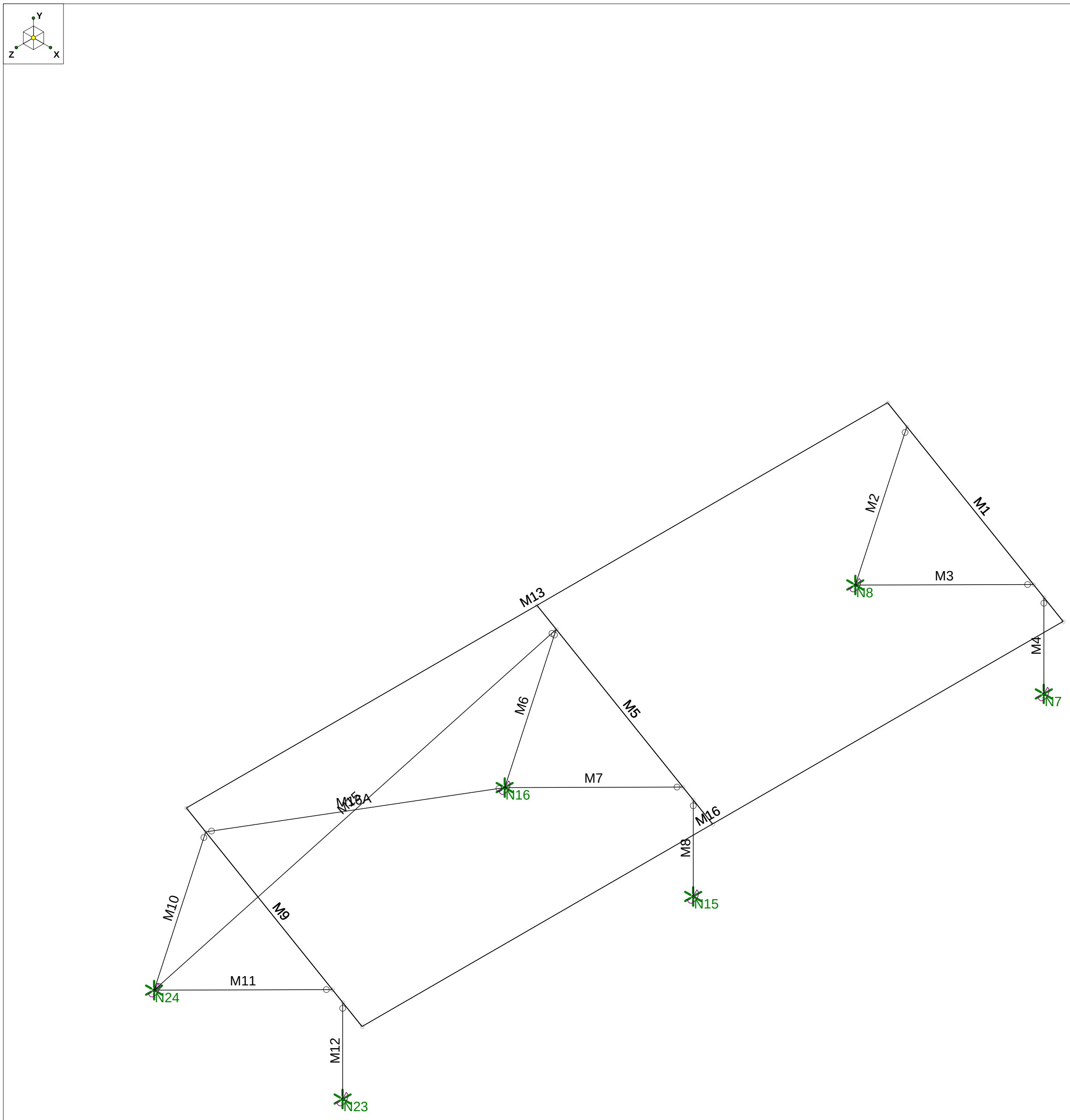


Schletter, Inc.		30ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

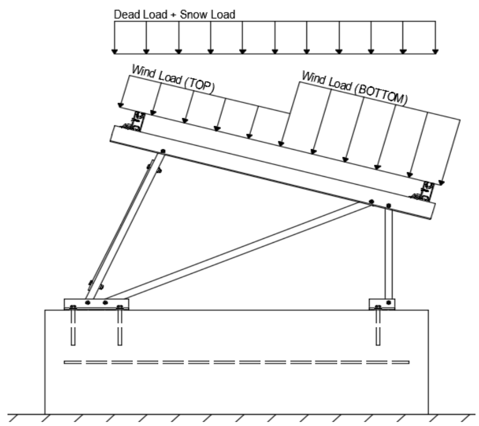
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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

PV modules are required to meet the following specifications:

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

Modules Per Row = 1
Module Tilt = 30°
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 = 16.49 psf *(ASCE 7-10, Eq. 7.4-1)*
I_s = 1.00
C_s = 0.73
C_e = 0.90
C_t = 1.20

2.3 Wind Loads
Design Wind Speed, V = 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

$Cf+_{TOP}$	=	1.15	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.85	
$Cf-_{TOP}$	=	-2.3	*(Suction)*
$Cf-_{BOTTOM}$	=	-1.1	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W ^{M}
1.54D + 1.3E + 0.2S ^{R}
0.56D + 1.3E ^{R}
1.54D + 1.25E + 0.2S ^{O}
0.56D + 1.25E ^{O}

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W ^{M}
1.238D + 0.875E ^{O}
1.1785D + 0.65625E + 0.75S ^{O}
0.362D + 0.875E ^{O}

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

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

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

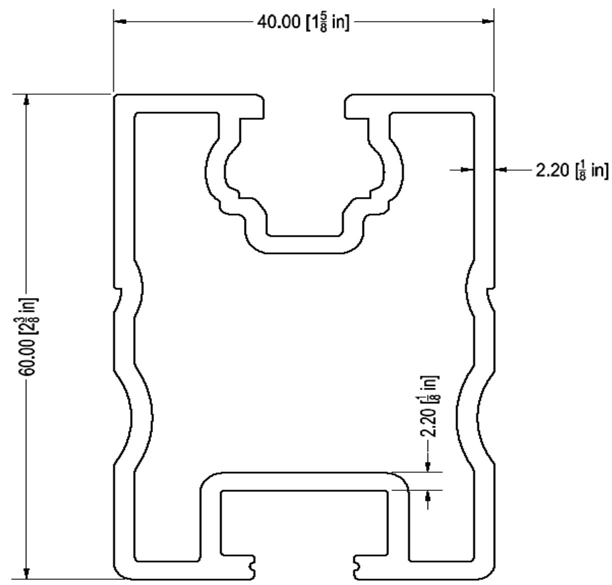
Front Struts	Location	Bracing
M4	Outer	M15
M8	Inner	M16A
M12	Outer	

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

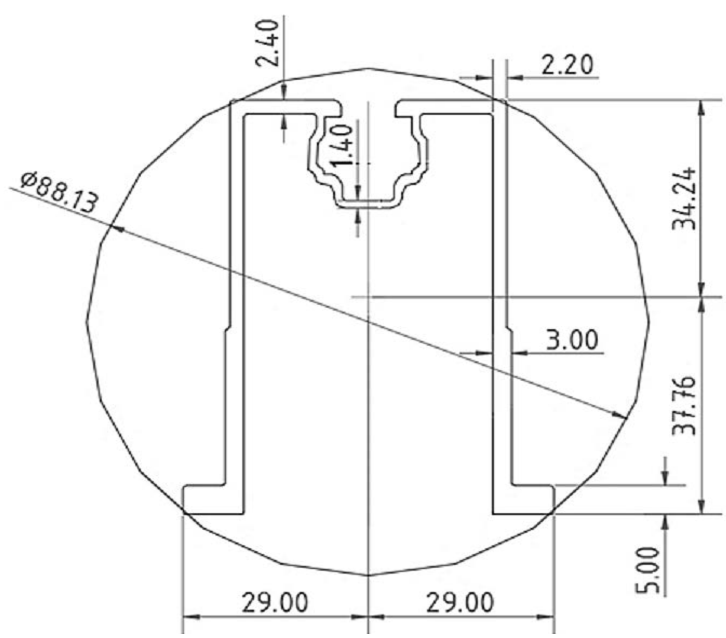
Purlin Type =	**ProfiPlus**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	84	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	28.54	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	28.47	ksi
S_y =	0.51	in^3
S_x =	0.37	in^3
E =	10100	ksi
I_y =	0.60	in^4
I_x =	0.29	in^4
A =	0.90	in^2
g =	1.08	lbs/ft
M_y =	0.764	k-ft
M_z =	0.192	k-ft
$M_{y\ allowable}$ =	1.214	k-ft
$M_{z\ allowable}$ =	0.871	k-ft
Utilization =	85%	



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).

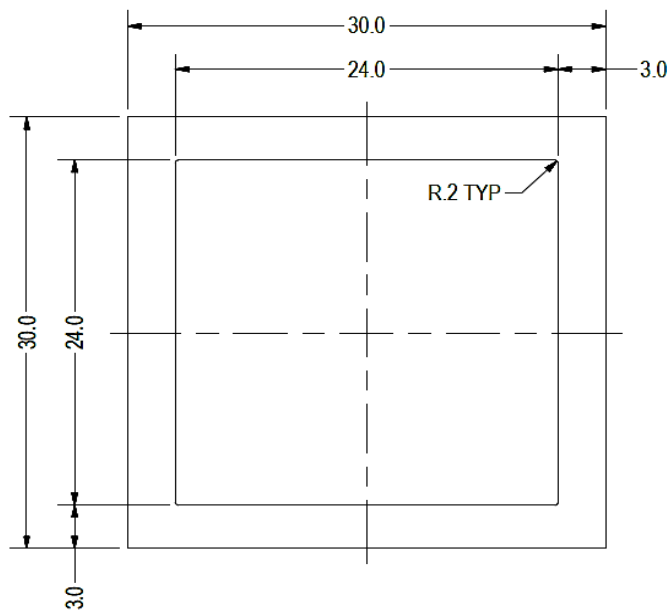
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.56	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.609	k-ft
M_z =	0.000	k-ft
P_n =	0.311	k
$M_{y\ allowable}$ =	1.451	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	44%	



4.3 Front Strut Design

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

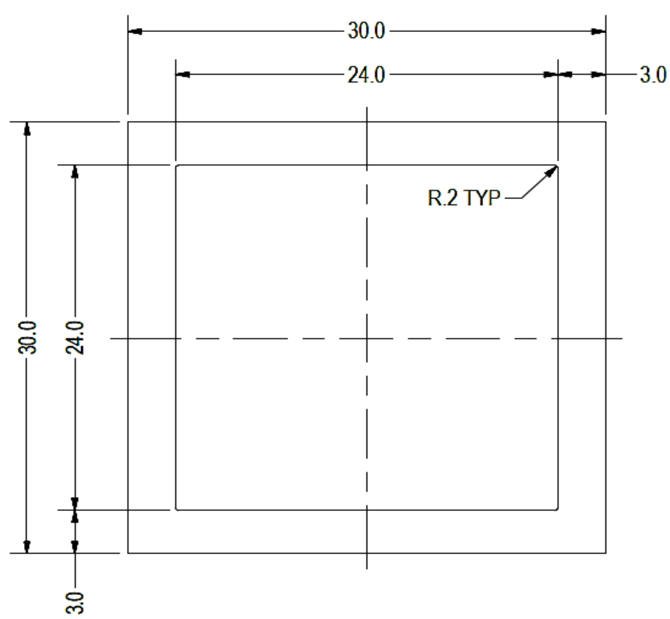
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.001	k-ft
P_n =	1.109	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	9%	



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).

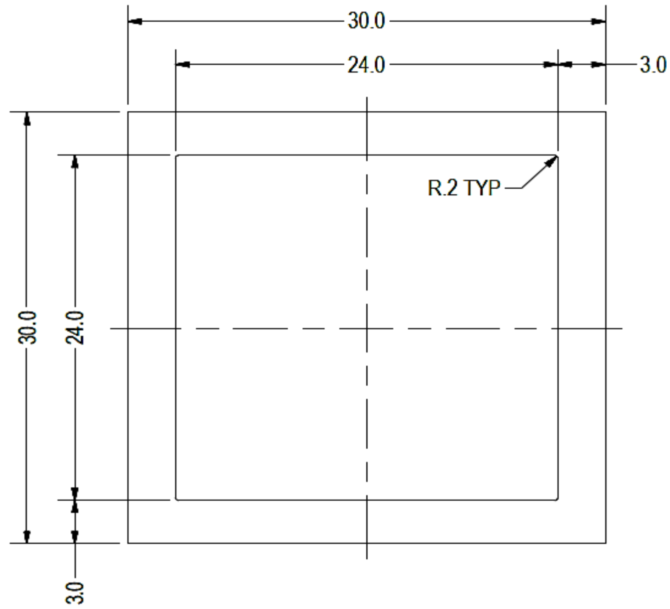
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.632	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	17%	



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).

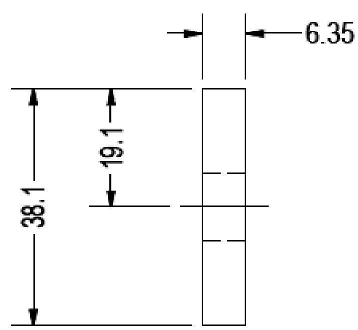
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	39.29	in
$\Phi F_{ty\ AXIAL}$ =	10.06	ksi
$\Phi F_{ty\ BENDING}$ =	30.09	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.929	k
$M_{y\ allowable}$ =	0.408	k-ft
$M_{z\ allowable}$ =	0.408	k-ft
$P_{n\ allowable}$ =	5.050	k
Utilization =	18%	



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 =	0.005	k-ft
P_n =	0.055	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	11%	



A cross brace kit is required every 17 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

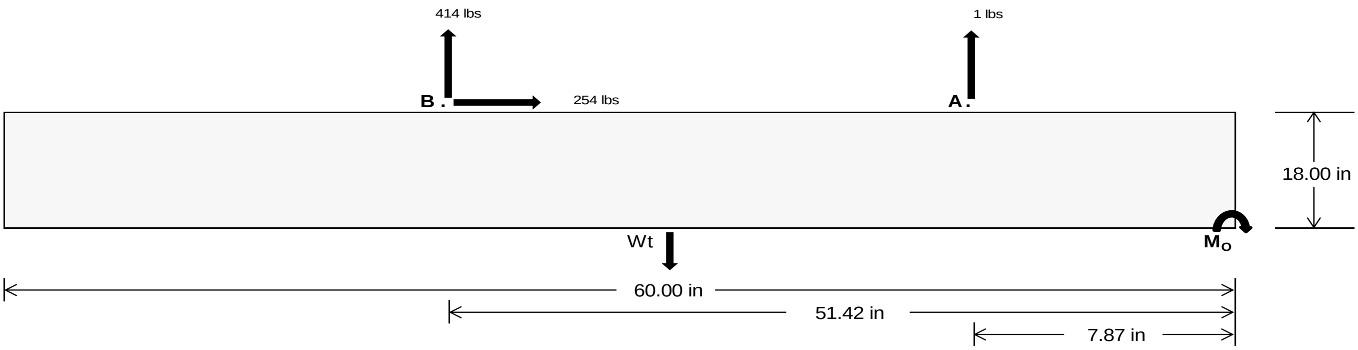
5.1 Helical Pile Foundations

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 =	12.20	1798.72	k
Compressive Load =	1441.48	1333.61	k
Lateral Load =	4.38	1102.66	k
Moment (Weak Axis) =	0.01	0.00	k

5.2 Design of Ballast Foundations

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



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

Footing Reinforcement
Use fiber reinforcing with (1) #5 rebar.

Overturning Check
M_O = 25862.5 in-lbs
Resisting Force Required = 862.08 lbs
S.F. = 1.67
Weight Required = 1436.81 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 = 254.26 lbs
Friction = 0.4
Weight Required = 635.66 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 = 254.26 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	552 lbs	552 lbs	552 lbs	552 lbs	418 lbs	418 lbs	418 lbs	418 lbs	678 lbs	678 lbs	678 lbs	678 lbs	-2 lbs	-2 lbs	-2 lbs	-2 lbs
F_B	388 lbs	388 lbs	388 lbs	388 lbs	540 lbs	540 lbs	540 lbs	540 lbs	660 lbs	660 lbs	660 lbs	660 lbs	-828 lbs	-828 lbs	-828 lbs	-828 lbs
F_V	67 lbs	67 lbs	67 lbs	67 lbs	464 lbs	464 lbs	464 lbs	464 lbs	393 lbs	393 lbs	393 lbs	393 lbs	-509 lbs	-509 lbs	-509 lbs	-509 lbs
P_{total}	2843 lbs	2934 lbs	3024 lbs	3115 lbs	2862 lbs	2953 lbs	3043 lbs	3134 lbs	3242 lbs	3332 lbs	3423 lbs	3514 lbs	312 lbs	367 lbs	421 lbs	476 lbs
M	426 lbs-ft	426 lbs-ft	426 lbs-ft	426 lbs-ft	503 lbs-ft	503 lbs-ft	503 lbs-ft	503 lbs-ft	661 lbs-ft	661 lbs-ft	661 lbs-ft	661 lbs-ft	711 lbs-ft	711 lbs-ft	711 lbs-ft	711 lbs-ft
e	0.15 ft	0.15 ft	0.14 ft	0.14 ft	0.18 ft	0.17 ft	0.17 ft	0.16 ft	0.20 ft	0.20 ft	0.19 ft	0.19 ft	2.28 ft	1.94 ft	1.69 ft	1.50 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}	266.6 psf	264.3 psf	262.3 psf	260.4 psf	258.1 psf	256.3 psf	254.6 psf	253.0 psf	279.9 psf	277.0 psf	274.4 psf	272.1 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	383.3 psf	375.8 psf	368.9 psf	362.6 psf	396.0 psf	387.9 psf	380.5 psf	373.7 psf	461.1 psf	450.1 psf	439.9 psf	430.7 psf	532.2 psf	237.7 psf	180.5 psf	157.8 psf

Maximum Bearing Pressure = 532 psf
Allowable Bearing Pressure = 1500 psf

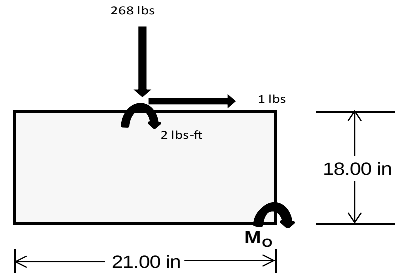
Use a 60in long x 21in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O = 231.2 ft-lbs
Resisting Force Required = 264.28 lbs
S.F. = 1.67
Weight Required = 440.47 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	82 lbs	212 lbs	78 lbs	273 lbs	778 lbs	268 lbs	24 lbs	62 lbs	23 lbs
F_V	4 lbs	4 lbs	0 lbs	16 lbs	15 lbs	1 lbs	1 lbs	1 lbs	0 lbs
P_{total}	2438 lbs	2568 lbs	2434 lbs	2516 lbs	3021 lbs	2511 lbs	713 lbs	751 lbs	712 lbs
M	6 lbs-ft	6 lbs-ft	0 lbs-ft	28 lbs-ft	23 lbs-ft	3 lbs-ft	2 lbs-ft	2 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.01 ft	0.01 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.29 ft	1.75 ft	1.75 ft	1.73 ft	1.73 ft	1.75 ft	1.75 ft	1.75 ft	1.75 ft
f_{min}	276.3 sqft	291.3 sqft	278.0 sqft	276.7 sqft	336.2 sqft	285.6 sqft	80.8 sqft	85.2 sqft	81.3 sqft
f_{max}	281.0 psf	295.6 psf	278.3 psf	298.3 psf	354.4 psf	288.3 psf	82.2 psf	86.4 psf	81.4 psf

Maximum Bearing Pressure = 354 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.

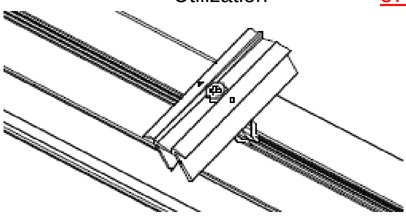
6. DESIGN OF JOINTS AND CONNECTIONS

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.

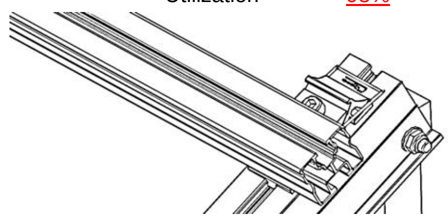
Fastening of Modules to Purlins

Maximum Uplifting Force =	0.444	k
Allowable Uplift =	1.214	k
Utilization =	37%	



Fastening of Purlins to Girders

Maximum Uplifting Force =	1.099	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 =	1.109	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	19%	

Rear Strut

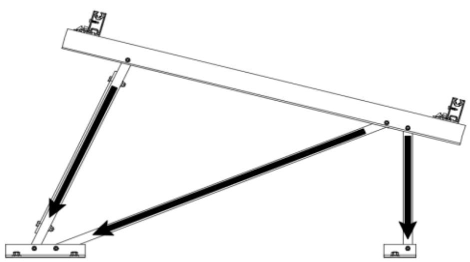
Maximum Axial Load =	1.178	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	21%	

Diagonal Strut

Maximum Axial Load =	0.632	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	11%	

Bracing

Maximum Axial Load =	0.055	k
M10 Bolt Capacity =	8.894	k
Strut Bearing Capacity =	7.952	k
Utilization =	1%	



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

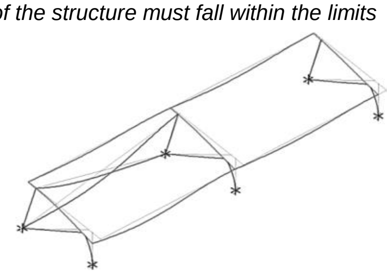
7. SEISMIC DESIGN

7.1 Seismic Drift - N/A

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

Mean Height, h_{sx} =	32.32	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.646	in
Max Drift, Δ_{MAX} =	0.051	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus**

Strong Axis:

3.4.14

L_b = 84.00 in

J = 0.255

218.731

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.5 ksi

3.4.16

b/t = 7.4

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 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 = 84.00 in

J = 0.255

227.139

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 28.4

3.4.16

b/t = 23.9

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 28.5 ksi

3.4.16.1

N/A for Weak Direction

3.4.18		3.4.18	
h/t =	23.9	h/t =	7.4
$S1 = \dfrac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$		$S1 = \dfrac{Bbr - \frac{\theta_y}{\theta_b}1.3Fcy}{mDbr}$	
S1 =	36.9	S1 =	36.9
m =	0.65	m =	0.65
C_0 =	30	C_0 =	20
Cc =	30	Cc =	20
$S2 = \dfrac{k_1 Bbr}{mDbr}$		$S2 = \dfrac{k_1 Bbr}{mDbr}$	
S2 =	77.3	S2 =	77.3
φF_L=	1.3φyFcy	φF_L=	1.3φyFcy
φF_L=	43.2 ksi	φF_L=	43.2 ksi
φF_LSt=	28.5 ksi	φF_LWk=	28.5 ksi
Ix =	250988 mm^4	Iy =	120291 mm^4
	0.603 in^4		0.289 in^4
y =	30 mm	x =	20 mm
Sx =	0.511 in^3	Sy =	0.367 in^3
M_{max}St =	1.214 k-ft	M_{max}Wk =	0.871 k-ft

Compression

3.4.9

b/t = 7.4
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 = 23.9
S1 = 12.21
S2 = 32.70
φF_L= φc[Bp-1.6Dp*b/t]
φF_L= 28.5 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 28.47 ksi
A = 578.06 mm^2
0.90 in^2
P_{max} = 25.51 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 = 1.19

22.5321

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.6 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 = 1.19

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= 29.6 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= 29.6 ksi
Ix = 364470 mm^4
0.876 in^4
y = 37.77 mm
Sx = 0.589 in^3
M_{max}St = 1.451 k-ft

3.4.18
h/t = 4.29

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

S1 = 36.9
m = 0.65
C_0 = 29
Cc = 29

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

φF_LWk= 13.5 ksi
Iy = 217168 mm^4
0.522 in^4
x = 29 mm
Sy = 0.457 in^3
M_{max}Wk = 0.513 k-ft

Compression
3.4.7
λ = 0.46067
r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671
φcc = 0.90326
φF_L= φcc(Bc-Dc*λ)
φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

λ = 0.77182

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.83792

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

$\varphi F_L =$ 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

$\lambda =$ 1.98863

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.85841

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

$\varphi F_L =$ 7.59722 ksi

3.4.9

b/t = 7.75

S1 = 12.21 (See 3.4.16 above for formula)

S2 = 32.70 (See 3.4.16 above for formula)

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

b/t = 7.75

S1 = 12.21

S2 = 32.70

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.3 ksi

3.4.10

Rb/t = 0.0

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

S1 = 6.87

S2 = 131.3

$\varphi F_L = \varphi yFcy$

$\varphi F_L =$ 33.25 ksi

$\varphi F_L =$ 7.60 ksi

A = 323.87 mm^2

0.50 in^2

$P_{max} =$ 3.81 kips

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1 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= 30.1 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.408 k-ft

Weak Axis:

3.4.14

L_b = 39.29 in

J = 0.16

103.073

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

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= 30.1

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 = 1.68476

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.81587

φF_L= (φccFcy)/(λ²)

φF_L= 10.0603 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= 10.06 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 5.05 kips

APPENDIX B

B.1

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

Basic Load Cases

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

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

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

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

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

Member Distributed Loads (BLC 3 : Snow Load)

	Member Label	Direction	Start Magnitude[lb/ft,F]	End Magnitude[lb/ft,F]	Start Location[ft,%]	End Location[ft,%]
1	M13	Y	-45.999	-45.999	0	0
2	M16	Y	-45.999	-45.999	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	-66.592	-66.592	0	0
2	M16	y	-107.127	-107.127	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	133.185	133.185	0	0
2	M16	y	63.697	63.697	0	0

Load Combinations

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

Envelope Joint Reactions

	Joint		X [lb]	LC	Y [lb]	LC	Z [lb]	LC	MX [k-ft]	LC	MY [k-ft]	LC	MZ [k-ft]	LC
1	N8	max	210.507	2	299.801	2	-.002	15	0	15	0	1	0	1
2		min	-264.911	3	-420.534	3	-.142	1	0	3	0	1	0	1
3	N7	max	.003	3	423.905	1	-.072	15	0	15	0	1	0	1
4		min	-.168	2	6.194	12	-1.548	1	-.003	1	0	1	0	1
5	N15	max	0	15	1108.828	1	.632	1	.001	1	0	1	0	1
6		min	-1.739	2	-9.383	3	-.429	3	0	3	0	1	0	1
7	N16	max	796.642	2	1025.854	2	-.138	10	0	1	0	1	0	1
8		min	-848.2	3	-1383.628	3	-48.603	3	0	3	0	1	0	1
9	N23	max	.004	3	423.557	1	3.372	1	.006	1	0	1	0	1
10		min	-.168	2	6.548	12	.147	15	0	15	0	1	0	1
11	N24	max	210.959	2	303.974	2	48.943	3	.002	1	0	1	0	1
12		min	-265.055	3	-418.145	3	.018	10	0	3	0	1	0	1
13	Totals:	max	1216.033	2	3473.56	1	0	3						
14		min	-1378.174	3	-2215.983	3	0	2						

Envelope Member Section Forces

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
1	M2	1	max	285.185	1	.654	4	.52	1	0	15	0	12	0	1
2			min	-361.807	3	.154	15	-.041	3	-.001	1	0	1	0	1
3		2	max	285.311	1	.603	4	.52	1	0	15	0	15	0	15
4			min	-361.712	3	.142	15	-.041	3	-.001	1	0	1	0	4
5		3	max	285.437	1	.552	4	.52	1	0	15	0	15	0	15
6			min	-361.618	3	.13	15	-.041	3	-.001	1	0	1	0	4
7		4	max	285.563	1	.5	4	.52	1	0	15	0	1	0	15
8			min	-361.524	3	.118	15	-.041	3	-.001	1	0	3	0	4
9		5	max	285.689	1	.449	4	.52	1	0	15	0	1	0	15
10			min	-361.429	3	.106	15	-.041	3	-.001	1	0	3	0	4
11		6	max	285.814	1	.398	4	.52	1	0	15	0	1	0	15
12			min	-361.335	3	.094	15	-.041	3	-.001	1	0	3	0	4
13		7	max	285.94	1	.347	4	.52	1	0	15	0	1	0	15
14			min	-361.24	3	.082	15	-.041	3	-.001	1	0	3	0	4
15		8	max	286.066	1	.296	4	.52	1	0	15	0	1	0	15
16			min	-361.146	3	.07	15	-.041	3	-.001	1	0	3	0	4
17		9	max	286.192	1	.245	4	.52	1	0	15	0	1	0	15
18			min	-361.052	3	.058	15	-.041	3	-.001	1	0	3	0	4
19		10	max	286.318	1	.194	4	.52	1	0	15	0	1	0	15
20			min	-360.957	3	.046	15	-.041	3	-.001	1	0	3	0	4
21		11	max	286.444	1	.142	4	.52	1	0	15	0	1	0	15
22			min	-360.863	3	.034	12	-.041	3	-.001	1	0	3	0	4
23		12	max	286.57	1	.1	2	.52	1	0	15	0	1	0	15
24			min	-360.768	3	.014	12	-.041	3	-.001	1	0	3	0	4
25		13	max	286.696	1	.06	2	.52	1	0	15	0	1	0	15
26			min	-360.674	3	-.013	3	-.041	3	-.001	1	0	3	0	4
27		14	max	286.821	1	.02	2	.52	1	0	15	0	1	0	15
28			min	-360.579	3	-.043	3	-.041	3	-.001	1	0	3	0	4
29		15	max	286.947	1	-.014	15	.52	1	0	15	.001	1	0	15
30			min	-360.485	3	-.073	3	-.041	3	-.001	1	0	3	0	4
31		16	max	287.073	1	-.026	15	.52	1	0	15	.001	1	0	15
32			min	-360.391	3	-.113	4	-.041	3	-.001	1	0	3	0	4
33		17	max	287.199	1	-.038	15	.52	1	0	15	.001	1	0	15
34			min	-360.296	3	-.164	4	-.041	3	-.001	1	0	3	0	4
35		18	max	287.325	1	-.05	15	.52	1	0	15	.001	1	0	15
36			min	-360.202	3	-.216	4	-.041	3	-.001	1	0	3	0	4
37		19	max	287.451	1	-.062	15	.52	1	0	15	.001	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-360.107	3	-.267	4	-.041	3	-.001	1	0	3	0	4
39	M3	1	max	155.621	2	1.757	4	-.023	15	0	15	.002	1	0	4
40			min	-174.058	3	.413	15	-.557	1	0	1	0	15	0	15
41		2	max	155.552	2	1.58	4	-.023	15	0	15	.002	1	0	2
42			min	-174.11	3	.372	15	-.557	1	0	1	0	15	0	12
43		3	max	155.483	2	1.404	4	-.023	15	0	15	.002	1	0	2
44			min	-174.162	3	.33	15	-.557	1	0	1	0	15	0	3
45		4	max	155.413	2	1.227	4	-.023	15	0	15	.001	1	0	15
46			min	-174.214	3	.289	15	-.557	1	0	1	0	15	0	4
47		5	max	155.344	2	1.05	4	-.023	15	0	15	.001	1	0	15
48			min	-174.266	3	.247	15	-.557	1	0	1	0	15	0	4
49		6	max	155.275	2	.873	4	-.023	15	0	15	.001	1	0	15
50			min	-174.318	3	.205	15	-.557	1	0	1	0	15	0	4
51		7	max	155.205	2	.696	4	-.023	15	0	15	.001	1	0	15
52			min	-174.37	3	.164	15	-.557	1	0	1	0	15	0	4
53		8	max	155.136	2	.519	4	-.023	15	0	15	0	1	0	15
54			min	-174.422	3	.122	15	-.557	1	0	1	0	15	-.001	4
55		9	max	155.067	2	.343	4	-.023	15	0	15	0	1	0	15
56			min	-174.474	3	.081	15	-.557	1	0	1	0	15	-.001	4
57		10	max	154.997	2	.166	4	-.023	15	0	15	0	1	0	15
58			min	-174.526	3	.039	15	-.557	1	0	1	0	15	-.001	4
59		11	max	154.928	2	.016	2	-.023	15	0	15	0	1	0	15
60			min	-174.578	3	-.038	3	-.557	1	0	1	0	15	-.001	4
61		12	max	154.859	2	-.044	15	-.023	15	0	15	0	1	0	15
62			min	-174.63	3	-.188	4	-.557	1	0	1	0	15	-.001	4
63		13	max	154.789	2	-.085	15	-.023	15	0	15	0	1	0	15
64			min	-174.682	3	-.365	4	-.557	1	0	1	0	15	-.001	4
65		14	max	154.72	2	-.127	15	-.023	15	0	15	0	1	0	15
66			min	-174.734	3	-.542	4	-.557	1	0	1	0	15	-.001	4
67		15	max	154.651	2	-.169	15	-.023	15	0	15	0	1	0	15
68			min	-174.786	3	-.718	4	-.557	1	0	1	0	12	0	4
69		16	max	154.581	2	-.21	15	-.023	15	0	15	0	1	0	15
70			min	-174.838	3	-.895	4	-.557	1	0	1	0	3	0	4
71		17	max	154.512	2	-.252	15	-.023	15	0	15	0	15	0	15
72			min	-174.89	3	-1.072	4	-.557	1	0	1	0	1	0	4
73		18	max	154.443	2	-.293	15	-.023	15	0	15	0	15	0	15
74			min	-174.942	3	-1.249	4	-.557	1	0	1	0	1	0	4
75		19	max	154.373	2	-.335	15	-.023	15	0	15	0	15	0	1
76			min	-174.994	3	-1.426	4	-.557	1	0	1	0	1	0	1
77	M4	1	max	422.74	1	0	1	-.072	15	0	1	0	3	0	1
78			min	5.611	12	0	1	-1.666	1	0	1	0	2	0	1
79		2	max	422.805	1	0	1	-.072	15	0	1	0	12	0	1
80			min	5.644	12	0	1	-1.666	1	0	1	0	1	0	1
81		3	max	422.87	1	0	1	-.072	15	0	1	0	15	0	1
82			min	5.676	12	0	1	-1.666	1	0	1	0	1	0	1
83		4	max	422.934	1	0	1	-.072	15	0	1	0	15	0	1
84			min	5.708	12	0	1	-1.666	1	0	1	0	1	0	1
85		5	max	422.999	1	0	1	-.072	15	0	1	0	15	0	1
86			min	5.741	12	0	1	-1.666	1	0	1	0	1	0	1
87		6	max	423.064	1	0	1	-.072	15	0	1	0	15	0	1
88			min	5.773	12	0	1	-1.666	1	0	1	0	1	0	1
89		7	max	423.129	1	0	1	-.072	15	0	1	0	15	0	1
90			min	5.805	12	0	1	-1.666	1	0	1	0	1	0	1
91		8	max	423.193	1	0	1	-.072	15	0	1	0	15	0	1
92			min	5.838	12	0	1	-1.666	1	0	1	-.001	1	0	1
93		9	max	423.258	1	0	1	-.072	15	0	1	0	15	0	1
94			min	5.87	12	0	1	-1.666	1	0	1	-.001	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	423.323	1	0	1	-.072	15	0	1	0	15	0	1
96			min	5.902	12	0	1	-1.666	1	0	1	-.001	1	0	1
97		11	max	423.387	1	0	1	-.072	15	0	1	0	15	0	1
98			min	5.935	12	0	1	-1.666	1	0	1	-.002	1	0	1
99		12	max	423.452	1	0	1	-.072	15	0	1	0	15	0	1
100			min	5.967	12	0	1	-1.666	1	0	1	-.002	1	0	1
101		13	max	423.517	1	0	1	-.072	15	0	1	0	15	0	1
102			min	5.999	12	0	1	-1.666	1	0	1	-.002	1	0	1
103		14	max	423.581	1	0	1	-.072	15	0	1	0	15	0	1
104			min	6.032	12	0	1	-1.666	1	0	1	-.002	1	0	1
105		15	max	423.646	1	0	1	-.072	15	0	1	0	15	0	1
106			min	6.064	12	0	1	-1.666	1	0	1	-.002	1	0	1
107		16	max	423.711	1	0	1	-.072	15	0	1	0	15	0	1
108			min	6.097	12	0	1	-1.666	1	0	1	-.002	1	0	1
109		17	max	423.776	1	0	1	-.072	15	0	1	0	15	0	1
110			min	6.129	12	0	1	-1.666	1	0	1	-.002	1	0	1
111		18	max	423.84	1	0	1	-.072	15	0	1	0	15	0	1
112			min	6.161	12	0	1	-1.666	1	0	1	-.003	1	0	1
113		19	max	423.905	1	0	1	-.072	15	0	1	0	15	0	1
114			min	6.194	12	0	1	-1.666	1	0	1	-.003	1	0	1
115	M6	1	max	926.718	1	.657	4	.169	1	0	1	0	3	0	1
116			min	-1177.702	3	.154	15	-.15	3	0	15	0	1	0	1
117		2	max	926.844	1	.606	4	.169	1	0	1	0	3	0	15
118			min	-1177.607	3	.142	15	-.15	3	0	15	0	11	0	4
119		3	max	926.97	1	.555	4	.169	1	0	1	0	3	0	15
120			min	-1177.513	3	.13	15	-.15	3	0	15	0	11	0	4
121		4	max	927.096	1	.503	4	.169	1	0	1	0	3	0	15
122			min	-1177.418	3	.118	15	-.15	3	0	15	0	15	0	4
123		5	max	927.222	1	.452	4	.169	1	0	1	0	1	0	15
124			min	-1177.324	3	.105	12	-.15	3	0	15	0	15	0	4
125		6	max	927.348	1	.41	2	.169	1	0	1	0	1	0	15
126			min	-1177.23	3	.085	12	-.15	3	0	15	0	15	0	4
127		7	max	927.473	1	.371	2	.169	1	0	1	0	1	0	15
128			min	-1177.135	3	.065	12	-.15	3	0	15	0	3	0	4
129		8	max	927.599	1	.331	2	.169	1	0	1	0	1	0	15
130			min	-1177.041	3	.046	12	-.15	3	0	15	0	3	0	4
131		9	max	927.725	1	.291	2	.169	1	0	1	0	1	0	12
132			min	-1176.946	3	.026	12	-.15	3	0	15	0	3	0	4
133		10	max	927.851	1	.251	2	.169	1	0	1	0	1	0	12
134			min	-1176.852	3	-.003	3	-.15	3	0	15	0	3	0	2
135		11	max	927.977	1	.211	2	.169	1	0	1	0	1	0	12
136			min	-1176.758	3	-.033	3	-.15	3	0	15	0	3	0	2
137		12	max	928.103	1	.171	2	.169	1	0	1	0	1	0	12
138			min	-1176.663	3	-.063	3	-.15	3	0	15	0	3	0	2
139		13	max	928.229	1	.131	2	.169	1	0	1	0	1	0	12
140			min	-1176.569	3	-.093	3	-.15	3	0	15	0	3	0	2
141		14	max	928.355	1	.092	2	.169	1	0	1	0	1	0	12
142			min	-1176.474	3	-.123	3	-.15	3	0	15	0	3	0	2
143		15	max	928.48	1	.052	2	.169	1	0	1	0	1	0	12
144			min	-1176.38	3	-.153	3	-.15	3	0	15	0	3	0	2
145		16	max	928.606	1	.012	2	.169	1	0	1	0	1	0	12
146			min	-1176.286	3	-.183	3	-.15	3	0	15	0	3	0	2
147		17	max	928.732	1	-.028	2	.169	1	0	1	0	1	0	12
148			min	-1176.191	3	-.212	3	-.15	3	0	15	0	3	0	2
149		18	max	928.858	1	-.05	15	.169	1	0	1	0	1	0	3
150			min	-1176.097	3	-.242	3	-.15	3	0	15	0	3	0	2
151		19	max	928.984	1	-.062	15	.169	1	0	1	0	1	0	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
152			min	-1176.002	3	-.272	3	-.15	3	0	15	0	3	0	2
153	M7	1	max	632.096	2	1.762	4	.017	3	0	2	0	2	0	2
154			min	-542.627	3	.414	15	-.005	10	0	3	0	3	0	3
155		2	max	632.027	2	1.585	4	.017	3	0	2	0	2	0	2
156			min	-542.679	3	.372	15	-.005	10	0	3	0	3	0	3
157		3	max	631.958	2	1.408	4	.017	3	0	2	0	2	0	2
158			min	-542.731	3	.331	15	-.005	10	0	3	0	3	0	3
159		4	max	631.888	2	1.231	4	.017	3	0	2	0	2	0	2
160			min	-542.783	3	.289	15	-.005	10	0	3	0	3	0	3
161		5	max	631.819	2	1.054	4	.017	3	0	2	0	2	0	15
162			min	-542.835	3	.248	15	-.005	10	0	3	0	3	0	3
163		6	max	631.75	2	.877	4	.017	3	0	2	0	2	0	15
164			min	-542.887	3	.206	15	-.005	10	0	3	0	3	0	4
165		7	max	631.68	2	.701	4	.017	3	0	2	0	2	0	15
166			min	-542.939	3	.165	15	-.005	10	0	3	0	3	0	4
167		8	max	631.611	2	.524	4	.017	3	0	2	0	2	0	15
168			min	-542.991	3	.123	15	-.005	10	0	3	0	3	-.001	4
169		9	max	631.542	2	.359	2	.017	3	0	2	0	2	0	15
170			min	-543.043	3	.07	12	-.005	10	0	3	0	3	-.001	4
171		10	max	631.472	2	.222	2	.017	3	0	2	0	2	0	15
172			min	-543.095	3	-.009	3	-.005	10	0	3	0	3	-.001	4
173		11	max	631.403	2	.084	2	.017	3	0	2	0	2	0	15
174			min	-543.147	3	-.113	3	-.005	10	0	3	0	3	-.001	4
175		12	max	631.334	2	-.043	15	.017	3	0	2	0	2	0	15
176			min	-543.199	3	-.216	3	-.005	10	0	3	0	3	-.001	4
177		13	max	631.264	2	-.085	15	.017	3	0	2	0	2	0	15
178			min	-543.251	3	-.36	4	-.005	10	0	3	0	3	-.001	4
179		14	max	631.195	2	-.126	15	.017	3	0	2	0	2	0	15
180			min	-543.303	3	-.537	4	-.005	10	0	3	0	3	-.001	4
181		15	max	631.126	2	-.168	15	.017	3	0	2	0	2	0	15
182			min	-543.355	3	-.714	4	-.005	10	0	3	0	3	0	4
183		16	max	631.056	2	-.209	15	.017	3	0	2	0	2	0	15
184			min	-543.407	3	-.891	4	-.005	10	0	3	0	3	0	4
185		17	max	630.987	2	-.251	15	.017	3	0	2	0	2	0	15
186			min	-543.459	3	-1.068	4	-.005	10	0	3	0	3	0	4
187		18	max	630.918	2	-.293	15	.017	3	0	2	0	2	0	15
188			min	-543.511	3	-1.245	4	-.005	10	0	3	0	3	0	4
189		19	max	630.848	2	-.334	15	.017	3	0	2	0	2	0	1
190			min	-543.563	3	-1.421	4	-.005	10	0	3	0	3	0	1
191	M8	1	max	1107.664	1	0	1	.771	1	0	1	0	15	0	1
192			min	-10.257	3	0	1	-.428	3	0	1	0	1	0	1
193		2	max	1107.728	1	0	1	.771	1	0	1	0	1	0	1
194			min	-10.208	3	0	1	-.428	3	0	1	0	3	0	1
195		3	max	1107.793	1	0	1	.771	1	0	1	0	1	0	1
196			min	-10.16	3	0	1	-.428	3	0	1	0	3	0	1
197		4	max	1107.858	1	0	1	.771	1	0	1	0	1	0	1
198			min	-10.111	3	0	1	-.428	3	0	1	0	3	0	1
199		5	max	1107.923	1	0	1	.771	1	0	1	0	1	0	1
200			min	-10.062	3	0	1	-.428	3	0	1	0	3	0	1
201		6	max	1107.987	1	0	1	.771	1	0	1	0	1	0	1
202			min	-10.014	3	0	1	-.428	3	0	1	0	3	0	1
203		7	max	1108.052	1	0	1	.771	1	0	1	0	1	0	1
204			min	-9.965	3	0	1	-.428	3	0	1	0	3	0	1
205		8	max	1108.117	1	0	1	.771	1	0	1	0	1	0	1
206			min	-9.917	3	0	1	-.428	3	0	1	0	3	0	1
207		9	max	1108.181	1	0	1	.771	1	0	1	0	1	0	1
208			min	-9.868	3	0	1	-.428	3	0	1	0	3	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
209		10	max	1108.246	1	0	1	.771	1	0	1	0	1	0	1
210			min	-9.82	3	0	1	-.428	3	0	1	0	3	0	1
211		11	max	1108.311	1	0	1	.771	1	0	1	0	1	0	1
212			min	-9.771	3	0	1	-.428	3	0	1	0	3	0	1
213		12	max	1108.376	1	0	1	.771	1	0	1	0	1	0	1
214			min	-9.723	3	0	1	-.428	3	0	1	0	3	0	1
215		13	max	1108.44	1	0	1	.771	1	0	1	0	1	0	1
216			min	-9.674	3	0	1	-.428	3	0	1	0	3	0	1
217		14	max	1108.505	1	0	1	.771	1	0	1	0	1	0	1
218			min	-9.626	3	0	1	-.428	3	0	1	0	3	0	1
219		15	max	1108.57	1	0	1	.771	1	0	1	0	1	0	1
220			min	-9.577	3	0	1	-.428	3	0	1	0	3	0	1
221		16	max	1108.634	1	0	1	.771	1	0	1	.001	1	0	1
222			min	-9.529	3	0	1	-.428	3	0	1	0	3	0	1
223		17	max	1108.699	1	0	1	.771	1	0	1	.001	1	0	1
224			min	-9.48	3	0	1	-.428	3	0	1	0	3	0	1
225		18	max	1108.764	1	0	1	.771	1	0	1	.001	1	0	1
226			min	-9.432	3	0	1	-.428	3	0	1	0	3	0	1
227		19	max	1108.828	1	0	1	.771	1	0	1	.001	1	0	1
228			min	-9.383	3	0	1	-.428	3	0	1	0	3	0	1
229	M10	1	max	296.298	1	.648	4	-.004	12	.001	1	0	1	0	1
230			min	-337.641	3	.153	15	-.184	1	0	3	0	3	0	1
231		2	max	296.423	1	.597	4	-.004	12	.001	1	0	1	0	15
232			min	-337.546	3	.141	15	-.184	1	0	3	0	3	0	4
233		3	max	296.549	1	.546	4	-.004	12	.001	1	0	1	0	15
234			min	-337.452	3	.129	15	-.184	1	0	3	0	3	0	4
235		4	max	296.675	1	.495	4	-.004	12	.001	1	0	1	0	15
236			min	-337.358	3	.117	15	-.184	1	0	3	0	3	0	4
237		5	max	296.801	1	.444	4	-.004	12	.001	1	0	1	0	15
238			min	-337.263	3	.105	15	-.184	1	0	3	0	3	0	4
239		6	max	296.927	1	.392	4	-.004	12	.001	1	0	1	0	15
240			min	-337.169	3	.093	15	-.184	1	0	3	0	3	0	4
241		7	max	297.053	1	.341	4	-.004	12	.001	1	0	1	0	15
242			min	-337.074	3	.081	15	-.184	1	0	3	0	3	0	4
243		8	max	297.179	1	.29	4	-.004	12	.001	1	0	1	0	15
244			min	-336.98	3	.069	15	-.184	1	0	3	0	3	0	4
245		9	max	297.305	1	.239	4	-.004	12	.001	1	0	1	0	15
246			min	-336.886	3	.057	15	-.184	1	0	3	0	3	0	4
247		10	max	297.43	1	.188	4	-.004	12	.001	1	0	11	0	15
248			min	-336.791	3	.045	15	-.184	1	0	3	0	3	0	4
249		11	max	297.556	1	.14	2	-.004	12	.001	1	0	11	0	15
250			min	-336.697	3	.033	15	-.184	1	0	3	0	3	0	4
251		12	max	297.682	1	.1	2	-.004	12	.001	1	0	15	0	15
252			min	-336.602	3	.021	15	-.184	1	0	3	0	3	0	4
253		13	max	297.808	1	.06	2	-.004	12	.001	1	0	15	0	15
254			min	-336.508	3	.008	9	-.184	1	0	3	0	3	0	4
255		14	max	297.934	1	.02	2	-.004	12	.001	1	0	15	0	15
256			min	-336.414	3	-.031	1	-.184	1	0	3	0	3	0	4
257		15	max	298.06	1	-.015	15	-.004	12	.001	1	0	15	0	15
258			min	-336.319	3	-.071	1	-.184	1	0	3	0	1	0	4
259		16	max	298.186	1	-.027	15	-.004	12	.001	1	0	15	0	15
260			min	-336.225	3	-.119	4	-.184	1	0	3	0	1	0	4
261		17	max	298.311	1	-.039	15	-.004	12	.001	1	0	15	0	15
262			min	-336.13	3	-.17	4	-.184	1	0	3	0	1	0	4
263		18	max	298.437	1	-.051	15	-.004	12	.001	1	0	15	0	15
264			min	-336.036	3	-.221	4	-.184	1	0	3	0	1	0	4
265		19	max	298.563	1	-.063	15	-.004	12	.001	1	0	15	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
266			min	-335.942	3	-.272	4	-.184	1	0	3	0	1	0	4
267	M11	1	max	155.345	2	1.762	4	.639	1	0	1	0	3	0	4
268			min	-174.693	3	.414	15	-.004	3	0	15	-.002	1	0	12
269		2	max	155.276	2	1.585	4	.639	1	0	1	0	3	0	1
270			min	-174.745	3	.372	15	-.004	3	0	15	-.002	1	0	3
271		3	max	155.207	2	1.408	4	.639	1	0	1	0	3	0	1
272			min	-174.797	3	.331	15	-.004	3	0	15	-.002	1	0	3
273		4	max	155.137	2	1.231	4	.639	1	0	1	0	3	0	15
274			min	-174.849	3	.289	15	-.004	3	0	15	-.001	1	0	3
275		5	max	155.068	2	1.054	4	.639	1	0	1	0	3	0	15
276			min	-174.901	3	.248	15	-.004	3	0	15	-.001	1	0	4
277		6	max	154.999	2	.877	4	.639	1	0	1	0	3	0	15
278			min	-174.953	3	.206	15	-.004	3	0	15	-.001	1	0	4
279		7	max	154.929	2	.701	4	.639	1	0	1	0	3	0	15
280			min	-175.005	3	.165	15	-.004	3	0	15	-.001	1	0	4
281		8	max	154.86	2	.524	4	.639	1	0	1	0	3	0	15
282			min	-175.057	3	.123	15	-.004	3	0	15	0	1	-.001	4
283		9	max	154.791	2	.347	4	.639	1	0	1	0	3	0	15
284			min	-175.109	3	.081	15	-.004	3	0	15	0	1	-.001	4
285		10	max	154.721	2	.17	4	.639	1	0	1	0	3	0	15
286			min	-175.161	3	.035	12	-.004	3	0	15	0	1	-.001	4
287		11	max	154.652	2	.017	1	.639	1	0	1	0	3	0	15
288			min	-175.213	3	-.056	3	-.004	3	0	15	0	1	-.001	4
289		12	max	154.583	2	-.043	15	.639	1	0	1	0	3	0	15
290			min	-175.265	3	-.184	4	-.004	3	0	15	0	1	-.001	4
291		13	max	154.513	2	-.085	15	.639	1	0	1	0	3	0	15
292			min	-175.317	3	-.36	4	-.004	3	0	15	0	1	-.001	4
293		14	max	154.444	2	-.126	15	.639	1	0	1	0	3	0	15
294			min	-175.369	3	-.537	4	-.004	3	0	15	0	1	-.001	4
295		15	max	154.375	2	-.168	15	.639	1	0	1	0	3	0	15
296			min	-175.421	3	-.714	4	-.004	3	0	15	0	10	0	4
297		16	max	154.305	2	-.209	15	.639	1	0	1	0	3	0	15
298			min	-175.473	3	-.891	4	-.004	3	0	15	0	10	0	4
299		17	max	154.236	2	-.251	15	.639	1	0	1	0	1	0	15
300			min	-175.525	3	-1.068	4	-.004	3	0	15	0	15	0	4
301		18	max	154.167	2	-.293	15	.639	1	0	1	0	1	0	15
302			min	-175.577	3	-1.245	4	-.004	3	0	15	0	15	0	4
303		19	max	154.097	2	-.334	15	.639	1	0	1	0	1	0	1
304			min	-175.629	3	-1.421	4	-.004	3	0	15	0	15	0	1
305	M12	1	max	422.392	1	0	1	3.625	1	0	1	0	2	0	1
306			min	5.966	12	0	1	.147	15	0	1	0	3	0	1
307		2	max	422.457	1	0	1	3.625	1	0	1	0	1	0	1
308			min	5.998	12	0	1	.147	15	0	1	0	15	0	1
309		3	max	422.522	1	0	1	3.625	1	0	1	0	1	0	1
310			min	6.03	12	0	1	.147	15	0	1	0	15	0	1
311		4	max	422.586	1	0	1	3.625	1	0	1	.001	1	0	1
312			min	6.063	12	0	1	.147	15	0	1	0	15	0	1
313		5	max	422.651	1	0	1	3.625	1	0	1	.001	1	0	1
314			min	6.095	12	0	1	.147	15	0	1	0	15	0	1
315		6	max	422.716	1	0	1	3.625	1	0	1	.002	1	0	1
316			min	6.127	12	0	1	.147	15	0	1	0	15	0	1
317		7	max	422.78	1	0	1	3.625	1	0	1	.002	1	0	1
318			min	6.16	12	0	1	.147	15	0	1	0	15	0	1
319		8	max	422.845	1	0	1	3.625	1	0	1	.002	1	0	1
320			min	6.192	12	0	1	.147	15	0	1	0	15	0	1
321		9	max	422.91	1	0	1	3.625	1	0	1	.003	1	0	1
322			min	6.224	12	0	1	.147	15	0	1	0	15	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
323		10	max	422.975	1	0	1	3.625	1	0	1	.003	1	0	1
324			min	6.257	12	0	1	.147	15	0	1	0	15	0	1
325		11	max	423.039	1	0	1	3.625	1	0	1	.003	1	0	1
326			min	6.289	12	0	1	.147	15	0	1	0	15	0	1
327		12	max	423.104	1	0	1	3.625	1	0	1	.004	1	0	1
328			min	6.321	12	0	1	.147	15	0	1	0	15	0	1
329		13	max	423.169	1	0	1	3.625	1	0	1	.004	1	0	1
330			min	6.354	12	0	1	.147	15	0	1	0	15	0	1
331		14	max	423.233	1	0	1	3.625	1	0	1	.004	1	0	1
332			min	6.386	12	0	1	.147	15	0	1	0	15	0	1
333		15	max	423.298	1	0	1	3.625	1	0	1	.005	1	0	1
334			min	6.419	12	0	1	.147	15	0	1	0	15	0	1
335		16	max	423.363	1	0	1	3.625	1	0	1	.005	1	0	1
336			min	6.451	12	0	1	.147	15	0	1	0	15	0	1
337		17	max	423.428	1	0	1	3.625	1	0	1	.005	1	0	1
338			min	6.483	12	0	1	.147	15	0	1	0	15	0	1
339		18	max	423.492	1	0	1	3.625	1	0	1	.006	1	0	1
340			min	6.516	12	0	1	.147	15	0	1	0	15	0	1
341		19	max	423.557	1	0	1	3.625	1	0	1	.006	1	0	1
342			min	6.548	12	0	1	.147	15	0	1	0	15	0	1
343	M1	1	max	141.822	1	340.157	3	-2.941	15	0	1	.142	1	0	1
344			min	5.733	15	-282.665	1	-71.877	1	0	3	.006	15	0	3
345		2	max	141.961	1	339.976	3	-2.941	15	0	1	.126	1	.062	1
346			min	5.775	15	-282.907	1	-71.877	1	0	3	.005	15	-.074	3
347		3	max	88.247	3	6.848	9	-2.921	15	0	12	.11	1	.122	1
348			min	-9.093	10	-23.078	2	-71.753	1	0	1	.004	15	-.146	3
349		4	max	88.351	3	6.647	9	-2.921	15	0	12	.094	1	.123	1
350			min	-8.976	10	-23.32	2	-71.753	1	0	1	.004	15	-.143	3
351		5	max	88.456	3	6.445	9	-2.921	15	0	12	.078	1	.124	1
352			min	-8.86	10	-23.562	2	-71.753	1	0	1	.003	15	-.14	3
353		6	max	88.561	3	6.244	9	-2.921	15	0	12	.063	1	.125	2
354			min	-8.744	10	-23.804	2	-71.753	1	0	1	.003	15	-.137	3
355		7	max	88.665	3	6.042	9	-2.921	15	0	12	.047	1	.13	2
356			min	-8.627	10	-24.046	2	-71.753	1	0	1	.002	15	-.134	3
357		8	max	88.77	3	5.841	9	-2.921	15	0	12	.032	1	.136	2
358			min	-8.511	10	-24.288	2	-71.753	1	0	1	.001	15	-.131	3
359		9	max	88.875	3	5.639	9	-2.921	15	0	12	.016	1	.141	2
360			min	-8.395	10	-24.529	2	-71.753	1	0	1	0	15	-.128	3
361		10	max	88.98	3	5.438	9	-2.921	15	0	12	.001	3	.146	2
362			min	-8.278	10	-24.771	2	-71.753	1	0	1	0	10	-.125	3
363		11	max	89.084	3	5.236	9	-2.921	15	0	12	0	12	.152	2
364			min	-8.162	10	-25.013	2	-71.753	1	0	1	-.015	1	-.122	3
365		12	max	89.189	3	5.035	9	-2.921	15	0	12	-.001	12	.157	2
366			min	-8.046	10	-25.255	2	-71.753	1	0	1	-.031	1	-.118	3
367		13	max	89.294	3	4.833	9	-2.921	15	0	12	-.002	12	.163	2
368			min	-7.929	10	-25.497	2	-71.753	1	0	1	-.046	1	-.115	3
369		14	max	89.398	3	4.632	9	-2.921	15	0	12	-.003	15	.168	2
370			min	-7.813	10	-25.739	2	-71.753	1	0	1	-.062	1	-.112	3
371		15	max	89.503	3	4.43	9	-2.921	15	0	12	-.003	15	.174	2
372			min	-7.697	10	-25.98	2	-71.753	1	0	1	-.077	1	-.108	3
373		16	max	93.496	2	102.58	2	-2.944	15	0	1	-.004	15	.178	2
374			min	-5.756	3	-162.581	3	-72.218	1	0	12	-.093	1	-.104	3
375		17	max	93.636	2	102.338	2	-2.944	15	0	1	-.004	15	.156	2
376			min	-5.652	3	-162.762	3	-72.218	1	0	12	-.109	1	-.068	3
377		18	max	-5.753	15	361.549	2	-3.016	15	0	3	-.005	15	.079	2
378			min	-141.562	1	-157.122	3	-74.047	1	0	2	-.125	1	-.034	3
379		19	max	-5.71	15	361.307	2	-3.016	15	0	3	-.006	15	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
380			min	-141.422	1	-157.303	3	-74.047	1	0	2	-.141	1	0	3
381	M5	1	max	311.501	1	1124.251	3	-.049	10	0	1	.005	3	0	3
382			min	10.413	12	-935.269	1	-43.67	3	0	3	0	10	0	1
383		2	max	311.641	1	1124.069	3	-.049	10	0	1	0	2	.202	1
384			min	10.483	12	-935.511	1	-43.67	3	0	3	-.005	3	-.243	3
385		3	max	274.23	3	6.274	9	5.028	3	0	3	0	2	.402	1
386			min	-43.969	10	-87.733	2	-.35	2	0	1	-.014	3	-.482	3
387		4	max	274.335	3	6.073	9	5.028	3	0	3	0	2	.41	1
388			min	-43.852	10	-87.975	2	-.35	2	0	1	-.013	3	-.471	3
389		5	max	274.44	3	5.871	9	5.028	3	0	3	0	2	.418	1
390			min	-43.736	10	-88.217	2	-.35	2	0	1	-.012	3	-.46	3
391		6	max	274.545	3	5.67	9	5.028	3	0	3	0	2	.426	1
392			min	-43.62	10	-88.459	2	-.35	2	0	1	-.01	3	-.449	3
393		7	max	274.649	3	5.468	9	5.028	3	0	3	0	2	.438	2
394			min	-43.503	10	-88.701	2	-.35	2	0	1	-.009	3	-.438	3
395		8	max	274.754	3	5.267	9	5.028	3	0	3	0	2	.457	2
396			min	-43.387	10	-88.942	2	-.35	2	0	1	-.008	3	-.427	3
397		9	max	274.859	3	5.065	9	5.028	3	0	3	0	2	.477	2
398			min	-43.27	10	-89.184	2	-.35	2	0	1	-.007	3	-.416	3
399		10	max	274.963	3	4.864	9	5.028	3	0	3	0	10	.496	2
400			min	-43.154	10	-89.426	2	-.35	2	0	1	-.006	3	-.405	3
401		11	max	275.068	3	4.662	9	5.028	3	0	3	0	10	.515	2
402			min	-43.038	10	-89.668	2	-.35	2	0	1	-.005	3	-.394	3
403		12	max	275.173	3	4.461	9	5.028	3	0	3	0	10	.535	2
404			min	-42.921	10	-89.91	2	-.35	2	0	1	-.004	3	-.383	3
405		13	max	275.278	3	4.259	9	5.028	3	0	3	0	10	.554	2
406			min	-42.805	10	-90.152	2	-.35	2	0	1	-.003	3	-.372	3
407		14	max	275.382	3	4.058	9	5.028	3	0	3	0	10	.574	2
408			min	-42.689	10	-90.393	2	-.35	2	0	1	-.002	3	-.36	3
409		15	max	275.487	3	3.856	9	5.028	3	0	3	0	10	.594	2
410			min	-42.572	10	-90.635	2	-.35	2	0	1	-.002	1	-.349	3
411		16	max	311.309	2	439.991	2	5.001	3	0	1	0	3	.609	2
412			min	-22.266	3	-507.155	3	-.377	2	0	15	-.001	1	-.334	3
413		17	max	311.449	2	439.749	2	5.001	3	0	1	.001	3	.513	2
414			min	-22.161	3	-507.336	3	-.377	2	0	15	-.001	1	-.224	3
415		18	max	-11.386	12	1191.242	2	4.574	3	0	12	.002	3	.258	2
416			min	-312.173	1	-516.437	3	-.089	2	0	1	0	1	-.112	3
417		19	max	-11.316	12	1191	2	4.574	3	0	12	.003	3	0	3
418			min	-312.033	1	-516.618	3	-.089	2	0	1	0	2	0	2
419	M9	1	max	141.192	1	340.127	3	88.203	1	0	3	-.006	15	0	1
420			min	5.705	15	-282.653	1	3.883	15	0	1	-.141	1	0	3
421		2	max	141.331	1	339.946	3	88.203	1	0	3	-.003	12	.062	1
422			min	5.747	15	-282.894	1	3.883	15	0	1	-.122	1	-.074	3
423		3	max	88.45	3	6.825	9	68.467	1	0	1	.006	3	.122	1
424			min	-8.589	10	-23.089	2	.902	12	0	15	-.101	1	-.146	3
425		4	max	88.554	3	6.624	9	68.467	1	0	1	.006	3	.123	1
426			min	-8.472	10	-23.331	2	.902	12	0	15	-.087	1	-.143	3
427		5	max	88.659	3	6.422	9	68.467	1	0	1	.006	3	.124	1
428			min	-8.356	10	-23.573	2	.902	12	0	15	-.072	1	-.14	3
429		6	max	88.764	3	6.221	9	68.467	1	0	1	.007	3	.125	2
430			min	-8.24	10	-23.814	2	.902	12	0	15	-.057	1	-.137	3
431		7	max	88.869	3	6.019	9	68.467	1	0	1	.007	3	.13	2
432			min	-8.123	10	-24.056	2	.902	12	0	15	-.042	1	-.134	3
433		8	max	88.973	3	5.818	9	68.467	1	0	1	.007	3	.135	2
434			min	-8.007	10	-24.298	2	.902	12	0	15	-.027	1	-.131	3
435		9	max	89.078	3	5.616	9	68.467	1	0	1	.007	3	.141	2
436			min	-7.891	10	-24.54	2	.902	12	0	15	-.012	1	-.128	3

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
437		10	max	89.183	3	5.415	9	68.467	1	0	1	.007	3	.146	2
438			min	-7.774	10	-24.782	2	.902	12	0	15	0	2	-.125	3
439		11	max	89.287	3	5.213	9	68.467	1	0	1	.017	1	.152	2
440			min	-7.658	10	-25.024	2	.902	12	0	15	0	15	-.122	3
441		12	max	89.392	3	5.011	9	68.467	1	0	1	.032	1	.157	2
442			min	-7.542	10	-25.265	2	.902	12	0	15	.001	15	-.118	3
443		13	max	89.497	3	4.81	9	68.467	1	0	1	.047	1	.163	2
444			min	-7.425	10	-25.507	2	.902	12	0	15	.002	15	-.115	3
445		14	max	89.602	3	4.608	9	68.467	1	0	1	.062	1	.168	2
446			min	-7.309	10	-25.749	2	.902	12	0	15	.003	15	-.112	3
447		15	max	89.706	3	4.407	9	68.467	1	0	1	.077	1	.174	2
448			min	-7.192	10	-25.991	2	.902	12	0	15	.003	15	-.108	3
449		16	max	93.804	2	102.339	2	69.015	1	0	15	.093	1	.178	2
450			min	-5.886	3	-163.05	3	.904	12	0	1	.004	15	-.104	3
451		17	max	93.943	2	102.098	2	69.015	1	0	15	.108	1	.156	2
452			min	-5.782	3	-163.231	3	.904	12	0	1	.004	15	-.068	3
453		18	max	-5.74	15	361.549	2	72.713	1	0	2	.123	1	.079	2
454			min	-141.199	1	-157.118	3	1.216	12	0	3	.005	15	-.034	3
455		19	max	-5.698	15	361.308	2	72.713	1	0	2	.139	1	0	2
456			min	-141.059	1	-157.299	3	1.216	12	0	3	.006	15	0	3
457	M13	1	max	88.435	1	282.218	1	-5.705	15	0	1	.141	1	0	1
458			min	3.883	15	-340.124	3	-141.174	1	0	3	.006	15	0	3
459		2	max	88.435	1	199.114	1	-4.375	15	0	1	.044	1	.226	3
460			min	3.883	15	-239.886	3	-108.145	1	0	3	.002	15	-.187	1
461		3	max	88.435	1	116.01	1	-3.046	15	0	1	.003	3	.373	3
462			min	3.883	15	-139.649	3	-75.116	1	0	3	-.027	1	-.31	1
463		4	max	88.435	1	32.905	1	-1.717	15	0	1	0	3	.443	3
464			min	3.883	15	-39.412	3	-42.088	1	0	3	-.073	1	-.368	1
465		5	max	88.435	1	60.826	3	-.387	15	0	1	-.002	12	.434	3
466			min	3.883	15	-50.199	1	-9.059	1	0	3	-.093	1	-.361	1
467		6	max	88.435	1	161.063	3	23.97	1	0	1	-.002	12	.348	3
468			min	3.883	15	-133.303	1	.073	3	0	3	-.087	1	-.29	1
469		7	max	88.435	1	261.3	3	56.998	1	0	1	-.002	12	.184	3
470			min	3.883	15	-216.407	1	1.425	12	0	3	-.056	1	-.154	1
471		8	max	88.435	1	361.538	3	90.027	1	0	1	.002	2	.047	1
472			min	3.883	15	-299.511	1	2.715	12	0	3	0	3	-.058	3
473		9	max	88.435	1	461.775	3	123.055	1	0	1	.084	1	.312	1
474			min	3.883	15	-382.615	1	4.004	12	0	3	.002	12	-.379	3
475		10	max	88.435	1	562.013	3	156.084	1	0	2	.193	1	.642	1
476			min	3.883	15	-465.72	1	5.294	12	0	3	.006	12	-.777	3
477		11	max	72.121	1	382.615	1	-3.824	12	0	3	.081	1	.312	1
478			min	2.941	15	-461.775	3	-122.422	1	0	1	0	3	-.379	3
479		12	max	72.121	1	299.511	1	-2.535	12	0	3	.002	2	.047	1
480			min	2.941	15	-361.538	3	-89.393	1	0	1	-.005	3	-.058	3
481		13	max	72.121	1	216.407	1	-1.245	12	0	3	-.002	15	.184	3
482			min	2.941	15	-261.3	3	-56.365	1	0	1	-.058	1	-.154	1
483		14	max	72.121	1	133.303	1	.221	3	0	3	-.004	15	.348	3
484			min	2.941	15	-161.063	3	-23.336	1	0	1	-.089	1	-.29	1
485		15	max	72.121	1	50.199	1	9.692	1	0	3	-.004	15	.434	3
486			min	2.941	15	-60.826	3	.415	15	0	1	-.094	1	-.361	1
487		16	max	72.121	1	39.412	3	42.721	1	0	3	-.003	12	.443	3
488			min	2.941	15	-32.906	1	1.745	15	0	1	-.074	1	-.368	1
489		17	max	72.121	1	139.649	3	75.75	1	0	3	0	3	.373	3
490			min	2.941	15	-116.01	1	3.074	15	0	1	-.027	1	-.31	1
491		18	max	72.121	1	239.886	3	108.778	1	0	3	.044	1	.226	3
492			min	2.941	15	-199.114	1	4.404	15	0	1	.002	15	-.187	1
493		19	max	72.121	1	340.124	3	141.807	1	0	3	.142	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
494			min	2.941	15	-282.218	1	5.733	15	0	1	.006	15	0	3
495	M16	1	max	-1.215	12	361.533	2	-5.698	15	0	3	.139	1	0	2
496			min	-72.447	1	-157.327	3	-141.074	1	0	2	.006	15	0	3
497		2	max	-1.215	12	255.087	2	-4.368	15	0	3	.042	1	.104	3
498			min	-72.447	1	-111.135	3	-108.046	1	0	2	.002	15	-.24	2
499		3	max	-1.215	12	148.641	2	-3.039	15	0	3	0	12	.173	3
500			min	-72.447	1	-64.944	3	-75.017	1	0	2	-.029	1	-.397	2
501		4	max	-1.215	12	42.195	2	-1.709	15	0	3	-.003	15	.205	3
502			min	-72.447	1	-18.753	3	-41.988	1	0	2	-.074	1	-.471	2
503		5	max	-1.215	12	27.438	3	-.38	15	0	3	-.004	15	.202	3
504			min	-72.447	1	-64.251	2	-8.96	1	0	2	-.094	1	-.462	2
505		6	max	-1.215	12	73.629	3	24.069	1	0	3	-.004	15	.163	3
506			min	-72.447	1	-170.697	2	.379	12	0	2	-.088	1	-.371	2
507		7	max	-1.215	12	119.82	3	57.097	1	0	3	-.002	15	.087	3
508			min	-72.447	1	-277.143	2	1.669	12	0	2	-.057	1	-.197	2
509		8	max	-1.215	12	166.012	3	90.126	1	0	3	.002	2	.06	2
510			min	-72.447	1	-383.589	2	2.959	12	0	2	-.003	3	-.024	3
511		9	max	-1.215	12	212.203	3	123.155	1	0	3	.083	1	.4	2
512			min	-72.447	1	-490.036	2	4.249	12	0	2	0	12	-.171	3
513		10	max	-3.015	15	-12.907	15	156.183	1	0	15	.192	1	.822	2
514			min	-73.811	1	-596.482	2	-8.62	3	0	2	.007	12	-.354	3
515		11	max	-3.015	15	490.035	2	-4.489	12	0	2	.083	1	.4	2
516			min	-73.811	1	-212.203	3	-122.791	1	0	3	.003	12	-.171	3
517		12	max	-3.015	15	383.589	2	-3.199	12	0	2	.002	2	.06	2
518			min	-73.811	1	-166.012	3	-89.763	1	0	3	0	3	-.024	3
519		13	max	-3.015	15	277.143	2	-1.909	12	0	2	-.002	15	.087	3
520			min	-73.811	1	-119.82	3	-56.734	1	0	3	-.056	1	-.197	2
521		14	max	-3.015	15	170.697	2	-.619	12	0	2	-.003	12	.163	3
522			min	-73.811	1	-73.629	3	-23.706	1	0	3	-.088	1	-.371	2
523		15	max	-3.015	15	64.251	2	9.323	1	0	2	-.003	12	.202	3
524			min	-73.811	1	-27.438	3	.393	15	0	3	-.093	1	-.462	2
525		16	max	-3.015	15	18.753	3	42.352	1	0	2	-.002	12	.205	3
526			min	-73.811	1	-42.195	2	1.722	15	0	3	-.073	1	-.471	2
527		17	max	-3.015	15	64.944	3	75.38	1	0	2	0	3	.173	3
528			min	-73.811	1	-148.641	2	3.052	15	0	3	-.027	1	-.397	2
529		18	max	-3.015	15	111.135	3	108.409	1	0	2	.044	1	.104	3
530			min	-73.811	1	-255.087	2	4.381	15	0	3	.002	15	-.24	2
531		19	max	-3.015	15	157.327	3	141.438	1	0	2	.141	1	0	2
532			min	-73.811	1	-361.533	2	5.71	15	0	3	.006	15	0	3
533	M15	1	max	0	2	2.45	4	.043	3	0	1	0	1	0	1
534			min	-53.43	3	0	2	-.04	1	0	3	0	3	0	1
535		2	max	0	2	2.178	4	.043	3	0	1	0	1	0	2
536			min	-53.501	3	0	2	-.04	1	0	3	0	3	0	4
537		3	max	0	2	1.905	4	.043	3	0	1	0	1	0	2
538			min	-53.571	3	0	2	-.04	1	0	3	0	3	-.002	4
539		4	max	0	2	1.633	4	.043	3	0	1	0	1	0	2
540			min	-53.642	3	0	2	-.04	1	0	3	0	3	-.003	4
541		5	max	0	2	1.361	4	.043	3	0	1	0	1	0	2
542			min	-53.712	3	0	2	-.04	1	0	3	0	3	-.003	4
543		6	max	0	2	1.089	4	.043	3	0	1	0	1	0	2
544			min	-53.783	3	0	2	-.04	1	0	3	0	3	-.004	4
545		7	max	0	2	.817	4	.043	3	0	1	0	3	0	2
546			min	-53.853	3	0	2	-.04	1	0	3	0	1	-.004	4
547		8	max	0	2	.544	4	.043	3	0	1	0	3	0	2
548			min	-53.924	3	0	2	-.04	1	0	3	0	1	-.005	4
549		9	max	0	2	.272	4	.043	3	0	1	0	3	0	2
550			min	-53.994	3	0	2	-.04	1	0	3	0	1	-.005	4

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
551		10	max	0	2	0	1	.043	3	0	1	0	3	0	2
552			min	-54.065	3	0	1	-.04	1	0	3	0	1	-.005	4
553		11	max	0	2	0	2	.043	3	0	1	0	3	0	2
554			min	-54.135	3	-.272	4	-.04	1	0	3	0	1	-.005	4
555		12	max	0	2	0	2	.043	3	0	1	0	3	0	2
556			min	-54.206	3	-.544	4	-.04	1	0	3	0	1	-.005	4
557		13	max	0	2	0	2	.043	3	0	1	0	3	0	2
558			min	-54.276	3	-.817	4	-.04	1	0	3	0	1	-.004	4
559		14	max	0	2	0	2	.043	3	0	1	0	3	0	2
560			min	-54.347	3	-1.089	4	-.04	1	0	3	0	1	-.004	4
561		15	max	0	2	0	2	.043	3	0	1	0	3	0	2
562			min	-54.417	3	-1.361	4	-.04	1	0	3	0	1	-.003	4
563		16	max	0	2	0	2	.043	3	0	1	0	3	0	2
564			min	-54.488	3	-1.633	4	-.04	1	0	3	0	1	-.003	4
565		17	max	0	2	0	2	.043	3	0	1	0	3	0	2
566			min	-54.558	3	-1.905	4	-.04	1	0	3	0	1	-.002	4
567		18	max	0	2	0	2	.043	3	0	1	0	3	0	2
568			min	-54.629	3	-2.178	4	-.04	1	0	3	0	1	0	4
569		19	max	0	2	0	2	.043	3	0	1	0	3	0	1
570			min	-54.699	3	-2.45	4	-.04	1	0	3	0	1	0	1
571	M16A	1	max	-.853	10	2.45	4	.023	1	0	3	0	3	0	1
572			min	-54.024	3	.576	15	-.017	3	0	2	0	1	0	1
573		2	max	-.775	10	2.178	4	.023	1	0	3	0	3	0	15
574			min	-53.953	3	.512	15	-.017	3	0	2	0	1	0	4
575		3	max	-.697	10	1.905	4	.023	1	0	3	0	3	0	15
576			min	-53.883	3	.448	15	-.017	3	0	2	0	1	-.002	4
577		4	max	-.618	10	1.633	4	.023	1	0	3	0	3	0	15
578			min	-53.812	3	.384	15	-.017	3	0	2	0	1	-.003	4
579		5	max	-.54	10	1.361	4	.023	1	0	3	0	3	0	15
580			min	-53.742	3	.32	15	-.017	3	0	2	0	1	-.003	4
581		6	max	-.462	10	1.089	4	.023	1	0	3	0	3	0	15
582			min	-53.671	3	.256	15	-.017	3	0	2	0	1	-.004	4
583		7	max	-.383	10	.817	4	.023	1	0	3	0	3	0	15
584			min	-53.601	3	.192	15	-.017	3	0	2	0	1	-.004	4
585		8	max	-.305	10	.544	4	.023	1	0	3	0	3	-.001	15
586			min	-53.53	3	.128	15	-.017	3	0	2	0	1	-.005	4
587		9	max	-.227	10	.272	4	.023	1	0	3	0	3	-.001	15
588			min	-53.46	3	.064	15	-.017	3	0	2	0	1	-.005	4
589		10	max	-.148	10	0	1	.023	1	0	3	0	3	-.001	15
590			min	-53.389	3	0	1	-.017	3	0	2	0	1	-.005	4
591		11	max	-.07	10	-.064	15	.023	1	0	3	0	3	-.001	15
592			min	-53.319	3	-.272	4	-.017	3	0	2	0	1	-.005	4
593		12	max	.008	10	-.128	15	.023	1	0	3	0	3	-.001	15
594			min	-53.248	3	-.544	4	-.017	3	0	2	0	1	-.005	4
595		13	max	.087	10	-.192	15	.023	1	0	3	0	2	0	15
596			min	-53.178	3	-.817	4	-.017	3	0	2	0	3	-.004	4
597		14	max	.165	10	-.256	15	.023	1	0	3	0	1	0	15
598			min	-53.107	3	-1.089	4	-.017	3	0	2	0	3	-.004	4
599		15	max	.243	10	-.32	15	.023	1	0	3	0	1	0	15
600			min	-53.037	3	-1.361	4	-.017	3	0	2	0	3	-.003	4
601		16	max	.322	10	-.384	15	.023	1	0	3	0	1	0	15
602			min	-52.966	3	-1.633	4	-.017	3	0	2	0	3	-.003	4
603		17	max	.4	10	-.448	15	.023	1	0	3	0	1	0	15
604			min	-52.896	3	-1.905	4	-.017	3	0	2	0	3	-.002	4
605		18	max	.478	10	-.512	15	.023	1	0	3	0	1	0	15
606			min	-52.825	3	-2.178	4	-.017	3	0	2	0	3	0	4
607		19	max	.557	10	-.576	15	.023	1	0	3	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
608			min	-52.755	3	-2.45	4	-.017	3	0	2	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.003	1	.009	2	.014	1	-4.727e-5	15	NC	3	NC	3
2			min	-.004	3	-.009	3	0	3	-1.154e-3	1	4253.755	2	2835.966	1
3		2	max	.003	1	.008	2	.013	1	-4.521e-5	15	NC	3	NC	3
4			min	-.003	3	-.009	3	0	3	-1.105e-3	1	4642.982	2	3053.843	1
5		3	max	.002	1	.008	2	.012	1	-4.315e-5	15	NC	3	NC	3
6			min	-.003	3	-.009	3	0	3	-1.055e-3	1	5105.982	2	3311.282	1
7		4	max	.002	1	.007	2	.011	1	-4.109e-5	15	NC	1	NC	3
8			min	-.003	3	-.008	3	0	3	-1.005e-3	1	5660.562	2	3617.714	1
9		5	max	.002	1	.006	2	.01	1	-3.904e-5	15	NC	1	NC	2
10			min	-.003	3	-.008	3	0	3	-9.551e-4	1	6330.454	2	3985.733	1
11		6	max	.002	1	.006	2	.009	1	-3.698e-5	15	NC	1	NC	2
12			min	-.003	3	-.007	3	0	3	-9.053e-4	1	7147.807	2	4432.451	1
13		7	max	.002	1	.005	2	.008	1	-3.492e-5	15	NC	1	NC	2
14			min	-.002	3	-.007	3	0	3	-8.555e-4	1	8157.005	2	4981.599	1
15		8	max	.002	1	.004	2	.007	1	-3.287e-5	15	NC	1	NC	2
16			min	-.002	3	-.007	3	0	3	-8.057e-4	1	9420.683	2	5666.88	1
17		9	max	.002	1	.004	2	.006	1	-3.081e-5	15	NC	1	NC	2
18			min	-.002	3	-.006	3	0	3	-7.558e-4	1	NC	1	6537.5	1
19		10	max	.001	1	.003	2	.005	1	-2.875e-5	15	NC	1	NC	2
20			min	-.002	3	-.006	3	0	3	-7.06e-4	1	NC	1	7667.7	1
21		11	max	.001	1	.002	2	.004	1	-2.669e-5	15	NC	1	NC	2
22			min	-.002	3	-.005	3	0	3	-6.562e-4	1	NC	1	9173.992	1
23		12	max	.001	1	.002	2	.004	1	-2.464e-5	15	NC	1	NC	1
24			min	-.001	3	-.005	3	0	3	-6.063e-4	1	NC	1	NC	1
25		13	max	0	1	.002	2	.003	1	-2.258e-5	15	NC	1	NC	1
26			min	-.001	3	-.004	3	0	3	-5.565e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	.002	1	-2.052e-5	15	NC	1	NC	1
28			min	0	3	-.003	3	0	3	-5.067e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	.002	1	-1.847e-5	15	NC	1	NC	1
30			min	0	3	-.003	3	0	3	-4.569e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-1.641e-5	15	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-4.07e-4	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-1.435e-5	15	NC	1	NC	1
34			min	0	3	-.001	3	0	3	-3.572e-4	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-1.229e-5	15	NC	1	NC	1
36			min	0	3	0	3	0	12	-3.074e-4	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-8.621e-6	12	NC	1	NC	1
38			min	0	1	0	1	0	1	-2.576e-4	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	1.215e-4	1	NC	1	NC	1
40			min	0	1	0	1	0	1	4.19e-6	12	NC	1	NC	1
41		2	max	0	3	0	2	0	12	1.49e-4	1	NC	1	NC	1
42			min	0	2	0	3	0	1	5.969e-6	15	NC	1	NC	1
43		3	max	0	3	0	2	0	12	1.766e-4	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	7.106e-6	15	NC	1	NC	1
45		4	max	0	3	0	2	0	12	2.041e-4	1	NC	1	NC	1
46			min	0	2	-.003	3	-.001	1	8.243e-6	15	NC	1	NC	1
47		5	max	0	3	0	2	0	3	2.316e-4	1	NC	1	NC	1
48			min	0	2	-.003	3	-.001	1	9.379e-6	15	NC	1	NC	1
49		6	max	0	3	0	2	0	3	2.591e-4	1	NC	1	NC	1
50			min	0	2	-.004	3	-.001	1	1.052e-5	15	NC	1	NC	1
51		7	max	0	3	0	2	0	3	2.867e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
52			min	0	2	-.005	3	0	1	1.165e-5	15	NC	1	NC	1
53		8	max	0	3	0	2	0	3	3.142e-4	1	NC	1	NC	1
54			min	0	2	-.006	3	0	1	1.279e-5	15	NC	1	NC	1
55		9	max	0	3	.001	2	0	3	3.417e-4	1	NC	1	NC	1
56			min	0	2	-.006	3	0	1	1.393e-5	15	NC	1	NC	1
57		10	max	0	3	.002	2	0	1	3.692e-4	1	NC	1	NC	1
58			min	0	2	-.007	3	0	15	1.506e-5	15	NC	1	NC	1
59		11	max	.001	3	.002	2	.001	1	3.967e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	15	1.62e-5	15	NC	1	NC	1
61		12	max	.001	3	.003	2	.002	1	4.243e-4	1	NC	1	NC	1
62			min	-.001	2	-.007	3	0	15	1.734e-5	15	NC	1	NC	1
63		13	max	.001	3	.003	2	.002	1	4.518e-4	1	NC	1	NC	1
64			min	-.001	2	-.008	3	0	15	1.847e-5	15	NC	1	NC	1
65		14	max	.001	3	.004	2	.003	1	4.793e-4	1	NC	1	NC	1
66			min	-.001	2	-.008	3	0	15	1.961e-5	15	NC	1	NC	1
67		15	max	.002	3	.005	2	.004	1	5.068e-4	1	NC	1	NC	1
68			min	-.001	2	-.008	3	0	15	2.075e-5	15	8997.649	2	NC	1
69		16	max	.002	3	.006	2	.005	1	5.344e-4	1	NC	1	NC	2
70			min	-.001	2	-.008	3	0	15	2.189e-5	15	7616.427	2	9636.709	1
71		17	max	.002	3	.007	2	.006	1	5.619e-4	1	NC	1	NC	2
72			min	-.002	2	-.008	3	0	15	2.302e-5	15	6549.366	2	8254.779	1
73		18	max	.002	3	.008	2	.006	1	5.894e-4	1	NC	3	NC	2
74			min	-.002	2	-.008	3	0	15	2.416e-5	15	5715.423	2	7228.815	1
75		19	max	.002	3	.009	2	.007	1	6.169e-4	1	NC	3	NC	2
76			min	-.002	2	-.008	3	0	15	2.53e-5	15	5057.729	2	6447.967	1
77	M4	1	max	.002	1	.011	2	0	15	-3.619e-5	15	NC	1	NC	3
78			min	0	12	-.009	3	-.005	1	-8.995e-4	1	NC	1	3592.242	1
79		2	max	.002	1	.01	2	0	15	-3.619e-5	15	NC	1	NC	3
80			min	0	12	-.009	3	-.005	1	-8.995e-4	1	NC	1	3918.977	1
81		3	max	.002	1	.01	2	0	15	-3.619e-5	15	NC	1	NC	2
82			min	0	12	-.008	3	-.004	1	-8.995e-4	1	NC	1	4307.836	1
83		4	max	.002	1	.009	2	0	15	-3.619e-5	15	NC	1	NC	2
84			min	0	12	-.008	3	-.004	1	-8.995e-4	1	NC	1	4775.207	1
85		5	max	.002	1	.008	2	0	15	-3.619e-5	15	NC	1	NC	2
86			min	0	12	-.007	3	-.004	1	-8.995e-4	1	NC	1	5343.414	1
87		6	max	.001	1	.008	2	0	15	-3.619e-5	15	NC	1	NC	2
88			min	0	12	-.007	3	-.003	1	-8.995e-4	1	NC	1	6043.511	1
89		7	max	.001	1	.007	2	0	15	-3.619e-5	15	NC	1	NC	2
90			min	0	12	-.006	3	-.003	1	-8.995e-4	1	NC	1	6919.728	1
91		8	max	.001	1	.007	2	0	15	-3.619e-5	15	NC	1	NC	2
92			min	0	12	-.006	3	-.002	1	-8.995e-4	1	NC	1	8036.841	1
93		9	max	.001	1	.006	2	0	15	-3.619e-5	15	NC	1	NC	2
94			min	0	12	-.005	3	-.002	1	-8.995e-4	1	NC	1	9492.834	1
95		10	max	.001	1	.005	2	0	15	-3.619e-5	15	NC	1	NC	1
96			min	0	12	-.005	3	-.002	1	-8.995e-4	1	NC	1	NC	1
97		11	max	0	1	.005	2	0	15	-3.619e-5	15	NC	1	NC	1
98			min	0	12	-.004	3	-.001	1	-8.995e-4	1	NC	1	NC	1
99		12	max	0	1	.004	2	0	15	-3.619e-5	15	NC	1	NC	1
100			min	0	12	-.004	3	-.001	1	-8.995e-4	1	NC	1	NC	1
101		13	max	0	1	.004	2	0	15	-3.619e-5	15	NC	1	NC	1
102			min	0	12	-.003	3	0	1	-8.995e-4	1	NC	1	NC	1
103		14	max	0	1	.003	2	0	15	-3.619e-5	15	NC	1	NC	1
104			min	0	12	-.003	3	0	1	-8.995e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	15	-3.619e-5	15	NC	1	NC	1
106			min	0	12	-.002	3	0	1	-8.995e-4	1	NC	1	NC	1
107		16	max	0	1	.002	2	0	15	-3.619e-5	15	NC	1	NC	1
108			min	0	12	-.002	3	0	1	-8.995e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	.001	2	0	15	-3.619e-5	15	NC	1	NC	1
110			min	0	12	-.001	3	0	1	-8.995e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	15	-3.619e-5	15	NC	1	NC	1
112			min	0	12	0	3	0	1	-8.995e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-3.619e-5	15	NC	1	NC	1
114			min	0	1	0	1	0	1	-8.995e-4	1	NC	1	NC	1
115	M6	1	max	.009	1	.034	2	.005	1	3.211e-4	3	NC	3	NC	2
116			min	-.011	3	-.03	3	-.004	3	9.103e-7	10	1174.557	2	8317.329	1
117		2	max	.009	1	.031	2	.004	1	3.109e-4	3	NC	3	NC	2
118			min	-.011	3	-.028	3	-.004	3	2.811e-7	10	1256.107	2	9005.318	1
119		3	max	.008	1	.029	2	.004	1	3.006e-4	3	NC	3	NC	2
120			min	-.01	3	-.027	3	-.003	3	-3.481e-7	10	1349.457	2	9818.967	1
121		4	max	.008	1	.027	2	.004	1	2.903e-4	3	NC	3	NC	1
122			min	-.01	3	-.025	3	-.003	3	-1.145e-6	2	1456.964	2	NC	1
123		5	max	.007	1	.025	2	.003	1	2.801e-4	3	NC	3	NC	1
124			min	-.009	3	-.023	3	-.003	3	-3.903e-6	2	1581.663	2	NC	1
125		6	max	.007	1	.023	2	.003	1	2.698e-4	3	NC	3	NC	1
126			min	-.008	3	-.022	3	-.003	3	-6.661e-6	2	1727.526	2	NC	1
127		7	max	.006	1	.021	2	.003	1	2.595e-4	3	NC	3	NC	1
128			min	-.008	3	-.02	3	-.002	3	-9.418e-6	2	1899.852	2	NC	1
129		8	max	.006	1	.019	2	.002	1	2.493e-4	3	NC	3	NC	1
130			min	-.007	3	-.019	3	-.002	3	-1.218e-5	2	2105.867	2	NC	1
131		9	max	.005	1	.017	2	.002	1	2.39e-4	3	NC	3	NC	1
132			min	-.006	3	-.017	3	-.002	3	-1.493e-5	2	2355.691	2	NC	1
133		10	max	.005	1	.015	2	.002	1	2.288e-4	3	NC	3	NC	1
134			min	-.006	3	-.015	3	-.002	3	-1.769e-5	2	2663.937	2	NC	1
135		11	max	.004	1	.013	2	.001	1	2.185e-4	3	NC	3	NC	1
136			min	-.005	3	-.014	3	-.001	3	-2.045e-5	2	3052.517	2	NC	1
137		12	max	.004	1	.011	2	.001	1	2.082e-4	3	NC	3	NC	1
138			min	-.004	3	-.012	3	-.001	3	-2.321e-5	2	3555.858	2	NC	1
139		13	max	.003	1	.009	2	0	1	1.98e-4	3	NC	3	NC	1
140			min	-.004	3	-.01	3	0	3	-2.596e-5	2	4231.319	2	NC	1
141		14	max	.003	1	.008	2	0	1	1.877e-4	3	NC	3	NC	1
142			min	-.003	3	-.009	3	0	3	-2.872e-5	2	5182.118	2	NC	1
143		15	max	.002	1	.006	2	0	1	1.775e-4	3	NC	3	NC	1
144			min	-.003	3	-.007	3	0	3	-3.148e-5	2	6614.65	2	NC	1
145		16	max	.002	1	.004	2	0	1	1.672e-4	3	NC	1	NC	1
146			min	-.002	3	-.005	3	0	3	-3.424e-5	2	9010.432	2	NC	1
147		17	max	.001	1	.003	2	0	1	1.569e-4	3	NC	1	NC	1
148			min	-.001	3	-.003	3	0	3	-3.699e-5	2	NC	1	NC	1
149		18	max	0	1	.001	2	0	1	1.467e-4	3	NC	1	NC	1
150			min	0	3	-.002	3	0	3	-4.63e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.364e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-5.736e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	2.663e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-6.403e-5	3	NC	1	NC	1
155		2	max	0	3	.002	2	0	3	2.405e-5	1	NC	1	NC	1
156			min	0	2	-.002	3	0	1	-4.701e-5	3	NC	1	NC	1
157		3	max	0	3	.003	2	0	3	2.147e-5	1	NC	1	NC	1
158			min	0	2	-.004	3	0	1	-3.e-5	3	NC	1	NC	1
159		4	max	.001	3	.005	2	0	3	1.889e-5	1	NC	1	NC	1
160			min	-.001	2	-.006	3	0	1	-1.298e-5	3	NC	1	NC	1
161		5	max	.001	3	.006	2	.001	3	1.631e-5	1	NC	1	NC	1
162			min	-.002	2	-.008	3	0	1	5.167e-7	15	7690.039	2	NC	1
163		6	max	.002	3	.007	2	.001	3	2.105e-5	3	NC	3	NC	1
164			min	-.002	2	-.01	3	0	1	5.307e-7	15	6165.667	2	NC	1
165		7	max	.002	3	.009	2	.002	3	3.807e-5	3	NC	3	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
166			min	-.002	2	-.012	3	0	1	5.447e-7	15	5125.995	2	NC	1
167		8	max	.002	3	.011	2	.002	3	5.508e-5	3	NC	3	NC	1
168			min	-.003	2	-.013	3	0	1	-9.525e-7	2	4365.738	2	NC	1
169		9	max	.003	3	.012	2	.002	3	7.21e-5	3	NC	3	NC	1
170			min	-.003	2	-.015	3	-.001	1	-3.931e-6	2	3782.554	2	NC	1
171		10	max	.003	3	.014	2	.002	3	8.911e-5	3	NC	3	NC	1
172			min	-.004	2	-.016	3	-.001	1	-6.909e-6	2	3319.706	2	NC	1
173		11	max	.003	3	.016	2	.002	3	1.061e-4	3	NC	3	NC	1
174			min	-.004	2	-.018	3	-.001	1	-9.887e-6	2	2943.145	2	NC	1
175		12	max	.004	3	.018	2	.002	3	1.231e-4	3	NC	3	NC	1
176			min	-.004	2	-.019	3	-.002	1	-1.287e-5	2	2631.116	2	NC	1
177		13	max	.004	3	.019	2	.002	3	1.402e-4	3	NC	3	NC	1
178			min	-.005	2	-.02	3	-.002	1	-1.584e-5	2	2368.987	2	NC	1
179		14	max	.004	3	.021	2	.002	3	1.572e-4	3	NC	3	NC	1
180			min	-.005	2	-.022	3	-.002	1	-1.882e-5	2	2146.483	2	NC	1
181		15	max	.005	3	.024	2	.002	3	1.742e-4	3	NC	3	NC	1
182			min	-.006	2	-.023	3	-.002	1	-2.18e-5	2	1956.123	2	NC	1
183		16	max	.005	3	.026	2	.002	3	1.912e-4	3	NC	3	NC	1
184			min	-.006	2	-.024	3	-.002	1	-2.478e-5	2	1792.293	2	NC	1
185		17	max	.005	3	.028	2	.002	3	2.082e-4	3	NC	3	NC	1
186			min	-.006	2	-.025	3	-.002	1	-2.776e-5	2	1650.671	2	NC	1
187		18	max	.006	3	.03	2	.002	3	2.252e-4	3	NC	3	NC	1
188			min	-.007	2	-.026	3	-.002	1	-3.073e-5	2	1527.868	2	NC	1
189		19	max	.006	3	.032	2	.002	3	2.422e-4	3	NC	3	NC	1
190			min	-.007	2	-.026	3	-.002	1	-3.371e-5	2	1421.179	2	NC	1
191	M8	1	max	.005	1	.038	2	.002	1	-3.189e-6	10	NC	1	NC	2
192			min	0	3	-.029	3	-.001	3	-1.914e-4	3	NC	1	7944.333	1
193		2	max	.005	1	.036	2	.002	1	-3.189e-6	10	NC	1	NC	2
194			min	0	3	-.028	3	-.001	3	-1.914e-4	3	NC	1	8661.472	1
195		3	max	.005	1	.034	2	.002	1	-3.189e-6	10	NC	1	NC	2
196			min	0	3	-.026	3	-.001	3	-1.914e-4	3	NC	1	9515.226	1
197		4	max	.004	1	.032	2	.002	1	-3.189e-6	10	NC	1	NC	1
198			min	0	3	-.025	3	-.001	3	-1.914e-4	3	NC	1	NC	1
199		5	max	.004	1	.03	2	.002	1	-3.189e-6	10	NC	1	NC	1
200			min	0	3	-.023	3	0	3	-1.914e-4	3	NC	1	NC	1
201		6	max	.004	1	.028	2	.001	1	-3.189e-6	10	NC	1	NC	1
202			min	0	3	-.021	3	0	3	-1.914e-4	3	NC	1	NC	1
203		7	max	.004	1	.026	2	.001	1	-3.189e-6	10	NC	1	NC	1
204			min	0	3	-.02	3	0	3	-1.914e-4	3	NC	1	NC	1
205		8	max	.003	1	.023	2	.001	1	-3.189e-6	10	NC	1	NC	1
206			min	0	3	-.018	3	0	3	-1.914e-4	3	NC	1	NC	1
207		9	max	.003	1	.021	2	0	1	-3.189e-6	10	NC	1	NC	1
208			min	0	3	-.016	3	0	3	-1.914e-4	3	NC	1	NC	1
209		10	max	.003	1	.019	2	0	1	-3.189e-6	10	NC	1	NC	1
210			min	0	3	-.015	3	0	3	-1.914e-4	3	NC	1	NC	1
211		11	max	.002	1	.017	2	0	1	-3.189e-6	10	NC	1	NC	1
212			min	0	3	-.013	3	0	3	-1.914e-4	3	NC	1	NC	1
213		12	max	.002	1	.015	2	0	1	-3.189e-6	10	NC	1	NC	1
214			min	0	3	-.011	3	0	3	-1.914e-4	3	NC	1	NC	1
215		13	max	.002	1	.013	2	0	1	-3.189e-6	10	NC	1	NC	1
216			min	0	3	-.01	3	0	3	-1.914e-4	3	NC	1	NC	1
217		14	max	.001	1	.011	2	0	1	-3.189e-6	10	NC	1	NC	1
218			min	0	3	-.008	3	0	3	-1.914e-4	3	NC	1	NC	1
219		15	max	.001	1	.009	2	0	1	-3.189e-6	10	NC	1	NC	1
220			min	0	3	-.007	3	0	3	-1.914e-4	3	NC	1	NC	1
221		16	max	0	1	.006	2	0	1	-3.189e-6	10	NC	1	NC	1
222			min	0	3	-.005	3	0	3	-1.914e-4	3	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
223		17	max	0	1	.004	2	0	1	-3.189e-6	10	NC	1	NC	1
224			min	0	3	-.003	3	0	3	-1.914e-4	3	NC	1	NC	1
225		18	max	0	1	.002	2	0	1	-3.189e-6	10	NC	1	NC	1
226			min	0	3	-.002	3	0	3	-1.914e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-3.189e-6	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.914e-4	3	NC	1	NC	1
229	M10	1	max	.003	1	.009	2	0	3	1.017e-3	1	NC	3	NC	1
230			min	-.003	3	-.009	3	-.002	1	-3.269e-4	3	4256.586	2	NC	1
231		2	max	.003	1	.008	2	0	3	9.648e-4	1	NC	3	NC	1
232			min	-.003	3	-.009	3	-.002	1	-3.163e-4	3	4646.177	2	NC	1
233		3	max	.003	1	.008	2	0	3	9.128e-4	1	NC	3	NC	1
234			min	-.003	3	-.009	3	-.002	1	-3.058e-4	3	5109.631	2	NC	1
235		4	max	.002	1	.007	2	0	3	8.608e-4	1	NC	1	NC	1
236			min	-.003	3	-.008	3	-.002	1	-2.952e-4	3	5664.782	2	NC	1
237		5	max	.002	1	.006	2	0	3	8.088e-4	1	NC	1	NC	1
238			min	-.003	3	-.008	3	-.002	1	-2.846e-4	3	6335.401	2	NC	1
239		6	max	.002	1	.006	2	0	3	7.568e-4	1	NC	1	NC	1
240			min	-.002	3	-.007	3	-.002	1	-2.741e-4	3	7153.691	2	NC	1
241		7	max	.002	1	.005	2	0	3	7.049e-4	1	NC	1	NC	1
242			min	-.002	3	-.007	3	-.001	1	-2.635e-4	3	8164.111	2	NC	1
243		8	max	.002	1	.004	2	0	3	6.529e-4	1	NC	1	NC	1
244			min	-.002	3	-.007	3	-.001	1	-2.529e-4	3	9429.416	2	NC	1
245		9	max	.002	1	.004	2	0	3	6.009e-4	1	NC	1	NC	1
246			min	-.002	3	-.006	3	-.001	1	-2.424e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	5.489e-4	1	NC	1	NC	1
248			min	-.002	3	-.006	3	-.001	1	-2.318e-4	3	NC	1	NC	1
249		11	max	.001	1	.002	2	0	3	4.969e-4	1	NC	1	NC	1
250			min	-.001	3	-.005	3	0	1	-2.212e-4	3	NC	1	NC	1
251		12	max	.001	1	.002	2	0	3	4.449e-4	1	NC	1	NC	1
252			min	-.001	3	-.005	3	0	1	-2.107e-4	3	NC	1	NC	1
253		13	max	0	1	.002	2	0	3	3.929e-4	1	NC	1	NC	1
254			min	-.001	3	-.004	3	0	1	-2.001e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	3.409e-4	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	-1.896e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	2.889e-4	1	NC	1	NC	1
258			min	0	3	-.003	3	0	1	-1.79e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	2.369e-4	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-1.684e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	1.85e-4	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-1.579e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	1.33e-4	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.473e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	8.098e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.367e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	6.448e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-3.932e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	4.613e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-8.972e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	11	2.779e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-1.401e-4	1	NC	1	NC	1
273		4	max	0	3	0	2	0	10	9.446e-6	3	NC	1	NC	1
274			min	0	2	-.003	3	0	3	-1.905e-4	1	NC	1	NC	1
275		5	max	0	3	0	2	0	10	-6.331e-6	12	NC	1	NC	1
276			min	0	2	-.004	3	-.001	3	-2.409e-4	1	NC	1	NC	1
277		6	max	0	3	0	2	0	10	-1.177e-5	15	NC	1	NC	1
278			min	0	2	-.004	3	-.001	3	-2.913e-4	1	NC	1	NC	1
279		7	max	0	3	0	2	0	15	-1.392e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
280			min	0	2	-.005	3	-.002	1	-3.417e-4	1	NC	1	NC	1
281		8	max	0	3	0	2	0	15	-1.607e-5	15	NC	1	NC	1
282			min	0	2	-.006	3	-.003	1	-3.921e-4	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	15	-1.822e-5	15	NC	1	NC	1
284			min	0	2	-.006	3	-.003	1	-4.425e-4	1	NC	1	NC	1
285		10	max	0	3	.002	2	0	15	-2.036e-5	15	NC	1	NC	1
286			min	0	2	-.007	3	-.004	1	-4.929e-4	1	NC	1	NC	1
287		11	max	.001	3	.002	2	0	15	-2.251e-5	15	NC	1	NC	2
288			min	0	2	-.007	3	-.005	1	-5.432e-4	1	NC	1	8678.816	1
289		12	max	.001	3	.003	2	0	15	-2.466e-5	15	NC	1	NC	2
290			min	-.001	2	-.008	3	-.006	1	-5.936e-4	1	NC	1	7252.411	1
291		13	max	.001	3	.003	2	0	15	-2.681e-5	15	NC	1	NC	2
292			min	-.001	2	-.008	3	-.007	1	-6.44e-4	1	NC	1	6196.929	1
293		14	max	.001	3	.004	2	0	15	-2.896e-5	15	NC	1	NC	2
294			min	-.001	2	-.008	3	-.009	1	-6.944e-4	1	NC	1	5394.393	1
295		15	max	.002	3	.005	2	0	15	-3.111e-5	15	NC	1	NC	2
296			min	-.001	2	-.008	3	-.01	1	-7.448e-4	1	9009.643	2	4770.837	1
297		16	max	.002	3	.006	2	0	15	-3.326e-5	15	NC	1	NC	2
298			min	-.001	2	-.008	3	-.011	1	-7.952e-4	1	7625.671	2	4277.944	1
299		17	max	.002	3	.007	2	0	15	-3.541e-5	15	NC	1	NC	2
300			min	-.002	2	-.008	3	-.012	1	-8.456e-4	1	6556.682	2	3883.073	1
301		18	max	.002	3	.008	2	0	15	-3.756e-5	15	NC	3	NC	3
302			min	-.002	2	-.008	3	-.013	1	-8.96e-4	1	5721.362	2	3563.553	1
303		19	max	.002	3	.009	2	0	15	-3.971e-5	15	NC	3	NC	3
304			min	-.002	2	-.008	3	-.014	1	-9.464e-4	1	5062.669	2	3303.286	1
305	M12	1	max	.002	1	.011	2	.012	1	8.774e-4	1	NC	1	NC	3
306			min	0	12	-.009	3	0	15	3.757e-5	15	NC	1	1670.898	1
307		2	max	.002	1	.01	2	.011	1	8.774e-4	1	NC	1	NC	3
308			min	0	12	-.009	3	0	15	3.757e-5	15	NC	1	1822.277	1
309		3	max	.002	1	.01	2	.01	1	8.774e-4	1	NC	1	NC	3
310			min	0	12	-.008	3	0	15	3.757e-5	15	NC	1	2002.468	1
311		4	max	.002	1	.009	2	.009	1	8.774e-4	1	NC	1	NC	3
312			min	0	12	-.008	3	0	15	3.757e-5	15	NC	1	2219.064	1
313		5	max	.002	1	.008	2	.008	1	8.774e-4	1	NC	1	NC	3
314			min	0	12	-.007	3	0	15	3.757e-5	15	NC	1	2482.412	1
315		6	max	.001	1	.008	2	.007	1	8.774e-4	1	NC	1	NC	3
316			min	0	12	-.007	3	0	15	3.757e-5	15	NC	1	2806.902	1
317		7	max	.001	1	.007	2	.006	1	8.774e-4	1	NC	1	NC	3
318			min	0	12	-.006	3	0	15	3.757e-5	15	NC	1	3213.033	1
319		8	max	.001	1	.007	2	.005	1	8.774e-4	1	NC	1	NC	2
320			min	0	12	-.006	3	0	15	3.757e-5	15	NC	1	3730.821	1
321		9	max	.001	1	.006	2	.004	1	8.774e-4	1	NC	1	NC	2
322			min	0	12	-.005	3	0	15	3.757e-5	15	NC	1	4405.671	1
323		10	max	.001	1	.005	2	.004	1	8.774e-4	1	NC	1	NC	2
324			min	0	12	-.005	3	0	15	3.757e-5	15	NC	1	5308.971	1
325		11	max	0	1	.005	2	.003	1	8.774e-4	1	NC	1	NC	2
326			min	0	12	-.004	3	0	15	3.757e-5	15	NC	1	6558.304	1
327		12	max	0	1	.004	2	.002	1	8.774e-4	1	NC	1	NC	2
328			min	0	12	-.004	3	0	15	3.757e-5	15	NC	1	8358.801	1
329		13	max	0	1	.004	2	.002	1	8.774e-4	1	NC	1	NC	1
330			min	0	12	-.003	3	0	15	3.757e-5	15	NC	1	NC	1
331		14	max	0	1	.003	2	.001	1	8.774e-4	1	NC	1	NC	1
332			min	0	12	-.003	3	0	15	3.757e-5	15	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	8.774e-4	1	NC	1	NC	1
334			min	0	12	-.002	3	0	15	3.757e-5	15	NC	1	NC	1
335		16	max	0	1	.002	2	0	1	8.774e-4	1	NC	1	NC	1
336			min	0	12	-.002	3	0	15	3.757e-5	15	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	.001	2	0	1	8.774e-4	1	NC	1	NC	1
338			min	0	12	-.001	3	0	15	3.757e-5	15	NC	1	NC	1
339		18	max	0	1	0	2	0	1	8.774e-4	1	NC	1	NC	1
340			min	0	12	0	3	0	15	3.757e-5	15	NC	1	NC	1
341		19	max	0	1	0	1	0	1	8.774e-4	1	NC	1	NC	1
342			min	0	1	0	1	0	1	3.757e-5	15	NC	1	NC	1
343	M1	1	max	.008	3	.025	3	.002	3	1.903e-2	1	NC	1	NC	1
344			min	-.009	2	-.023	2	-.005	1	-2.279e-2	3	NC	1	NC	1
345		2	max	.008	3	.015	3	.001	3	9.078e-3	1	NC	4	NC	2
346			min	-.009	2	-.013	2	-.01	1	-1.128e-2	3	4709.547	2	8466.37	1
347		3	max	.008	3	.005	3	0	3	3.127e-6	3	NC	4	NC	2
348			min	-.009	2	-.004	2	-.014	1	-6.847e-4	1	2417.243	2	5136.82	1
349		4	max	.008	3	.004	1	0	3	7.892e-6	3	NC	4	NC	2
350			min	-.009	2	-.003	3	-.016	1	-5.867e-4	1	1690.958	2	4253.782	1
351		5	max	.008	3	.011	2	0	3	1.266e-5	3	NC	5	NC	2
352			min	-.009	2	-.009	3	-.016	1	-4.887e-4	1	1339.529	2	4088.784	1
353		6	max	.008	3	.017	2	0	3	1.742e-5	3	NC	5	NC	2
354			min	-.009	2	-.014	3	-.015	1	-3.906e-4	1	1138.8	2	4381.579	1
355		7	max	.008	3	.021	2	0	3	2.219e-5	3	NC	5	NC	2
356			min	-.009	2	-.018	3	-.013	1	-2.926e-4	1	1015.062	2	5229.675	1
357		8	max	.008	3	.025	2	0	3	2.696e-5	3	NC	5	NC	2
358			min	-.009	2	-.021	3	-.011	1	-1.946e-4	1	937.518	2	7212.043	1
359		9	max	.008	3	.027	2	0	3	3.172e-5	3	NC	5	NC	1
360			min	-.009	2	-.023	3	-.008	1	-9.659e-5	1	891.628	2	NC	1
361		10	max	.008	3	.028	2	0	3	3.649e-5	3	NC	5	NC	1
362			min	-.009	2	-.023	3	-.004	1	-1.545e-6	11	870.461	2	NC	1
363		11	max	.008	3	.027	2	0	3	9.945e-5	1	NC	5	NC	1
364			min	-.009	2	-.022	3	-.001	1	4.421e-6	15	871.523	2	NC	1
365		12	max	.008	3	.025	2	.002	1	1.975e-4	1	NC	5	NC	2
366			min	-.009	2	-.021	3	0	15	8.39e-6	15	895.83	2	8022.977	1
367		13	max	.008	3	.022	2	.005	1	2.955e-4	1	NC	5	NC	2
368			min	-.009	2	-.018	3	0	15	1.236e-5	15	948.452	2	5613.94	1
369		14	max	.008	3	.017	2	.006	1	3.935e-4	1	NC	5	NC	2
370			min	-.009	2	-.014	3	0	15	1.633e-5	15	1041.086	2	4620.284	1
371		15	max	.008	3	.011	2	.007	1	4.915e-4	1	NC	4	NC	2
372			min	-.009	2	-.009	3	0	15	2.03e-5	15	1199.397	2	4265.34	1
373		16	max	.008	3	.003	2	.007	1	5.599e-4	1	NC	4	NC	2
374			min	-.009	2	-.003	3	0	15	2.308e-5	15	1486.13	2	4403.268	1
375		17	max	.008	3	.004	3	.005	1	3.147e-5	3	NC	4	NC	2
376			min	-.009	2	-.006	2	0	15	-7.703e-5	1	2101.78	2	5289.496	1
377		18	max	.008	3	.012	3	.002	1	1.207e-2	2	NC	4	NC	2
378			min	-.009	2	-.018	2	0	15	-5.355e-3	3	4070.938	2	8686.911	1
379		19	max	.008	3	.02	3	0	3	2.44e-2	2	NC	1	NC	1
380			min	-.009	2	-.029	2	-.003	1	-1.084e-2	3	NC	1	NC	1
381	M5	1	max	.027	3	.081	3	.002	3	1.627e-6	3	NC	1	NC	1
382			min	-.031	2	-.077	2	-.006	1	4.783e-8	10	NC	1	NC	1
383		2	max	.027	3	.048	3	.003	3	8.698e-5	3	NC	5	NC	1
384			min	-.031	2	-.044	2	-.005	1	-6.538e-5	1	1402.362	2	NC	1
385		3	max	.027	3	.017	3	.004	3	1.707e-4	3	NC	5	NC	1
386			min	-.031	2	-.014	2	-.005	1	-1.302e-4	1	719.344	2	NC	1
387		4	max	.026	3	.013	2	.005	3	1.655e-4	3	NC	5	NC	1
388			min	-.031	2	-.009	3	-.004	1	-1.239e-4	1	502.67	2	NC	1
389		5	max	.026	3	.036	2	.005	3	1.603e-4	3	NC	5	NC	1
390			min	-.031	2	-.03	3	-.004	1	-1.177e-4	1	397.777	2	NC	1
391		6	max	.026	3	.056	2	.005	3	1.552e-4	3	NC	15	NC	1
392			min	-.031	2	-.047	3	-.004	1	-1.114e-4	1	337.828	2	NC	1
393		7	max	.026	3	.071	2	.005	3	1.5e-4	3	NC	15	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
394			min	-.031	2	-.06	3	-.003	1	-1.052e-4	1	300.836	2	NC	1
395		8	max	.026	3	.083	2	.005	3	1.448e-4	3	NC	15	NC	1
396			min	-.031	2	-.069	3	-.003	1	-9.891e-5	1	277.613	2	NC	1
397		9	max	.026	3	.091	2	.005	3	1.397e-4	3	NC	15	NC	1
398			min	-.031	2	-.074	3	-.003	1	-9.266e-5	1	263.816	2	NC	1
399		10	max	.026	3	.094	2	.005	3	1.345e-4	3	NC	15	NC	1
400			min	-.031	2	-.076	3	-.003	1	-8.641e-5	1	257.371	2	NC	1
401		11	max	.026	3	.092	2	.005	3	1.293e-4	3	NC	15	NC	1
402			min	-.031	2	-.073	3	-.003	1	-8.016e-5	1	257.526	2	NC	1
403		12	max	.026	3	.086	2	.004	3	1.242e-4	3	NC	15	NC	1
404			min	-.031	2	-.067	3	-.002	1	-7.391e-5	1	264.573	2	NC	1
405		13	max	.026	3	.075	2	.004	3	1.19e-4	3	NC	15	NC	1
406			min	-.031	2	-.057	3	-.002	1	-6.766e-5	1	280.006	2	NC	1
407		14	max	.026	3	.059	2	.003	3	1.138e-4	3	NC	15	NC	1
408			min	-.031	2	-.044	3	-.002	1	-6.141e-5	1	307.284	2	NC	1
409		15	max	.026	3	.037	2	.003	3	1.087e-4	3	NC	5	NC	1
410			min	-.031	2	-.028	3	-.002	1	-5.516e-5	1	354.018	2	NC	1
411		16	max	.025	3	.011	2	.002	3	9.955e-5	3	NC	5	NC	1
412			min	-.031	2	-.008	3	-.002	1	-5.587e-5	1	438.866	2	NC	1
413		17	max	.025	3	.014	3	.001	3	-2.394e-6	12	NC	5	NC	1
414			min	-.031	2	-.022	2	-.002	1	-2.222e-4	1	621.959	2	NC	1
415		18	max	.025	3	.039	3	0	3	-1.885e-6	12	NC	5	NC	1
416			min	-.031	2	-.06	2	-.002	1	-1.137e-4	1	1205.82	2	NC	1
417		19	max	.026	3	.065	3	0	3	-3.262e-8	15	NC	1	NC	1
418			min	-.031	2	-.1	2	-.003	1	-3.158e-7	3	NC	1	NC	1
419	M9	1	max	.008	3	.024	3	.002	3	2.279e-2	3	NC	1	NC	1
420			min	-.009	2	-.023	2	-.007	1	-1.902e-2	1	NC	1	NC	1
421		2	max	.008	3	.014	3	0	3	1.127e-2	3	NC	4	NC	2
422			min	-.009	2	-.013	2	-.001	1	-9.307e-3	1	4711.755	2	9488.214	1
423		3	max	.008	3	.005	3	.002	1	2.3e-4	1	NC	4	NC	2
424			min	-.009	2	-.004	2	0	3	-3.455e-5	3	2418.406	2	5857.704	1
425		4	max	.008	3	.004	2	.004	1	1.472e-4	1	NC	4	NC	2
426			min	-.009	2	-.003	3	0	3	-4.131e-5	3	1691.786	2	4935.42	1
427		5	max	.008	3	.011	2	.004	1	6.443e-5	1	NC	5	NC	2
428			min	-.009	2	-.009	3	-.002	3	-4.808e-5	3	1340.183	2	4854.015	1
429		6	max	.008	3	.017	2	.003	1	1.16e-5	2	NC	5	NC	2
430			min	-.009	2	-.015	3	-.002	3	-5.484e-5	3	1139.349	2	5382.919	1
431		7	max	.008	3	.021	2	.002	1	7.758e-7	10	NC	5	NC	2
432			min	-.009	2	-.019	3	-.003	3	-1.011e-4	1	1015.543	2	6811.334	1
433		8	max	.008	3	.025	2	0	2	-7.441e-6	10	NC	5	NC	1
434			min	-.009	2	-.021	3	-.003	3	-1.839e-4	1	937.954	2	NC	1
435		9	max	.008	3	.027	2	0	10	-1.09e-5	15	NC	5	NC	1
436			min	-.009	2	-.023	3	-.003	3	-2.667e-4	1	892.034	2	NC	1
437		10	max	.008	3	.028	2	0	10	-1.426e-5	15	NC	5	NC	1
438			min	-.009	2	-.023	3	-.006	1	-3.494e-4	1	870.849	2	NC	1
439		11	max	.008	3	.027	2	0	15	-1.763e-5	15	NC	5	NC	1
440			min	-.009	2	-.023	3	-.009	1	-4.322e-4	1	871.903	2	NC	1
441		12	max	.008	3	.025	2	0	15	-2.1e-5	15	NC	5	NC	2
442			min	-.009	2	-.021	3	-.011	1	-5.15e-4	1	896.21	2	6340.909	1
443		13	max	.008	3	.022	2	0	15	-2.437e-5	15	NC	5	NC	2
444			min	-.009	2	-.018	3	-.013	1	-5.977e-4	1	948.845	2	4846.105	1
445		14	max	.008	3	.017	2	0	15	-2.773e-5	15	NC	5	NC	2
446			min	-.009	2	-.014	3	-.014	1	-6.805e-4	1	1041.504	2	4175.212	1
447		15	max	.008	3	.011	2	0	15	-3.11e-5	15	NC	4	NC	2
448			min	-.009	2	-.009	3	-.015	1	-7.633e-4	1	1199.864	2	3963.656	1
449		16	max	.008	3	.003	2	0	15	-3.35e-5	15	NC	4	NC	2
450			min	-.009	2	-.003	3	-.014	1	-8.233e-4	1	1486.686	2	4168.777	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
451		17	max	.008	3	.004	3	0	15	3.453e-5	3	NC	4	NC	2
452			min	-.009	2	-.006	2	-.012	1	-3.43e-4	1	2102.516	2	5074.411	1
453		18	max	.008	3	.012	3	0	15	5.389e-3	3	NC	4	NC	2
454			min	-.009	2	-.018	2	-.008	1	-1.215e-2	2	4072.316	2	8414.598	1
455		19	max	.008	3	.02	3	0	3	1.084e-2	3	NC	1	NC	1
456			min	-.009	2	-.029	2	-.002	1	-2.44e-2	2	NC	1	NC	1
457	M13	1	max	.007	1	.024	3	.008	3	3.805e-3	3	NC	1	NC	1
458			min	-.002	3	-.023	2	-.009	2	-3.635e-3	2	NC	1	NC	1
459		2	max	.006	1	.23	3	.037	1	4.766e-3	3	NC	5	NC	2
460			min	-.002	3	-.193	1	0	10	-4.585e-3	2	817.997	3	4037.184	1
461		3	max	.006	1	.398	3	.095	1	5.728e-3	3	NC	5	NC	3
462			min	-.002	3	-.334	1	.004	15	-5.536e-3	2	450.127	3	1685.139	1
463		4	max	.006	1	.503	3	.144	1	6.69e-3	3	NC	15	NC	3
464			min	-.002	3	-.422	1	.006	15	-6.487e-3	2	351.279	3	1129.62	1
465		5	max	.006	1	.533	3	.168	1	7.652e-3	3	NC	15	NC	3
466			min	-.002	3	-.448	1	.007	15	-7.438e-3	2	330.369	3	974.632	1
467		6	max	.006	1	.49	3	.159	1	8.614e-3	3	NC	5	NC	3
468			min	-.002	3	-.413	1	.007	15	-8.388e-3	2	360.931	3	1027.384	1
469		7	max	.006	1	.388	3	.12	1	9.576e-3	3	NC	5	NC	3
470			min	-.002	3	-.33	1	.001	10	-9.339e-3	2	461.714	3	1352.142	1
471		8	max	.006	1	.256	3	.062	1	1.054e-2	3	NC	5	NC	2
472			min	-.002	3	-.221	1	-.007	10	-1.029e-2	2	724.565	3	2552.227	1
473		9	max	.006	1	.136	3	.025	3	1.15e-2	3	NC	5	NC	1
474			min	-.002	3	-.121	1	-.02	2	-1.124e-2	2	1513.88	3	NC	1
475		10	max	.006	1	.081	3	.027	3	1.246e-2	3	NC	4	NC	4
476			min	-.002	3	-.077	2	-.031	2	-1.219e-2	2	2997.072	3	7440.439	2
477		11	max	.006	1	.136	3	.03	3	1.15e-2	3	NC	5	NC	1
478			min	-.002	3	-.121	1	-.019	2	-1.124e-2	2	1513.878	3	7698.219	3
479		12	max	.006	1	.256	3	.066	1	1.054e-2	3	NC	5	NC	2
480			min	-.002	3	-.221	1	-.007	10	-1.029e-2	2	724.564	3	2398.03	1
481		13	max	.005	1	.388	3	.125	1	9.578e-3	3	NC	5	NC	5
482			min	-.002	3	-.33	1	.001	10	-9.34e-3	2	461.714	3	1300.712	1
483		14	max	.005	1	.49	3	.164	1	8.617e-3	3	NC	5	NC	5
484			min	-.002	3	-.413	1	.007	10	-8.389e-3	2	360.931	3	997.669	1
485		15	max	.005	1	.533	3	.172	1	7.656e-3	3	NC	15	NC	5
486			min	-.002	3	-.448	1	.007	15	-7.438e-3	2	330.369	3	951.005	1
487		16	max	.005	1	.503	3	.148	1	6.695e-3	3	NC	15	NC	5
488			min	-.002	3	-.422	1	.006	15	-6.488e-3	2	351.279	3	1104.918	1
489		17	max	.005	1	.398	3	.098	1	5.734e-3	3	NC	5	NC	3
490			min	-.002	3	-.334	1	.004	15	-5.537e-3	2	450.127	3	1649.169	1
491		18	max	.005	1	.23	3	.038	1	4.773e-3	3	NC	5	NC	2
492			min	-.002	3	-.193	1	0	10	-4.586e-3	2	817.996	3	3941.768	1
493		19	max	.005	1	.025	3	.008	3	3.812e-3	3	NC	1	NC	1
494			min	-.002	3	-.023	2	-.009	2	-3.636e-3	2	NC	1	NC	1
495	M16	1	max	.002	1	.02	3	.008	3	4.503e-3	2	NC	1	NC	1
496			min	0	3	-.029	2	-.009	2	-3.052e-3	3	NC	1	NC	1
497		2	max	.002	1	.118	3	.039	1	5.695e-3	2	NC	5	NC	2
498			min	0	3	-.249	2	0	10	-3.809e-3	3	763.842	2	3859.238	1
499		3	max	.002	1	.198	3	.098	1	6.886e-3	2	NC	5	NC	3
500			min	0	3	-.429	2	.004	15	-4.567e-3	3	420.021	2	1631.332	1
501		4	max	.002	1	.25	3	.148	1	8.078e-3	2	NC	15	NC	5
502			min	0	3	-.543	2	.006	15	-5.324e-3	3	327.35	2	1099.053	1
503		5	max	.002	1	.266	3	.172	1	9.27e-3	2	NC	15	NC	5
504			min	0	3	-.576	2	.007	15	-6.082e-3	3	307.173	2	949.887	1
505		6	max	.002	1	.249	3	.163	1	1.046e-2	2	NC	5	NC	5
506			min	0	3	-.532	2	.007	15	-6.839e-3	3	334.274	2	1000.593	1
507		7	max	.002	1	.204	3	.123	1	1.165e-2	2	NC	5	NC	5

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
508			min	0	3	-.425	2	.001	10	-7.597e-3	3	424.411	2	1311.732	1
509		8	max	.002	1	.145	3	.064	1	1.285e-2	2	NC	5	NC	2
510			min	0	3	-.286	2	-.007	10	-8.354e-3	3	654.841	2	2445.739	1
511		9	max	.002	1	.09	3	.028	3	1.404e-2	2	NC	5	NC	1
512			min	0	3	-.158	2	-.02	2	-9.111e-3	3	1305	2	8348.697	3
513		10	max	.003	1	.065	3	.026	3	1.523e-2	2	NC	4	NC	4
514			min	0	3	-.1	2	-.031	2	-9.869e-3	3	2379.131	2	7472.435	2
515		11	max	.003	1	.09	3	.025	3	1.404e-2	2	NC	5	NC	1
516			min	0	3	-.158	2	-.019	2	-9.111e-3	3	1305	2	9831.738	3
517		12	max	.003	1	.145	3	.063	1	1.285e-2	2	NC	5	NC	2
518			min	0	3	-.286	2	-.007	10	-8.352e-3	3	654.841	2	2490.285	1
519		13	max	.003	1	.204	3	.122	1	1.165e-2	2	NC	5	NC	5
520			min	0	3	-.425	2	.001	10	-7.594e-3	3	424.411	2	1331.31	1
521		14	max	.003	1	.249	3	.161	1	1.046e-2	2	NC	5	NC	5
522			min	0	3	-.532	2	.007	15	-6.836e-3	3	334.274	2	1015.287	1
523		15	max	.003	1	.266	3	.17	1	9.271e-3	2	NC	15	NC	3
524			min	0	3	-.576	2	.007	15	-6.077e-3	3	307.173	2	964.986	1
525		16	max	.003	1	.25	3	.145	1	8.08e-3	2	NC	15	NC	3
526			min	0	3	-.543	2	.006	15	-5.319e-3	3	327.35	2	1119.516	1
527		17	max	.003	1	.198	3	.096	1	6.888e-3	2	NC	5	NC	3
528			min	0	3	-.429	2	.004	15	-4.561e-3	3	420.021	2	1670.411	1
529		18	max	.003	1	.118	3	.037	1	5.697e-3	2	NC	5	NC	2
530			min	0	3	-.249	2	0	10	-3.802e-3	3	763.842	2	3998.072	1
531		19	max	.003	1	.02	3	.008	3	4.505e-3	2	NC	1	NC	1
532			min	0	3	-.029	2	-.009	2	-3.044e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.746e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.48e-5	2	NC	1	NC	1
535		2	max	0	3	-.004	15	.001	1	8.88e-4	3	NC	3	NC	1
536			min	0	2	-.016	4	0	3	-6.11e-4	2	5852.507	4	NC	1
537		3	max	0	3	-.007	15	.004	1	1.401e-3	3	NC	15	NC	1
538			min	0	2	-.031	4	-.004	3	-1.157e-3	2	2978.141	4	NC	1
539		4	max	0	3	-.011	15	.008	1	1.915e-3	3	8691.976	15	NC	4
540			min	0	2	-.046	4	-.007	3	-1.703e-3	2	2043.179	4	7244.007	3
541		5	max	0	3	-.014	15	.013	1	2.428e-3	3	6782.437	15	NC	4
542			min	0	2	-.058	4	-.012	3	-2.25e-3	2	1594.313	4	4768.212	3
543		6	max	0	3	-.016	15	.018	1	2.942e-3	3	5708.137	15	NC	4
544			min	0	2	-.07	4	-.018	3	-2.796e-3	2	1341.783	4	3478.786	3
545		7	max	0	3	-.018	15	.024	1	3.455e-3	3	5062.088	15	NC	4
546			min	0	2	-.078	4	-.023	3	-3.342e-3	2	1189.919	4	2723.429	3
547		8	max	0	3	-.02	15	.029	1	3.969e-3	3	4674.361	15	NC	4
548			min	0	2	-.085	4	-.029	3	-3.888e-3	2	1098.778	4	2247.997	3
549		9	max	0	3	-.021	15	.033	1	4.482e-3	3	4465.664	15	NC	4
550			min	0	2	-.089	4	-.034	3	-4.435e-3	2	1049.721	4	1936.628	3
551		10	max	0	3	-.021	15	.037	1	4.996e-3	3	4399.642	15	NC	4
552			min	0	2	-.09	4	-.038	3	-4.981e-3	2	1034.202	4	1731.053	3
553		11	max	0	3	-.021	15	.04	1	5.509e-3	3	4465.664	15	NC	5
554			min	0	2	-.089	4	-.04	3	-5.527e-3	2	1049.721	4	1600.664	3
555		12	max	0	3	-.02	15	.04	1	6.022e-3	3	4674.361	15	NC	5
556			min	0	2	-.085	4	-.041	3	-6.073e-3	2	1098.778	4	1530.291	3
557		13	max	0	3	-.018	15	.039	1	6.536e-3	3	5062.088	15	NC	5
558			min	0	2	-.079	4	-.04	3	-6.619e-3	2	1189.919	4	1515.593	3
559		14	max	0	3	-.016	15	.036	1	7.049e-3	3	5708.137	15	NC	5
560			min	0	2	-.07	4	-.036	3	-7.166e-3	2	1341.783	4	1563.26	3
561		15	max	.001	3	-.014	15	.03	1	7.563e-3	3	6782.437	15	NC	4
562			min	-.001	2	-.059	4	-.03	3	-7.712e-3	2	1594.313	4	1697.651	3
563		16	max	.001	3	-.011	15	.021	1	8.076e-3	3	8691.976	15	NC	4
564			min	-.001	2	-.046	4	-.02	3	-8.258e-3	2	2043.179	4	1984.817	3

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
565		17	max	.001	3	-.007	15	.009	1	8.59e-3	3	NC	15	NC	4
566			min	-.001	2	-.032	4	-.007	3	-8.804e-3	2	2978.141	4	2631.916	3
567		18	max	.001	3	-.004	15	.01	3	9.103e-3	3	NC	3	NC	4
568			min	-.001	2	-.017	4	-.014	2	-9.351e-3	2	5852.507	4	4686.817	3
569		19	max	.001	3	.004	2	.032	3	9.617e-3	3	NC	1	NC	1
570			min	-.001	2	-.003	9	-.034	2	-9.897e-3	2	NC	1	NC	1
571	M16A	1	max	0	10	0	2	.01	3	2.841e-3	3	NC	1	NC	1
572			min	-.001	3	-.002	9	-.01	2	-2.753e-3	2	NC	1	NC	1
573		2	max	0	10	-.004	15	.004	1	2.727e-3	3	NC	3	NC	2
574			min	-.001	3	-.017	4	-.002	10	-2.632e-3	2	5852.507	4	9830.363	1
575		3	max	0	10	-.007	15	.011	1	2.612e-3	3	NC	15	NC	4
576			min	-.001	3	-.032	4	-.003	3	-2.512e-3	2	2978.141	4	5557.605	1
577		4	max	0	10	-.011	15	.017	1	2.497e-3	3	8691.976	15	NC	4
578			min	-.001	3	-.046	4	-.008	3	-2.391e-3	2	2043.179	4	4223.159	1
579		5	max	0	10	-.014	15	.021	1	2.383e-3	3	6782.437	15	NC	4
580			min	-.001	3	-.059	4	-.011	3	-2.27e-3	2	1594.313	4	3643.53	1
581		6	max	0	10	-.016	15	.023	1	2.268e-3	3	5708.137	15	NC	4
582			min	0	3	-.07	4	-.012	3	-2.15e-3	2	1341.783	4	3388.592	1
583		7	max	0	10	-.018	15	.024	1	2.153e-3	3	5062.088	15	NC	4
584			min	0	3	-.079	4	-.013	3	-2.029e-3	2	1189.919	4	3323.349	1
585		8	max	0	10	-.02	15	.024	1	2.039e-3	3	4674.361	15	NC	4
586			min	0	3	-.085	4	-.013	3	-1.908e-3	2	1098.778	4	3401.3	1
587		9	max	0	10	-.021	15	.022	1	1.924e-3	3	4465.664	15	NC	4
588			min	0	3	-.089	4	-.013	3	-1.788e-3	2	1049.721	4	3615.523	1
589		10	max	0	10	-.021	15	.02	1	1.81e-3	3	4399.642	15	NC	4
590			min	0	3	-.09	4	-.011	3	-1.667e-3	2	1034.202	4	3987.134	1
591		11	max	0	10	-.021	15	.018	1	1.695e-3	3	4465.664	15	NC	4
592			min	0	3	-.089	4	-.01	3	-1.547e-3	2	1049.721	4	4569.642	1
593		12	max	0	10	-.02	15	.015	1	1.58e-3	3	4674.361	15	NC	4
594			min	0	3	-.085	4	-.008	3	-1.426e-3	2	1098.778	4	5469.348	1
595		13	max	0	10	-.018	15	.011	1	1.466e-3	3	5062.088	15	NC	3
596			min	0	3	-.078	4	-.006	3	-1.305e-3	2	1189.919	4	6897.632	1
597		14	max	0	10	-.016	15	.008	1	1.351e-3	3	5708.137	15	NC	2
598			min	0	3	-.069	4	-.004	3	-1.185e-3	2	1341.783	4	9309.125	1
599		15	max	0	10	-.014	15	.005	1	1.237e-3	3	6782.437	15	NC	1
600			min	0	3	-.058	4	-.002	3	-1.064e-3	2	1594.313	4	NC	1
601		16	max	0	10	-.011	15	.003	1	1.122e-3	3	8691.976	15	NC	1
602			min	0	3	-.046	4	0	3	-9.436e-4	2	2043.179	4	NC	1
603		17	max	0	10	-.007	15	.001	9	1.007e-3	3	NC	15	NC	1
604			min	0	3	-.031	4	0	2	-8.23e-4	2	2978.141	4	NC	1
605		18	max	0	10	-.004	15	0	3	8.927e-4	3	NC	3	NC	1
606			min	0	3	-.016	4	0	2	-7.024e-4	2	5852.507	4	NC	1
607		19	max	0	1	0	1	0	1	7.781e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-5.818e-4	2	NC	1	NC	1

1.Project information

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

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

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

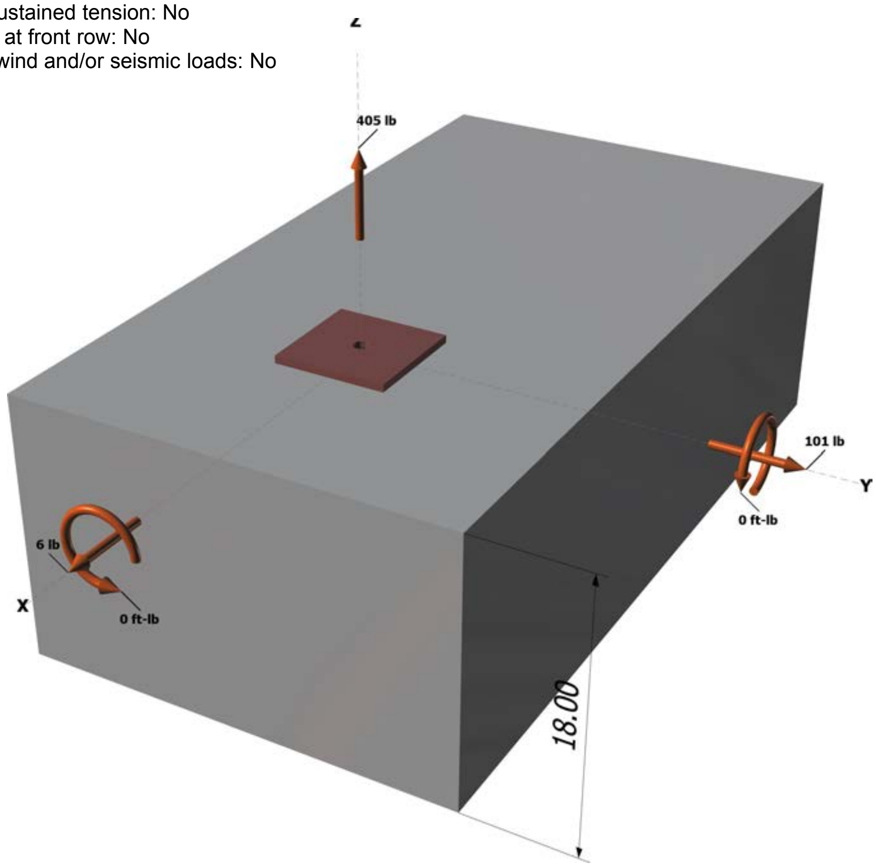
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

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

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

<Figure 1>



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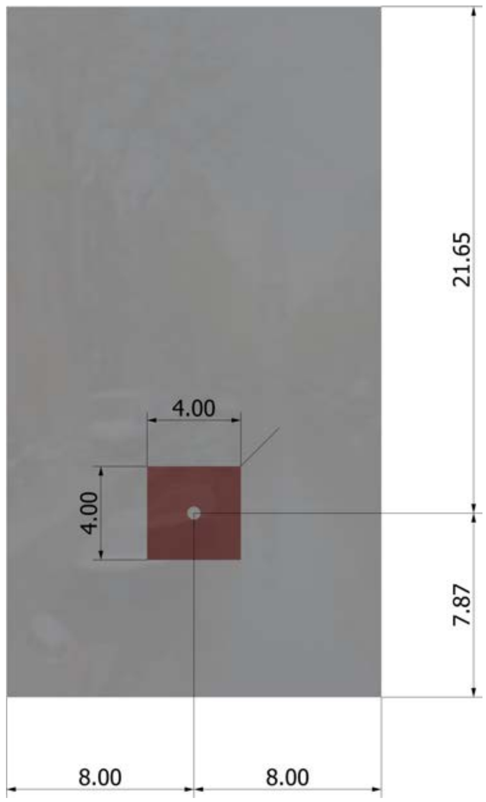


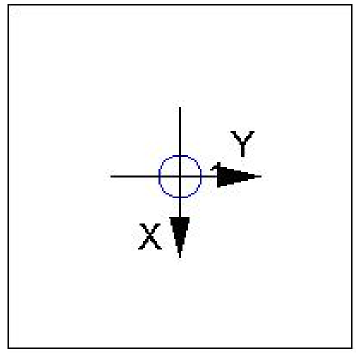
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	405.0	6.0	101.0	101.2
Sum	405.0	6.0	101.0	101.2

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 405
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



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

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

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

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

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

$\phi N_{cb} = \phi\,(A_{Nc} / A_{Nco})\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-4)

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cb} (lb)
253.92	256.00	0.995	1.00	1.000	10469	0.65	6717

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

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

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

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

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

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

Shear perpendicular to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cby} = \phi(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
238.44	288.00	0.897	1.000	1.000	8488	0.70	4411

Shear perpendicular to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cbx} = \phi(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
188.88	278.72	0.903	1.000	1.000	8282	0.70	3549

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

$\phi V_{cbx} = \phi\ (2)(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbx} (lb)
238.44	288.00	1.000	1.000	1.000	8488	0.70	9838

Shear parallel to edge in y-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	7.87	8282

$\phi V_{cby} = \phi\ (2)(A_{Vc}/A_{Vco})\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1, D.6.2.1(c) & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cby} (lb)
188.88	278.72	1.000	1.000	1.000	8282	0.70	7858

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cp} = \phi\ \min|k_{cp}N_a\ ;\ k_{cp}N_{cb}| = \phi\ \min|k_{cp}(A_{Na}/A_{Na0})\Psi_{ed,Na}\Psi_{p,Na}N_{a0}\ ;\ k_{cp}(A_{Nc}/A_{Nco})\Psi_{ed,N}\Psi_{c,N}\Psi_{cp,N}N_b|$ (Eq. D-30a)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	109.66	109.66	1.000	1.000	9755	9755

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ	ϕV_{cp} (lb)
253.92	256.00	0.995	1.000	1.000	10469	10334	0.70	13657

11. Results

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

Tension	Factored Load, N_{ua} (lb)	Design Strength, $øN_n$ (lb)	Ratio	Status
Steel	405	6071	0.07	Pass
Concrete breakout	405	6717	0.06	Pass
Adhesive	**405**	**5365**	**0.08**	**Pass (Governs)**

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

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

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

12. Warnings

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

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

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

Anchor Designer™
Software
Version 2.4.5673.0

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

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

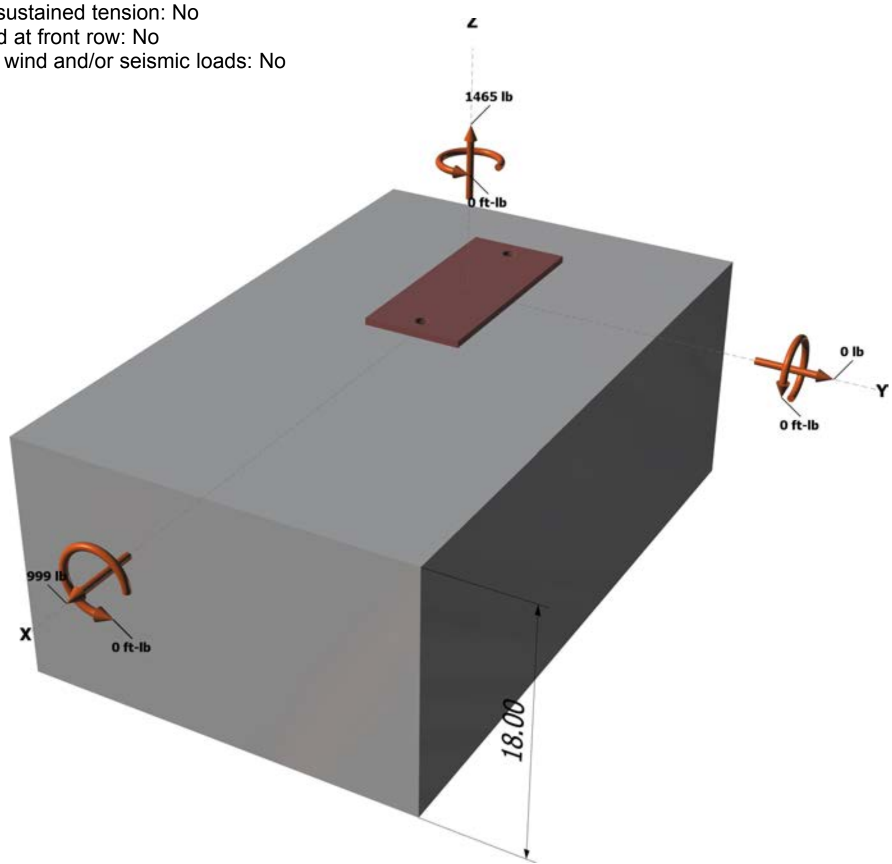
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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



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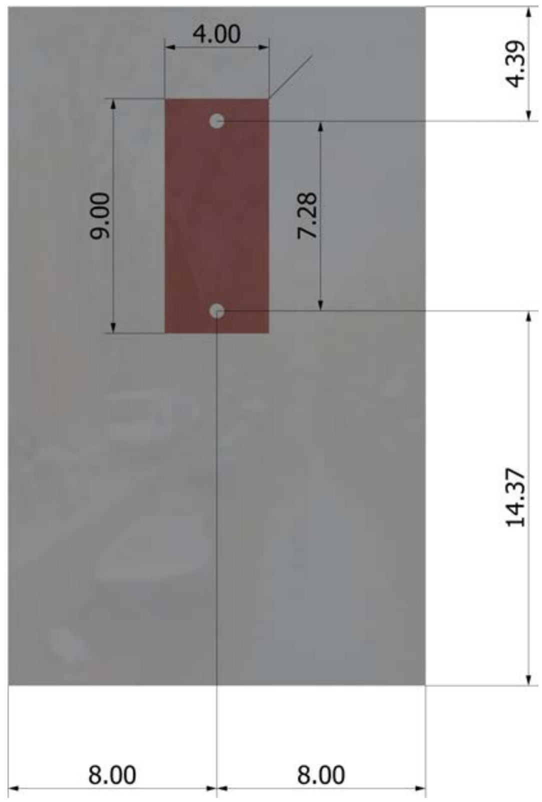


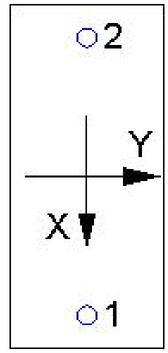
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕN_{cbg} (lb)
314.72	256.00	1.000	0.865	1.00	1.000	10469	0.65	7233

6. Adhesive Strength of Anchor in Tension (AC308 Sec. 3.3)

$\tau_{k,cr} = \tau_{k,cr} f_{short\text{-}term} K_{sat}$

$\tau_{k,cr}$ (psi)	$f_{short\text{-}term}$	K_{sat}	$\tau_{k,cr}$ (psi)
1035	1.00	1.00	1035

$N_{a0} = \tau_{k,cr} \pi d_a h_{ef}$ (Eq. D-16f)

$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{a0} (lb)
1035	0.50	6.000	9755

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

A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0}(lb)	ϕ	ϕN_{ag} (lb)
177.03	109.66	0.952	1.021	1.000	1.000	9755	0.55	8418

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

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

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

Shear perpendicular to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
4.00	0.50	1.00	2500	12.00	15593

$\phi V_{cbx} = \phi (A_{Vc} / A_{Vco}) \Psi_{ed,V} \Psi_{c,V} \Psi_{h,V} V_{bx}$ (Sec. D.4.1 & Eq. D-21)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbx} (lb)
288.00	648.00	0.833	1.000	1.000	15593	0.70	4043

Shear parallel to edge in x-direction:

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

l_e (in)	d_a (in)	λ	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.50	1.00	2500	8.00	8488

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

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

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{g,Na} \Psi_{ec,Na} \Psi_{p,Na} N_{a0}\ ;\ k_{cp}(A_{Nc} / A_{Nco}) \Psi_{ec,N} \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b|$ (Eq. D-30b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{g,Na}$	$\Psi_{ec,Na}$	$\Psi_{p,Na}$	N_{a0} (lb)	N_a (lb)
2.0	177.03	109.66	0.952	1.021	1.000	1.000	9755	15305

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
314.72	256.00	1.000	0.865	1.000	1.000	10469	11128	0.70

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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