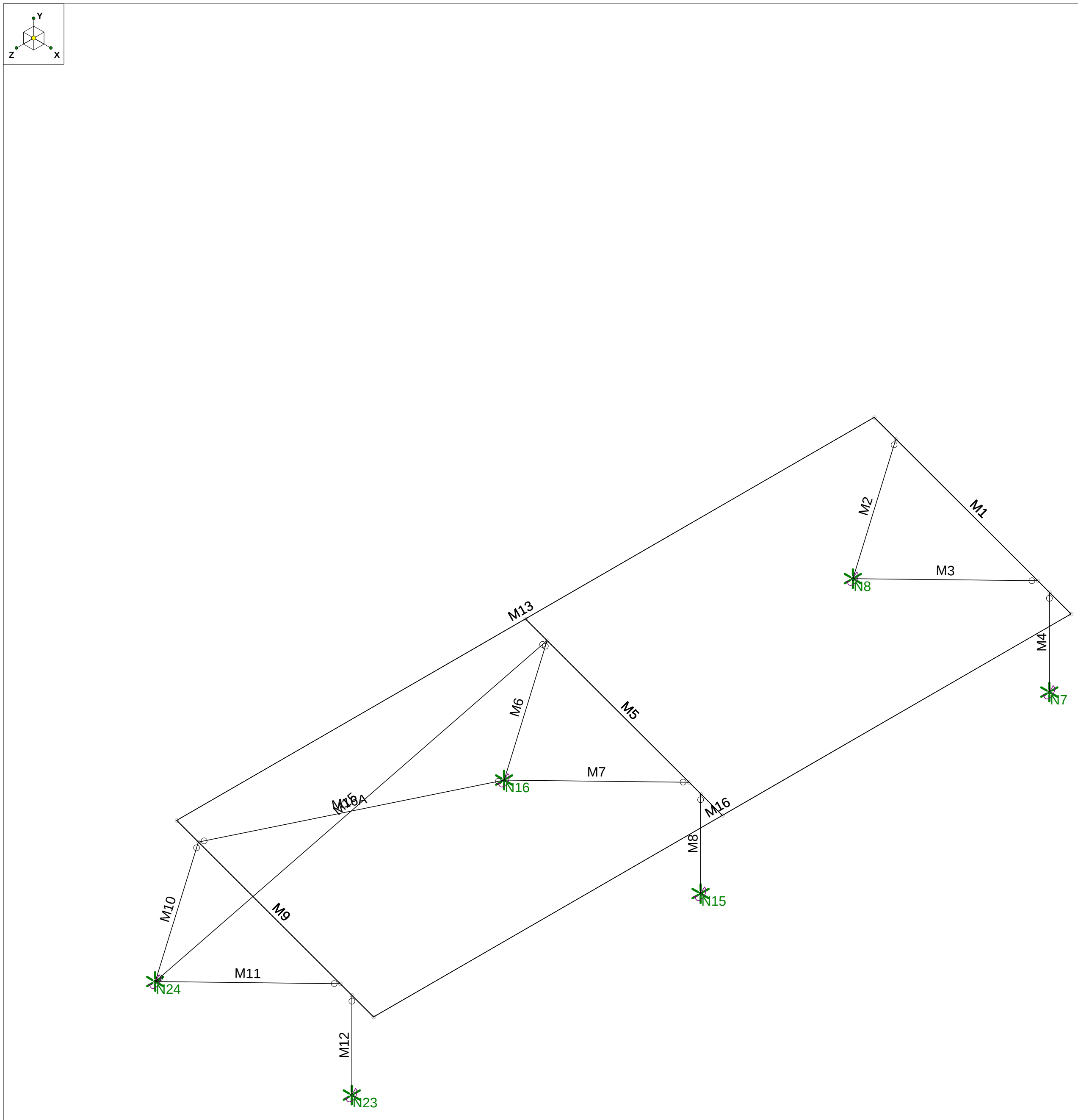


Schletter, Inc.		20ÁTilt w/o Seismic Design
HCV	Standard PVMini Racking System	
	Representative Calculations - ASCE 7-10	

1. INTRODUCTION

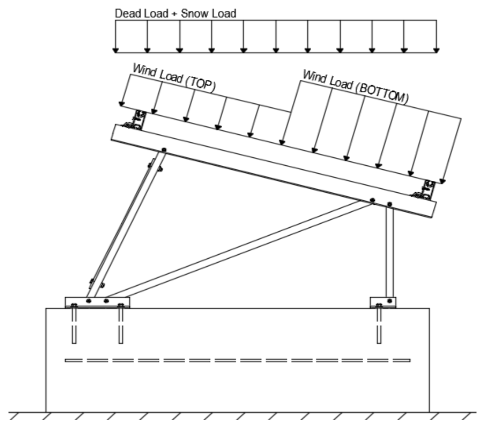
1.1 Project Description
The following sections will cover the determination of forces and structural design calculations for the Schletter, Inc. PVMini ground mount system.

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 =	20°
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	*Self-weight of the PV modules.*
g_{MIN} =	1.75 psf	

2.2 Snow Loads

Ground Snow Load, P_g =	30.00 psf	
Sloped Roof Snow Load, P_s =	20.62 psf	*(ASCE 7-10, Eq. 7.4-1)*
I_s =	1.00	
C_s =	0.91	
C_e =	0.90	
C_t =	1.20	

2.3 Wind Loads

Design Wind Speed, V =	150 mph	Exposure Category = C
Height ≤	15 ft	Importance Category = II

Peak Velocity Pressure, q_z = 35.33 psf *Including the gust factor, G=0.85. (ASCE 7-10, Eq. 27.3-1)*

Pressure Coefficients

$Cf+_{TOP}$	=	1.05	*(Pressure)*
$Cf+_{BOTTOM}$	=	1.65	
$Cf-_{TOP}$	=	-2.12	*(Suction)*
$Cf-_{BOTTOM}$	=	-1	

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

2.4 Seismic Loads - N/A

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

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

2.5 Combination of Loads

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

Strength Design, LRFD

Component stresses are checked using the following LRFD load combinations:

1.2D + 1.6S + 0.5W
1.2D + 1.0W + 0.5S
0.9D + 1.0W [M]
1.54D + 1.3E + 0.2S [R]
0.56D + 1.3E [R]
1.54D + 1.25E + 0.2S [O]
0.56D + 1.25E [O]

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

Allowable Stress Design, ASD

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

1.0D + 1.0S
1.0D + 0.6W
1.0D + 0.75L + 0.45W + 0.75S
0.6D + 0.6W [M]
1.238D + 0.875E [O]
1.1785D + 0.65625E + 0.75S [O]
0.362D + 0.875E [O]

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

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

3. STRUCTURAL ANALYSIS

3.1 RISA Results

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

3.2 RISA Components

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

Purlins	Location
M13	Top
M16	Bottom

Girders	Location
M1	Outer
M5	Inner
M9	Outer

Front Struts	Location
M4	Outer
M8	Inner
M12	Outer

Diagonal Struts	Location
M3	Outer
M7	Inner
M11	Outer

Rear Struts	Location
M2	Outer
M6	Inner
M10	Outer

Bracing
M15
M16A

Front Reactions	Location
N7	Outer
N15	Inner
N23	Outer

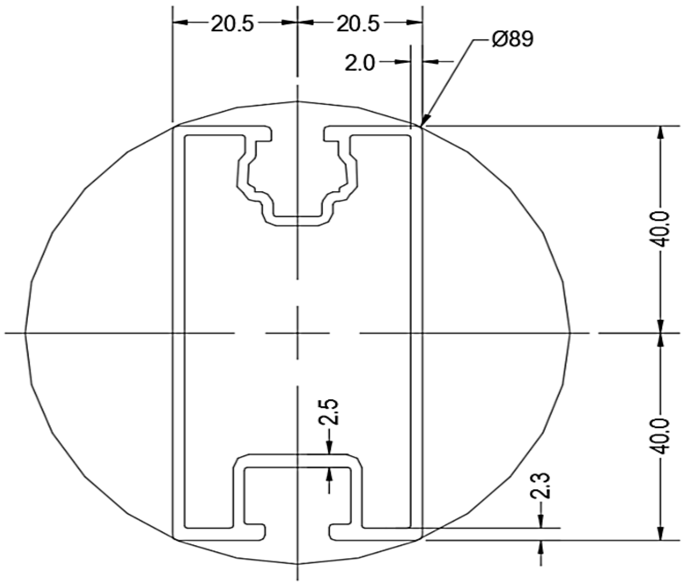
Rear Reactions	Location
N8	Outer
N16	Inner
N24	Outer

4. MEMBER DESIGN CALCULATIONS

4.1 Purlin Design

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

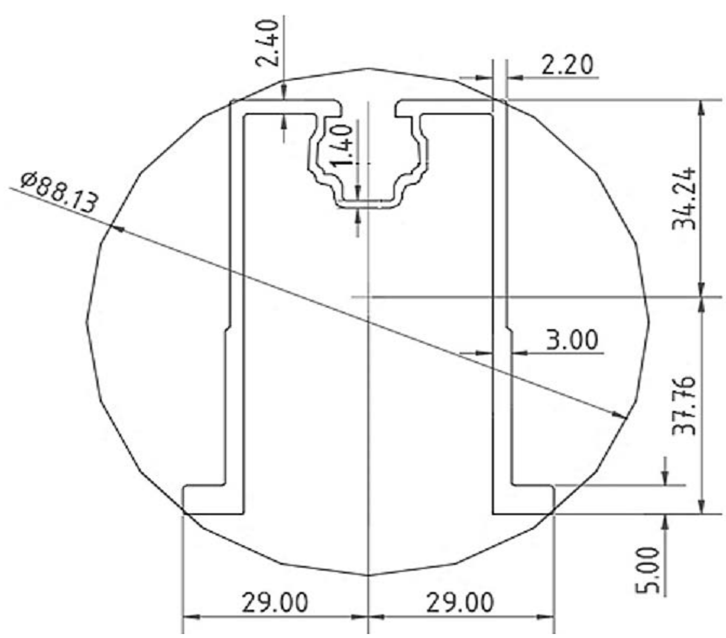
Purlin Type =	**ProfiPlusXT**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	51	in
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	30.04	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	22.71	ksi
S_y =	0.75	in^3
S_x =	0.44	in^3
E =	10100	ksi
I_y =	1.20	in^4
I_x =	0.36	in^4
A =	0.96	in^2
g =	1.15	lbs/ft
M_y =	0.358	k-ft
M_z =	0.066	k-ft
$M_{y\ allowable}$ =	1.866	k-ft
$M_{z\ allowable}$ =	0.838	k-ft
Utilization =	27%	



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).

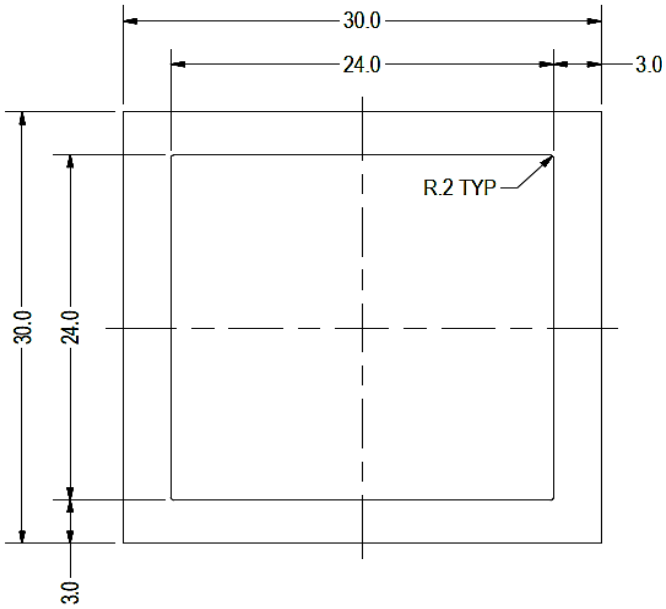
Girder Type =	**Flex Profi**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.78	in
$\Phi F_{ty\ AXIAL}$ =	14.29	ksi
$\Phi F_{ty\ STRONG\text{-}AXIS}$ =	29.88	ksi
$\Phi F_{ty\ WEAK\text{-}AXIS}$ =	13.46	ksi
S_y =	0.59	in^3
S_x =	0.46	in^3
E =	10100	ksi
I_y =	0.88	in^4
I_x =	0.52	in^4
A =	0.89	in^2
g =	1.07	lbs/ft
M_y =	0.447	k-ft
M_z =	0.000	k-ft
P_n =	0.251	k
$M_{y\ allowable}$ =	1.466	k-ft
$M_{z\ allowable}$ =	0.513	k-ft
$P_{n\ allowable}$ =	12.764	k
Utilization =	32%	



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).

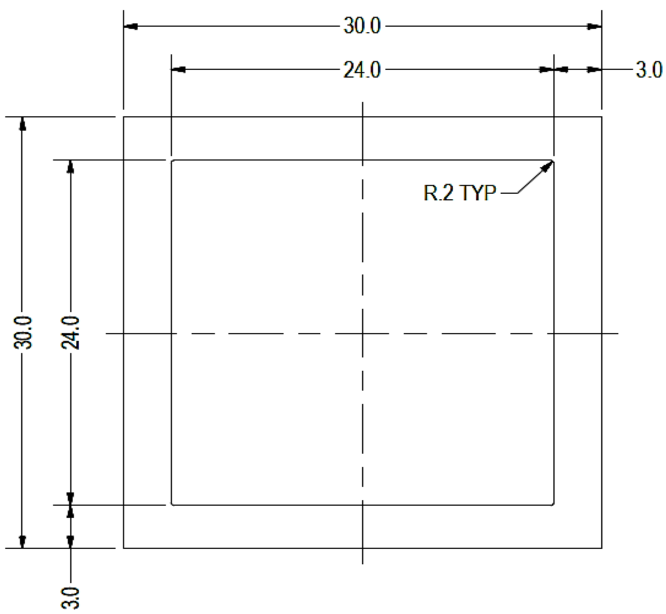
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	18.00	in
$\Phi F_{ty\ AXIAL}$ =	24.52	ksi
$\Phi F_{ty\ BENDING}$ =	31.19	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.971	k
$M_{y\ allowable}$ =	0.423	k-ft
$M_{z\ allowable}$ =	0.423	k-ft
$P_{n\ allowable}$ =	12.310	k
Utilization =	8%	



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).

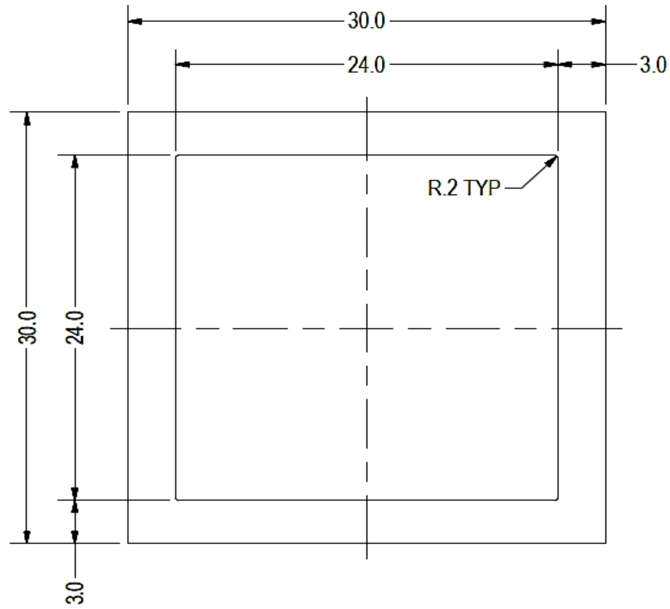
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	46.38	in
$\Phi F_{ty\ AXIAL}$ =	7.60	ksi
$\Phi F_{ty\ BENDING}$ =	29.80	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.314	k
$M_{y\ allowable}$ =	0.404	k-ft
$M_{z\ allowable}$ =	0.404	k-ft
$P_{n\ allowable}$ =	3.814	k
Utilization =	8%	



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).

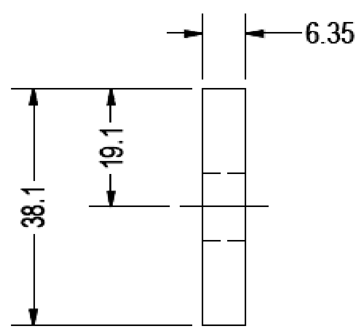
Strut Type =	**30x30x3**	
Aluminum Type =	6105-T5	
F_{ty} =	35	ksi
L_b =	33.07	in
$\Phi F_{ty\ AXIAL}$ =	13.55	ksi
$\Phi F_{ty\ BENDING}$ =	30.37	ksi
S_y =	0.16	in^3
S_x =	0.16	in^3
E =	10100	ksi
I_y =	0.10	in^4
I_x =	0.10	in^4
A =	0.50	in^2
g =	0.60	lbs/ft
M_y =	0.000	k-ft
M_z =	0.000	k-ft
P_n =	0.756	k
$M_{y\ allowable}$ =	0.411	k-ft
$M_{z\ allowable}$ =	0.411	k-ft
$P_{n\ allowable}$ =	6.803	k
Utilization =	11%	



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 =	0.002	k-ft
P_n =	0.078	k
$M_{y\ allowable}$ =	0.046	k-ft
$P_{n\ allowable}$ =	11.813	k
Utilization =	5%	



A cross brace kit is required every 39 bays and is to be installed in centermost bays.

5. FOUNDATION DESIGN CALCULATIONS

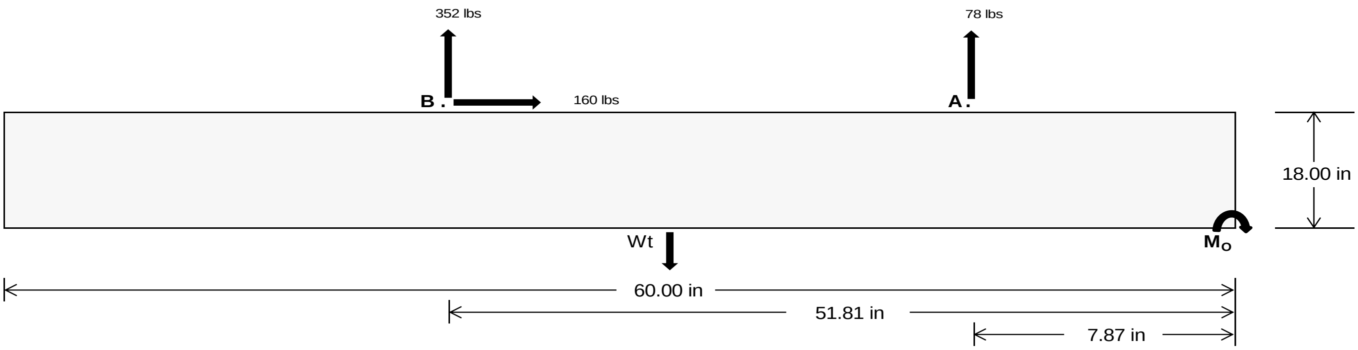
5.1 Helical Pile Foundations

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 =	342.47	1529.04	k
Compressive Load =	1262.94	1029.77	k
Lateral Load =	1.41	691.95	k
Moment (Weak Axis) =	0.00	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 =	21725.1 in-lbs
Resisting Force Required =	724.17 lbs
S.F. =	1.67
Weight Required =	1206.95 lbs
Minimum Width =	20 in in
Weight Provided =	1812.50 lbs

A minimum 60in long x 20in wide x 18in tall ballast foundation is required to resist overturning.

Sliding

Force =	159.65 lbs
Friction =	0.4
Weight Required =	399.12 lbs
Resisting Weight =	1812.50 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 20in wide x 18in tall ballast foundation to resist sliding. Friction is OK.

Cohesion

Sliding Force =	159.65 lbs
Cohesion =	130 psf
Area =	8.33 ft^2
Resisting =	906.25 lbs
Additional Weight Required =	0 lbs

Use a 60in long x 20in 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			
	20 in	21 in	22 in	23 in
P_{ftg} = (145 pcf)(5 ft)(1.5 ft)(1.67 ft) =	1813 lbs	1903 lbs	1994 lbs	2084 lbs

ASD LC	1.0D + 1.0S				1.0D + 0.6W				1.0D + 0.75L + 0.45W + 0.75S				0.6D + 0.6W			
Width	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in	20 in	21 in	22 in	23 in
F_A	409 lbs	409 lbs	409 lbs	409 lbs	474 lbs	474 lbs	474 lbs	474 lbs	631 lbs	631 lbs	631 lbs	631 lbs	-156 lbs	-156 lbs	-156 lbs	-156 lbs
F_B	289 lbs	289 lbs	289 lbs	289 lbs	415 lbs	415 lbs	415 lbs	415 lbs	505 lbs	505 lbs	505 lbs	505 lbs	-704 lbs	-704 lbs	-704 lbs	-704 lbs
F_V	25 lbs	25 lbs	25 lbs	25 lbs	281 lbs	281 lbs	281 lbs	281 lbs	228 lbs	228 lbs	228 lbs	228 lbs	-319 lbs	-319 lbs	-319 lbs	-319 lbs
P_{total}	2511 lbs	2601 lbs	2692 lbs	2783 lbs	2701 lbs	2792 lbs	2882 lbs	2973 lbs	2948 lbs	3039 lbs	3130 lbs	3220 lbs	228 lbs	282 lbs	337 lbs	391 lbs
M	266 lbs-ft	266 lbs-ft	266 lbs-ft	266 lbs-ft	540 lbs-ft	540 lbs-ft	540 lbs-ft	540 lbs-ft	586 lbs-ft	586 lbs-ft	586 lbs-ft	586 lbs-ft	514 lbs-ft	514 lbs-ft	514 lbs-ft	514 lbs-ft
e	0.11 ft	0.10 ft	0.10 ft	0.10 ft	0.20 ft	0.19 ft	0.19 ft	0.18 ft	0.20 ft	0.19 ft	0.19 ft	0.18 ft	2.26 ft	1.82 ft	1.53 ft	1.31 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}	263.0 psf	260.8 psf	258.9 psf	257.1 psf	246.4 psf	245.0 psf	243.8 psf	242.7 psf	269.5 psf	267.0 psf	264.7 psf	262.7 psf	0.0 psf	0.0 psf	0.0 psf	0.0 psf
f_{max}	339.6 psf	333.8 psf	328.5 psf	323.7 psf	401.9 psf	393.1 psf	385.1 psf	377.8 psf	438.2 psf	427.7 psf	418.1 psf	409.4 psf	372.3 psf	158.3 psf	125.7 psf	114.7 psf

Maximum Bearing Pressure = 438 psf
Allowable Bearing Pressure = 1500 psf

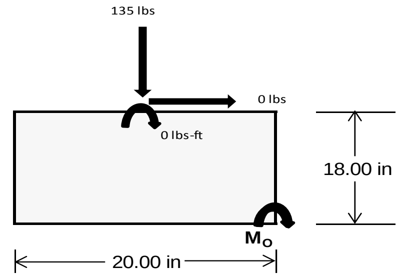
Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Weak Side Design

Overturning Check

M_O =	0.0 ft-lbs
Resisting Force Required =	0.00 lbs
S.F. =	1.67
Weight Required =	0.00 lbs
Minimum Width =	20 in in
Weight Provided =	1812.50 lbs

A minimum 60in long x 20in 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	20 in			20 in			20 in		
Support	Outer	Inner	Outer	Outer	Inner	Outer	Outer	Inner	Outer
F_Y	54 lbs	135 lbs	51 lbs	197 lbs	570 lbs	194 lbs	16 lbs	39 lbs	15 lbs
F_V	0 lbs	0 lbs	0 lbs	1 lbs	0 lbs	0 lbs	0 lbs	0 lbs	0 lbs
P_{total}	2298 lbs	2379 lbs	2295 lbs	2333 lbs	2707 lbs	2330 lbs	672 lbs	696 lbs	671 lbs
M	0 lbs-ft	0 lbs-ft	0 lbs-ft	1 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft	0 lbs-ft
e	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft	0.00 ft
L/6	0.28 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft	1.67 ft
f_{min}	275.7 sqft	285.4 sqft	275.4 sqft	279.6 sqft	324.6 sqft	279.5 sqft	80.6 sqft	83.5 sqft	80.5 sqft
f_{max}	275.8 psf	285.5 psf	275.4 psf	280.3 psf	325.0 psf	279.8 psf	80.6 psf	83.5 psf	80.5 psf

Maximum Bearing Pressure = 325 psf
Allowable Bearing Pressure = 1500 psf

Use a 60in long x 20in wide x 18in tall ballast foundation for an acceptable bearing pressure.

Foundation Requirements: 60in long x 20in wide x 18in tall ballast foundation and fiber reinforcing with (1) #5 rebar.

5.3 Foundation Anchors

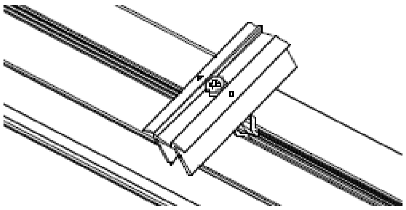
Threaded rods are anchored to the the ballast foundations using the Simpson AT-XP epoxy solution. LRFD load results are compared to the allowable strengths of the epoxy solution. Please see the supplementary calculations provided by the Simpson Anchor Designer software.

6. DESIGN OF JOINTS AND CONNECTIONS

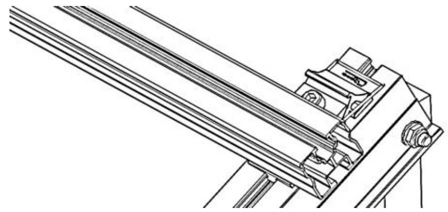
6.1 Anchorage of Modules to Purlins and Connection of Purlins to Girders

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 =	0.704	k
Allowable Uplift =	1.214	k
Utilization =	58%	



Fastening of Purlins to Girders		
Maximum Uplifting Force =	1.066	k
Allowable Uplift =	1.116	k
Utilization =	95%	



6.2 Bolted Connections

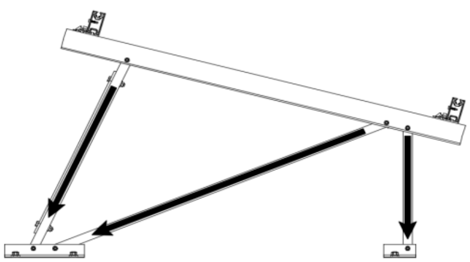
The aluminum struts connect the aluminum girder ends to custom brackets with mounting holes. Cross bracing is attached to rear struts to provide lateral stability. Single M8 bolts are used to attach each end of the strut to the girder and post. ASTM A193/A193M-86 equivalent stainless steel bolts are used.

Front Strut		
Maximum Axial Load =	0.971	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	17%	

Rear Strut		
Maximum Axial Load =	1.085	k
M8 Bolt Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	19%	

Diagonal Strut		
Maximum Axial Load =	0.314	k
M8 Bolt Shear Capacity =	5.692	k
Strut Bearing Capacity =	7.952	k
Utilization =	6%	

Bracing		
Maximum Axial Load =	0.078	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.

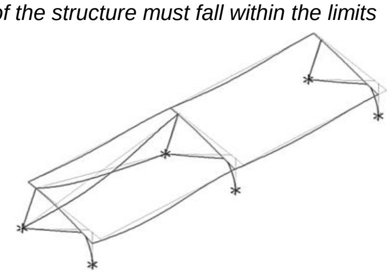
7. SEISMIC DESIGN

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} =	29.57	in
Allowable Story Drift for All Other Structures, Δ = {	$0.020h_{sx}$	
	0.591	in
Max Drift, Δ_{MAX} =	0.004	in
N/A		

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



APPENDIX A

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

Purlin = **ProfiPlus XT**

Strong Axis:

3.4.14

L_b = 51.00 in

J = 0.427

106.368

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

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= 30.0 ksi

3.4.16

b/t = 6.6

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

Weak Axis:

3.4.14

L_b = 51.00 in

J = 0.427

115.584

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

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= 29.9

3.4.16

b/t = 37.95

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

S1 = 12.2

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

S2 = 46.7

φF_L= φb[Bp-1.6Dp*b/t]

φF_L= 22.7 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 37.95

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

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

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

S2 = 79.7
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

$\varphi F_L St$= 30.0 ksi
Ix = 498305 mm^4
1.197 in^4
y = 40.784 mm
Sx = 0.746 in^3
$M_{max}St$ = 1.866 k-ft

3.4.18

h/t = 6.6

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

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

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

S2 = 77.3
φF_L= 1.3φyFcy
φF_L= 43.2 ksi

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

<u>Compression</u>

3.4.9

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

b/t = 37.95
S1 = 12.21
S2 = 32.70
φF_L= (φck2*√(BpE))/(1.6b/t)
φF_L= 21.4 ksi

3.4.10

Rb/t = 0.0

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

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

φF_L= 21.42 ksi
A = 620.02 mm^2
0.96 in^2
P_{max} = 20.59 kips

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

Girder = **Flex Profi**

Strong Axis:

3.4.11

L_b = 33.78 in

ry = 1.374

Cb = 1.41

20.702

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

S1 = 1.37733

$$S2 = 1.2C_c$$

S2 = 79.2

φF_L= φb[Bc-Dc*Lb/(1.2*ry*√(Cb))

φF_L= 29.9 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 = 1.41

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= 29.9 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= 29.9 ksi

Ix = 364470 mm^4

0.876 in^4

y = 37.77 mm

Sx = 0.589 in^3

M_{max}St = 1.466 k-ft

3.4.18

h/t = 4.29

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

S1 = 36.9

m = 0.65

C_0 = 29

Cc = 29

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 13.5 ksi

Iy = 217168 mm^4

0.522 in^4

x = 29 mm

Sy = 0.457 in^3

M_{max}Wk = 0.513 k-ft

Compression

3.4.7

λ = 0.46067

r = 1.374 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.90326

φF_L= φcc(Bc-Dc*λ)

φF_L= 30.1251 ksi

3.4.8

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

3.4.9

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

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

3.4.9.1

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

3.4.10

Rb/t = 0.0

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

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

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

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

Strut = **30x30x3**

Strong Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2 ksi

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1 Not Used

Rb/t = 0.0

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

S1 = 1.1

$$S2 = C_t$$

S2 = 141.0

φF_L= 1.17φyFcy

φF_L= 38.9 ksi

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LSt= 31.2 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.423 k-ft

Weak Axis:

3.4.14

L_b = 18.00 in

J = 0.16

47.2194

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

S1 = 0.51461

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

S2 = 1701.56

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

φF_L= 31.2

3.4.16

b/t = 7.75

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

S1 = 12.2

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

S2 = 46.7

φF_L= φyFcy

φF_L= 33.3 ksi

3.4.16.1

N/A for Weak Direction

3.4.18

h/t = 7.75

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

S1 = 36.9

m = 0.65

C_0 = 15

Cc = 15

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

S2 = 77.3

φF_L= 1.3φyFcy

φF_L= 43.2 ksi

φF_LWk= 31.2 ksi

Iy = 39958.2 mm^4

0.096 in^4

x = 15 mm

Sy = 0.163 in^3

M_{max}Wk = 0.423 k-ft

Compression

3.4.7

$\lambda =$ 0.77182

r = 0.437 in

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

$S1^* =$ 0.33515

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

$S2^* =$ 1.23671

$\varphi cc =$ 0.83792

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

$\varphi F_L =$ 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 = 33.07 in

J = 0.16

86.7548

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

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= 30.4 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= 30.4 ksi

Ix = 39958.2 mm^4

0.096 in^4

y = 15 mm

Sx = 0.163 in^3

M_{max}St = 0.411 k-ft

Weak Axis:

3.4.14

L_b = 33.07 in

J = 0.16

86.7548

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

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= 30.4

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 = 1.41804

r = 0.437 in

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

$S1^*$ = 0.33515

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

$S2^*$ = 1.23671

φcc = 0.77853

φF_L= (φccFcy)/(λ²)

φF_L= 13.5508 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= 13.55 ksi

A = 323.87 mm^2

0.50 in^2

P_{max} = 6.80 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	-57.498	-57.498	0	0
2	M16	Y	-57.498	-57.498	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	-103.443	-103.443	0	0
2	M16	y	-162.554	-162.554	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	208.857	208.857	0	0
2	M16	y	98.517	98.517	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	148.549	2	253.169	2	0	10	0	9	0	1	0	1
2		min	-180.352	3	-377.381	3	-.153	3	0	3	0	1	0	1
3	N7	max	0	15	336.206	1	.001	10	0	10	0	1	0	1
4		min	-.133	2	-73.883	3	-.46	1	0	1	0	1	0	1
5	N15	max	0	15	971.491	1	.136	9	0	9	0	1	0	1
6		min	-1.081	2	-263.438	3	-.465	3	0	3	0	1	0	1
7	N16	max	477.548	2	792.134	2	0	10	0	9	0	1	0	1
8		min	-532.266	3	-1176.184	3	-64.095	3	0	3	0	1	0	1
9	N23	max	0	15	336.351	1	.725	1	.001	1	0	1	0	1
10		min	-.133	2	-73.45	3	0	10	0	10	0	1	0	1
11	N24	max	148.549	2	255.608	2	64.601	3	0	1	0	1	0	1
12		min	-180.684	3	-376.239	3	-.001	10	0	3	0	1	0	1
13	Totals:	max	773.299	2	2858.862	1	0	1						
14		min	-893.589	3	-2340.576	3	0	3						

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	242.772	1	.649	4	.149	1	0	10	0	15	0	1
2			min	-357.271	3	.153	15	-.096	3	0	1	0	1	0	1
3		2	max	242.879	1	.607	4	.149	1	0	10	0	9	0	15
4			min	-357.191	3	.143	15	-.096	3	0	1	0	3	0	4
5		3	max	242.985	1	.566	4	.149	1	0	10	0	1	0	15
6			min	-357.111	3	.134	15	-.096	3	0	1	0	3	0	4
7		4	max	243.092	1	.525	4	.149	1	0	10	0	1	0	15
8			min	-357.031	3	.124	15	-.096	3	0	1	0	3	0	4
9		5	max	243.198	1	.483	4	.149	1	0	10	0	1	0	15
10			min	-356.951	3	.114	15	-.096	3	0	1	0	3	0	4
11		6	max	243.305	1	.442	4	.149	1	0	10	0	1	0	15
12			min	-356.872	3	.104	15	-.096	3	0	1	0	3	0	4
13		7	max	243.411	1	.401	4	.149	1	0	10	0	1	0	15
14			min	-356.792	3	.095	15	-.096	3	0	1	0	3	0	4
15		8	max	243.518	1	.36	4	.149	1	0	10	0	1	0	15
16			min	-356.712	3	.085	15	-.096	3	0	1	0	3	0	4
17		9	max	243.624	1	.318	4	.149	1	0	10	0	1	0	15
18			min	-356.632	3	.075	15	-.096	3	0	1	0	3	0	4
19		10	max	243.731	1	.277	4	.149	1	0	10	0	1	0	15
20			min	-356.552	3	.066	15	-.096	3	0	1	0	3	0	4
21		11	max	243.838	1	.236	4	.149	1	0	10	0	1	0	15
22			min	-356.472	3	.056	15	-.096	3	0	1	0	3	0	4
23		12	max	243.944	1	.195	4	.149	1	0	10	0	1	0	15
24			min	-356.392	3	.046	15	-.096	3	0	1	0	3	0	4
25		13	max	244.051	1	.153	4	.149	1	0	10	0	1	0	15
26			min	-356.312	3	.037	15	-.096	3	0	1	0	3	0	4
27		14	max	244.157	1	.113	2	.149	1	0	10	0	1	0	15
28			min	-356.232	3	.027	15	-.096	3	0	1	0	3	0	4
29		15	max	244.264	1	.081	2	.149	1	0	10	0	1	0	15
30			min	-356.152	3	.015	12	-.096	3	0	1	0	3	0	4
31		16	max	244.37	1	.048	2	.149	1	0	10	0	1	0	15
32			min	-356.073	3	-.005	3	-.096	3	0	1	0	3	0	4
33		17	max	244.477	1	.016	2	.149	1	0	10	0	1	0	15
34			min	-355.993	3	-.029	3	-.096	3	0	1	0	3	0	4
35		18	max	244.583	1	-.012	15	.149	1	0	10	0	1	0	15
36			min	-355.913	3	-.053	4	-.096	3	0	1	0	3	0	4
37		19	max	244.69	1	-.022	15	.149	1	0	10	0	1	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
38			min	-355.833	3	-.094	4	-.096	3	0	1	0	3	0	4
39	M3	1	max	95.759	2	1.799	4	0	10	0	10	0	1	0	4
40			min	-85.676	3	.423	15	-.166	1	0	1	0	10	0	15
41		2	max	95.692	2	1.621	4	0	10	0	10	0	1	0	4
42			min	-85.727	3	.381	15	-.166	1	0	1	0	10	0	15
43		3	max	95.624	2	1.444	4	0	10	0	10	0	1	0	2
44			min	-85.778	3	.34	15	-.166	1	0	1	0	10	0	3
45		4	max	95.556	2	1.266	4	0	10	0	10	0	1	0	15
46			min	-85.829	3	.298	15	-.166	1	0	1	0	10	0	4
47		5	max	95.488	2	1.088	4	0	10	0	10	0	1	0	15
48			min	-85.88	3	.256	15	-.166	1	0	1	0	10	0	4
49		6	max	95.42	2	.911	4	0	10	0	10	0	1	0	15
50			min	-85.931	3	.214	15	-.166	1	0	1	0	10	0	4
51		7	max	95.352	2	.733	4	0	10	0	10	0	1	0	15
52			min	-85.982	3	.173	15	-.166	1	0	1	0	10	0	4
53		8	max	95.284	2	.555	4	0	10	0	10	0	1	0	15
54			min	-86.033	3	.131	15	-.166	1	0	1	0	10	0	4
55		9	max	95.217	2	.378	4	0	10	0	10	0	1	0	15
56			min	-86.084	3	.089	15	-.166	1	0	1	0	10	-.001	4
57		10	max	95.149	2	.2	4	0	10	0	10	0	1	0	15
58			min	-86.134	3	.047	15	-.166	1	0	1	0	10	-.001	4
59		11	max	95.081	2	.036	2	0	10	0	10	0	1	0	15
60			min	-86.185	3	-.003	3	-.166	1	0	1	0	10	-.001	4
61		12	max	95.013	2	-.036	15	0	10	0	10	0	1	0	15
62			min	-86.236	3	-.155	4	-.166	1	0	1	0	10	-.001	4
63		13	max	94.945	2	-.078	15	0	10	0	10	0	1	0	15
64			min	-86.287	3	-.333	4	-.166	1	0	1	0	10	-.001	4
65		14	max	94.877	2	-.12	15	0	10	0	10	0	1	0	15
66			min	-86.338	3	-.511	4	-.166	1	0	1	0	10	-.001	4
67		15	max	94.809	2	-.161	15	0	10	0	10	0	3	0	15
68			min	-86.389	3	-.688	4	-.166	1	0	1	0	1	0	4
69		16	max	94.742	2	-.203	15	0	10	0	10	0	10	0	15
70			min	-86.44	3	-.866	4	-.166	1	0	1	0	1	0	4
71		17	max	94.674	2	-.245	15	0	10	0	10	0	10	0	15
72			min	-86.491	3	-1.044	4	-.166	1	0	1	0	1	0	4
73		18	max	94.606	2	-.287	15	0	10	0	10	0	10	0	15
74			min	-86.542	3	-1.221	4	-.166	1	0	1	0	1	0	4
75		19	max	94.538	2	-.328	15	0	10	0	10	0	10	0	1
76			min	-86.592	3	-1.399	4	-.166	1	0	1	0	1	0	1
77	M4	1	max	335.041	1	0	1	.001	10	0	1	0	3	0	1
78			min	-74.757	3	0	1	-.487	1	0	1	0	2	0	1
79		2	max	335.106	1	0	1	.001	10	0	1	0	15	0	1
80			min	-74.708	3	0	1	-.487	1	0	1	0	1	0	1
81		3	max	335.17	1	0	1	.001	10	0	1	0	15	0	1
82			min	-74.66	3	0	1	-.487	1	0	1	0	1	0	1
83		4	max	335.235	1	0	1	.001	10	0	1	0	10	0	1
84			min	-74.611	3	0	1	-.487	1	0	1	0	1	0	1
85		5	max	335.3	1	0	1	.001	10	0	1	0	10	0	1
86			min	-74.563	3	0	1	-.487	1	0	1	0	1	0	1
87		6	max	335.364	1	0	1	.001	10	0	1	0	10	0	1
88			min	-74.514	3	0	1	-.487	1	0	1	0	1	0	1
89		7	max	335.429	1	0	1	.001	10	0	1	0	10	0	1
90			min	-74.466	3	0	1	-.487	1	0	1	0	1	0	1
91		8	max	335.494	1	0	1	.001	10	0	1	0	10	0	1
92			min	-74.417	3	0	1	-.487	1	0	1	0	1	0	1
93		9	max	335.559	1	0	1	.001	10	0	1	0	10	0	1
94			min	-74.369	3	0	1	-.487	1	0	1	0	1	0	1

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
95		10	max	335.623	1	0	1	.001	10	0	1	0	10	0	1
96			min	-74.32	3	0	1	-.487	1	0	1	0	1	0	1
97		11	max	335.688	1	0	1	.001	10	0	1	0	10	0	1
98			min	-74.272	3	0	1	-.487	1	0	1	0	1	0	1
99		12	max	335.753	1	0	1	.001	10	0	1	0	10	0	1
100			min	-74.223	3	0	1	-.487	1	0	1	0	1	0	1
101		13	max	335.817	1	0	1	.001	10	0	1	0	10	0	1
102			min	-74.175	3	0	1	-.487	1	0	1	0	1	0	1
103		14	max	335.882	1	0	1	.001	10	0	1	0	10	0	1
104			min	-74.126	3	0	1	-.487	1	0	1	0	1	0	1
105		15	max	335.947	1	0	1	.001	10	0	1	0	10	0	1
106			min	-74.077	3	0	1	-.487	1	0	1	0	1	0	1
107		16	max	336.011	1	0	1	.001	10	0	1	0	10	0	1
108			min	-74.029	3	0	1	-.487	1	0	1	0	1	0	1
109		17	max	336.076	1	0	1	.001	10	0	1	0	10	0	1
110			min	-73.98	3	0	1	-.487	1	0	1	0	1	0	1
111		18	max	336.141	1	0	1	.001	10	0	1	0	10	0	1
112			min	-73.932	3	0	1	-.487	1	0	1	0	1	0	1
113		19	max	336.206	1	0	1	.001	10	0	1	0	10	0	1
114			min	-73.883	3	0	1	-.487	1	0	1	0	1	0	1
115	M6	1	max	754.029	1	.643	4	.037	9	0	3	0	3	0	1
116			min	-1085.312	3	.152	15	-.242	3	0	2	0	2	0	1
117		2	max	754.135	1	.602	4	.037	9	0	3	0	3	0	15
118			min	-1085.232	3	.142	15	-.242	3	0	2	0	2	0	4
119		3	max	754.242	1	.56	4	.037	9	0	3	0	3	0	15
120			min	-1085.152	3	.133	15	-.242	3	0	2	0	2	0	4
121		4	max	754.348	1	.519	4	.037	9	0	3	0	3	0	15
122			min	-1085.072	3	.123	15	-.242	3	0	2	0	2	0	4
123		5	max	754.455	1	.478	4	.037	9	0	3	0	9	0	15
124			min	-1084.992	3	.113	15	-.242	3	0	2	0	2	0	4
125		6	max	754.562	1	.436	4	.037	9	0	3	0	9	0	15
126			min	-1084.912	3	.104	15	-.242	3	0	2	0	3	0	4
127		7	max	754.668	1	.395	4	.037	9	0	3	0	9	0	15
128			min	-1084.832	3	.094	15	-.242	3	0	2	0	3	0	4
129		8	max	754.775	1	.355	2	.037	9	0	3	0	9	0	15
130			min	-1084.753	3	.084	15	-.242	3	0	2	0	3	0	4
131		9	max	754.881	1	.323	2	.037	9	0	3	0	9	0	15
132			min	-1084.673	3	.074	15	-.242	3	0	2	0	3	0	4
133		10	max	754.988	1	.291	2	.037	9	0	3	0	9	0	15
134			min	-1084.593	3	.065	15	-.242	3	0	2	0	3	0	4
135		11	max	755.094	1	.258	2	.037	9	0	3	0	9	0	15
136			min	-1084.513	3	.055	15	-.242	3	0	2	0	3	0	4
137		12	max	755.201	1	.226	2	.037	9	0	3	0	9	0	15
138			min	-1084.433	3	.04	12	-.242	3	0	2	0	3	0	4
139		13	max	755.307	1	.194	2	.037	9	0	3	0	9	0	15
140			min	-1084.353	3	.024	12	-.242	3	0	2	0	3	0	4
141		14	max	755.414	1	.162	2	.037	9	0	3	0	9	0	15
142			min	-1084.273	3	.005	3	-.242	3	0	2	0	3	0	4
143		15	max	755.52	1	.13	2	.037	9	0	3	0	9	0	15
144			min	-1084.193	3	-.019	3	-.242	3	0	2	0	3	0	2
145		16	max	755.627	1	.098	2	.037	9	0	3	0	9	0	15
146			min	-1084.113	3	-.043	3	-.242	3	0	2	0	3	0	2
147		17	max	755.733	1	.065	2	.037	9	0	3	0	9	0	15
148			min	-1084.033	3	-.067	3	-.242	3	0	2	0	3	0	2
149		18	max	755.84	1	.033	2	.037	9	0	3	0	9	0	15
150			min	-1083.953	3	-.091	3	-.242	3	0	2	0	3	0	2
151		19	max	755.947	1	.001	2	.037	9	0	3	0	9	0	15

Envelope Member Section Forces (Continued)

	Member	Sec		Axial[lb]	LC	y Shear[lb]	LC	z Shear[lb]	LC	Torque[k-ft]	LC	y-y Mome...	LC	z-z Mome...	LC
152			min	-1083.874	3	-.115	3	-.242	3	0	2	0	3	0	2
153	M7	1	max	314.283	2	1.798	4	.013	3	0	9	0	1	0	2
154			min	-229.44	3	.423	15	-.016	1	0	3	0	3	0	15
155		2	max	314.215	2	1.62	4	.013	3	0	9	0	1	0	2
156			min	-229.491	3	.381	15	-.016	1	0	3	0	3	0	12
157		3	max	314.147	2	1.442	4	.013	3	0	9	0	1	0	2
158			min	-229.542	3	.34	15	-.016	1	0	3	0	3	0	3
159		4	max	314.08	2	1.265	4	.013	3	0	9	0	1	0	2
160			min	-229.593	3	.298	15	-.016	1	0	3	0	3	0	3
161		5	max	314.012	2	1.087	4	.013	3	0	9	0	1	0	15
162			min	-229.644	3	.256	15	-.016	1	0	3	0	3	0	4
163		6	max	313.944	2	.909	4	.013	3	0	9	0	1	0	15
164			min	-229.694	3	.214	15	-.016	1	0	3	0	3	0	4
165		7	max	313.876	2	.732	4	.013	3	0	9	0	1	0	15
166			min	-229.745	3	.173	15	-.016	1	0	3	0	3	0	4
167		8	max	313.808	2	.554	4	.013	3	0	9	0	1	0	15
168			min	-229.796	3	.131	15	-.016	1	0	3	0	3	0	4
169		9	max	313.74	2	.376	4	.013	3	0	9	0	1	0	15
170			min	-229.847	3	.089	15	-.016	1	0	3	0	3	-.001	4
171		10	max	313.672	2	.21	2	.013	3	0	9	0	1	0	15
172			min	-229.898	3	.047	15	-.016	1	0	3	0	3	-.001	4
173		11	max	313.605	2	.071	2	.013	3	0	9	0	1	0	15
174			min	-229.949	3	-.035	3	-.016	1	0	3	0	3	-.001	4
175		12	max	313.537	2	-.036	15	.013	3	0	9	0	1	0	15
176			min	-230	3	-.157	4	-.016	1	0	3	0	3	-.001	4
177		13	max	313.469	2	-.078	15	.013	3	0	9	0	1	0	15
178			min	-230.051	3	-.334	4	-.016	1	0	3	0	3	-.001	4
179		14	max	313.401	2	-.12	15	.013	3	0	9	0	1	0	15
180			min	-230.102	3	-.512	4	-.016	1	0	3	0	3	-.001	4
181		15	max	313.333	2	-.161	15	.013	3	0	9	0	1	0	15
182			min	-230.153	3	-.689	4	-.016	1	0	3	0	3	0	4
183		16	max	313.265	2	-.203	15	.013	3	0	9	0	1	0	15
184			min	-230.203	3	-.867	4	-.016	1	0	3	0	3	0	4
185		17	max	313.197	2	-.245	15	.013	3	0	9	0	1	0	15
186			min	-230.254	3	-1.045	4	-.016	1	0	3	0	3	0	4
187		18	max	313.13	2	-.287	15	.013	3	0	9	0	1	0	15
188			min	-230.305	3	-1.222	4	-.016	1	0	3	0	3	0	4
189		19	max	313.062	2	-.329	15	.013	3	0	9	0	9	0	1
190			min	-230.356	3	-1.4	4	-.016	1	0	3	0	3	0	1
191	M8	1	max	970.327	1	0	1	.146	9	0	1	0	2	0	1
192			min	-264.311	3	0	1	-.446	3	0	1	0	3	0	1
193		2	max	970.391	1	0	1	.146	9	0	1	0	9	0	1
194			min	-264.263	3	0	1	-.446	3	0	1	0	3	0	1
195		3	max	970.456	1	0	1	.146	9	0	1	0	9	0	1
196			min	-264.214	3	0	1	-.446	3	0	1	0	3	0	1
197		4	max	970.521	1	0	1	.146	9	0	1	0	9	0	1
198			min	-264.166	3	0	1	-.446	3	0	1	0	3	0	1
199		5	max	970.585	1	0	1	.146	9	0	1	0	9	0	1
200			min	-264.117	3	0	1	-.446	3	0	1	0	3	0	1
201		6	max	970.65	1	0	1	.146	9	0	1	0	9	0	1
202			min	-264.069	3	0	1	-.446	3	0	1	0	3	0	1
203		7	max	970.715	1	0	1	.146	9	0	1	0	9	0	1
204			min	-264.02	3	0	1	-.446	3	0	1	0	3	0	1
205		8	max	970.78	1	0	1	.146	9	0	1	0	9	0	1
206			min	-263.972	3	0	1	-.446	3	0	1	0	3	0	1
207		9	max	970.844	1	0	1	.146	9	0	1	0	9	0	1
208			min	-263.923	3	0	1	-.446	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	970.909	1	0	1	.146	9	0	1	0	9	0	1
210			min	-263.875	3	0	1	-.446	3	0	1	0	3	0	1
211		11	max	970.974	1	0	1	.146	9	0	1	0	9	0	1
212			min	-263.826	3	0	1	-.446	3	0	1	0	3	0	1
213		12	max	971.038	1	0	1	.146	9	0	1	0	9	0	1
214			min	-263.778	3	0	1	-.446	3	0	1	0	3	0	1
215		13	max	971.103	1	0	1	.146	9	0	1	0	9	0	1
216			min	-263.729	3	0	1	-.446	3	0	1	0	3	0	1
217		14	max	971.168	1	0	1	.146	9	0	1	0	9	0	1
218			min	-263.68	3	0	1	-.446	3	0	1	0	3	0	1
219		15	max	971.233	1	0	1	.146	9	0	1	0	9	0	1
220			min	-263.632	3	0	1	-.446	3	0	1	0	3	0	1
221		16	max	971.297	1	0	1	.146	9	0	1	0	9	0	1
222			min	-263.583	3	0	1	-.446	3	0	1	0	3	0	1
223		17	max	971.362	1	0	1	.146	9	0	1	0	9	0	1
224			min	-263.535	3	0	1	-.446	3	0	1	0	3	0	1
225		18	max	971.427	1	0	1	.146	9	0	1	0	9	0	1
226			min	-263.486	3	0	1	-.446	3	0	1	0	3	0	1
227		19	max	971.491	1	0	1	.146	9	0	1	0	9	0	1
228			min	-263.438	3	0	1	-.446	3	0	1	0	3	0	1
229	M10	1	max	244.314	1	.648	4	-.002	10	0	1	0	1	0	1
230			min	-314.679	3	.153	15	-.105	1	0	3	0	3	0	1
231		2	max	244.42	1	.607	4	-.002	10	0	1	0	1	0	15
232			min	-314.599	3	.143	15	-.105	1	0	3	0	3	0	4
233		3	max	244.527	1	.566	4	-.002	10	0	1	0	1	0	15
234			min	-314.519	3	.134	15	-.105	1	0	3	0	3	0	4
235		4	max	244.633	1	.525	4	-.002	10	0	1	0	1	0	15
236			min	-314.439	3	.124	15	-.105	1	0	3	0	3	0	4
237		5	max	244.74	1	.483	4	-.002	10	0	1	0	1	0	15
238			min	-314.359	3	.114	15	-.105	1	0	3	0	3	0	4
239		6	max	244.846	1	.442	4	-.002	10	0	1	0	10	0	15
240			min	-314.279	3	.104	15	-.105	1	0	3	0	3	0	4
241		7	max	244.953	1	.401	4	-.002	10	0	1	0	10	0	15
242			min	-314.199	3	.095	15	-.105	1	0	3	0	3	0	4
243		8	max	245.059	1	.36	4	-.002	10	0	1	0	10	0	15
244			min	-314.119	3	.085	15	-.105	1	0	3	0	3	0	4
245		9	max	245.166	1	.318	4	-.002	10	0	1	0	10	0	15
246			min	-314.039	3	.075	15	-.105	1	0	3	0	3	0	4
247		10	max	245.272	1	.277	4	-.002	10	0	1	0	10	0	15
248			min	-313.96	3	.066	15	-.105	1	0	3	0	3	0	4
249		11	max	245.379	1	.236	4	-.002	10	0	1	0	10	0	15
250			min	-313.88	3	.056	15	-.105	1	0	3	0	3	0	4
251		12	max	245.485	1	.194	4	-.002	10	0	1	0	10	0	15
252			min	-313.8	3	.046	15	-.105	1	0	3	0	3	0	4
253		13	max	245.592	1	.153	4	-.002	10	0	1	0	10	0	15
254			min	-313.72	3	.037	15	-.105	1	0	3	0	3	0	4
255		14	max	245.699	1	.113	2	-.002	10	0	1	0	10	0	15
256			min	-313.64	3	.027	15	-.105	1	0	3	0	3	0	4
257		15	max	245.805	1	.08	2	-.002	10	0	1	0	10	0	15
258			min	-313.56	3	.017	15	-.105	1	0	3	0	3	0	4
259		16	max	245.912	1	.048	2	-.002	10	0	1	0	10	0	15
260			min	-313.48	3	.007	15	-.105	1	0	3	0	3	0	4
261		17	max	246.018	1	.016	2	-.002	10	0	1	0	10	0	15
262			min	-313.4	3	-.017	9	-.105	1	0	3	0	3	0	4
263		18	max	246.125	1	-.012	15	-.002	10	0	1	0	10	0	15
264			min	-313.32	3	-.053	4	-.105	1	0	3	0	3	0	4
265		19	max	246.231	1	-.022	15	-.002	10	0	1	0	10	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	-313.24	3	-.094	4	-.105	1	0	3	0	3	0	4
267	M11	1	max	95.338	2	1.799	4	.177	1	0	3	0	3	0	4
268			min	-86.327	3	.423	15	-.027	3	0	10	0	1	0	15
269		2	max	95.27	2	1.621	4	.177	1	0	3	0	3	0	4
270			min	-86.378	3	.381	15	-.027	3	0	10	0	1	0	12
271		3	max	95.202	2	1.444	4	.177	1	0	3	0	3	0	2
272			min	-86.429	3	.34	15	-.027	3	0	10	0	1	0	3
273		4	max	95.135	2	1.266	4	.177	1	0	3	0	3	0	15
274			min	-86.48	3	.298	15	-.027	3	0	10	0	1	0	3
275		5	max	95.067	2	1.088	4	.177	1	0	3	0	3	0	15
276			min	-86.53	3	.256	15	-.027	3	0	10	0	1	0	4
277		6	max	94.999	2	.911	4	.177	1	0	3	0	3	0	15
278			min	-86.581	3	.214	15	-.027	3	0	10	0	1	0	4
279		7	max	94.931	2	.733	4	.177	1	0	3	0	3	0	15
280			min	-86.632	3	.173	15	-.027	3	0	10	0	1	0	4
281		8	max	94.863	2	.555	4	.177	1	0	3	0	3	0	15
282			min	-86.683	3	.131	15	-.027	3	0	10	0	1	0	4
283		9	max	94.795	2	.378	4	.177	1	0	3	0	3	0	15
284			min	-86.734	3	.089	15	-.027	3	0	10	0	1	-.001	4
285		10	max	94.727	2	.2	4	.177	1	0	3	0	3	0	15
286			min	-86.785	3	.047	15	-.027	3	0	10	0	1	-.001	4
287		11	max	94.66	2	.036	2	.177	1	0	3	0	3	0	15
288			min	-86.836	3	-.016	3	-.027	3	0	10	0	1	-.001	4
289		12	max	94.592	2	-.036	15	.177	1	0	3	0	3	0	15
290			min	-86.887	3	-.155	4	-.027	3	0	10	0	1	-.001	4
291		13	max	94.524	2	-.078	15	.177	1	0	3	0	3	0	15
292			min	-86.938	3	-.333	4	-.027	3	0	10	0	1	-.001	4
293		14	max	94.456	2	-.12	15	.177	1	0	3	0	3	0	15
294			min	-86.989	3	-.511	4	-.027	3	0	10	0	11	-.001	4
295		15	max	94.388	2	-.161	15	.177	1	0	3	0	3	0	15
296			min	-87.039	3	-.688	4	-.027	3	0	10	0	10	0	4
297		16	max	94.32	2	-.203	15	.177	1	0	3	0	3	0	15
298			min	-87.09	3	-.866	4	-.027	3	0	10	0	10	0	4
299		17	max	94.252	2	-.245	15	.177	1	0	3	0	3	0	15
300			min	-87.141	3	-1.044	4	-.027	3	0	10	0	10	0	4
301		18	max	94.185	2	-.287	15	.177	1	0	3	0	3	0	15
302			min	-87.192	3	-1.221	4	-.027	3	0	10	0	10	0	4
303		19	max	94.117	2	-.328	15	.177	1	0	3	0	3	0	1
304			min	-87.243	3	-1.399	4	-.027	3	0	10	0	10	0	1
305	M12	1	max	335.186	1	0	1	.767	1	0	1	0	2	0	1
306			min	-74.324	3	0	1	0	10	0	1	0	3	0	1
307		2	max	335.251	1	0	1	.767	1	0	1	0	1	0	1
308			min	-74.275	3	0	1	0	10	0	1	0	15	0	1
309		3	max	335.316	1	0	1	.767	1	0	1	0	1	0	1
310			min	-74.227	3	0	1	0	10	0	1	0	10	0	1
311		4	max	335.38	1	0	1	.767	1	0	1	0	1	0	1
312			min	-74.178	3	0	1	0	10	0	1	0	10	0	1
313		5	max	335.445	1	0	1	.767	1	0	1	0	1	0	1
314			min	-74.13	3	0	1	0	10	0	1	0	10	0	1
315		6	max	335.51	1	0	1	.767	1	0	1	0	1	0	1
316			min	-74.081	3	0	1	0	10	0	1	0	10	0	1
317		7	max	335.575	1	0	1	.767	1	0	1	0	1	0	1
318			min	-74.033	3	0	1	0	10	0	1	0	10	0	1
319		8	max	335.639	1	0	1	.767	1	0	1	0	1	0	1
320			min	-73.984	3	0	1	0	10	0	1	0	10	0	1
321		9	max	335.704	1	0	1	.767	1	0	1	0	1	0	1
322			min	-73.935	3	0	1	0	10	0	1	0	10	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	335.769	1	0	1	.767	1	0	1	0	1	0	1
324			min	-73.887	3	0	1	0	10	0	1	0	10	0	1
325		11	max	335.833	1	0	1	.767	1	0	1	0	1	0	1
326			min	-73.838	3	0	1	0	10	0	1	0	10	0	1
327		12	max	335.898	1	0	1	.767	1	0	1	0	1	0	1
328			min	-73.79	3	0	1	0	10	0	1	0	10	0	1
329		13	max	335.963	1	0	1	.767	1	0	1	0	1	0	1
330			min	-73.741	3	0	1	0	10	0	1	0	10	0	1
331		14	max	336.028	1	0	1	.767	1	0	1	0	1	0	1
332			min	-73.693	3	0	1	0	10	0	1	0	10	0	1
333		15	max	336.092	1	0	1	.767	1	0	1	0	1	0	1
334			min	-73.644	3	0	1	0	10	0	1	0	10	0	1
335		16	max	336.157	1	0	1	.767	1	0	1	.001	1	0	1
336			min	-73.596	3	0	1	0	10	0	1	0	10	0	1
337		17	max	336.222	1	0	1	.767	1	0	1	.001	1	0	1
338			min	-73.547	3	0	1	0	10	0	1	0	10	0	1
339		18	max	336.286	1	0	1	.767	1	0	1	.001	1	0	1
340			min	-73.499	3	0	1	0	10	0	1	0	10	0	1
341		19	max	336.351	1	0	1	.767	1	0	1	.001	1	0	1
342			min	-73.45	3	0	1	0	10	0	1	0	10	0	1
343	M1	1	max	67.486	1	336.373	3	-.09	10	0	1	.033	1	.015	2
344			min	2.296	15	-246.807	1	-16.981	1	0	3	0	10	-.016	3
345		2	max	67.581	1	336.176	3	-.09	10	0	1	.03	1	.068	1
346			min	2.325	15	-247.069	1	-16.981	1	0	3	0	10	-.089	3
347		3	max	54.572	1	4.336	9	-.089	10	0	3	.026	1	.121	1
348			min	-.723	10	-20.741	3	-16.888	1	0	1	0	10	-.161	3
349		4	max	54.668	1	4.117	9	-.089	10	0	3	.022	1	.122	1
350			min	-.644	10	-20.938	3	-16.888	1	0	1	0	10	-.156	3
351		5	max	54.763	1	3.898	9	-.089	10	0	3	.018	1	.124	2
352			min	-.564	10	-21.135	3	-16.888	1	0	1	0	10	-.152	3
353		6	max	54.859	1	3.68	9	-.089	10	0	3	.015	1	.128	2
354			min	-.484	10	-21.331	3	-16.888	1	0	1	0	10	-.147	3
355		7	max	54.954	1	3.461	9	-.089	10	0	3	.011	1	.132	2
356			min	-.405	10	-21.528	3	-16.888	1	0	1	0	10	-.142	3
357		8	max	55.05	1	3.242	9	-.089	10	0	3	.007	1	.136	2
358			min	-.325	10	-21.725	3	-16.888	1	0	1	0	10	-.138	3
359		9	max	55.145	1	3.024	9	-.089	10	0	3	.004	1	.14	2
360			min	-.246	10	-21.922	3	-16.888	1	0	1	0	10	-.133	3
361		10	max	55.241	1	2.805	9	-.089	10	0	3	.001	3	.144	2
362			min	-.166	10	-22.118	3	-16.888	1	0	1	0	15	-.128	3
363		11	max	55.336	1	2.586	9	-.089	10	0	3	0	3	.149	2
364			min	-.086	10	-22.315	3	-16.888	1	0	1	-.004	1	-.123	3
365		12	max	55.432	1	2.368	9	-.089	10	0	3	0	10	.153	2
366			min	-.007	10	-22.512	3	-16.888	1	0	1	-.007	1	-.119	3
367		13	max	55.527	1	2.149	9	-.089	10	0	3	0	10	.158	2
368			min	.073	10	-22.709	3	-16.888	1	0	1	-.011	1	-.114	3
369		14	max	55.623	1	1.93	9	-.089	10	0	3	0	10	.162	2
370			min	.152	10	-22.906	3	-16.888	1	0	1	-.015	1	-.109	3
371		15	max	55.718	1	1.712	9	-.089	10	0	3	0	10	.167	2
372			min	.232	10	-23.102	3	-16.888	1	0	1	-.018	1	-.104	3
373		16	max	80.073	2	46.192	2	-.089	10	0	1	0	10	.171	2
374			min	-30.389	3	-86.202	3	-17.039	1	0	3	-.022	1	-.098	3
375		17	max	80.169	2	45.93	2	-.089	10	0	1	0	10	.161	2
376			min	-30.317	3	-86.399	3	-17.039	1	0	3	-.026	1	-.079	3
377		18	max	-2.324	15	331.586	2	-.088	10	0	3	0	10	.09	2
378			min	-67.549	1	-156.921	3	-17.533	1	0	2	-.03	1	-.046	3
379		19	max	-2.295	15	331.324	2	-.088	10	0	3	0	10	.018	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	-67.453	1	-157.117	3	-17.533	1	0	2	-.033	1	-.012	3
381	M5	1	max	165.794	1	1062.355	3	0	10	0	9	.009	3	.033	3
382			min	-.123	3	-774.034	1	-58.185	3	0	3	0	10	-.029	2
383		2	max	165.89	1	1062.158	3	0	10	0	9	0	9	.139	1
384			min	-.052	3	-774.296	1	-58.185	3	0	3	-.003	3	-.198	3
385		3	max	124.501	1	6.019	9	6.113	3	0	3	0	9	.304	1
386			min	.421	10	-64.645	3	-.165	9	0	1	-.015	3	-.423	3
387		4	max	124.597	1	5.801	9	6.113	3	0	3	0	9	.309	1
388			min	.501	10	-64.841	3	-.165	9	0	1	-.014	3	-.409	3
389		5	max	124.692	1	5.582	9	6.113	3	0	3	0	9	.314	1
390			min	.58	10	-65.038	3	-.165	9	0	1	-.013	3	-.395	3
391		6	max	124.788	1	5.363	9	6.113	3	0	3	0	9	.323	2
392			min	.66	10	-65.235	3	-.165	9	0	1	-.012	3	-.381	3
393		7	max	124.883	1	5.145	9	6.113	3	0	3	0	9	.335	2
394			min	.739	10	-65.432	3	-.165	9	0	1	-.01	3	-.367	3
395		8	max	124.979	1	4.926	9	6.113	3	0	3	0	9	.348	2
396			min	.819	10	-65.629	3	-.165	9	0	1	-.009	3	-.352	3
397		9	max	125.074	1	4.707	9	6.113	3	0	3	0	1	.36	2
398			min	.898	10	-65.825	3	-.165	9	0	1	-.008	3	-.338	3
399		10	max	125.17	1	4.489	9	6.113	3	0	3	0	11	.373	2
400			min	.978	10	-66.022	3	-.165	9	0	1	-.006	3	-.324	3
401		11	max	125.265	1	4.27	9	6.113	3	0	3	0	2	.385	2
402			min	1.058	10	-66.219	3	-.165	9	0	1	-.005	3	-.309	3
403		12	max	125.361	1	4.051	9	6.113	3	0	3	0	2	.398	2
404			min	1.137	10	-66.416	3	-.165	9	0	1	-.004	3	-.295	3
405		13	max	125.456	1	3.833	9	6.113	3	0	3	0	2	.411	2
406			min	1.217	10	-66.613	3	-.165	9	0	1	-.002	3	-.281	3
407		14	max	125.552	1	3.614	9	6.113	3	0	3	0	2	.424	2
408			min	1.296	10	-66.809	3	-.165	9	0	1	0	3	-.266	3
409		15	max	125.647	1	3.395	9	6.113	3	0	3	0	3	.437	2
410			min	1.376	10	-67.006	3	-.165	9	0	1	0	9	-.252	3
411		16	max	250.608	2	167.627	2	6.091	3	0	3	.001	3	.447	2
412			min	-94.932	3	-233.166	3	-.166	9	0	2	0	9	-.236	3
413		17	max	250.704	2	167.365	2	6.091	3	0	3	.003	3	.411	2
414			min	-94.861	3	-233.363	3	-.166	9	0	2	0	9	-.185	3
415		18	max	-3.298	12	1039.22	2	5.645	3	0	3	.004	3	.189	2
416			min	-165.964	1	-482.613	3	-.037	1	0	9	0	9	-.081	3
417		19	max	-3.25	12	1038.958	2	5.645	3	0	3	.005	3	.023	3
418			min	-165.868	1	-482.81	3	-.037	1	0	9	0	9	-.036	2
419	M9	1	max	67.383	1	336.326	3	61.304	3	0	3	0	10	.015	2
420			min	2.29	15	-246.806	1	.09	10	0	1	-.033	1	-.016	3
421		2	max	67.479	1	336.129	3	61.304	3	0	3	0	10	.068	1
422			min	2.319	15	-247.068	1	.09	10	0	1	-.029	1	-.089	3
423		3	max	54.827	1	4.319	9	16.648	1	0	1	.012	3	.12	1
424			min	-.394	10	-20.667	3	-2.464	3	0	10	-.025	1	-.161	3
425		4	max	54.922	1	4.1	9	16.648	1	0	1	.011	3	.121	1
426			min	-.315	10	-20.864	3	-2.464	3	0	10	-.022	1	-.156	3
427		5	max	55.018	1	3.882	9	16.648	1	0	1	.011	3	.123	2
428			min	-.235	10	-21.061	3	-2.464	3	0	10	-.018	1	-.152	3
429		6	max	55.113	1	3.663	9	16.648	1	0	1	.01	3	.128	2
430			min	-.155	10	-21.258	3	-2.464	3	0	10	-.015	1	-.147	3
431		7	max	55.209	1	3.444	9	16.648	1	0	1	.01	3	.132	2
432			min	-.076	10	-21.455	3	-2.464	3	0	10	-.011	1	-.142	3
433		8	max	55.304	1	3.226	9	16.648	1	0	1	.009	3	.136	2
434			min	.004	10	-21.651	3	-2.464	3	0	10	-.007	1	-.138	3
435		9	max	55.4	1	3.007	9	16.648	1	0	1	.008	3	.14	2
436			min	.083	10	-21.848	3	-2.464	3	0	10	-.004	1	-.133	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	55.495	1	2.788	9	16.648	1	0	1	.008	3	.144	2
438			min	.163	10	-22.045	3	-2.464	3	0	10	0	1	-.128	3
439		11	max	55.591	1	2.57	9	16.648	1	0	1	.007	3	.149	2
440			min	.242	10	-22.242	3	-2.464	3	0	10	0	10	-.123	3
441		12	max	55.686	1	2.351	9	16.648	1	0	1	.007	1	.153	2
442			min	.322	10	-22.439	3	-2.464	3	0	10	0	10	-.119	3
443		13	max	55.782	1	2.132	9	16.648	1	0	1	.011	1	.158	2
444			min	.402	10	-22.635	3	-2.464	3	0	10	0	10	-.114	3
445		14	max	55.877	1	1.914	9	16.648	1	0	1	.014	1	.162	2
446			min	.481	10	-22.832	3	-2.464	3	0	10	0	10	-.109	3
447		15	max	55.973	1	1.695	9	16.648	1	0	1	.018	1	.167	2
448			min	.561	10	-23.029	3	-2.464	3	0	10	0	10	-.104	3
449		16	max	80.176	2	45.911	2	16.811	1	0	10	.022	1	.171	2
450			min	-31.106	3	-86.603	3	-2.482	3	0	3	0	10	-.098	3
451		17	max	80.271	2	45.648	2	16.811	1	0	10	.026	1	.161	2
452			min	-31.035	3	-86.8	3	-2.482	3	0	3	0	10	-.079	3
453		18	max	-2.317	15	331.586	2	17.571	1	0	2	.029	1	.09	2
454			min	-67.437	1	-156.915	3	-2.148	3	0	3	0	10	-.046	3
455		19	max	-2.289	15	331.324	2	17.571	1	0	2	.033	1	.018	2
456			min	-67.342	1	-157.112	3	-2.148	3	0	3	0	10	-.012	3
457	M13	1	max	61.301	3	246.584	1	-2.29	15	.015	2	.033	1	0	1
458			min	.09	10	-336.345	3	-67.381	1	-.016	3	0	10	0	3
459		2	max	61.301	3	176.267	1	-1.733	15	.015	2	.011	3	.136	3
460			min	.09	10	-239.956	3	-50.677	1	-.016	3	-.002	10	-.1	1
461		3	max	61.301	3	105.95	1	-1.176	15	.015	2	.008	3	.227	3
462			min	.09	10	-143.567	3	-33.974	1	-.016	3	-.015	1	-.166	1
463		4	max	61.301	3	35.634	1	-.094	10	.015	2	.006	3	.272	3
464			min	.09	10	-47.179	3	-17.27	1	-.016	3	-.027	1	-.2	1
465		5	max	61.301	3	49.21	3	1.95	2	.015	2	.004	3	.271	3
466			min	.09	10	-34.683	1	-3.826	3	-.016	3	-.031	1	-.2	1
467		6	max	61.301	3	145.599	3	16.137	1	.015	2	.002	3	.225	3
468			min	.09	10	-105	1	-3.012	3	-.016	3	-.027	1	-.167	1
469		7	max	61.301	3	241.987	3	32.841	1	.015	2	.001	3	.134	3
470			min	.09	10	-175.316	1	-2.197	3	-.016	3	-.016	1	-.101	1
471		8	max	61.301	3	338.376	3	49.544	1	.015	2	.004	2	0	9
472			min	.09	10	-245.633	1	-1.382	3	-.016	3	0	15	-.003	3
473		9	max	61.301	3	434.765	3	66.248	1	.015	2	.031	1	.131	1
474			min	.09	10	-315.95	1	-.568	3	-.016	3	0	3	-.186	3
475		10	max	61.301	3	317.871	12	82.951	1	.015	2	.066	1	.297	1
476			min	.09	10	-531.153	3	.383	3	-.016	3	-.009	3	-.414	3
477		11	max	17.009	1	315.95	1	1.198	3	.016	3	.031	1	.131	1
478			min	.09	10	-434.764	3	-66.145	1	-.015	2	-.009	3	-.186	3
479		12	max	17.009	1	245.633	1	2.012	3	.016	3	.004	2	0	9
480			min	.09	10	-338.376	3	-49.442	1	-.015	2	-.008	3	-.003	3
481		13	max	17.009	1	175.316	1	2.827	3	.016	3	0	10	.134	3
482			min	.09	10	-241.987	3	-32.738	1	-.015	2	-.016	1	-.101	1
483		14	max	17.009	1	105	1	3.642	3	.016	3	0	15	.225	3
484			min	.09	10	-145.599	3	-16.035	1	-.015	2	-.027	1	-.167	1
485		15	max	17.009	1	34.683	1	4.456	3	.016	3	-.001	15	.271	3
486			min	.09	10	-49.21	3	-1.95	2	-.015	2	-.031	1	-.2	1
487		16	max	17.009	1	47.179	3	17.372	1	.016	3	0	15	.272	3
488			min	.09	10	-35.634	1	.094	10	-.015	2	-.027	1	-.2	1
489		17	max	17.009	1	143.567	3	34.076	1	.016	3	.001	3	.227	3
490			min	.09	10	-105.95	1	1.183	15	-.015	2	-.015	1	-.166	1
491		18	max	17.009	1	239.956	3	50.779	1	.016	3	.005	1	.136	3
492			min	.09	10	-176.267	1	1.739	15	-.015	2	-.002	10	-.1	1
493		19	max	17.009	1	336.345	3	67.483	1	.016	3	.033	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	.09	10	-246.584	1	2.296	15	-.015	2	0	10	0	3
495	M16	1	max	2.149	3	331.425	2	-2.289	15	.012	3	.033	1	0	2
496			min	-17.544	1	-157.13	3	-67.345	1	-.018	2	0	10	0	3
497		2	max	2.149	3	236.837	2	-1.732	15	.012	3	.005	1	.064	3
498			min	-17.544	1	-112.846	3	-50.641	1	-.018	2	-.002	10	-.134	2
499		3	max	2.149	3	142.248	2	-1.175	15	.012	3	0	15	.107	3
500			min	-17.544	1	-68.563	3	-33.938	1	-.018	2	-.015	1	-.224	2
501		4	max	2.149	3	47.66	2	-.088	10	.012	3	0	15	.128	3
502			min	-17.544	1	-24.279	3	-17.234	1	-.018	2	-.027	1	-.269	2
503		5	max	2.149	3	20.005	3	1.962	2	.012	3	-.001	15	.13	3
504			min	-17.544	1	-46.929	2	-2.238	3	-.018	2	-.031	1	-.269	2
505		6	max	2.149	3	64.288	3	16.173	1	.012	3	0	15	.11	3
506			min	-17.544	1	-141.517	2	-1.423	3	-.018	2	-.027	1	-.224	2
507		7	max	2.149	3	108.572	3	32.876	1	.012	3	0	10	.069	3
508			min	-17.544	1	-236.105	2	-.608	3	-.018	2	-.016	1	-.135	2
509		8	max	2.149	3	152.855	3	49.58	1	.012	3	.004	2	.007	3
510			min	-17.544	1	-330.694	2	.206	3	-.018	2	-.005	3	-.001	2
511		9	max	2.149	3	197.139	3	66.283	1	.012	3	.031	1	.177	2
512			min	-17.544	1	-425.282	2	.823	12	-.018	2	-.005	3	-.076	3
513		10	max	-.088	10	-8.412	15	82.987	1	0	15	.066	1	.4	2
514			min	-17.544	1	-519.871	2	-2.702	3	-.018	2	-.004	3	-.179	3
515		11	max	-.088	10	425.282	2	-1.34	12	.018	2	.031	1	.177	2
516			min	-17.506	1	-197.139	3	-66.172	1	-.012	3	0	3	-.076	3
517		12	max	-.088	10	330.694	2	-.797	12	.018	2	.004	2	.007	3
518			min	-17.506	1	-152.855	3	-49.468	1	-.012	3	0	3	-.001	2
519		13	max	-.088	10	236.105	2	-.254	12	.018	2	0	10	.069	3
520			min	-17.506	1	-108.572	3	-32.765	1	-.012	3	-.016	1	-.135	2
521		14	max	-.088	10	141.517	2	.557	3	.018	2	0	12	.11	3
522			min	-17.506	1	-64.288	3	-16.061	1	-.012	3	-.027	1	-.224	2
523		15	max	-.088	10	46.929	2	1.371	3	.018	2	0	12	.13	3
524			min	-17.506	1	-20.005	3	-1.962	2	-.012	3	-.031	1	-.269	2
525		16	max	-.088	10	24.279	3	17.346	1	.018	2	0	3	.128	3
526			min	-17.506	1	-47.66	2	.088	10	-.012	3	-.027	1	-.269	2
527		17	max	-.088	10	68.563	3	34.049	1	.018	2	.002	3	.107	3
528			min	-17.506	1	-142.248	2	1.181	15	-.012	3	-.015	1	-.224	2
529		18	max	-.088	10	112.846	3	50.753	1	.018	2	.005	1	.064	3
530			min	-17.506	1	-236.837	2	1.738	15	-.012	3	-.002	10	-.134	2
531		19	max	-.088	10	157.13	3	67.456	1	.018	2	.033	1	0	2
532			min	-17.506	1	-331.425	2	2.295	15	-.012	3	0	10	0	3
533	M15	1	max	0	1	.876	3	.109	3	0	1	0	1	0	1
534			min	-76.648	3	0	1	0	1	0	3	0	3	0	1
535		2	max	0	1	.778	3	.109	3	0	1	0	1	0	1
536			min	-76.708	3	0	1	0	1	0	3	0	3	0	3
537		3	max	0	1	.681	3	.109	3	0	1	0	1	0	1
538			min	-76.768	3	0	1	0	1	0	3	0	3	0	3
539		4	max	0	1	.584	3	.109	3	0	1	0	1	0	1
540			min	-76.827	3	0	1	0	1	0	3	0	3	0	3
541		5	max	0	1	.487	3	.109	3	0	1	0	1	0	1
542			min	-76.887	3	0	1	0	1	0	3	0	3	0	3
543		6	max	0	1	.389	3	.109	3	0	1	0	1	0	1
544			min	-76.947	3	0	1	0	1	0	3	0	3	0	3
545		7	max	0	1	.292	3	.109	3	0	1	0	3	0	1
546			min	-77.006	3	0	1	0	1	0	3	0	1	0	3
547		8	max	0	1	.195	3	.109	3	0	1	0	3	0	1
548			min	-77.066	3	0	1	0	1	0	3	0	1	-.001	3
549		9	max	0	1	.097	3	.109	3	0	1	0	3	0	1
550			min	-77.126	3	0	1	0	1	0	3	0	1	-.001	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
551		10	max	0	1	0	1	.109	3	0	1	0	3	0	1
552			min	-77.185	3	0	1	0	1	0	3	0	1	-.001	3
553		11	max	0	1	0	1	.109	3	0	1	0	3	0	1
554			min	-77.245	3	-.097	3	0	1	0	3	0	1	-.001	3
555		12	max	0	1	0	1	.109	3	0	1	0	3	0	1
556			min	-77.305	3	-.195	3	0	1	0	3	0	1	-.001	3
557		13	max	0	1	0	1	.109	3	0	1	0	3	0	1
558			min	-77.364	3	-.292	3	0	1	0	3	0	1	0	3
559		14	max	0	1	0	1	.109	3	0	1	0	3	0	1
560			min	-77.424	3	-.389	3	0	1	0	3	0	1	0	3
561		15	max	0	1	0	1	.109	3	0	1	0	3	0	1
562			min	-77.484	3	-.487	3	0	1	0	3	0	1	0	3
563		16	max	0	1	0	1	.109	3	0	1	0	3	0	1
564			min	-77.543	3	-.584	3	0	1	0	3	0	1	0	3
565		17	max	0	1	0	1	.109	3	0	1	0	3	0	1
566			min	-77.603	3	-.681	3	0	1	0	3	0	1	0	3
567		18	max	0	1	0	1	.109	3	0	1	0	3	0	1
568			min	-77.663	3	-.778	3	0	1	0	3	0	1	0	3
569		19	max	0	1	0	1	.109	3	0	1	0	3	0	1
570			min	-77.722	3	-.876	3	0	1	0	3	0	1	0	1
571	M16A	1	max	0	2	1.499	4	.044	1	0	3	0	3	0	1
572			min	-76.582	3	0	2	-.051	3	0	1	0	1	0	1
573		2	max	0	2	1.332	4	.044	1	0	3	0	3	0	2
574			min	-76.522	3	0	2	-.051	3	0	1	0	1	0	4
575		3	max	0	2	1.166	4	.044	1	0	3	0	3	0	2
576			min	-76.462	3	0	2	-.051	3	0	1	0	1	0	4
577		4	max	0	2	.999	4	.044	1	0	3	0	3	0	2
578			min	-76.403	3	0	2	-.051	3	0	1	0	1	-.001	4
579		5	max	0	2	.833	4	.044	1	0	3	0	3	0	2
580			min	-76.343	3	0	2	-.051	3	0	1	0	1	-.001	4
581		6	max	0	2	.666	4	.044	1	0	3	0	3	0	2
582			min	-76.283	3	0	2	-.051	3	0	1	0	1	-.002	4
583		7	max	0	2	.5	4	.044	1	0	3	0	3	0	2
584			min	-76.224	3	0	2	-.051	3	0	1	0	1	-.002	4
585		8	max	0	2	.333	4	.044	1	0	3	0	3	0	2
586			min	-76.164	3	0	2	-.051	3	0	1	0	1	-.002	4
587		9	max	0	2	.167	4	.044	1	0	3	0	3	0	2
588			min	-76.104	3	0	2	-.051	3	0	1	0	1	-.002	4
589		10	max	0	2	0	1	.044	1	0	3	0	3	0	2
590			min	-76.045	3	0	1	-.051	3	0	1	0	1	-.002	4
591		11	max	0	2	0	2	.044	1	0	3	0	3	0	2
592			min	-75.985	3	-.167	4	-.051	3	0	1	0	1	-.002	4
593		12	max	.063	13	0	2	.044	1	0	3	0	3	0	2
594			min	-75.925	3	-.333	4	-.051	3	0	1	0	1	-.002	4
595		13	max	.145	13	0	2	.044	1	0	3	0	1	0	2
596			min	-75.866	3	-.5	4	-.051	3	0	1	0	4	-.002	4
597		14	max	.227	13	0	2	.044	1	0	3	0	1	0	2
598			min	-75.806	3	-.666	4	-.051	3	0	1	0	3	-.002	4
599		15	max	.309	13	0	2	.044	1	0	3	0	1	0	2
600			min	-75.746	3	-.833	4	-.051	3	0	1	0	3	-.001	4
601		16	max	.391	13	0	2	.044	1	0	3	0	1	0	2
602			min	-75.687	3	-.999	4	-.051	3	0	1	0	3	-.001	4
603		17	max	.475	4	0	2	.044	1	0	3	0	1	0	2
604			min	-75.627	3	-1.166	4	-.051	3	0	1	0	3	0	4
605		18	max	.577	4	0	2	.044	1	0	3	0	1	0	2
606			min	-75.567	3	-1.332	4	-.051	3	0	1	0	3	0	4
607		19	max	.679	4	0	2	.044	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	-75.508	3	-1.499	4	-.051	3	0	1	0	3	0	1

Envelope Member Section Deflections

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
1	M2	1	max	.002	1	.007	2	.003	1	-1.597e-6	10	NC	3	NC	1
2			min	-.003	3	-.007	3	-.001	3	-2.542e-4	1	4456.915	2	NC	1
3		2	max	.002	1	.007	2	.003	1	-1.529e-6	10	NC	3	NC	1
4			min	-.003	3	-.006	3	-.001	3	-2.433e-4	1	4835.076	2	NC	1
5		3	max	.002	1	.006	2	.002	1	-1.462e-6	10	NC	3	NC	1
6			min	-.003	3	-.006	3	-.001	3	-2.324e-4	1	5279.862	2	NC	1
7		4	max	.002	1	.006	2	.002	1	-1.395e-6	10	NC	3	NC	1
8			min	-.002	3	-.006	3	-.001	3	-2.215e-4	1	5806.549	2	NC	1
9		5	max	.002	1	.005	2	.002	1	-1.328e-6	10	NC	1	NC	1
10			min	-.002	3	-.006	3	0	3	-2.106e-4	1	6435.272	2	NC	1
11		6	max	.001	1	.005	2	.002	1	-1.261e-6	10	NC	1	NC	1
12			min	-.002	3	-.005	3	0	3	-1.997e-4	1	7192.999	2	NC	1
13		7	max	.001	1	.004	2	.002	1	-1.194e-6	10	NC	1	NC	1
14			min	-.002	3	-.005	3	0	3	-1.888e-4	1	8116.532	2	NC	1
15		8	max	.001	1	.004	2	.001	1	-1.126e-6	10	NC	1	NC	1
16			min	-.002	3	-.005	3	0	3	-1.779e-4	1	9257.202	2	NC	1
17		9	max	.001	1	.003	2	.001	1	-1.059e-6	10	NC	1	NC	1
18			min	-.002	3	-.004	3	0	3	-1.67e-4	1	NC	1	NC	1
19		10	max	0	1	.003	2	0	1	-9.921e-7	10	NC	1	NC	1
20			min	-.001	3	-.004	3	0	3	-1.561e-4	1	NC	1	NC	1
21		11	max	0	1	.002	2	0	1	-9.249e-7	10	NC	1	NC	1
22			min	-.001	3	-.004	3	0	3	-1.452e-4	1	NC	1	NC	1
23		12	max	0	1	.002	2	0	1	-8.578e-7	10	NC	1	NC	1
24			min	-.001	3	-.003	3	0	3	-1.343e-4	1	NC	1	NC	1
25		13	max	0	1	.001	2	0	1	-7.906e-7	10	NC	1	NC	1
26			min	0	3	-.003	3	0	3	-1.234e-4	1	NC	1	NC	1
27		14	max	0	1	.001	2	0	1	-7.234e-7	10	NC	1	NC	1
28			min	0	3	-.002	3	0	3	-1.125e-4	1	NC	1	NC	1
29		15	max	0	1	0	2	0	1	-6.563e-7	10	NC	1	NC	1
30			min	0	3	-.002	3	0	3	-1.016e-4	1	NC	1	NC	1
31		16	max	0	1	0	2	0	1	-5.891e-7	10	NC	1	NC	1
32			min	0	3	-.002	3	0	3	-9.067e-5	1	NC	1	NC	1
33		17	max	0	1	0	2	0	1	-5.219e-7	10	NC	1	NC	1
34			min	0	3	-.001	3	0	3	-7.977e-5	1	NC	1	NC	1
35		18	max	0	1	0	2	0	1	-4.548e-7	10	NC	1	NC	1
36			min	0	3	0	3	0	3	-6.887e-5	1	NC	1	NC	1
37		19	max	0	1	0	1	0	1	-3.876e-7	10	NC	1	NC	1
38			min	0	1	0	1	0	1	-5.796e-5	1	NC	1	NC	1
39	M3	1	max	0	1	0	1	0	1	2.669e-5	1	NC	1	NC	1
40			min	0	1	0	1	0	1	1.783e-7	10	NC	1	NC	1
41		2	max	0	3	0	2	0	10	3.56e-5	1	NC	1	NC	1
42			min	0	2	0	3	0	1	2.219e-7	10	NC	1	NC	1
43		3	max	0	3	0	2	0	10	4.451e-5	1	NC	1	NC	1
44			min	0	2	-.002	3	0	1	2.656e-7	10	NC	1	NC	1
45		4	max	0	3	0	2	0	10	5.341e-5	1	NC	1	NC	1
46			min	0	2	-.002	3	0	1	3.092e-7	10	NC	1	NC	1
47		5	max	0	3	0	2	0	3	6.232e-5	1	NC	1	NC	1
48			min	0	2	-.003	3	0	1	3.529e-7	10	NC	1	NC	1
49		6	max	0	3	0	2	0	3	7.123e-5	1	NC	1	NC	1
50			min	0	2	-.004	3	0	9	3.966e-7	10	NC	1	NC	1
51		7	max	0	3	0	2	0	3	8.014e-5	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	9	4.402e-7	10	NC	1	NC	1
53		8	max	0	3	.001	2	0	3	8.905e-5	1	NC	1	NC	1
54			min	0	2	-.005	3	0	9	4.839e-7	10	NC	1	NC	1
55		9	max	0	3	.001	2	0	1	9.796e-5	1	NC	1	NC	1
56			min	0	2	-.006	3	0	10	5.275e-7	10	NC	1	NC	1
57		10	max	0	3	.002	2	0	1	1.069e-4	1	NC	1	NC	1
58			min	0	2	-.006	3	0	10	5.712e-7	10	NC	1	NC	1
59		11	max	0	3	.002	2	0	1	1.158e-4	1	NC	1	NC	1
60			min	0	2	-.007	3	0	10	6.148e-7	10	NC	1	NC	1
61		12	max	0	3	.003	2	0	1	1.247e-4	1	NC	1	NC	1
62			min	0	2	-.007	3	0	10	6.585e-7	10	NC	1	NC	1
63		13	max	0	3	.004	2	0	1	1.336e-4	1	NC	1	NC	1
64			min	0	2	-.007	3	0	10	7.021e-7	10	NC	1	NC	1
65		14	max	0	3	.004	2	.001	1	1.425e-4	1	NC	1	NC	1
66			min	0	2	-.008	3	0	10	7.458e-7	10	NC	1	NC	1
67		15	max	0	3	.005	2	.001	1	1.514e-4	1	NC	1	NC	1
68			min	0	2	-.008	3	0	10	7.895e-7	10	8702.783	2	NC	1
69		16	max	0	3	.006	2	.001	1	1.603e-4	1	NC	1	NC	1
70			min	0	2	-.008	3	0	10	8.331e-7	10	7418.916	2	NC	1
71		17	max	0	3	.007	2	.002	1	1.692e-4	1	NC	3	NC	1
72			min	0	2	-.008	3	0	10	8.768e-7	10	6414.852	2	NC	1
73		18	max	0	3	.008	2	.002	1	1.781e-4	1	NC	3	NC	1
74			min	-.001	2	-.008	3	0	10	9.204e-7	10	5622.472	2	NC	1
75		19	max	0	3	.009	2	.002	1	1.871e-4	1	NC	3	NC	1
76			min	-.001	2	-.008	3	0	10	9.641e-7	10	4992.688	2	NC	1
77	M4	1	max	.002	1	.008	2	0	10	-8.71e-7	10	NC	1	NC	1
78			min	0	3	-.007	3	-.002	1	-2.112e-4	1	NC	1	NC	1
79		2	max	.002	1	.008	2	0	10	-8.71e-7	10	NC	1	NC	1
80			min	0	3	-.007	3	-.001	1	-2.112e-4	1	NC	1	NC	1
81		3	max	.001	1	.007	2	0	10	-8.71e-7	10	NC	1	NC	1
82			min	0	3	-.006	3	-.001	1	-2.112e-4	1	NC	1	NC	1
83		4	max	.001	1	.007	2	0	10	-8.71e-7	10	NC	1	NC	1
84			min	0	3	-.006	3	-.001	1	-2.112e-4	1	NC	1	NC	1
85		5	max	.001	1	.007	2	0	10	-8.71e-7	10	NC	1	NC	1
86			min	0	3	-.005	3	-.001	1	-2.112e-4	1	NC	1	NC	1
87		6	max	.001	1	.006	2	0	10	-8.71e-7	10	NC	1	NC	1
88			min	0	3	-.005	3	0	1	-2.112e-4	1	NC	1	NC	1
89		7	max	.001	1	.006	2	0	10	-8.71e-7	10	NC	1	NC	1
90			min	0	3	-.005	3	0	1	-2.112e-4	1	NC	1	NC	1
91		8	max	0	1	.005	2	0	10	-8.71e-7	10	NC	1	NC	1
92			min	0	3	-.004	3	0	1	-2.112e-4	1	NC	1	NC	1
93		9	max	0	1	.005	2	0	10	-8.71e-7	10	NC	1	NC	1
94			min	0	3	-.004	3	0	1	-2.112e-4	1	NC	1	NC	1
95		10	max	0	1	.004	2	0	10	-8.71e-7	10	NC	1	NC	1
96			min	0	3	-.003	3	0	1	-2.112e-4	1	NC	1	NC	1
97		11	max	0	1	.004	2	0	10	-8.71e-7	10	NC	1	NC	1
98			min	0	3	-.003	3	0	1	-2.112e-4	1	NC	1	NC	1
99		12	max	0	1	.003	2	0	10	-8.71e-7	10	NC	1	NC	1
100			min	0	3	-.003	3	0	1	-2.112e-4	1	NC	1	NC	1
101		13	max	0	1	.003	2	0	10	-8.71e-7	10	NC	1	NC	1
102			min	0	3	-.002	3	0	1	-2.112e-4	1	NC	1	NC	1
103		14	max	0	1	.002	2	0	10	-8.71e-7	10	NC	1	NC	1
104			min	0	3	-.002	3	0	1	-2.112e-4	1	NC	1	NC	1
105		15	max	0	1	.002	2	0	10	-8.71e-7	10	NC	1	NC	1
106			min	0	3	-.002	3	0	1	-2.112e-4	1	NC	1	NC	1
107		16	max	0	1	.001	2	0	10	-8.71e-7	10	NC	1	NC	1
108			min	0	3	-.001	3	0	1	-2.112e-4	1	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
109		17	max	0	1	0	2	0	10	-8.71e-7	10	NC	1	NC	1
110			min	0	3	0	3	0	1	-2.112e-4	1	NC	1	NC	1
111		18	max	0	1	0	2	0	10	-8.71e-7	10	NC	1	NC	1
112			min	0	3	0	3	0	1	-2.112e-4	1	NC	1	NC	1
113		19	max	0	1	0	1	0	1	-8.71e-7	10	NC	1	NC	1
114			min	0	1	0	1	0	1	-2.112e-4	1	NC	1	NC	1
115	M6	1	max	.006	1	.02	2	0	9	3.186e-4	3	NC	3	NC	1
116			min	-.009	3	-.016	3	-.004	3	-8.429e-8	2	1688.984	2	7712.333	3
117		2	max	.006	1	.018	2	0	9	3.105e-4	3	NC	3	NC	1
118			min	-.008	3	-.016	3	-.004	3	-4.849e-7	11	1806.859	2	8244.223	3
119		3	max	.005	1	.017	2	0	9	3.024e-4	3	NC	3	NC	1
120			min	-.008	3	-.015	3	-.004	3	-1.396e-6	11	1941.903	2	8869.015	3
121		4	max	.005	1	.016	2	0	9	2.943e-4	3	NC	3	NC	1
122			min	-.007	3	-.014	3	-.003	3	-2.429e-6	1	2097.586	2	9607.361	3
123		5	max	.005	1	.015	2	0	9	2.863e-4	3	NC	3	NC	1
124			min	-.007	3	-.013	3	-.003	3	-4.447e-6	1	2278.38	2	NC	1
125		6	max	.004	1	.013	2	0	9	2.782e-4	3	NC	3	NC	1
126			min	-.006	3	-.012	3	-.003	3	-6.465e-6	1	2490.149	2	NC	1
127		7	max	.004	1	.012	2	0	9	2.701e-4	3	NC	3	NC	1
128			min	-.006	3	-.011	3	-.003	3	-8.483e-6	1	2740.72	2	NC	1
129		8	max	.004	1	.011	2	0	9	2.621e-4	3	NC	3	NC	1
130			min	-.005	3	-.011	3	-.002	3	-1.05e-5	1	3040.783	2	NC	1
131		9	max	.003	1	.01	2	0	9	2.54e-4	3	NC	3	NC	1
132			min	-.005	3	-.01	3	-.002	3	-1.252e-5	1	3405.319	2	NC	1
133		10	max	.003	1	.009	2	0	9	2.459e-4	3	NC	3	NC	1
134			min	-.004	3	-.009	3	-.002	3	-1.454e-5	1	3855.981	2	NC	1
135		11	max	.003	1	.008	2	0	9	2.378e-4	3	NC	3	NC	1
136			min	-.004	3	-.008	3	-.001	3	-1.655e-5	1	4425.265	2	NC	1
137		12	max	.002	1	.006	2	0	1	2.298e-4	3	NC	3	NC	1
138			min	-.003	3	-.007	3	-.001	3	-1.857e-5	1	5164.254	2	NC	1
139		13	max	.002	1	.005	2	0	1	2.217e-4	3	NC	3	NC	1
140			min	-.003	3	-.006	3	-.001	3	-2.059e-5	1	6158.105	2	NC	1
141		14	max	.002	1	.004	2	0	1	2.136e-4	3	NC	1	NC	1
142			min	-.002	3	-.005	3	0	3	-2.261e-5	1	7560.117	2	NC	1
143		15	max	.001	1	.003	2	0	1	2.056e-4	3	NC	1	NC	1
144			min	-.002	3	-.004	3	0	3	-2.463e-5	1	9676.909	2	NC	1
145		16	max	.001	1	.003	2	0	1	1.975e-4	3	NC	1	NC	1
146			min	-.001	3	-.003	3	0	3	-2.664e-5	1	NC	1	NC	1
147		17	max	0	1	.002	2	0	1	1.894e-4	3	NC	1	NC	1
148			min	0	3	-.002	3	0	3	-2.866e-5	1	NC	1	NC	1
149		18	max	0	1	0	2	0	1	1.813e-4	3	NC	1	NC	1
150			min	0	3	-.001	3	0	3	-3.068e-5	1	NC	1	NC	1
151		19	max	0	1	0	1	0	1	1.733e-4	3	NC	1	NC	1
152			min	0	1	0	1	0	1	-3.27e-5	1	NC	1	NC	1
153	M7	1	max	0	1	0	1	0	1	1.5e-5	1	NC	1	NC	1
154			min	0	1	0	1	0	1	-7.928e-5	3	NC	1	NC	1
155		2	max	0	3	.001	2	0	3	1.392e-5	1	NC	1	NC	1
156			min	0	2	-.001	3	0	1	-6.149e-5	3	NC	1	NC	1
157		3	max	0	3	.002	2	0	3	1.285e-5	1	NC	1	NC	1
158			min	0	2	-.003	3	0	1	-4.37e-5	3	NC	1	NC	1
159		4	max	0	3	.003	2	.001	3	1.178e-5	1	NC	1	NC	1
160			min	0	2	-.004	3	0	1	-2.591e-5	3	NC	1	NC	1
161		5	max	0	3	.004	2	.001	3	1.07e-5	1	NC	1	NC	1
162			min	0	2	-.006	3	0	1	-8.125e-6	3	NC	1	NC	1
163		6	max	0	3	.005	2	.002	3	9.663e-6	3	NC	1	NC	1
164			min	0	2	-.007	3	0	1	0	2	9365.015	2	NC	1
165		7	max	0	3	.006	2	.002	3	2.745e-5	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
166			min	-.001	2	-.009	3	0	1	0	2	7760.414	2	NC	1
167		8	max	.001	3	.007	2	.002	3	4.524e-5	3	NC	3	NC	1
168			min	-.001	2	-.01	3	0	1	0	5	6574.976	2	NC	1
169		9	max	.001	3	.008	2	.002	3	6.303e-5	3	NC	3	NC	1
170			min	-.002	2	-.011	3	0	1	-1.463e-7	13	5658.038	2	NC	1
171		10	max	.001	3	.009	2	.002	3	8.082e-5	3	NC	3	NC	1
172			min	-.002	2	-.012	3	0	1	-1.012e-6	9	4926.134	2	NC	1
173		11	max	.001	3	.011	2	.002	3	9.86e-5	3	NC	3	NC	1
174			min	-.002	2	-.013	3	0	1	-2.197e-6	9	4328.992	2	NC	1
175		12	max	.002	3	.012	2	.002	3	1.164e-4	3	NC	3	NC	1
176			min	-.002	2	-.014	3	0	1	-3.382e-6	9	3834.196	2	NC	1
177		13	max	.002	3	.013	2	.003	3	1.342e-4	3	NC	3	NC	1
178			min	-.002	2	-.015	3	0	1	-4.568e-6	9	3419.616	2	NC	1
179		14	max	.002	3	.015	2	.003	3	1.52e-4	3	NC	3	NC	1
180			min	-.003	2	-.016	3	0	1	-5.753e-6	9	3069.41	2	NC	1
181		15	max	.002	3	.017	2	.002	3	1.698e-4	3	NC	3	NC	1
182			min	-.003	2	-.017	3	0	1	-6.938e-6	9	2771.797	2	NC	1
183		16	max	.002	3	.018	2	.002	3	1.875e-4	3	NC	3	NC	1
184			min	-.003	2	-.017	3	0	1	-8.124e-6	9	2517.75	2	NC	1
185		17	max	.002	3	.02	2	.002	3	2.053e-4	3	NC	3	NC	1
186			min	-.003	2	-.018	3	0	1	-9.309e-6	9	2300.194	2	NC	1
187		18	max	.002	3	.022	2	.002	3	2.231e-4	3	NC	3	NC	1
188			min	-.003	2	-.019	3	0	9	-1.049e-5	9	2113.493	2	NC	1
189		19	max	.003	3	.024	2	.002	3	2.409e-4	3	NC	3	NC	1
190			min	-.004	2	-.019	3	0	9	-1.168e-5	9	1953.11	2	NC	1
191	M8	1	max	.005	1	.022	2	0	9	-8.306e-8	10	NC	1	NC	1
192			min	-.001	3	-.017	3	-.001	3	-1.835e-4	3	NC	1	NC	1
193		2	max	.004	1	.021	2	0	9	-8.306e-8	10	NC	1	NC	1
194			min	-.001	3	-.016	3	-.001	3	-1.835e-4	3	NC	1	NC	1
195		3	max	.004	1	.02	2	0	9	-8.306e-8	10	NC	1	NC	1
196			min	-.001	3	-.015	3	-.001	3	-1.835e-4	3	NC	1	NC	1
197		4	max	.004	1	.019	2	0	9	-8.306e-8	10	NC	1	NC	1
198			min	-.001	3	-.014	3	-.001	3	-1.835e-4	3	NC	1	NC	1
199		5	max	.004	1	.017	2	0	9	-8.306e-8	10	NC	1	NC	1
200			min	0	3	-.013	3	0	3	-1.835e-4	3	NC	1	NC	1
201		6	max	.003	1	.016	2	0	9	-8.306e-8	10	NC	1	NC	1
202			min	0	3	-.012	3	0	3	-1.835e-4	3	NC	1	NC	1
203		7	max	.003	1	.015	2	0	9	-8.306e-8	10	NC	1	NC	1
204			min	0	3	-.011	3	0	3	-1.835e-4	3	NC	1	NC	1
205		8	max	.003	1	.014	2	0	9	-8.306e-8	10	NC	1	NC	1
206			min	0	3	-.01	3	0	3	-1.835e-4	3	NC	1	NC	1
207		9	max	.003	1	.012	2	0	9	-8.306e-8	10	NC	1	NC	1
208			min	0	3	-.01	3	0	3	-1.835e-4	3	NC	1	NC	1
209		10	max	.002	1	.011	2	0	9	-8.306e-8	10	NC	1	NC	1
210			min	0	3	-.009	3	0	3	-1.835e-4	3	NC	1	NC	1
211		11	max	.002	1	.01	2	0	9	-8.306e-8	10	NC	1	NC	1
212			min	0	3	-.008	3	0	3	-1.835e-4	3	NC	1	NC	1
213		12	max	.002	1	.009	2	0	9	-8.306e-8	10	NC	1	NC	1
214			min	0	3	-.007	3	0	3	-1.835e-4	3	NC	1	NC	1
215		13	max	.002	1	.007	2	0	9	-8.306e-8	10	NC	1	NC	1
216			min	0	3	-.006	3	0	3	-1.835e-4	3	NC	1	NC	1
217		14	max	.001	1	.006	2	0	9	-8.306e-8	10	NC	1	NC	1
218			min	0	3	-.005	3	0	3	-1.835e-4	3	NC	1	NC	1
219		15	max	.001	1	.005	2	0	9	-8.306e-8	10	NC	1	NC	1
220			min	0	3	-.004	3	0	3	-1.835e-4	3	NC	1	NC	1
221		16	max	0	1	.004	2	0	9	-8.306e-8	10	NC	1	NC	1
222			min	0	3	-.003	3	0	3	-1.835e-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	.002	2	0	9	-8.306e-8	10	NC	1	NC	1
224			min	0	3	-.002	3	0	3	-1.835e-4	3	NC	1	NC	1
225		18	max	0	1	.001	2	0	9	-8.306e-8	10	NC	1	NC	1
226			min	0	3	0	3	0	3	-1.835e-4	3	NC	1	NC	1
227		19	max	0	1	0	1	0	1	-8.306e-8	10	NC	1	NC	1
228			min	0	1	0	1	0	1	-1.835e-4	3	NC	1	NC	1
229	M10	1	max	.002	1	.007	2	0	3	2.594e-4	1	NC	3	NC	1
230			min	-.003	3	-.007	3	-.001	1	-4.056e-4	3	4462.798	2	NC	1
231		2	max	.002	1	.007	2	0	3	2.468e-4	1	NC	3	NC	1
232			min	-.002	3	-.006	3	-.001	1	-3.931e-4	3	4841.582	2	NC	1
233		3	max	.002	1	.006	2	0	3	2.343e-4	1	NC	3	NC	1
234			min	-.002	3	-.006	3	-.001	1	-3.806e-4	3	5287.121	2	NC	1
235		4	max	.002	1	.006	2	0	3	2.217e-4	1	NC	3	NC	1
236			min	-.002	3	-.006	3	-.001	1	-3.681e-4	3	5814.728	2	NC	1
237		5	max	.002	1	.005	2	0	3	2.091e-4	1	NC	1	NC	1
238			min	-.002	3	-.006	3	0	1	-3.556e-4	3	6444.582	2	NC	1
239		6	max	.001	1	.005	2	0	3	1.965e-4	1	NC	1	NC	1
240			min	-.002	3	-.005	3	0	1	-3.431e-4	3	7203.718	2	NC	1
241		7	max	.001	1	.004	2	0	3	1.84e-4	1	NC	1	NC	1
242			min	-.002	3	-.005	3	0	1	-3.306e-4	3	8129.027	2	NC	1
243		8	max	.001	1	.004	2	0	3	1.714e-4	1	NC	1	NC	1
244			min	-.002	3	-.005	3	0	1	-3.181e-4	3	9271.969	2	NC	1
245		9	max	.001	1	.003	2	0	3	1.588e-4	1	NC	1	NC	1
246			min	-.001	3	-.004	3	0	1	-3.056e-4	3	NC	1	NC	1
247		10	max	.001	1	.003	2	0	3	1.463e-4	1	NC	1	NC	1
248			min	-.001	3	-.004	3	0	1	-2.932e-4	3	NC	1	NC	1
249		11	max	0	1	.002	2	0	3	1.337e-4	1	NC	1	NC	1
250			min	-.001	3	-.004	3	0	1	-2.807e-4	3	NC	1	NC	1
251		12	max	0	1	.002	2	0	3	1.211e-4	1	NC	1	NC	1
252			min	-.001	3	-.003	3	0	1	-2.682e-4	3	NC	1	NC	1
253		13	max	0	1	.001	2	0	3	1.086e-4	1	NC	1	NC	1
254			min	0	3	-.003	3	0	1	-2.557e-4	3	NC	1	NC	1
255		14	max	0	1	.001	2	0	3	9.599e-5	1	NC	1	NC	1
256			min	0	3	-.003	3	0	1	-2.432e-4	3	NC	1	NC	1
257		15	max	0	1	0	2	0	3	8.342e-5	1	NC	1	NC	1
258			min	0	3	-.002	3	0	1	-2.307e-4	3	NC	1	NC	1
259		16	max	0	1	0	2	0	3	7.085e-5	1	NC	1	NC	1
260			min	0	3	-.002	3	0	1	-2.182e-4	3	NC	1	NC	1
261		17	max	0	1	0	2	0	3	5.828e-5	1	NC	1	NC	1
262			min	0	3	-.001	3	0	1	-2.057e-4	3	NC	1	NC	1
263		18	max	0	1	0	2	0	3	4.571e-5	1	NC	1	NC	1
264			min	0	3	0	3	0	1	-1.932e-4	3	NC	1	NC	1
265		19	max	0	1	0	1	0	1	3.314e-5	1	NC	1	NC	1
266			min	0	1	0	1	0	1	-1.808e-4	3	NC	1	NC	1
267	M11	1	max	0	1	0	1	0	1	8.327e-5	3	NC	1	NC	1
268			min	0	1	0	1	0	1	-1.543e-5	1	NC	1	NC	1
269		2	max	0	3	0	2	0	1	6.552e-5	3	NC	1	NC	1
270			min	0	2	0	3	0	3	-2.661e-5	1	NC	1	NC	1
271		3	max	0	3	0	2	0	1	4.777e-5	3	NC	1	NC	1
272			min	0	2	-.002	3	0	3	-3.779e-5	1	NC	1	NC	1
273		4	max	0	3	0	2	0	11	3.002e-5	3	NC	1	NC	1
274			min	0	2	-.002	3	-.001	3	-4.897e-5	1	NC	1	NC	1
275		5	max	0	3	0	2	0	2	1.227e-5	3	NC	1	NC	1
276			min	0	2	-.003	3	-.001	3	-6.015e-5	1	NC	1	NC	1
277		6	max	0	3	0	2	0	2	-3.549e-7	10	NC	1	NC	1
278			min	0	2	-.004	3	-.002	3	-7.133e-5	1	NC	1	NC	1
279		7	max	0	3	0	2	0	10	-3.907e-7	10	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	3	-8.251e-5	1	NC	1	NC	1
281		8	max	0	3	.001	2	0	10	-4.265e-7	10	NC	1	NC	1
282			min	0	2	-.005	3	-.002	3	-9.369e-5	1	NC	1	NC	1
283		9	max	0	3	.001	2	0	10	-4.623e-7	10	NC	1	NC	1
284			min	0	2	-.006	3	-.002	3	-1.049e-4	1	NC	1	NC	1
285		10	max	0	3	.002	2	0	10	-4.981e-7	10	NC	1	NC	1
286			min	0	2	-.006	3	-.002	3	-1.161e-4	1	NC	1	NC	1
287		11	max	0	3	.002	2	0	10	-5.338e-7	10	NC	1	NC	1
288			min	0	2	-.007	3	-.002	3	-1.272e-4	1	NC	1	NC	1
289		12	max	0	3	.003	2	0	10	-5.696e-7	10	NC	1	NC	1
290			min	0	2	-.007	3	-.002	3	-1.384e-4	1	NC	1	NC	1
291		13	max	0	3	.004	2	0	10	-6.054e-7	10	NC	1	NC	1
292			min	0	2	-.007	3	-.002	3	-1.496e-4	1	NC	1	NC	1
293		14	max	0	3	.004	2	0	10	-6.412e-7	10	NC	1	NC	1
294			min	0	2	-.008	3	-.002	3	-1.608e-4	1	NC	1	NC	1
295		15	max	0	3	.005	2	0	10	-6.77e-7	10	NC	1	NC	1
296			min	0	2	-.008	3	-.002	3	-1.72e-4	1	8713.368	2	NC	1
297		16	max	0	3	.006	2	0	10	-7.128e-7	10	NC	1	NC	1
298			min	0	2	-.008	3	-.002	1	-1.831e-4	1	7427.027	2	NC	1
299		17	max	0	3	.007	2	0	10	-7.486e-7	10	NC	3	NC	1
300			min	0	2	-.008	3	-.002	1	-2.008e-4	3	6421.225	2	NC	1
301		18	max	0	3	.008	2	0	10	-7.843e-7	10	NC	3	NC	1
302			min	-.001	2	-.008	3	-.003	1	-2.185e-4	3	5627.602	2	NC	1
303		19	max	0	3	.009	2	0	10	-8.201e-7	10	NC	3	NC	1
304			min	-.001	2	-.008	3	-.003	1	-2.363e-4	3	4996.917	2	NC	1
305	M12	1	max	.002	1	.008	2	.002	1	2.453e-4	3	NC	1	NC	2
306			min	0	3	-.007	3	0	10	7.046e-7	10	NC	1	7903.887	1
307		2	max	.002	1	.008	2	.002	1	2.453e-4	3	NC	1	NC	2
308			min	0	3	-.007	3	0	10	7.046e-7	10	NC	1	8619.645	1
309		3	max	.001	1	.007	2	.002	1	2.453e-4	3	NC	1	NC	2
310			min	0	3	-.006	3	0	10	7.046e-7	10	NC	1	9471.646	1
311		4	max	.001	1	.007	2	.002	1	2.453e-4	3	NC	1	NC	1
312			min	0	3	-.006	3	0	10	7.046e-7	10	NC	1	NC	1
313		5	max	.001	1	.007	2	.002	1	2.453e-4	3	NC	1	NC	1
314			min	0	3	-.005	3	0	10	7.046e-7	10	NC	1	NC	1
315		6	max	.001	1	.006	2	.001	1	2.453e-4	3	NC	1	NC	1
316			min	0	3	-.005	3	0	10	7.046e-7	10	NC	1	NC	1
317		7	max	.001	1	.006	2	.001	1	2.453e-4	3	NC	1	NC	1
318			min	0	3	-.005	3	0	10	7.046e-7	10	NC	1	NC	1
319		8	max	0	1	.005	2	.001	1	2.453e-4	3	NC	1	NC	1
320			min	0	3	-.004	3	0	10	7.046e-7	10	NC	1	NC	1
321		9	max	0	1	.005	2	0	1	2.453e-4	3	NC	1	NC	1
322			min	0	3	-.004	3	0	10	7.046e-7	10	NC	1	NC	1
323		10	max	0	1	.004	2	0	1	2.453e-4	3	NC	1	NC	1
324			min	0	3	-.003	3	0	10	7.046e-7	10	NC	1	NC	1
325		11	max	0	1	.004	2	0	1	2.453e-4	3	NC	1	NC	1
326			min	0	3	-.003	3	0	10	7.046e-7	10	NC	1	NC	1
327		12	max	0	1	.003	2	0	1	2.453e-4	3	NC	1	NC	1
328			min	0	3	-.003	3	0	10	7.046e-7	10	NC	1	NC	1
329		13	max	0	1	.003	2	0	1	2.453e-4	3	NC	1	NC	1
330			min	0	3	-.002	3	0	10	7.046e-7	10	NC	1	NC	1
331		14	max	0	1	.002	2	0	1	2.453e-4	3	NC	1	NC	1
332			min	0	3	-.002	3	0	10	7.046e-7	10	NC	1	NC	1
333		15	max	0	1	.002	2	0	1	2.453e-4	3	NC	1	NC	1
334			min	0	3	-.002	3	0	10	7.046e-7	10	NC	1	NC	1
335		16	max	0	1	.001	2	0	1	2.453e-4	3	NC	1	NC	1
336			min	0	3	-.001	3	0	10	7.046e-7	10	NC	1	NC	1

Envelope Member Section Deflections (Continued)

	Member	Sec		x [in]	LC	y [in]	LC	z [in]	LC	x Rotate [r...	LC	(n) L/y Ratio	LC	(n) L/z Ratio	LC
337		17	max	0	1	0	2	0	1	2.453e-4	3	NC	1	NC	1
338			min	0	3	0	3	0	10	7.046e-7	10	NC	1	NC	1
339		18	max	0	1	0	2	0	1	2.453e-4	3	NC	1	NC	1
340			min	0	3	0	3	0	10	7.046e-7	10	NC	1	NC	1
341		19	max	0	1	0	1	0	1	2.453e-4	3	NC	1	NC	1
342			min	0	1	0	1	0	1	7.046e-7	10	NC	1	NC	1
343	M1	1	max	.006	3	.024	3	.002	3	3.823e-3	1	NC	1	NC	1
344			min	-.007	2	-.021	2	0	9	-5.058e-3	3	NC	1	NC	1
345		2	max	.006	3	.013	3	.002	3	1.83e-3	1	NC	4	NC	1
346			min	-.007	2	-.011	2	-.002	1	-2.476e-3	3	4489.046	3	NC	1
347		3	max	.006	3	.003	3	.001	3	5.893e-5	3	NC	4	NC	1
348			min	-.007	2	-.002	1	-.003	1	-1.269e-4	1	2337.209	3	NC	1
349		4	max	.006	3	.006	2	.001	3	5.783e-5	3	NC	4	NC	1
350			min	-.007	2	-.005	3	-.003	1	-1.034e-4	1	1671.998	3	NC	1
351		5	max	.006	3	.013	2	0	3	5.673e-5	3	NC	4	NC	1
352			min	-.007	2	-.012	3	-.003	1	-8.004e-5	1	1335.744	2	NC	1
353		6	max	.006	3	.019	2	0	3	5.563e-5	3	NC	5	NC	1
354			min	-.007	2	-.017	3	-.003	1	-5.664e-5	1	1138.398	2	NC	1
355		7	max	.006	3	.023	2	0	3	5.453e-5	3	NC	5	NC	1
356			min	-.007	2	-.021	3	-.003	1	-3.406e-5	9	1017.099	2	NC	1
357		8	max	.006	3	.027	2	0	3	5.343e-5	3	NC	5	NC	1
358			min	-.007	2	-.024	3	-.002	1	-1.712e-5	9	941.512	2	NC	1
359		9	max	.006	3	.029	2	0	3	5.233e-5	3	NC	5	NC	1
360			min	-.007	2	-.026	3	-.001	1	-1.801e-7	9	897.339	2	NC	1
361		10	max	.006	3	.03	2	0	3	5.123e-5	3	NC	5	NC	1
362			min	-.007	2	-.026	3	0	9	4.712e-7	10	877.8	2	NC	1
363		11	max	.006	3	.029	2	0	3	6.039e-5	1	NC	5	NC	1
364			min	-.007	2	-.025	3	0	9	5.538e-7	10	880.517	2	NC	1
365		12	max	.006	3	.027	2	0	1	8.38e-5	1	NC	5	NC	1
366			min	-.007	2	-.023	3	0	10	6.365e-7	10	906.613	2	NC	1
367		13	max	.006	3	.024	2	.001	1	1.072e-4	1	NC	5	NC	1
368			min	-.007	2	-.02	3	0	10	7.191e-7	10	961.281	2	NC	1
369		14	max	.006	3	.019	2	.002	1	1.306e-4	1	NC	5	NC	1
370			min	-.007	2	-.016	3	0	10	8.018e-7	10	1056.372	2	NC	1
371		15	max	.006	3	.013	2	.002	1	1.54e-4	1	NC	4	NC	1
372			min	-.007	2	-.011	3	0	10	8.844e-7	10	1217.739	2	NC	1
373		16	max	.006	3	.005	2	.002	1	1.713e-4	1	NC	4	NC	1
374			min	-.007	2	-.004	3	0	10	9.521e-7	10	1508.116	2	NC	1
375		17	max	.006	3	.003	3	.002	1	4.468e-5	3	NC	4	NC	1
376			min	-.007	2	-.004	2	0	10	6.649e-7	10	2124.139	2	NC	1
377		18	max	.006	3	.01	3	0	1	2.543e-3	2	NC	4	NC	1
378			min	-.007	2	-.015	2	0	10	-1.268e-3	3	4094.051	2	NC	1
379		19	max	.006	3	.019	3	0	3	5.114e-3	2	NC	1	NC	1
380			min	-.007	2	-.027	2	0	1	-2.606e-3	3	NC	1	NC	1
381	M5	1	max	.016	3	.062	3	.002	3	3.989e-6	3	NC	1	NC	1
382			min	-.019	2	-.054	2	0	9	0	1	NC	1	NC	1
383		2	max	.016	3	.035	3	.003	3	8.571e-5	3	NC	4	NC	1
384			min	-.019	2	-.03	2	0	9	-1.678e-5	9	1765.851	3	NC	1
385		3	max	.016	3	.009	3	.004	3	1.659e-4	3	NC	5	NC	1
386			min	-.019	2	-.007	1	0	9	-3.33e-5	9	914.557	3	NC	1
387		4	max	.016	3	.014	2	.005	3	1.621e-4	3	NC	5	NC	1
388			min	-.019	2	-.012	3	0	9	-3.147e-5	9	654.849	3	NC	1
389		5	max	.016	3	.032	2	.005	3	1.583e-4	3	NC	5	NC	1
390			min	-.019	2	-.029	3	0	9	-2.964e-5	9	523.548	2	NC	1
391		6	max	.016	3	.047	2	.006	3	1.545e-4	3	NC	5	NC	1
392			min	-.019	2	-.043	3	0	9	-2.782e-5	9	445.391	2	NC	1
393		7	max	.016	3	.059	2	.006	3	1.508e-4	3	NC	5	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	-.019	2	-.054	3	0	9	-2.599e-5	9	397.281	2	NC	1
395		8	max	.016	3	.067	2	.006	3	1.47e-4	3	NC	5	NC	1
396			min	-.019	2	-.06	3	0	9	-2.416e-5	9	367.204	2	NC	1
397		9	max	.016	3	.073	2	.006	3	1.432e-4	3	NC	5	NC	1
398			min	-.019	2	-.064	3	0	9	-2.233e-5	9	349.493	2	NC	1
399		10	max	.016	3	.075	2	.005	3	1.394e-4	3	NC	5	NC	1
400			min	-.019	2	-.065	3	0	9	-2.05e-5	9	341.452	2	NC	1
401		11	max	.016	3	.074	2	.005	3	1.357e-4	3	NC	5	NC	1
402			min	-.019	2	-.062	3	0	9	-1.868e-5	9	342.119	2	NC	1
403		12	max	.016	3	.069	2	.004	3	1.319e-4	3	NC	5	NC	1
404			min	-.019	2	-.057	3	0	9	-1.685e-5	9	351.904	2	NC	1
405		13	max	.016	3	.061	2	.004	3	1.281e-4	3	NC	5	NC	1
406			min	-.019	2	-.049	3	0	9	-1.502e-5	9	372.808	2	NC	1
407		14	max	.016	3	.049	2	.003	3	1.244e-4	3	NC	5	NC	1
408			min	-.019	2	-.039	3	0	9	-1.319e-5	9	409.425	2	NC	1
409		15	max	.016	3	.033	2	.003	3	1.206e-4	3	NC	5	NC	1
410			min	-.019	2	-.026	3	0	9	-1.136e-5	9	471.816	2	NC	1
411		16	max	.016	3	.013	2	.002	3	1.14e-4	3	NC	5	NC	1
412			min	-.019	2	-.011	3	0	9	-1.061e-5	9	584.478	2	NC	1
413		17	max	.016	3	.007	3	.001	3	4.048e-5	3	NC	5	NC	1
414			min	-.02	2	-.011	2	0	9	-3.527e-5	9	824.879	2	NC	1
415		18	max	.016	3	.026	3	0	3	1.946e-5	3	NC	4	NC	1
416			min	-.02	2	-.04	2	0	9	-1.805e-5	9	1600.43	2	NC	1
417		19	max	.016	3	.046	3	0	3	0	15	NC	1	NC	1
418			min	-.019	2	-.07	2	0	9	-5.731e-7	3	NC	1	NC	1
419	M9	1	max	.007	3	.023	3	.002	3	5.066e-3	3	NC	1	NC	1
420			min	-.007	2	-.021	2	0	9	-3.823e-3	1	NC	1	NC	1
421		2	max	.007	3	.013	3	0	3	2.512e-3	3	NC	4	NC	1
422			min	-.007	2	-.011	2	0	15	-1.864e-3	1	4490.67	3	NC	1
423		3	max	.006	3	.003	3	.001	1	5.855e-5	1	NC	4	NC	1
424			min	-.007	2	-.002	1	0	3	2.818e-7	10	2338.109	3	NC	1
425		4	max	.006	3	.006	2	.002	1	3.819e-5	1	NC	4	NC	1
426			min	-.007	2	-.005	3	-.001	3	-2.812e-6	3	1672.654	3	NC	1
427		5	max	.006	3	.013	2	.002	1	1.783e-5	1	NC	4	NC	1
428			min	-.007	2	-.012	3	-.002	3	-1.133e-5	3	1335.974	2	NC	1
429		6	max	.006	3	.019	2	.002	1	7.727e-6	2	NC	5	NC	1
430			min	-.007	2	-.018	3	-.003	3	-1.984e-5	3	1138.603	2	NC	1
431		7	max	.006	3	.023	2	.001	1	1.968e-6	2	NC	5	NC	1
432			min	-.007	2	-.022	3	-.003	3	-2.836e-5	3	1017.291	2	NC	1
433		8	max	.006	3	.027	2	0	1	-1.713e-7	10	NC	5	NC	1
434			min	-.007	2	-.024	3	-.003	3	-4.325e-5	1	941.698	2	9668.047	3
435		9	max	.006	3	.029	2	0	11	-2.619e-7	10	NC	5	NC	1
436			min	-.007	2	-.026	3	-.004	3	-6.36e-5	1	897.523	2	9485.12	3
437		10	max	.006	3	.03	2	0	2	-3.525e-7	10	NC	5	NC	1
438			min	-.007	2	-.026	3	-.004	3	-8.396e-5	1	877.986	2	9557.653	3
439		11	max	.006	3	.029	2	0	10	-4.431e-7	10	NC	5	NC	1
440			min	-.007	2	-.025	3	-.004	3	-1.043e-4	1	880.71	2	9880.539	3
441		12	max	.006	3	.027	2	0	10	-5.337e-7	10	NC	5	NC	1
442			min	-.007	2	-.023	3	-.003	3	-1.247e-4	1	906.817	2	NC	1
443		13	max	.006	3	.024	2	0	10	-6.243e-7	10	NC	5	NC	1
444			min	-.007	2	-.02	3	-.003	3	-1.45e-4	1	961.503	2	NC	1
445		14	max	.006	3	.019	2	0	10	-7.149e-7	10	NC	5	NC	1
446			min	-.007	2	-.016	3	-.003	1	-1.654e-4	1	1056.62	2	NC	1
447		15	max	.006	3	.013	2	0	10	-8.055e-7	10	NC	4	NC	1
448			min	-.007	2	-.011	3	-.003	1	-1.858e-4	1	1218.027	2	NC	1
449		16	max	.006	3	.005	2	0	10	-8.882e-7	10	NC	4	NC	1
450			min	-.007	2	-.005	3	-.003	1	-2.016e-4	1	1508.468	2	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
451		17	max	.006	3	.003	3	0	10	6.296e-6	3	NC	4	NC	1
452			min	-.007	2	-.004	2	-.002	1	-1.108e-4	1	2124.593	2	NC	1
453		18	max	.006	3	.01	3	0	10	1.294e-3	3	NC	4	NC	1
454			min	-.007	2	-.015	2	-.002	1	-2.543e-3	2	4094.89	2	NC	1
455		19	max	.006	3	.019	3	0	3	2.604e-3	3	NC	1	NC	1
456			min	-.007	2	-.027	2	0	9	-5.114e-3	2	NC	1	NC	1
457	M13	1	max	0	9	.023	3	.007	3	4.08e-3	3	NC	1	NC	1
458			min	-.002	3	-.021	2	-.007	2	-3.732e-3	2	NC	1	NC	1
459		2	max	0	9	.051	3	.005	3	4.772e-3	3	NC	4	NC	1
460			min	-.002	3	-.041	2	-.006	2	-4.346e-3	2	3675.444	3	NC	1
461		3	max	0	9	.075	3	.006	9	5.464e-3	3	NC	4	NC	1
462			min	-.002	3	-.059	1	-.005	2	-4.96e-3	2	1988.374	3	NC	1
463		4	max	0	9	.091	3	.009	9	6.156e-3	3	NC	4	NC	2
464			min	-.002	3	-.072	1	-.005	10	-5.573e-3	2	1505.305	3	7443.931	1
465		5	max	0	9	.099	3	.01	9	6.848e-3	3	NC	4	NC	2
466			min	-.002	3	-.078	1	-.006	2	-6.187e-3	2	1347.311	3	6944.26	1
467		6	max	0	9	.099	3	.009	9	7.539e-3	3	NC	4	NC	2
468			min	-.002	3	-.078	1	-.008	2	-6.8e-3	2	1357.26	3	8205.287	1
469		7	max	0	9	.091	3	.01	3	8.231e-3	3	NC	4	NC	1
470			min	-.002	3	-.073	1	-.011	2	-7.414e-3	2	1509.816	3	NC	1
471		8	max	0	9	.079	3	.012	3	8.923e-3	3	NC	4	NC	1
472			min	-.002	3	-.065	2	-.015	2	-8.027e-3	2	1826.8	3	NC	1
473		9	max	0	9	.068	3	.014	3	9.615e-3	3	NC	4	NC	1
474			min	-.002	3	-.058	2	-.018	2	-8.641e-3	2	2300.388	3	9627.704	2
475		10	max	0	9	.062	3	.016	3	1.031e-2	3	NC	4	NC	1
476			min	-.002	3	-.054	2	-.019	2	-9.255e-3	2	2623.681	3	8519.828	2
477		11	max	0	9	.068	3	.017	3	9.616e-3	3	NC	4	NC	1
478			min	-.002	3	-.058	2	-.018	2	-8.641e-3	2	2300.387	3	9373.257	3
479		12	max	0	9	.079	3	.018	3	8.925e-3	3	NC	4	NC	1
480			min	-.002	3	-.065	2	-.015	2	-8.027e-3	2	1826.799	3	8951.019	3
481		13	max	0	9	.091	3	.018	3	8.235e-3	3	NC	4	NC	1
482			min	-.002	3	-.073	1	-.011	2	-7.414e-3	2	1509.816	3	9250.54	3
483		14	max	0	9	.099	3	.016	3	7.544e-3	3	NC	4	NC	2
484			min	-.002	3	-.078	1	-.008	2	-6.8e-3	2	1357.26	3	8199.956	1
485		15	max	0	9	.099	3	.015	3	6.854e-3	3	NC	4	NC	2
486			min	-.002	3	-.078	1	-.006	2	-6.187e-3	2	1347.311	3	6948.573	1
487		16	max	0	9	.091	3	.013	3	6.163e-3	3	NC	4	NC	2
488			min	-.002	3	-.072	1	-.005	10	-5.573e-3	2	1505.304	3	7456.819	1
489		17	max	0	9	.075	3	.01	3	5.473e-3	3	NC	4	NC	1
490			min	-.002	3	-.059	1	-.005	2	-4.96e-3	2	1988.373	3	NC	1
491		18	max	0	9	.051	3	.008	3	4.782e-3	3	NC	4	NC	1
492			min	-.002	3	-.041	2	-.006	2	-4.346e-3	2	3675.443	3	NC	1
493		19	max	0	9	.024	3	.006	3	4.092e-3	3	NC	1	NC	1
494			min	-.002	3	-.021	2	-.007	2	-3.733e-3	2	NC	1	NC	1
495	M16	1	max	0	9	.019	3	.006	3	4.496e-3	2	NC	1	NC	1
496			min	0	3	-.027	2	-.007	2	-3.169e-3	3	NC	1	NC	1
497		2	max	0	9	.033	3	.008	3	5.257e-3	2	NC	4	NC	1
498			min	0	3	-.055	2	-.006	2	-3.658e-3	3	3635.007	2	NC	1
499		3	max	0	9	.045	3	.01	3	6.018e-3	2	NC	4	NC	1
500			min	0	3	-.079	2	-.005	2	-4.148e-3	3	1962.53	2	NC	1
501		4	max	0	9	.054	3	.012	3	6.779e-3	2	NC	4	NC	2
502			min	0	3	-.096	2	-.005	2	-4.638e-3	3	1480.533	2	7512.302	1
503		5	max	0	9	.059	3	.014	3	7.54e-3	2	NC	4	NC	2
504			min	0	3	-.104	2	-.006	2	-5.128e-3	3	1317.897	2	7023.947	1
505		6	max	0	9	.06	3	.015	3	8.301e-3	2	NC	4	NC	2
506			min	0	3	-.104	2	-.008	2	-5.618e-3	3	1316.572	2	8343.378	1
507		7	max	0	9	.058	3	.016	3	9.062e-3	2	NC	4	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
508			min	0	3	-.097	2	-.011	2	-6.108e-3	3	1445.937	2	NC	1
509		8	max	0	9	.053	3	.017	3	9.823e-3	2	NC	4	NC	1
510			min	0	3	-.086	2	-.015	2	-6.598e-3	3	1716.119	2	NC	1
511		9	max	0	9	.048	3	.016	3	1.058e-2	2	NC	4	NC	1
512			min	0	3	-.075	2	-.018	2	-7.088e-3	3	2106.981	2	9519.176	2
513		10	max	0	9	.046	3	.016	3	1.134e-2	2	NC	4	NC	1
514			min	0	3	-.07	2	-.019	2	-7.578e-3	3	2364.416	2	8433.077	2
515		11	max	0	9	.048	3	.015	3	1.058e-2	2	NC	4	NC	1
516			min	0	3	-.075	2	-.018	2	-7.087e-3	3	2106.981	2	9519.2	2
517		12	max	0	9	.053	3	.014	3	9.823e-3	2	NC	4	NC	1
518			min	0	3	-.086	2	-.015	2	-6.596e-3	3	1716.119	2	NC	1
519		13	max	0	9	.058	3	.013	3	9.062e-3	2	NC	4	NC	1
520			min	0	3	-.097	2	-.011	2	-6.105e-3	3	1445.937	2	NC	1
521		14	max	0	9	.06	3	.012	3	8.302e-3	2	NC	4	NC	2
522			min	0	3	-.104	2	-.008	2	-5.614e-3	3	1316.572	2	8354.554	1
523		15	max	0	9	.059	3	.011	3	7.541e-3	2	NC	4	NC	2
524			min	0	3	-.104	2	-.006	2	-5.123e-3	3	1317.897	2	7040.964	1
525		16	max	0	9	.054	3	.009	3	6.78e-3	2	NC	4	NC	2
526			min	0	3	-.096	2	-.005	2	-4.632e-3	3	1480.533	2	7539.208	1
527		17	max	0	9	.045	3	.008	3	6.019e-3	2	NC	4	NC	1
528			min	0	3	-.079	2	-.005	2	-4.141e-3	3	1962.53	2	NC	1
529		18	max	0	1	.033	3	.007	3	5.258e-3	2	NC	4	NC	1
530			min	0	3	-.055	2	-.006	2	-3.65e-3	3	3635.007	2	NC	1
531		19	max	0	1	.019	3	.006	3	4.497e-3	2	NC	1	NC	1
532			min	0	3	-.027	2	-.007	2	-3.159e-3	3	NC	1	NC	1
533	M15	1	max	0	1	0	1	0	1	3.545e-4	3	NC	1	NC	1
534			min	0	1	0	1	0	1	-6.901e-5	2	NC	1	NC	1
535		2	max	0	3	0	15	0	1	7.412e-4	3	NC	1	NC	1
536			min	0	2	-.003	4	0	3	-4.542e-4	2	NC	1	NC	1
537		3	max	0	3	-.001	15	.002	1	1.128e-3	3	NC	1	NC	1
538			min	0	2	-.005	4	-.003	3	-8.393e-4	2	NC	1	NC	1
539		4	max	0	3	-.002	15	.005	1	1.515e-3	3	NC	3	NC	4
540			min	0	2	-.008	4	-.006	3	-1.225e-3	2	7761.044	4	7027.583	3
541		5	max	0	3	-.002	15	.008	1	1.901e-3	3	NC	3	NC	4
542			min	0	2	-.01	4	-.009	3	-1.61e-3	2	6056.021	4	4584.823	3
543		6	max	0	3	-.003	15	.011	1	2.288e-3	3	NC	5	NC	4
544			min	0	2	-.012	4	-.013	3	-1.995e-3	2	5096.782	4	3324.583	3
545		7	max	0	3	-.003	15	.015	1	2.675e-3	3	NC	5	NC	4
546			min	-.001	2	-.014	4	-.017	3	-2.38e-3	2	4519.926	4	2591.101	3
547		8	max	0	3	-.003	15	.018	1	3.062e-3	3	NC	5	NC	4
548			min	-.001	2	-.015	4	-.021	3	-2.765e-3	2	4173.726	4	2131.492	3
549		9	max	0	3	-.004	15	.022	1	3.448e-3	3	NC	5	NC	4
550			min	-.001	2	-.016	4	-.025	3	-3.15e-3	2	3987.38	4	1831.336	3
551		10	max	0	3	-.004	15	.024	1	3.835e-3	3	NC	5	NC	4
552			min	-.002	2	-.016	4	-.028	3	-3.535e-3	2	3928.43	4	1633.391	3
553		11	max	0	3	-.004	15	.026	1	4.222e-3	3	NC	5	NC	4
554			min	-.002	2	-.016	4	-.03	3	-3.921e-3	2	3987.38	4	1507.658	3
555		12	max	0	3	-.003	15	.027	1	4.608e-3	3	NC	5	NC	4
556			min	-.002	2	-.015	4	-.031	3	-4.306e-3	2	4173.726	4	1439.211	3
557		13	max	0	3	-.003	15	.026	1	4.995e-3	3	NC	5	NC	4
558			min	-.002	2	-.014	4	-.03	3	-4.691e-3	2	4519.926	4	1423.567	3
559		14	max	0	3	-.003	15	.024	1	5.382e-3	3	NC	5	NC	4
560			min	-.002	2	-.012	4	-.028	3	-5.076e-3	2	5096.782	4	1466.725	3
561		15	max	0	3	-.002	12	.021	1	5.769e-3	3	NC	3	NC	4
562			min	-.002	2	-.011	4	-.024	3	-5.461e-3	2	6056.021	4	1591.292	3
563		16	max	.001	3	-.001	12	.015	1	6.155e-3	3	NC	3	NC	4
564			min	-.003	2	-.008	4	-.017	3	-5.846e-3	2	7761.044	4	1858.903	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	0	3	.008	1	6.542e-3	3	NC	1	NC	4
566			min	-.003	2	-.006	4	-.008	3	-6.232e-3	2	NC	1	2463.117	3
567		18	max	.001	3	.002	3	.004	3	6.929e-3	3	NC	1	NC	4
568			min	-.003	2	-.003	4	-.007	2	-6.617e-3	2	NC	1	4383.316	3
569		19	max	.001	3	.004	3	.019	3	7.315e-3	3	NC	1	NC	1
570			min	-.003	2	-.002	9	-.02	2	-7.002e-3	2	NC	1	NC	1
571	M16A	1	max	0	2	0	2	.007	3	2.677e-3	3	NC	1	NC	1
572			min	-.001	3	0	9	-.008	2	-2.709e-3	2	NC	1	NC	1
573		2	max	0	2	0	15	.001	9	2.56e-3	3	NC	1	NC	1
574			min	-.001	3	-.003	4	-.002	2	-2.578e-3	2	NC	1	NC	1
575		3	max	0	2	-.001	15	.004	1	2.443e-3	3	NC	1	NC	4
576			min	-.001	3	-.006	4	-.004	3	-2.447e-3	2	NC	1	5784.606	3
577		4	max	0	2	-.002	15	.008	1	2.326e-3	3	NC	3	NC	4
578			min	-.001	3	-.008	4	-.008	3	-2.316e-3	2	7761.044	4	4391.404	3
579		5	max	0	2	-.002	15	.01	1	2.209e-3	3	NC	3	NC	4
580			min	0	3	-.01	4	-.011	3	-2.185e-3	2	6056.021	4	3784.484	3
581		6	max	0	2	-.003	15	.011	1	2.092e-3	3	NC	5	NC	4
582			min	0	3	-.012	4	-.012	3	-2.054e-3	2	5096.782	4	3515.169	3
583		7	max	0	2	-.003	15	.012	1	1.975e-3	3	NC	5	NC	4
584			min	0	3	-.014	4	-.013	3	-1.923e-3	2	4519.926	4	3442.309	3
585		8	max	0	2	-.003	15	.012	1	1.858e-3	3	NC	5	NC	4
586			min	0	3	-.015	4	-.013	3	-1.792e-3	2	4173.726	4	3516.77	3
587		9	max	0	2	-.004	15	.011	1	1.741e-3	3	NC	5	NC	4
588			min	0	3	-.015	4	-.012	3	-1.661e-3	2	3987.38	4	3730.225	3
589		10	max	0	2	-.004	15	.01	1	1.624e-3	3	NC	5	NC	4
590			min	0	3	-.016	4	-.011	3	-1.53e-3	2	3928.43	4	4102.745	3
591		11	max	0	2	-.004	15	.009	1	1.507e-3	3	NC	5	NC	4
592			min	0	3	-.015	4	-.01	3	-1.399e-3	2	3987.38	4	4686.477	3
593		12	max	0	2	-.003	15	.007	1	1.39e-3	3	NC	5	NC	4
594			min	0	3	-.015	4	-.008	3	-1.268e-3	2	4173.726	4	5584.92	3
595		13	max	0	2	-.003	15	.006	1	1.273e-3	3	NC	5	NC	4
596			min	0	3	-.014	4	-.006	3	-1.137e-3	2	4519.926	4	7002.235	3
597		14	max	0	2	-.003	15	.004	1	1.156e-3	3	NC	5	NC	1
598			min	0	3	-.012	4	-.005	3	-1.006e-3	2	5096.782	4	9371.627	3
599		15	max	0	2	-.002	15	.003	1	1.039e-3	3	NC	3	NC	1
600			min	0	3	-.01	4	-.003	3	-8.749e-4	2	6056.021	4	NC	1
601		16	max	0	2	-.002	15	.001	1	9.218e-4	3	NC	3	NC	1
602			min	0	3	-.008	4	-.001	3	-7.439e-4	2	7761.044	4	NC	1
603		17	max	0	2	-.001	15	0	14	8.048e-4	3	NC	1	NC	1
604			min	0	3	-.005	4	0	3	-6.129e-4	2	NC	1	NC	1
605		18	max	0	2	0	15	0	4	6.877e-4	3	NC	1	NC	1
606			min	0	3	-.003	4	0	2	-4.82e-4	2	NC	1	NC	1
607		19	max	0	1	0	1	0	1	5.707e-4	3	NC	1	NC	1
608			min	0	1	0	1	0	1	-3.51e-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

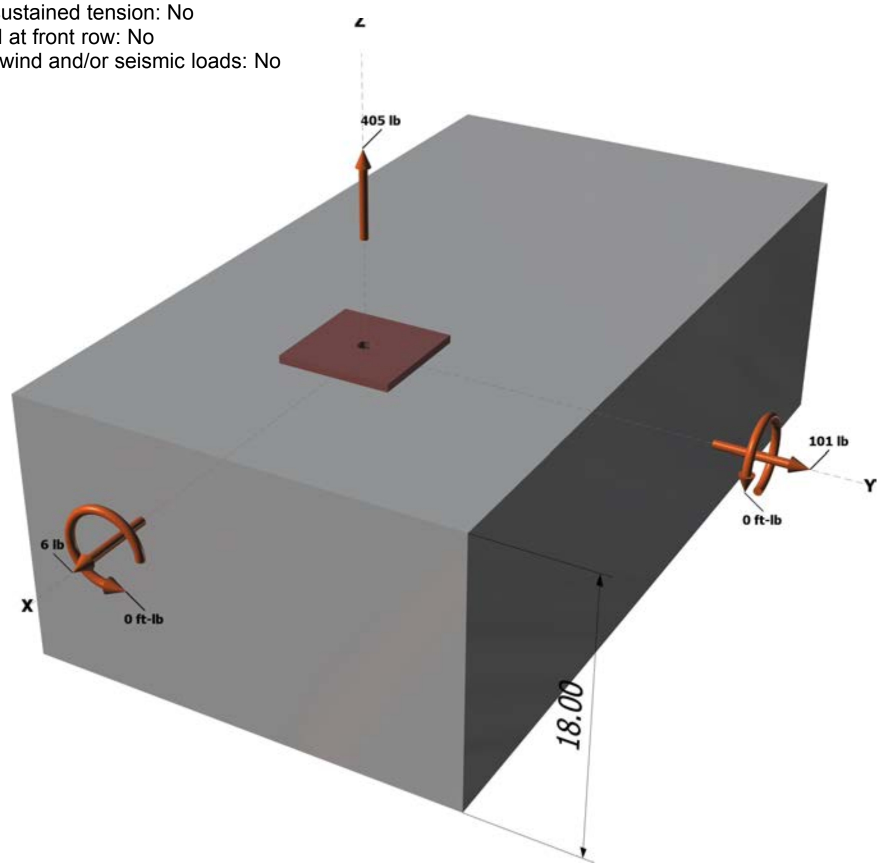
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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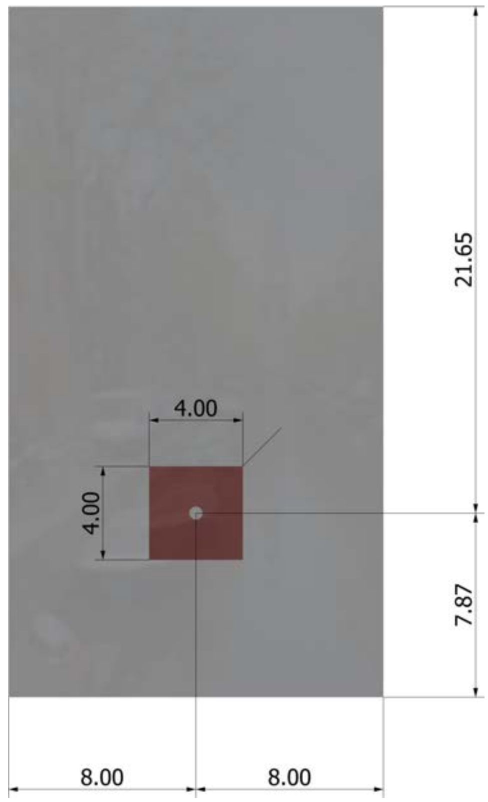


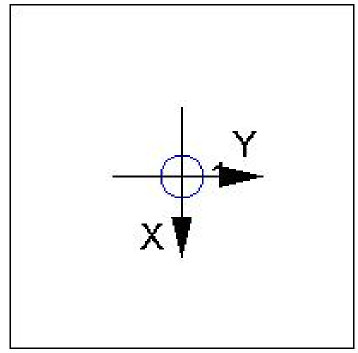
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

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.

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

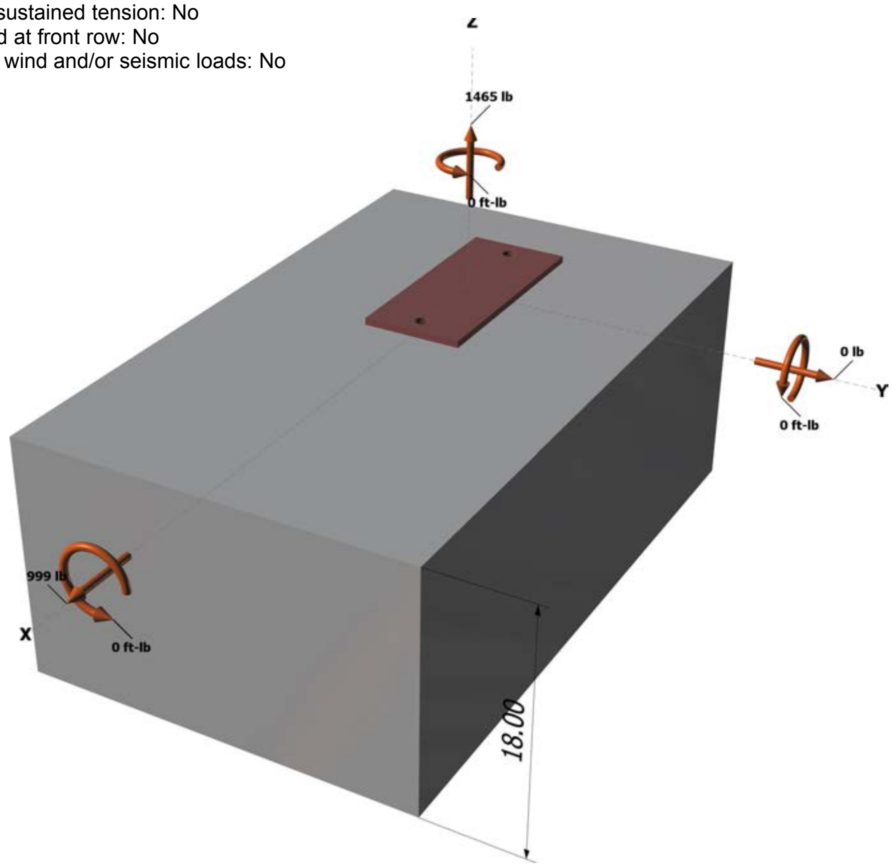
Anchor Information:
Anchor type: Bonded anchor
Material: A193 Grade B8/B8M (304/316SS)
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 6.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 8.50
c_{ac} (inch): 9.67
C_{min} (inch): 1.75
S_{min} (inch):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

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

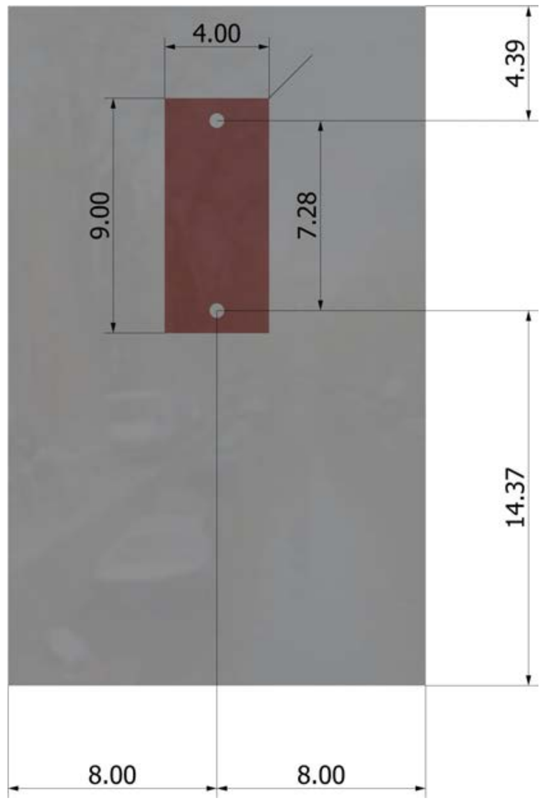
Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 18.00
State: Cracked
Compressive strength, f'c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Do not evaluate concrete breakout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

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

<Figure 1>



<Figure 2>



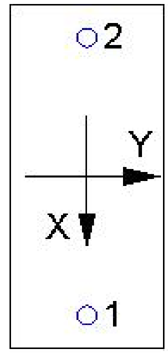
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø A193 Gr. B8/B8M (304/316SS)
Code Report: IAPMO UES ER-263

3. Resulting Anchor Forces

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

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

<Figure 3>



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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Shear perpendicular to edge in x-direction:

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

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

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

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

Shear parallel to edge in x-direction:

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

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

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

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

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

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

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

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

ϕV_{cpg} (lb)
15580

11. Results

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

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

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

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

Sec. D.7.3	0.20	0.25	45.0 %	1.2	Pass

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

12. Warnings

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

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

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