	1
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	-.005	1
553		11	max	0	2	0	2	.024	3	0	1	0	3	0	2
554			min	-27.798	3	-.241	1	-.033	1	0	3	0	1	-.004	1
555		12	max	0	2	0	2	.024	3	0	1	0	3	0	2
556			min	-27.852	3	-.482	1	-.033	1	0	3	0	1	-.004	1
557		13	max	0	2	0	2	.024	3	0	1	0	3	0	2
558			min	-27.906	3	-.723	1	-.033	1	0	3	0	1	-.004	1
559		14	max	0	2	0	2	.024	3	0	1	0	3	0	2
560			min	-27.96	3	-.964	1	-.033	1	0	3	0	1	-.004	1
561		15	max	0	2	0	2	.024	3	0	1	0	3	0	2
562			min	-28.014	3	-1.205	1	-.033	1	0	3	0	1	-.003	1
563		16	max	0	2	0	2	.024	3	0	1	0	3	0	2
564			min	-28.068	3	-1.446	1	-.033	1	0	3	0	1	-.003	1
565		17	max	0	2	0	2	.024	3	0	1	0	3	0	2
566			min	-28.122	3	-1.687	1	-.033	1	0	3	0	1	-.002	1
567		18	max	0	2	0	2	.024	3	0	1	0	3	0	2
568			min	-28.176	3	-1.928	1	-.033	1	0	3	0	1	0	1
569		19	max	0	2	0	2	.024	3	0	1	0	3	0	1
570			min	-28.23	3	-2.169	1	-.033	1	0	3	0	1	0	1
571	M16A	1	max	-.722	10	3.343	4	.209	4	0	3	0	3	0	1
572			min	-256.16	4	1.031	15	-.01	3	0	1	0	4	0	1
573		2	max	-.663	10	2.971	4	.189	4	0	3	0	3	0	15
574			min	-256.275	4	.916	15	-.01	3	0	1	0	4	-.001	4
575		3	max	-.603	10	2.6	4	.169	4	0	3	0	3	0	15
576			min	-256.391	4	.802	15	-.01	3	0	1	0	4	-.003	4
577		4	max	-.543	10	2.228	4	.149	4	0	3	0	3	-.001	15
578			min	-256.507	4	.687	15	-.01	3	0	1	0	4	-.004	4
579		5	max	-.483	10	1.857	4	.129	4	0	3	0	3	-.001	15
580			min	-256.622	4	.573	15	-.01	3	0	1	0	1	-.005	4
581		6	max	-.423	10	1.486	4	.109	4	0	3	0	3	-.002	15
582			min	-256.738	4	.458	15	-.01	3	0	1	0	1	-.006	4
583		7	max	-.363	10	1.114	4	.089	4	0	3	0	5	-.002	15
584			min	-256.854	4	.344	15	-.01	3	0	1	0	1	-.006	4
585		8	max	-.303	10	.743	4	.07	4	0	3	0	5	-.002	15
586			min	-256.969	4	.229	15	-.01	3	0	1	0	1	-.007	4
587		9	max	-.243	10	.371	4	.05	4	0	3	0	5	-.002	15
588			min	-257.085	4	.115	15	-.01	3	0	1	0	1	-.007	4
589		10	max	-.183	10	0	1	.03	4	0	3	0	5	-.002	15
590			min	-257.2	4	0	1	-.01	3	0	1	0	1	-.007	4
591		11	max	-.123	10	-.115	15	.02	1	0	3	0	5	-.002	15
592			min	-257.316	4	-.371	4	-.01	3	0	1	0	1	-.007	4
593		12	max	-.063	10	-.229	15	.02	1	0	3	0	5	-.002	15
594			min	-257.432	4	-.743	4	-.014	5	0	1	0	1	-.007	4
595		13	max	-.003	10	-.344	15	.02	1	0	3	0	5	-.002	15
596			min	-257.547	4	-1.114	4	-.034	5	0	1	0	3	-.006	4
597		14	max	.057	10	-.458	15	.02	1	0	3	0	4	-.002	15
598			min	-257.663	4	-1.486	4	-.054	5	0	1	0	3	-.006	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
599		15	max	.117	10	-.573	15	.02	1	0	3	0	4	-.001	15
600			min	-257.779	4	-1.857	4	-.073	5	0	1	0	3	-.005	4
601		16	max	.177	10	-.687	15	.02	1	0	3	0	4	-.001	15
602			min	-257.894	4	-2.228	4	-.093	5	0	1	0	3	-.004	4
603		17	max	.237	10	-.802	15	.02	1	0	3	0	1	0	15
604			min	-258.01	4	-2.6	4	-.113	5	0	1	0	3	-.003	4
605		18	max	.297	10	-.916	15	.02	1	0	3	0	1	0	15
606			min	-258.126	4	-2.971	4	-.133	5	0	1	0	5	-.001	4
607		19	max	.357	10	-1.031	15	.02	1	0	3	0	1	0	1
608			min	-258.241	4	-3.343	4	-.153	5	0	1	0	5	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.006	2	.012	1	1.866e-3	5	NC	3	NC	3
2			min	-.003	3	-.005	3	-.019	5	-9.135e-4	1	4867.067	2	2486.431	1
3		2	max	.003	1	.006	2	.011	1	1.893e-3	5	NC	3	NC	3
4			min	-.003	3	-.005	3	-.018	5	-8.777e-4	1	5268.035	2	2695.562	1
5		3	max	.003	1	.005	2	.01	1	1.92e-3	5	NC	3	NC	3
6			min	-.002	3	-.004	3	-.017	5	-8.419e-4	1	5737.65	2	2941.623	1
7		4	max	.003	1	.005	2	.009	1	1.947e-3	5	NC	3	NC	3
8			min	-.002	3	-.004	3	-.016	5	-8.061e-4	1	6291.34	2	3233.617	1
9		5	max	.002	1	.004	2	.008	1	1.974e-3	5	NC	3	NC	3
10			min	-.002	3	-.004	3	-.015	5	-7.703e-4	1	6949.351	2	3583.563	1
11		6	max	.002	1	.004	2	.008	1	2.001e-3	5	NC	1	NC	2
12			min	-.002	3	-.004	3	-.014	5	-7.345e-4	1	7738.689	2	4007.795	1
13		7	max	.002	1	.003	2	.007	1	2.028e-3	5	NC	1	NC	2
14			min	-.002	3	-.004	3	-.013	5	-6.987e-4	1	8696.047	2	4528.984	1
15		8	max	.002	1	.003	2	.006	1	2.055e-3	5	NC	1	NC	2
16			min	-.002	3	-.003	3	-.012	5	-6.628e-4	1	9872.378	2	5179.356	1
17		9	max	.002	1	.003	2	.005	1	2.082e-3	5	NC	1	NC	2
18			min	-.002	3	-.003	3	-.011	5	-6.27e-4	1	NC	1	6006.024	1
19		10	max	.002	1	.002	2	.004	1	2.108e-3	5	NC	1	NC	2
20			min	-.001	3	-.003	3	-.01	5	-5.912e-4	1	NC	1	7080.181	1
21		11	max	.001	1	.002	2	.004	1	2.135e-3	5	NC	1	NC	2
22			min	-.001	3	-.003	3	-.009	5	-5.554e-4	1	NC	1	8513.757	1
23		12	max	.001	1	.002	2	.003	1	2.162e-3	5	NC	1	NC	1
24			min	-.001	3	-.002	3	-.008	5	-5.196e-4	1	NC	1	NC	1
25		13	max	.001	1	.001	2	.002	1	2.189e-3	5	NC	1	NC	1
26			min	0	3	-.002	3	-.007	5	-4.838e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	2.216e-3	5	NC	1	NC	1
28			min	0	3	-.002	3	-.006	5	-4.48e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.001	1	2.243e-3	5	NC	1	NC	1
30			min	0	3	-.002	3	-.005	5	-4.122e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	2.27e-3	5	NC	1	NC	1
32			min	0	3	-.001	3	-.004	5	-3.764e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	2.297e-3	5	NC	1	NC	1
34			min	0	3	0	3	-.002	5	-3.406e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	2.324e-3	5	NC	1	NC	1
36			min	0	3	0	3	-.001	5	-3.048e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	2.351e-3	5	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	-1.07e-3	5	NC	1	NC	1
41		2	max	0	1	0	2	.006	5	1.554e-4	1	NC	1	NC	1
42			min	0	10	0	3	0	1	-1.076e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
43		3	max	0	1	0	2	.011	5	1.886e-4	1	NC	1	NC	1
44			min	0	10	-.001	3	0	1	-1.081e-3	5	NC	1	8457.238	14
45		4	max	0	1	0	2	.017	5	2.218e-4	1	NC	1	NC	1
46			min	0	10	-.002	3	-.001	1	-1.087e-3	5	NC	1	5532.48	14
47		5	max	0	1	0	2	.023	4	2.55e-4	1	NC	1	NC	1
48			min	0	10	-.003	3	-.001	1	-1.092e-3	5	NC	1	4082.115	14
49		6	max	0	1	0	2	.029	4	2.882e-4	1	NC	1	NC	1
50			min	0	10	-.003	3	-.001	1	-1.097e-3	5	NC	1	3220.281	14
51		7	max	0	1	0	2	.035	4	3.214e-4	1	NC	1	NC	1
52			min	0	10	-.004	3	0	1	-1.103e-3	5	NC	1	2651.858	14
53		8	max	0	1	.001	2	.04	4	3.546e-4	1	NC	1	NC	1
54			min	0	10	-.005	3	0	1	-1.108e-3	5	NC	1	2250.477	14
55		9	max	0	1	.002	2	.046	4	3.878e-4	1	NC	1	NC	1
56			min	0	10	-.005	3	0	1	-1.113e-3	5	NC	1	1953.033	14
57		10	max	0	1	.002	2	.052	4	4.21e-4	1	NC	1	NC	1
58			min	0	10	-.006	3	0	10	-1.119e-3	5	NC	1	1724.519	14
59		11	max	0	1	.003	2	.058	4	4.542e-4	1	NC	1	NC	1
60			min	0	10	-.006	3	0	10	-1.124e-3	5	NC	1	1543.971	14
61		12	max	0	1	.003	2	.063	4	4.874e-4	1	NC	1	NC	1
62			min	0	10	-.006	3	0	12	-1.13e-3	5	NC	1	1398.075	14
63		13	max	0	1	.004	2	.069	4	5.206e-4	1	NC	1	NC	1
64			min	0	10	-.007	3	0	12	-1.135e-3	5	NC	1	1277.974	14
65		14	max	0	1	.005	2	.074	4	5.538e-4	1	NC	1	NC	1
66			min	0	10	-.007	3	0	12	-1.14e-3	5	9790.049	2	1177.55	14
67		15	max	.001	1	.006	2	.08	4	5.87e-4	1	NC	3	NC	1
68			min	0	10	-.007	3	0	12	-1.146e-3	5	8254.389	2	1092.443	14
69		16	max	.001	1	.007	2	.085	4	6.201e-4	1	NC	3	NC	1
70			min	0	10	-.007	3	0	12	-1.151e-3	5	7059.582	2	1019.46	14
71		17	max	.001	1	.008	2	.09	4	6.533e-4	1	NC	3	NC	2
72			min	0	10	-.007	3	0	12	-1.157e-3	5	6120.811	2	956.213	14
73		18	max	.001	1	.009	2	.096	4	6.865e-4	1	NC	3	NC	2
74			min	0	10	-.007	3	0	12	-1.162e-3	5	5376.907	2	900.875	14
75		19	max	.001	1	.01	1	.101	4	7.197e-4	1	NC	3	NC	2
76			min	0	10	-.007	3	0	12	-1.167e-3	5	4763.986	1	852.028	14
77	M4	1	max	.003	1	.007	2	0	12	4.384e-3	5	NC	1	NC	2
78			min	0	3	-.005	3	-.107	4	-8.114e-4	1	NC	1	181.187	4
79		2	max	.003	1	.007	2	0	12	4.384e-3	5	NC	1	NC	2
80			min	0	3	-.005	3	-.098	4	-8.114e-4	1	NC	1	197.522	4
81		3	max	.002	1	.006	2	0	12	4.384e-3	5	NC	1	NC	2
82			min	0	3	-.005	3	-.089	4	-8.114e-4	1	NC	1	216.965	4
83		4	max	.002	1	.006	2	0	12	4.384e-3	5	NC	1	NC	2
84			min	0	3	-.004	3	-.08	4	-8.114e-4	1	NC	1	240.335	4
85		5	max	.002	1	.006	2	0	12	4.384e-3	5	NC	1	NC	2
86			min	0	3	-.004	3	-.072	4	-8.114e-4	1	NC	1	268.747	4
87		6	max	.002	1	.005	2	0	12	4.384e-3	5	NC	1	NC	2
88			min	0	3	-.004	3	-.064	4	-8.114e-4	1	NC	1	303.752	4
89		7	max	.002	1	.005	2	0	12	4.384e-3	5	NC	1	NC	2
90			min	0	3	-.003	3	-.056	4	-8.114e-4	1	NC	1	347.56	4
91		8	max	.002	1	.004	2	0	12	4.384e-3	5	NC	1	NC	2
92			min	0	3	-.003	3	-.048	4	-8.114e-4	1	NC	1	403.404	4
93		9	max	.002	1	.004	2	0	12	4.384e-3	5	NC	1	NC	1
94			min	0	3	-.003	3	-.041	4	-8.114e-4	1	NC	1	476.177	4
95		10	max	.001	1	.004	2	0	12	4.384e-3	5	NC	1	NC	1
96			min	0	3	-.003	3	-.034	4	-8.114e-4	1	NC	1	573.571	4
97		11	max	.001	1	.003	2	0	12	4.384e-3	5	NC	1	NC	1
98			min	0	3	-.002	3	-.027	4	-8.114e-4	1	NC	1	708.253	4
99		12	max	.001	1	.003	2	0	12	4.384e-3	5	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
100			min	0	3	-.002	3	-.021	4	-8.114e-4	1	NC	1	902.318	4
101		13	max	0	1	.002	2	0	12	4.384e-3	5	NC	1	NC	1
102			min	0	3	-.002	3	-.016	4	-8.114e-4	1	NC	1	1197.212	4
103		14	max	0	1	.002	2	0	12	4.384e-3	5	NC	1	NC	1
104			min	0	3	-.001	3	-.012	4	-8.114e-4	1	NC	1	1678.429	4
105		15	max	0	1	.002	2	0	12	4.384e-3	5	NC	1	NC	1
106			min	0	3	-.001	3	-.008	4	-8.114e-4	1	NC	1	2546.823	4
107		16	max	0	1	.001	2	0	12	4.384e-3	5	NC	1	NC	1
108			min	0	3	0	3	-.004	4	-8.114e-4	1	NC	1	4373.389	4
109		17	max	0	1	0	2	0	12	4.384e-3	5	NC	1	NC	1
110			min	0	3	0	3	-.002	4	-8.114e-4	1	NC	1	9375.768	4
111		18	max	0	1	0	2	0	12	4.384e-3	5	NC	1	NC	1
112			min	0	3	0	3	0	4	-8.114e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	4.384e-3	5	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	2.051e-3	4	NC	3	NC	2
116			min	-.009	3	-.013	3	-.019	5	3.139e-6	10	1537.557	2	7981.469	1
117		2	max	.01	1	.018	2	.003	1	2.074e-3	4	NC	3	NC	2
118			min	-.008	3	-.013	3	-.018	5	2.48e-6	10	1639.671	2	8648.546	1
119		3	max	.009	1	.017	2	.003	1	2.097e-3	4	NC	3	NC	2
120			min	-.008	3	-.012	3	-.017	5	1.822e-6	10	1755.99	2	9440.039	1
121		4	max	.008	1	.016	2	.003	1	2.12e-3	4	NC	3	NC	1
122			min	-.007	3	-.011	3	-.016	5	1.163e-6	10	1889.347	2	NC	1
123		5	max	.008	1	.015	2	.003	1	2.143e-3	4	NC	3	NC	1
124			min	-.007	3	-.011	3	-.015	5	5.041e-7	10	2043.384	2	NC	1
125		6	max	.007	1	.014	2	.002	1	2.167e-3	4	NC	3	NC	1
126			min	-.006	3	-.01	3	-.014	5	-1.547e-7	10	2222.869	2	NC	1
127		7	max	.007	1	.012	2	.002	1	2.19e-3	4	NC	3	NC	1
128			min	-.006	3	-.009	3	-.013	5	-8.134e-7	10	2434.164	2	NC	1
129		8	max	.006	1	.011	2	.002	1	2.213e-3	4	NC	3	NC	1
130			min	-.005	3	-.009	3	-.012	5	-2.064e-6	2	2685.941	2	NC	1
131		9	max	.006	1	.01	2	.002	1	2.236e-3	4	NC	3	NC	1
132			min	-.005	3	-.008	3	-.011	5	-5.805e-6	2	2990.35	2	NC	1
133		10	max	.005	1	.009	2	.001	1	2.259e-3	4	NC	3	NC	1
134			min	-.004	3	-.007	3	-.01	5	-9.546e-6	2	3364.935	2	NC	1
135		11	max	.005	1	.008	2	.001	1	2.282e-3	4	NC	3	NC	1
136			min	-.004	3	-.007	3	-.009	5	-1.329e-5	2	3836.016	2	NC	1
137		12	max	.004	1	.007	2	0	1	2.305e-3	4	NC	3	NC	1
138			min	-.003	3	-.006	3	-.008	5	-1.703e-5	2	4444.95	2	NC	1
139		13	max	.003	1	.006	2	0	1	2.328e-3	4	NC	3	NC	1
140			min	-.003	3	-.005	3	-.007	5	-2.077e-5	2	5260.662	2	NC	1
141		14	max	.003	1	.005	2	0	1	2.352e-3	4	NC	3	NC	1
142			min	-.002	3	-.004	3	-.006	5	-2.451e-5	2	6407.207	2	NC	1
143		15	max	.002	1	.004	2	0	1	2.375e-3	4	NC	3	NC	1
144			min	-.002	3	-.003	3	-.005	5	-2.825e-5	2	8132.687	2	NC	1
145		16	max	.002	1	.003	2	0	1	2.398e-3	4	NC	1	NC	1
146			min	-.001	3	-.003	3	-.004	5	-3.199e-5	2	NC	1	NC	1
147		17	max	.001	1	.002	2	0	1	2.421e-3	4	NC	1	NC	1
148			min	0	3	-.002	3	-.002	5	-3.573e-5	2	NC	1	NC	1
149		18	max	0	1	0	2	0	1	2.444e-3	4	NC	1	NC	1
150			min	0	3	0	3	-.001	5	-3.947e-5	2	NC	1	NC	1
151		19	max	0	1	0	1	0	1	2.467e-3	4	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	-1.123e-3	4	NC	1	NC	1
155		2	max	0	9	.001	2	.006	4	1.716e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	2	-1.109e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
157		3	max	0	9	.003	2	.012	4	1.614e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-1.094e-3	4	NC	1	NC	1
159		4	max	0	9	.004	2	.018	4	1.511e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-1.079e-3	4	NC	1	NC	1
161		5	max	0	9	.005	2	.024	4	1.409e-5	1	NC	3	NC	1
162			min	0	2	-.006	3	0	1	-1.064e-3	4	9201.506	2	NC	1
163		6	max	0	9	.006	1	.03	4	1.306e-5	1	NC	3	NC	1
164			min	0	2	-.007	3	0	1	-1.05e-3	4	7350.17	1	NC	1
165		7	max	0	9	.008	1	.036	4	1.601e-5	3	NC	3	NC	1
166			min	0	2	-.008	3	0	1	-1.035e-3	4	6032.798	1	NC	1
167		8	max	0	9	.009	1	.042	4	2.525e-5	3	NC	3	NC	1
168			min	0	2	-.01	3	0	1	-1.02e-3	4	5073.038	1	NC	1
169		9	max	0	9	.011	1	.048	4	3.449e-5	3	NC	3	NC	1
170			min	0	2	-.011	3	0	1	-1.006e-3	4	4341.194	1	NC	1
171		10	max	0	9	.012	1	.054	4	4.372e-5	3	NC	3	NC	1
172			min	0	2	-.012	3	-.001	1	-9.91e-4	4	3764.944	1	NC	1
173		11	max	.001	9	.014	1	.06	4	5.296e-5	3	NC	3	NC	1
174			min	-.001	2	-.013	3	-.001	1	-9.763e-4	4	3300.538	1	NC	1
175		12	max	.001	9	.016	1	.065	4	6.22e-5	3	NC	3	NC	1
176			min	-.001	2	-.014	3	-.001	1	-9.616e-4	4	2919.757	1	NC	1
177		13	max	.001	9	.018	1	.071	4	7.144e-5	3	NC	3	NC	1
178			min	-.001	2	-.015	3	-.001	1	-9.469e-4	4	2603.434	1	NC	1
179		14	max	.001	9	.02	1	.076	4	8.068e-5	3	NC	3	NC	1
180			min	-.001	2	-.016	3	-.001	1	-9.322e-4	4	2337.996	1	NC	1
181		15	max	.001	9	.022	1	.082	4	8.992e-5	3	NC	3	NC	1
182			min	-.001	2	-.017	3	-.002	1	-9.175e-4	4	2113.496	1	NC	1
183		16	max	.002	9	.024	1	.087	4	9.916e-5	3	NC	3	NC	1
184			min	-.002	2	-.017	3	-.002	1	-9.028e-4	4	1922.443	1	NC	1
185		17	max	.002	9	.026	1	.092	4	1.084e-4	3	NC	3	NC	1
186			min	-.002	2	-.018	3	-.002	1	-8.881e-4	4	1759.074	1	NC	1
187		18	max	.002	9	.028	1	.097	4	1.176e-4	3	NC	3	NC	1
188			min	-.002	2	-.019	3	-.002	1	-8.734e-4	4	1618.877	1	NC	1
189		19	max	.002	9	.031	1	.102	4	1.269e-4	3	NC	3	NC	1
190			min	-.002	2	-.02	3	-.002	1	-8.587e-4	4	1498.275	1	NC	1
191	M8	1	max	.008	1	.023	2	.002	1	4.122e-3	4	NC	1	NC	2
192			min	-.002	3	-.015	3	-.108	4	-1.02e-4	3	NC	1	179.306	4
193		2	max	.008	1	.022	2	.002	1	4.122e-3	4	NC	1	NC	2
194			min	-.002	3	-.014	3	-.099	4	-1.02e-4	3	NC	1	195.471	4
195		3	max	.007	1	.02	2	.002	1	4.122e-3	4	NC	1	NC	1
196			min	-.002	3	-.013	3	-.09	4	-1.02e-4	3	NC	1	214.712	4
197		4	max	.007	1	.019	2	.002	1	4.122e-3	4	NC	1	NC	1
198			min	-.002	3	-.012	3	-.081	4	-1.02e-4	3	NC	1	237.839	4
199		5	max	.006	1	.018	2	.001	1	4.122e-3	4	NC	1	NC	1
200			min	-.001	3	-.011	3	-.073	4	-1.02e-4	3	NC	1	265.956	4
201		6	max	.006	1	.016	2	.001	1	4.122e-3	4	NC	1	NC	1
202			min	-.001	3	-.011	3	-.064	4	-1.02e-4	3	NC	1	300.597	4
203		7	max	.005	1	.015	2	.001	1	4.122e-3	4	NC	1	NC	1
204			min	-.001	3	-.01	3	-.056	4	-1.02e-4	3	NC	1	343.949	4
205		8	max	.005	1	.014	2	0	1	4.122e-3	4	NC	1	NC	1
206			min	-.001	3	-.009	3	-.048	4	-1.02e-4	3	NC	1	399.213	4
207		9	max	.005	1	.013	2	0	1	4.122e-3	4	NC	1	NC	1
208			min	-.001	3	-.008	3	-.041	4	-1.02e-4	3	NC	1	471.23	4
209		10	max	.004	1	.011	2	0	1	4.122e-3	4	NC	1	NC	1
210			min	0	3	-.007	3	-.034	4	-1.02e-4	3	NC	1	567.612	4
211		11	max	.004	1	.01	2	0	1	4.122e-3	4	NC	1	NC	1
212			min	0	3	-.007	3	-.028	4	-1.02e-4	3	NC	1	700.895	4
213		12	max	.003	1	.009	2	0	1	4.122e-3	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
214			min	0	3	-.006	3	-.022	4	-1.02e-4	3	NC	1	892.943	4
215		13	max	.003	1	.008	2	0	1	4.122e-3	4	NC	1	NC	1
216			min	0	3	-.005	3	-.016	4	-1.02e-4	3	NC	1	1184.774	4
217		14	max	.002	1	.006	2	0	1	4.122e-3	4	NC	1	NC	1
218			min	0	3	-.004	3	-.012	4	-1.02e-4	3	NC	1	1660.992	4
219		15	max	.002	1	.005	2	0	1	4.122e-3	4	NC	1	NC	1
220			min	0	3	-.003	3	-.008	4	-1.02e-4	3	NC	1	2520.365	4
221		16	max	.001	1	.004	2	0	1	4.122e-3	4	NC	1	NC	1
222			min	0	3	-.002	3	-.004	4	-1.02e-4	3	NC	1	4327.957	4
223		17	max	0	1	.003	2	0	1	4.122e-3	4	NC	1	NC	1
224			min	0	3	-.002	3	-.002	4	-1.02e-4	3	NC	1	9278.368	4
225		18	max	0	1	.001	2	0	1	4.122e-3	4	NC	1	NC	1
226			min	0	3	0	3	0	4	-1.02e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	4.122e-3	4	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	-.008	4	-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	-.007	4	-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	-.007	4	-1.562e-4	3	5749.547	2	NC	1
235		4	max	.003	1	.005	2	0	3	7.46e-4	4	NC	3	NC	1
236			min	-.002	3	-.004	3	-.007	4	-1.519e-4	3	6304.659	2	NC	1
237		5	max	.002	1	.004	2	0	3	8.135e-4	4	NC	3	NC	1
238			min	-.002	3	-.004	3	-.007	4	-1.475e-4	3	6964.406	2	NC	1
239		6	max	.002	1	.004	2	0	3	8.81e-4	4	NC	1	NC	1
240			min	-.002	3	-.004	3	-.007	4	-1.432e-4	3	7755.885	2	NC	1
241		7	max	.002	1	.003	2	0	3	9.486e-4	4	NC	1	NC	1
242			min	-.002	3	-.004	3	-.007	4	-1.389e-4	3	8715.915	2	NC	1
243		8	max	.002	1	.003	2	0	3	1.016e-3	4	NC	1	NC	1
244			min	-.002	3	-.004	3	-.006	4	-1.345e-4	3	9895.631	2	NC	1
245		9	max	.002	1	.003	2	0	3	1.084e-3	4	NC	1	NC	1
246			min	-.001	3	-.003	3	-.006	4	-1.302e-4	3	NC	1	NC	1
247		10	max	.002	1	.002	2	0	3	1.151e-3	4	NC	1	NC	1
248			min	-.001	3	-.003	3	-.006	4	-1.258e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	1.219e-3	4	NC	1	NC	1
250			min	-.001	3	-.003	3	-.005	4	-1.215e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	1.286e-3	4	NC	1	NC	1
252			min	-.001	3	-.003	3	-.005	4	-1.172e-4	3	NC	1	NC	1
253		13	max	.001	1	.001	2	0	3	1.354e-3	4	NC	1	NC	1
254			min	0	3	-.002	3	-.004	4	-1.128e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	1.421e-3	4	NC	1	NC	1
256			min	0	3	-.002	3	-.004	4	-1.085e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	1.489e-3	4	NC	1	NC	1
258			min	0	3	-.002	3	-.003	4	-1.041e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	1.556e-3	4	NC	1	NC	1
260			min	0	3	-.001	3	-.002	4	-9.979e-5	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.624e-3	4	NC	1	NC	1
262			min	0	3	0	3	-.002	4	-9.545e-5	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.691e-3	4	NC	1	NC	1
264			min	0	3	0	3	0	4	-9.11e-5	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	1.759e-3	4	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	-8.02e-4	4	NC	1	NC	1
269		2	max	0	1	0	2	.004	4	2.88e-5	3	NC	1	NC	1
270			min	0	10	0	3	0	3	-9.033e-4	4	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
271		3	max	0	1	0	2	.009	4	1.805e-5	3	NC	1	NC	1
272			min	0	10	-.001	3	0	3	-1.005e-3	4	NC	1	5303.791	4
273		4	max	0	1	0	2	.013	4	7.307e-6	3	NC	1	NC	1
274			min	0	10	-.002	3	0	3	-1.106e-3	4	NC	1	3498.866	4
275		5	max	0	1	0	2	.018	4	-2.855e-6	12	NC	1	NC	1
276			min	0	10	-.003	3	0	1	-1.207e-3	4	NC	1	2599.809	4
277		6	max	0	1	0	2	.022	4	-9.482e-6	12	NC	1	NC	1
278			min	0	10	-.004	3	-.001	1	-1.308e-3	4	NC	1	2062.627	4
279		7	max	0	1	0	2	.027	5	-1.611e-5	12	NC	1	NC	1
280			min	0	10	-.004	3	-.002	1	-1.41e-3	4	NC	1	1705.961	5
281		8	max	0	1	.001	2	.032	5	-2.273e-5	12	NC	1	NC	1
282			min	0	10	-.005	3	-.003	1	-1.511e-3	4	NC	1	1448.56	5
283		9	max	0	1	.002	2	.037	5	-2.936e-5	12	NC	1	NC	1
284			min	0	10	-.005	3	-.004	1	-1.612e-3	4	NC	1	1256.57	5
285		10	max	0	1	.002	2	.042	5	-3.599e-5	12	NC	1	NC	2
286			min	0	10	-.006	3	-.005	1	-1.713e-3	4	NC	1	1107.97	5
287		11	max	0	1	.003	2	.047	5	-4.124e-5	10	NC	1	NC	2
288			min	0	10	-.006	3	-.006	1	-1.815e-3	4	NC	1	989.562	5
289		12	max	0	1	.003	2	.052	5	-4.492e-5	10	NC	1	NC	2
290			min	0	10	-.006	3	-.007	1	-1.916e-3	4	NC	1	892.958	5
291		13	max	0	1	.004	2	.057	5	-4.86e-5	10	NC	1	NC	2
292			min	0	10	-.007	3	-.008	1	-2.017e-3	4	NC	1	812.572	5
293		14	max	0	1	.005	2	.062	5	-5.228e-5	10	NC	3	NC	2
294			min	0	10	-.007	3	-.009	1	-2.119e-3	4	9806.303	2	744.547	5
295		15	max	.001	1	.006	1	.067	5	-5.596e-5	10	NC	3	NC	2
296			min	0	10	-.007	3	-.009	1	-2.22e-3	4	8256.754	1	686.133	5
297		16	max	.001	1	.007	1	.072	5	-5.964e-5	10	NC	3	NC	2
298			min	0	10	-.007	3	-.01	1	-2.321e-3	4	7052.175	1	635.318	5
299		17	max	.001	1	.008	1	.078	5	-6.331e-5	10	NC	3	NC	2
300			min	0	10	-.007	3	-.011	1	-2.422e-3	4	6108.055	1	590.6	5
301		18	max	.001	1	.009	1	.084	5	-6.699e-5	10	NC	3	NC	2
302			min	0	10	-.007	3	-.012	1	-2.524e-3	4	5361.354	1	550.836	5
303		19	max	.001	1	.01	1	.089	5	-7.067e-5	10	NC	3	NC	2
304			min	0	10	-.007	3	-.013	1	-2.625e-3	4	4766.589	1	515.143	5
305	M12	1	max	.003	1	.007	2	.01	1	5.633e-3	4	NC	1	NC	3
306			min	0	3	-.005	3	-.098	5	6.282e-5	10	NC	1	196.323	5
307		2	max	.003	1	.007	2	.01	1	5.633e-3	4	NC	1	NC	3
308			min	0	3	-.005	3	-.09	5	6.282e-5	10	NC	1	214.018	5
309		3	max	.002	1	.006	2	.009	1	5.633e-3	4	NC	1	NC	3
310			min	0	3	-.005	3	-.082	5	6.282e-5	10	NC	1	235.081	5
311		4	max	.002	1	.006	2	.008	1	5.633e-3	4	NC	1	NC	3
312			min	0	3	-.004	3	-.074	5	6.282e-5	10	NC	1	260.397	5
313		5	max	.002	1	.006	2	.007	1	5.633e-3	4	NC	1	NC	3
314			min	0	3	-.004	3	-.066	5	6.282e-5	10	NC	1	291.175	5
315		6	max	.002	1	.005	2	.006	1	5.633e-3	4	NC	1	NC	3
316			min	0	3	-.004	3	-.059	5	6.282e-5	10	NC	1	329.095	5
317		7	max	.002	1	.005	2	.005	1	5.633e-3	4	NC	1	NC	3
318			min	0	3	-.003	3	-.051	5	6.282e-5	10	NC	1	376.55	5
319		8	max	.002	1	.004	2	.005	1	5.633e-3	4	NC	1	NC	2
320			min	0	3	-.003	3	-.044	5	6.282e-5	10	NC	1	437.042	5
321		9	max	.002	1	.004	2	.004	1	5.633e-3	4	NC	1	NC	2
322			min	0	3	-.003	3	-.037	5	6.282e-5	10	NC	1	515.872	5
323		10	max	.001	1	.004	2	.003	1	5.633e-3	4	NC	1	NC	2
324			min	0	3	-.003	3	-.031	5	6.282e-5	10	NC	1	621.371	5
325		11	max	.001	1	.003	2	.003	1	5.633e-3	4	NC	1	NC	2
326			min	0	3	-.002	3	-.025	5	6.282e-5	10	NC	1	767.258	5
327		12	max	.001	1	.003	2	.002	1	5.633e-3	4	NC	1	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
328			min	0	3	-.002	3	-.02	5	6.282e-5	10	NC	1	977.467	5
329		13	max	0	1	.002	2	.002	1	5.633e-3	4	NC	1	NC	1
330			min	0	3	-.002	3	-.015	5	6.282e-5	10	NC	1	1296.89	5
331		14	max	0	1	.002	2	.001	1	5.633e-3	4	NC	1	NC	1
332			min	0	3	-.001	3	-.011	5	6.282e-5	10	NC	1	1818.127	5
333		15	max	0	1	.002	2	0	1	5.633e-3	4	NC	1	NC	1
334			min	0	3	-.001	3	-.007	5	6.282e-5	10	NC	1	2758.727	5
335		16	max	0	1	.001	2	0	1	5.633e-3	4	NC	1	NC	1
336			min	0	3	0	3	-.004	5	6.282e-5	10	NC	1	4737.144	5
337		17	max	0	1	0	2	0	1	5.633e-3	4	NC	1	NC	1
338			min	0	3	0	3	-.002	5	6.282e-5	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	5.633e-3	4	NC	1	NC	1
340			min	0	3	0	3	0	5	6.282e-5	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	5.633e-3	4	NC	1	NC	1
342			min	0	1	0	1	0	1	6.282e-5	10	NC	1	NC	1
343	M1	1	max	.005	3	.022	3	.01	5	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	.014	5	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	.019	5	4.686e-4	5	NC	5	NC	2
348			min	-.006	2	-.003	1	-.012	1	-5.273e-4	1	1660.183	1	5259.955	5
349		4	max	.005	3	.009	1	.024	5	4.645e-4	5	NC	5	NC	2
350			min	-.006	2	-.005	3	-.014	1	-4.342e-4	1	1174.729	1	3339.584	5
351		5	max	.005	3	.019	1	.029	5	4.603e-4	5	NC	5	NC	2
352			min	-.006	2	-.012	3	-.014	1	-3.41e-4	1	941.478	1	2400.811	5
353		6	max	.005	3	.027	1	.035	5	4.562e-4	5	NC	5	NC	2
354			min	-.006	2	-.017	3	-.013	1	-2.479e-4	1	809.723	1	1851.149	5
355		7	max	.005	3	.033	1	.041	5	4.521e-4	5	NC	5	NC	2
356			min	-.006	2	-.021	3	-.012	1	-1.547e-4	1	730.041	1	1494.088	5
357		8	max	.005	3	.037	1	.048	5	4.48e-4	5	NC	5	NC	2
358			min	-.006	2	-.023	3	-.01	1	-6.16e-5	1	681.886	1	1245.828	5
359		9	max	.005	3	.04	1	.054	5	4.439e-4	5	NC	5	NC	1
360			min	-.006	2	-.025	3	-.007	1	4.118e-6	2	655.672	1	1056.832	4
361		10	max	.005	3	.041	1	.06	5	4.582e-4	4	NC	5	NC	1
362			min	-.006	2	-.025	3	-.004	1	1.323e-5	10	646.984	1	909.579	4
363		11	max	.005	3	.04	1	.067	4	4.74e-4	4	NC	5	NC	1
364			min	-.006	2	-.024	3	-.001	1	2.021e-5	10	654.492	1	797.727	4
365		12	max	.005	3	.037	1	.075	4	4.897e-4	4	NC	5	NC	2
366			min	-.006	2	-.022	3	0	10	2.531e-5	12	679.4	1	710.887	4
367		13	max	.005	3	.032	1	.082	4	5.054e-4	4	NC	5	NC	2
368			min	-.006	2	-.019	3	0	12	2.686e-5	12	725.953	1	642.326	4
369		14	max	.005	3	.026	1	.088	4	5.212e-4	4	NC	5	NC	2
370			min	-.006	2	-.015	3	0	12	2.841e-5	12	803.442	1	587.526	4
371		15	max	.005	3	.018	1	.095	4	5.904e-4	1	NC	5	NC	2
372			min	-.006	2	-.01	3	0	12	2.996e-5	12	931.777	1	543.362	4
373		16	max	.005	3	.008	1	.101	4	8.744e-4	4	NC	5	NC	2
374			min	-.006	2	-.005	3	0	12	3.09e-5	12	1158.436	1	507.622	4
375		17	max	.005	3	.002	3	.107	4	8.871e-3	4	NC	4	NC	2
376			min	-.006	2	-.004	1	0	12	1.647e-5	10	1626.08	1	478.74	4
377		18	max	.005	3	.009	3	.112	4	1.035e-2	1	NC	4	NC	2
378			min	-.006	2	-.018	1	0	10	-3.564e-3	3	3134.139	1	455.515	4
379		19	max	.005	3	.017	3	.116	4	2.076e-2	1	NC	1	NC	1
380			min	-.006	2	-.033	1	-.003	1	-7.224e-3	3	NC	1	437.59	4
381	M5	1	max	.014	3	.065	3	.009	5	4.168e-6	4	NC	1	NC	1
382			min	-.02	2	-.091	1	-.005	1	5.323e-8	10	NC	1	NC	1
383		2	max	.014	3	.036	3	.014	5	2.212e-4	5	NC	5	NC	1
384			min	-.02	2	-.049	1	-.004	1	-9.028e-5	1	1089.425	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
385		3	max	.014	3	.008	3	.019	5	4.347e-4	5	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	.024	5	4.519e-4	5	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	.03	5	4.69e-4	5	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	.037	5	4.862e-4	5	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	.043	5	5.034e-4	5	NC	15	NC	1
394			min	-.02	2	-.06	3	-.002	1	-1.327e-4	1	244.952	1	NC	1
395		8	max	.014	3	.11	1	.05	5	5.205e-4	5	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	.057	5	5.377e-4	5	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	.064	5	5.549e-4	5	9924.339	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	.071	4	5.72e-4	5	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	.078	4	5.892e-4	5	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	.084	4	6.063e-4	5	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	.091	4	6.235e-4	5	NC	15	NC	1
408			min	-.02	2	-.043	3	-.002	1	-5.148e-5	1	267.475	1	9503.839	4
409		15	max	.014	3	.053	1	.097	4	6.407e-4	5	NC	15	NC	1
410			min	-.02	2	-.03	3	-.002	1	-3.988e-5	1	310.13	1	9365.95	4
411		16	max	.014	3	.023	1	.103	4	9.742e-4	5	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	.108	4	8.912e-3	4	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	.112	4	4.572e-3	4	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	.116	4	1.573e-6	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	.008	5	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	.007	5	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	.008	4	4.147e-5	1	NC	5	NC	2
424			min	-.006	2	-.003	1	0	3	9.131e-6	10	1660.653	1	6815.474	1
425		4	max	.005	3	.009	1	.01	4	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	.012	4	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	.016	4	-4.287e-6	12	NC	5	NC	2
430			min	-.006	2	-.017	3	-.001	3	-1.893e-4	1	809.935	1	4636.414	4
431		7	max	.005	3	.033	1	.021	4	-9.664e-6	12	NC	5	NC	2
432			min	-.006	2	-.021	3	-.001	3	-2.662e-4	1	730.222	1	3168.316	4
433		8	max	.005	3	.037	1	.026	4	-1.504e-5	12	NC	5	NC	1
434			min	-.006	2	-.024	3	-.002	3	-3.431e-4	1	682.044	1	2316.535	4
435		9	max	.005	3	.04	1	.033	4	-2.042e-5	12	NC	5	NC	1
436			min	-.006	2	-.025	3	-.003	1	-4.2e-4	1	655.813	1	1778.46	4
437		10	max	.005	3	.04	1	.04	5	-2.579e-5	12	NC	5	NC	1
438			min	-.006	2	-.025	3	-.005	1	-4.969e-4	1	647.112	1	1416.639	4
439		11	max	.005	3	.04	1	.047	5	-3.117e-5	12	NC	5	NC	1
440			min	-.006	2	-.024	3	-.008	1	-5.738e-4	1	654.611	1	1161.458	4
441		12	max	.005	3	.037	1	.055	5	-3.655e-5	12	NC	5	NC	2

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
442			min	-.006	2	-.022	3	-.01	1	-6.507e-4	1	679.512	1	974.614	4
443		13	max	.005	3	.032	1	.064	5	-4.193e-5	12	NC	5	NC	2
444			min	-.006	2	-.019	3	-.012	1	-7.276e-4	1	726.061	1	833.622	4
445		14	max	.005	3	.026	1	.072	5	-4.73e-5	12	NC	5	NC	2
446			min	-.006	2	-.015	3	-.013	1	-8.045e-4	1	803.547	1	724.573	4
447		15	max	.005	3	.018	1	.081	5	-5.268e-5	12	NC	5	NC	2
448			min	-.006	2	-.01	3	-.013	1	-8.814e-4	1	931.885	1	638.487	4
449		16	max	.005	3	.008	1	.09	5	2.246e-5	5	NC	5	NC	2
450			min	-.006	2	-.005	3	-.012	1	-9.394e-4	1	1158.555	1	569.353	4
451		17	max	.005	3	.002	3	.098	5	8.543e-3	4	NC	5	NC	2
452			min	-.006	2	-.004	1	-.01	1	-5.482e-4	1	1626.236	1	512.9	4
453		18	max	.005	3	.009	3	.107	4	4.048e-3	5	NC	4	NC	2
454			min	-.006	2	-.018	1	-.007	1	-1.056e-2	1	3134.426	1	466.105	4
455		19	max	.005	3	.017	3	.116	4	7.224e-3	3	NC	1	NC	1
456			min	-.006	2	-.033	1	-.002	1	-2.077e-2	1	NC	1	427.335	4
457	M13	1	max	.006	1	.022	3	.005	3	3.898e-3	3	NC	1	NC	1
458			min	-.008	5	-.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	-.008	5	-.221	1	-.002	5	-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	-.008	5	-.376	1	-.005	5	-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	-.008	5	-.474	1	-.008	5	-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	-.008	5	-.503	1	-.012	5	-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	-.009	5	-.465	1	-.016	5	-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	-.009	5	-.373	1	-.018	5	-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	-.009	5	-.252	1	-.018	5	-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	-.009	5	-.142	1	-.013	5	-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	-.009	5	-.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	-.009	5	-.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	-.01	5	-.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	-.01	5	-.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	-.01	5	-.465	1	.007	10	-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	-.01	5	-.503	1	.002	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	-.01	5	-.474	1	-.005	5	-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	-.01	5	-.376	1	-.01	5	-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	-.01	5	-.221	1	-.01	5	-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	-.01	5	-.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	-.116	4	-.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	-.116	4	-.247	1	0	10	-3.512e-3	3	897.996	1	4487.668	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
499		3	max	.002	1	.152	3	.095	1	8.238e-3	1	NC	5	NC	3
500			min	-.116	4	-.422	1	.004	10	-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	-.116	4	-.532	1	.007	10	-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	-.116	4	-.564	1	.008	10	-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	-.116	4	-.521	1	.006	10	-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
508			min	-.116	4	-.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	-.116	4	-.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	-.116	4	-.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	-.116	4	-.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	-.116	4	-.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	-.116	4	-.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	-.116	4	-.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	-.116	4	-.521	1	.002	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	-.116	4	-.564	1	-.004	5	-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	-.116	4	-.532	1	-.012	5	-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	-.116	4	-.422	1	-.016	5	-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	-.116	4	-.247	1	-.013	5	-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	-.116	4	-.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	-4.59e-4	5	NC	1	NC	1
535		2	max	0	3	-.002	15	.011	4	7.77e-4	3	NC	5	NC	1
536			min	0	5	-.018	6	0	3	-8.394e-4	1	5430.005	6	8883.798	4
537		3	max	0	3	-.004	15	.024	4	1.271e-3	3	NC	5	NC	1
538			min	-.002	5	-.036	6	-.003	3	-1.59e-3	1	2763.144	6	4189.89	4
539		4	max	0	3	-.006	15	.037	4	1.766e-3	3	NC	15	NC	2
540			min	-.003	5	-.052	6	-.006	3	-2.341e-3	1	1895.678	6	2739.101	4
541		5	max	0	3	-.008	15	.048	4	2.26e-3	3	NC	15	NC	9
542			min	-.004	5	-.067	6	-.009	3	-3.091e-3	1	1479.217	6	2080.031	4
543		6	max	0	3	-.009	15	.058	4	2.754e-3	3	NC	15	NC	10
544			min	-.005	5	-.08	6	-.014	3	-3.842e-3	1	1244.917	6	1733.546	4
545		7	max	0	3	-.01	15	.065	4	3.249e-3	3	8915.947	15	8452.53	10
546			min	-.006	5	-.09	6	-.018	3	-4.592e-3	1	1104.017	6	1546.336	4
547		8	max	0	3	-.011	15	.069	4	3.743e-3	3	8233.037	15	6991.16	10
548			min	-.007	5	-.097	6	-.022	3	-5.343e-3	1	1019.456	6	1458.15	4
549		9	max	0	3	-.011	15	.069	4	4.238e-3	3	7865.454	15	6032.517	10
550			min	-.008	5	-.102	1	-.026	3	-6.093e-3	1	973.94	6	1445.297	4
551		10	max	0	3	-.011	15	.066	4	4.732e-3	3	7749.169	15	5399.205	10
552			min	-.009	5	-.104	1	-.029	3	-6.844e-3	1	959.541	6	1504.008	4
553		11	max	0	3	-.011	15	.06	4	5.226e-3	3	7865.454	15	4997.914	10
554			min	-.01	5	-.102	1	-.031	3	-7.594e-3	1	973.94	6	1647.807	4
555		12	max	0	3	-.01	15	.052	4	5.721e-3	3	8233.037	15	4782.526	10

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
556			min	-.011	5	-.098	1	-.033	3	-8.345e-3	1	1019.456	6	1772.532	1
557		13	max	0	3	-.009	15	.044	1	6.215e-3	3	8915.947	15	4740.262	10
558			min	-.012	5	-.091	1	-.032	3	-9.095e-3	1	1104.017	6	1752.484	1
559		14	max	0	3	-.008	15	.041	1	6.709e-3	3	NC	15	6834.92	15
560			min	-.013	5	-.082	1	-.03	3	-9.846e-3	1	1244.917	6	1804.921	1
561		15	max	0	3	-.006	15	.036	1	7.204e-3	3	NC	15	NC	15
562			min	-.014	5	-.07	1	-.026	3	-1.06e-2	1	1479.217	6	1957.558	1
563		16	max	0	3	-.004	15	.027	1	7.698e-3	3	NC	15	NC	4
564			min	-.015	5	-.055	1	-.02	3	-1.135e-2	1	1895.678	6	2286.097	1
565		17	max	0	3	-.001	15	.015	1	8.192e-3	3	NC	5	NC	4
566			min	-.016	5	-.04	1	-.011	3	-1.21e-2	1	2763.144	6	3028.382	1
567		18	max	0	3	.001	5	.002	9	8.687e-3	3	NC	5	NC	4
568			min	-.017	5	-.023	1	-.005	5	-1.285e-2	1	5430.005	6	5388.01	1
569		19	max	0	3	.005	5	.015	3	9.181e-3	3	NC	1	NC	1
570			min	-.018	5	-.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	-.007	4	-.003	4	-.007	2	-4.314e-3	1	NC	1	NC	1
573		2	max	0	10	-.008	12	.005	1	2.969e-3	3	NC	12	NC	2
574			min	-.006	4	-.03	4	-.003	5	-4.102e-3	1	3648.98	4	9679.475	1
575		3	max	0	10	-.017	12	.013	1	2.826e-3	3	6022.707	15	NC	3
576			min	-.006	4	-.057	4	-.01	5	-3.889e-3	1	1856.841	4	5471.243	1
577		4	max	0	10	-.025	12	.02	1	2.683e-3	3	4131.929	15	NC	10
578			min	-.006	4	-.082	4	-.021	5	-3.676e-3	1	1273.902	4	4156.62	1
579		5	max	0	10	-.032	12	.024	1	2.54e-3	3	3224.186	15	NC	10
580			min	-.005	4	-.104	4	-.034	5	-3.463e-3	1	994.038	4	3002.749	5
581		6	max	0	10	-.038	15	.026	1	2.397e-3	3	2713.493	15	NC	10
582			min	-.005	4	-.122	4	-.048	5	-3.25e-3	1	836.588	4	2123.01	5
583		7	max	0	10	-.043	15	.027	1	2.254e-3	3	2406.379	15	NC	10
584			min	-.005	4	-.138	4	-.061	5	-3.037e-3	1	741.903	4	1660.592	5
585		8	max	0	10	-.046	15	.027	1	2.11e-3	3	2222.064	15	NC	10
586			min	-.004	4	-.149	4	-.073	5	-2.825e-3	1	685.077	4	1396.667	5
587		9	max	0	10	-.048	15	.025	1	1.967e-3	3	2122.855	15	NC	10
588			min	-.004	4	-.155	4	-.082	5	-2.612e-3	1	654.491	4	1243.673	5
589		10	max	0	10	-.049	15	.023	1	1.824e-3	3	2091.47	15	NC	10
590			min	-.003	4	-.158	4	-.087	5	-2.399e-3	1	644.814	4	1162.416	5
591		11	max	0	10	-.048	15	.02	1	1.681e-3	3	2122.855	15	NC	10
592			min	-.003	4	-.155	4	-.089	5	-2.186e-3	1	654.491	4	1135.529	5
593		12	max	0	10	-.046	15	.017	1	1.538e-3	3	2222.064	15	NC	3
594			min	-.003	4	-.148	4	-.087	5	-1.973e-3	1	685.077	4	1158.21	5
595		13	max	0	10	-.042	15	.013	1	1.395e-3	3	2406.379	15	NC	2
596			min	-.002	4	-.137	4	-.082	5	-1.761e-3	1	741.903	4	1236.165	5
597		14	max	0	10	-.038	15	.01	1	1.252e-3	3	2713.493	15	NC	2
598			min	-.002	4	-.121	4	-.073	5	-1.548e-3	1	836.588	4	1389.071	5
599		15	max	0	10	-.032	15	.006	1	1.109e-3	3	3224.186	15	NC	1
600			min	-.002	4	-.102	4	-.061	5	-1.335e-3	1	994.038	4	1663.758	5
601		16	max	0	10	-.025	15	.003	1	9.658e-4	3	4131.929	15	NC	1
602			min	-.001	4	-.079	4	-.046	5	-1.122e-3	1	1273.902	4	2176.921	5
603		17	max	0	10	-.017	15	.001	1	8.227e-4	3	6022.707	15	NC	1
604			min	0	4	-.055	4	-.031	5	-9.092e-4	1	1856.841	4	3289.223	5
605		18	max	0	10	-.009	15	0	9	7.262e-4	4	NC	12	NC	1
606			min	0	4	-.028	4	-.015	5	-6.964e-4	1	3648.98	4	6831.294	5
607		19	max	0	1	0	1	0	1	8.078e-4	4	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

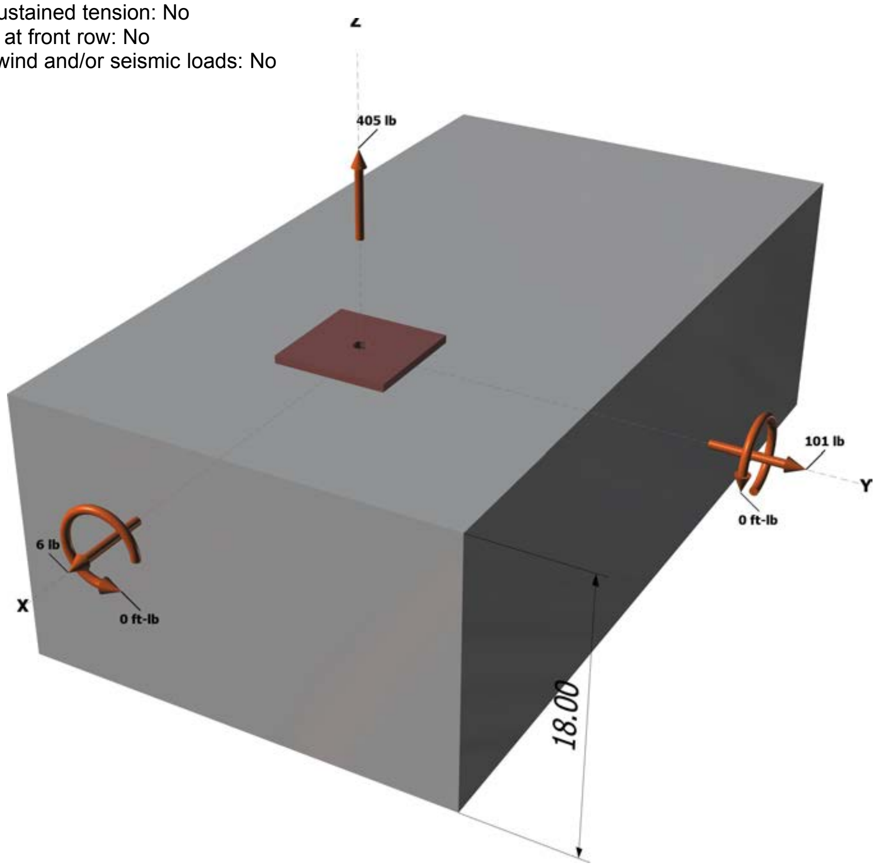
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

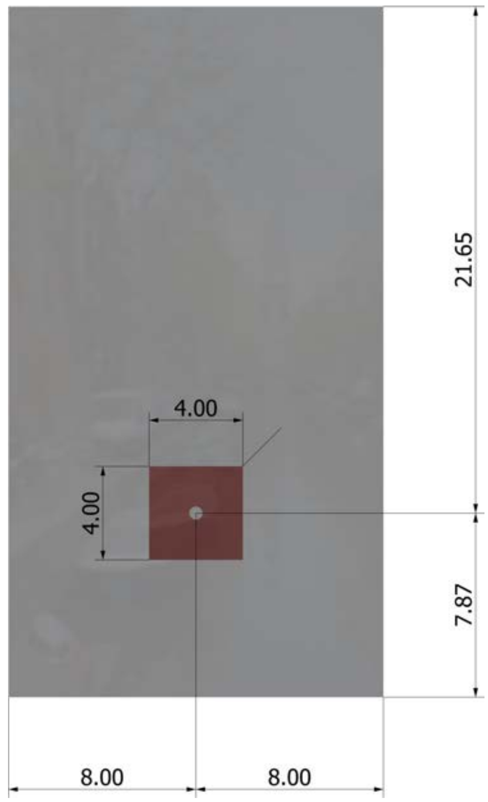
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



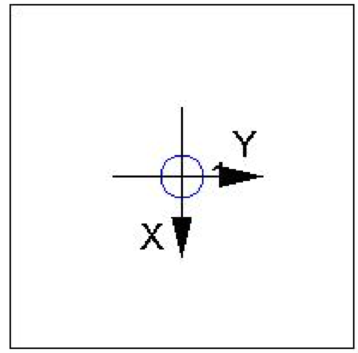
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Vco} (in²)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	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} (in²)	A_{Na0} (in²)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	109.66	109.66	1.000	1.000	9755	9755

A_{Nc} (in²)	A_{Nco} (in²)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	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.

Company:	Schletter, Inc.	Date:	12/10/2015
Engineer:	HCV	Page:	1/5
Project:	Standard PVMini - Worst Case		
Address:			
Phone:			
E-mail:			

SIMPSON Strong-Tie

Anchor Designer™ Software
Version 2.4.5673.0

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

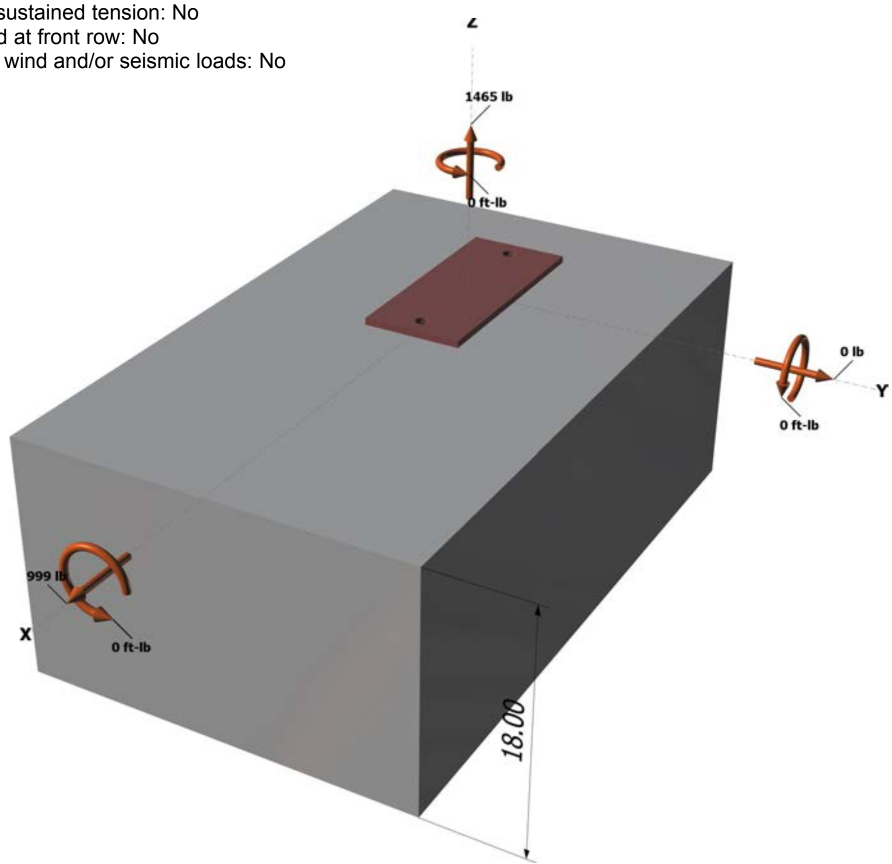
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

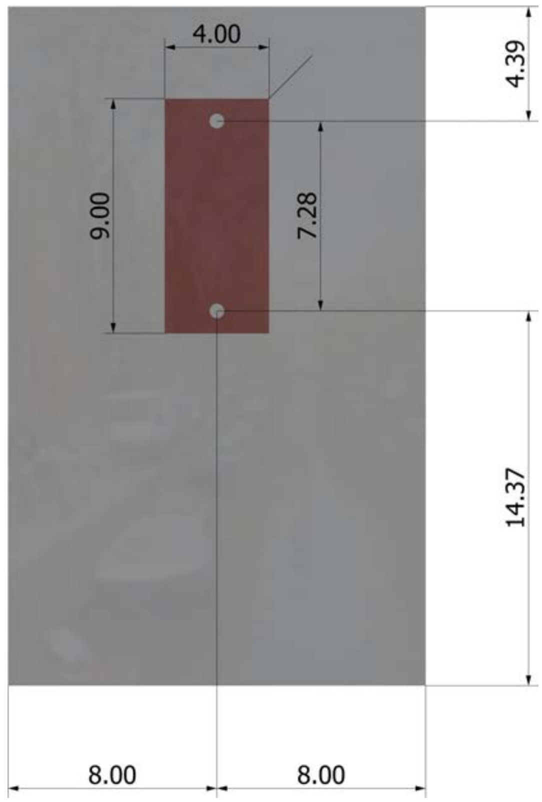
Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: No

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

<Figure 1>



<Figure 2>



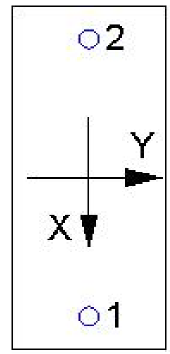
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	732.5	499.5	0.0	499.5
2	732.5	499.5	0.0	499.5
Sum	1465.0	999.0	0.0	999.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 1465
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



4. Steel Strength of Anchor in Tension(Sec. D.5.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
8095	0.75	6071

5. Concrete Breakout Strength of Anchor in Tension (Sec. D.5.2)

$N_b = k_c \lambda \sqrt{f'_c} h_{ef}^{1.5}$ (Eq. D-7)

k_c	λ	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	5.333	10469

$\phi N_{cbg} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (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, $øN_n$ (lb)	Ratio	Status
Steel	733	6071	0.12	Pass
Concrete breakout	**1465**	**7233**	**0.20**	**Pass (Governs)**
Adhesive	1465	8418	0.17	Pass

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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